CENTERING WOMEN AND NEWBORNS IN HEALTH HUMAN RESOURCES
PLANNING: A NEEDS-BASED APPROACH TO PRIMARY MATERNITY HEALTH
CARE IN NOVA SCOTIA

by

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This work is dedicated to the generations of women who have and continue to influence my life. To Nanny, for encouraging my childhood curiosity; to my mother, one of the most resilient and resourceful women I know; to Catherine, who nurtures my spirit and most importantly, to Georgia...my greatest joy is being your mother.

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ABSTRACT

With a global health human resources (HHR) crisis and increasing health needs, new ways of designing health care in all clinical settings, including primary maternity health care is required. The purpose of this sequential quantitative-qualitative mixed methods study was to identify the primary maternity care needs of women and newborns in Nova Scotia (NS). Informed by established HHR frameworks, data from the NS Atlee Perinatal Database (NSAPD) (n=17,856) were analyzed using univariate and multiple regression analyses to determine the health needs of women and newborns based on various health needs indicators. Using purposeful sampling and poster and email recruitment, focus groups and interview data from women (n=22), health care providers (n=16) and health leaders (n=18) were analyzed using a thematic analysis approach. From the quantitative analysis, rurality, lower maternal education and income and identifying as not Caucasian were significant predictors for various maternal-newborn primary health care needs indicators. In the qualitative analysis, women, health leaders and providers identified the social determinants of health as a prevalent health care need for women and newborns. From a systems perspective, there was a general call for a change in the current paradigm of health care to move from illness and acute care to one that includes a broader definition of health. Study participants also identified a lack of patient-centredness complicated by provider-focused care in our current system. Strategies identified to improve primary maternity health care included care providers practicing to full scope and a need for increased interprofessional/intersectoral collaboration. A number of providers and leaders expressed concern about the various funding models and how these impact the timing and type of care that was provided. From an individual care encounter perspective, the need for respectful, culturally competent and safe care rooted in relationships was identified. Methodologically, the need for improvements to how we understand and measure health and health needs to inform how we design and deliver health care was identified. The integrated findings from this research will inform HHR and health care planning in Nova Scotia and will identify gaps in services for specific populations of women to inform targeted planning.

LIST OF ABBREVIATIONS USED

ACHDHR: Advisory Committee on Health Delivery and Human Resources

BMI: body-mass-index

CAIPE: Center for the Advancement of Interprofessional Education

CAM: Canadian Association of Midwives

CAPWHN: Canadian Association of Perinatal and Women's Health Nurses

CCHS: Canadian Community Health Survey

CFPC: College of Family Physicians of Canada

CIHC: Canadian Interprofessional Health Collaborative

CIHI: Canadian Institute for Health Information

CIHR: Canadian Institute for Health Research

CMQCC: California Maternity Quality Care Collaborative

GST: General System Theory

HHR: Health Human Resources

HHRP: Health Human Resources Planning

IPC: Interprofessional Collaboration

NSAPD: Nova Scotia Atlee Perinatal Database

OECD: Organization for Economic Development and Cooperation

PERU: Perinatal Epidemiology Research Unit

PHAC: Public Health Agency of Canada

PHC: Primary Health Care

PMHC: Primary Maternity Health Care

PUMF: Public Use Micro-data File (from the Canadian Community Health Survey)

RCP: Reproductive Care Program of Nova Scotia

SDH: Social Determinants of Health

SOGC: Society of Obstetricians and Gynecologists of Canada

SRPC: Society of Rural Physicians of Canada

WHO: World Health Organization

ACKNOWLEDGEMENTS

CHAPTER ONE: INTRODUCTION

"Ensuring that the voices of Canadian women are heard about their needs during pregnancy and childbirth [is important], so that we create and deliver maternity care that meets their needs and expectations"

Society of Obstetricians & Gynecologists of Canada (SOGC)

(2008, p. 2)

Like most countries in the world, Canada is experiencing health human resources (HHR) challenges in all clinical care settings (Campbell et al., 2013a; O'Brien-Pallas, Tomblin Murphy, Birch & Baumann, 2007; Tomblin Murphy & O'Brien-Pallas, 2005; World Health Organization, 2006). A shortage of maternity care providers has been identified both internationally and within Canada (Biringer, Maxted & Graves, 2009; Hutten-Czapski, 1999; Kaczorowski & Levitt, 2000; Lofsky, 1998; Natale, Medves, O'Driscoll & Van Wagner, 2006; Pellizzari & Medves, 2002; Phillips, Petterson, Fryer & Rosser, 2007; Rourke, 1998; Sheldon, 2006). In Canada, the majority of women received their prenatal care from an obstetrician/gynecologist (58.1%) or family physician (34.2%) with an additional 6.1% and 0.6% of women receiving prenatal care from a midwife or nurse/nurse practitioner, respectively (Public Health Agency of Canada (PHAC), 2009). Obstetricians attend the majority of births. Of the 293 hospitals included in the Canadian Hospitals Maternity Policies and Practices Survey report, (representing 287,003 births), 72% of births are attended by obstetricians, 25% by family physicians, and 3% by midwives (PHAC, 2012). Similarly, obstetricians or family physicians provide most primary maternity care in Nova Scotia (College of Family Physicians of Canada, the Canadian Medical Association, and the Royal College of Physicians and Surgeons of Canada, 2010). There are increasing numbers of primary health care nurse practitioners and family practice nurses in Nova Scotia and midwives were legislated and regulated to provide care in the province in March 2009 (Government of Nova Scotia, 2009). However, midwifery care is only offered in three facilities/areas in the province and over the past decade, there has been a decline in family physicians providing full spectrum (prenatal, birth and postnatal) maternity care (Biringer et al., 2009). For a variety of reasons, including challenges with health human resources (HHR), incentives to keep specialists in communities and the changing demographics and health needs of women

and newborns, more and more Nova Scotia women receive perinatal care from specialists or sub-specialists.

There were approximately 9000 births in Nova Scotia in 2011, most to first-time mothers between the ages of 20 and 34 (Perinatal Epidemiological Research Unit--PERU, 2011). Like many areas in Canada, there are increasing rates of maternal obesity, maternal diabetes, post-partum hemorrhage and interventions in labour and birth such as induction and cesarean section (PERU, 2011; Reproductive Care Program--RCP, 2008; 2012a; Robinson, O'Connell, Joseph & McLeod, 2005). Although there has been some decline in smoking rates overall, there has been a recent increase in the number of teenage mothers who smoke and/or use other recreational drugs in pregnancy and reports of younger women experiencing stress and violence in pregnancy (PHAC, 2009). Breastfeeding rates have risen over the last decade but still remain lower for younger women with multiple life challenges such as lower socio-economic status (SES), limited education and those living in rural areas (Brown et al., 2012). The breastfeeding rates are also considerably lower than other parts of Canada and lower than the national average (Kirk, Hennems, Price & Sim, 2011). Therefore, it is important to design care delivery models to address a variety of health and social needs of pregnant women (Aston, Saulnier & Robb, 2010; SOGC, 2008).

Research Context

Past health human resources utilization-based approaches have been used to plan services and HHR based on the services people use in the system, not necessarily the services people need in the system (Birch, Tomblin Murphy, MacKenzie & Cumming, 2015; Tomblin Murphy, 2002; 2004; Tomblin Murphy & MacKenzie, 2013). Therefore, comprehensive needs-based approaches are required to ascertain what the needs of people are so that services are aligned with those needs in an effort to improve health care experiences and outcomes. Needs-based HHR planning involves estimating the health services required to meet the needs of the population and then translating the health services to the required number and type of health care providers to deliver those services (Tomblin Murphy, 2007; Birch et al., 2007; 2009). Although some research has included needs-based planning for perinatal services as part of planning for specific provider

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groups (Tomblin Murphy et al., 2007a; 2007b; 2009a; 2009b; 2010a; 2011) or for health services in developing countries (Scheffler, Liu, Kinfu & Dal Poz, 2008), no study has used needs-based HHR planning to plan for human resources specifically for maternal and newborn care. Two key strategies to improve provider, system and health outcomes in HHR and health systems planning have been identified in the literature: 1) changing the productivity of care providers and 2) efforts to improve and/or address population health needs (Birch et al., 2007, 2009; Tomblin Murphy et al., 2007b, 2009, 2012a). The aim of this research was on the latter. Therefore, using both quantitative and qualitative approaches, this mixed methods research was a comprehensive needs-based approach to determine the health needs for women and newborns in Nova Scotia and to explore how care can be planned and delivered to meet the identified needs. The intent is that findings from this research will inform health human resources and primary maternity care planning in Nova Scotia.

Problem Statement

With global human resource shortages, increasing health care acuity and disparity and a focus on the post-2015 agenda, health human resources planning and research is a priority for all countries (Campbell et al., 2013b; Global Health Workforce Alliance, (n.d.), Global Health Workforce Alliance/World Health Organization, 2008; Joint Learning Initiative, 2004; Vega, 2013). In 2012, 10.9% of Canada's gross domestic product (GDP) was spent on health care (Canadian Institute for Health Information (CIHI), 2014a) with an estimated 60-90 cents of every dollar spent on HHR (Advisory Committee on Health Delivery and Human Resources (ACHDHR), 2005). Similarly, almost 50% of the overall provincial budget in Nova Scotia is spent on health care (CIHI, 2014a). For every health dollar in Nova Scotia, 70 cents is spent on salaries and fees for health care providers (Health Care Human Resource Sector Council, 2003).

Therefore, in order to improve health outcomes and experiences and to influence sustainable health care, planning for HHR must be based on sound research evidence and focused on the needs of people, including women and newborns (Tomblin Murphy, 2007). In addition, many of the current models of primary maternity care delivery focus on risk for adverse maternal and fetal/neonatal outcomes in maternity care related to the

physiological aspects of pregnancy and birth (McCool & Simeone, 2002; Aston et al., 2010). This has resulted in little focus on the assessment or inclusion of broader determinants of health to inform health services (Carson, Elliott Rose and MacPherson, 2012; Feder, Hutson, Ramsay & Taket, 2006; McGibbon, 2009; PHAC, 2009). There are also shortages of maternity care providers across the province so decisions need to be made about how, and what care will be delivered and who is needed to provide care. Therefore, a needs-based approach to primary maternity care is warranted to ensure that current and future models of service delivery are based upon a comprehensive understanding of maternal and newborn health needs in Nova Scotia.

Purpose

The purpose of this research was to identify primary maternity care needs of women and newborns in Nova Scotia and to explore models of care to address the identified needs.

The primary maternity care needs of women and newborns in Nova Scotia were identified through an examination of the following factors:

1. maternal demographic, epidemiologic or lifestyle factors that are perceived to influence the health needs of maternal-newborn populations;
2. maternal demographic, epidemiologic or lifestyle factors that are perceived to influence the women's self-reported health status and self-reported unmet needs;
3. the differences that are perceived to exist among and between the needs identified by women, care providers, leaders and decision-makers compared to those needs identified using the needs-based HHR frameworks;
4. gaps in the primary maternity health care services and the needs of women and newborns as identified by women, care providers and/or health leaders and decision-makers;
5. service delivery approaches that women, care providers and/or health leaders and decision-makers identified as addressing gaps in service.

Research Questions:

1. What were the primary maternity care needs of women and newborns in Nova Scotia?
2. Were there differences between the identified needs of the general perinatal population and sub-populations of the maternal-newborn population based on maternal education, maternal income, area of residence, maternal race/ethnicity?
3. Were there differences in the identified primary maternity care needs between women, care providers, leaders, decision-makers, and those needs identified using the needs-based HHR frameworks?
4. Did women, care providers and/or health leaders and decision-makers identify gaps in services in the current models of primary maternity care?
5. If gaps were identified, what service delivery approaches can be used to address the gaps in services?

Hypotheses

Rationale #1: A number of factors including geography, poverty, education and racial/ethnic differences impact health. Therefore, I proposed that women from different groups based on geography, poverty, education and race/ethnicity may identify different health needs compared to women in the general perinatal population.

Null Hypothesis 1($H0_1$). There was no difference in the needs identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

Rationale #2: Self-reported health status is established in the literature as a proxy for health needs (Birch, Eyles & Newbold, 1996). An example of such an indicator is self-reported health status from the Canadian Community Health Survey (CCHS, 2009-2010). There is a wealth of literature that supports the impact that geographic location, race, education and ethnicity and socio-economic status have on health, in general and specifically on maternal-newborn health. Therefore, I proposed that there would be a

difference between the self-reported health needs and unmet health needs of women in particular sub-populations (as identified above) vs. the general perinatal population.

H0$_2$. There was no difference in self-reported health status identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

H0$_3$: There was no difference in self-reported unmet needs identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

Clinical, Policy, Education and Research Implications

It is anticipated that the integrated findings from this research will inform health human resources and primary maternity health care planning in Nova Scotia by identifying the health needs of women and newborns and in turn, informing different maternal and newborn care delivery models. From a clinical perspective, participants in the study identified strategies to improve the care of women and newborns. Such strategies included recommendations to enhance relational and culturally competent and safe care as well as for collaborative practice models that support and/or expand primary maternity care providers' scope of practice. For research, this study builds upon several components of the Health Systems and Health Human Resources conceptual framework (Tomblin Murphy, 2007) and indentifies ways to measure health and health needs in primary maternity health care based upon a broad definition of health. For health provider education, the findings from this research identify key strategies such as interprofessional education and knowledge about the determinants of health to enhance health care curricula. Further details about the clinical, policy, education and research implications of this work as well as future research are provided in Chapter Eight: Conclusions. The intent of my research was to determine the health needs of the maternity population in Nova Scotia. With maternal and newborn needs identified, future

research will focus on the competencies necessary to meet those needs and which maternity care models support care providers with those competencies.

CHAPTER TWO: THEORETICAL AND CONCEPTUAL FRAMEWORKS

"The world of symbols, values, social entities and cultures is something very 'real'; and its embeddedness in a cosmic order…tends to bridge the gulf between…science and the humanities, technology and history, natural and social sciences…"

Von Bertalanffy (1972, p. 423)

Theory is defined as "an abstract generalization that offers a systematic explanation about how phenomena are interrelated" (Loiselle, Profetto-McGrath, Polit and Beck, 2007, p. 154). A theoretical framework is defined as a set of relationships that are understood to exist between various concepts (D'Amour, Beaulieu, San martin Rodriguez & Ferrada-Videla, 2005). A conceptual or theoretical framework is used in research to connect all aspects of inquiry and outline possible courses of action or to present a preferred approach to an idea or thought (Botha, 1989). It is essential to focus the research and provides a "map of the territory being investigated" (Miles & Huberman, 1984, p. 20). Choosing a theoretical framework depends upon the methods being used (quantitative, qualitative or mixed), the empirical data available to support the theory and the literature that explicitly uses the theory (D'Amour et al., 2005).

The intent of a theory is to be "an explanation independent of the phenomenon being studied. A theory is based on principles that are coherent, generalisable, transferable and of continuing applicability" (Gilbert & Bainsbridge, 2003, p. 282). In addition, the purpose of a theoretical or conceptual framework is to consolidate information into a coherent model that helps identify relationships between variables and elements, provides an objective picture for research and a reference point to evaluate research progress (O'Brien-Pallas, 2002). The purpose of this chapter is to outline the theoretical and conceptual frameworks that were used to inform my research. These were: 1) General System Theory (GST) (von Bertalanffy, 1971; 1972); 2) the Needs-Based Health Systems and Health Human Resources (HHR) Conceptual Framework developed by Tomblin Murphy (2007) and O'Brien-Pallas, Tomblin Murphy, Baumann & Birch (2001); and 3) the related Analytical Framework (Birch et al., 2007; 2009). The Simulation Model (Tomblin Murphy et al., 2007b; 2009b) and Service-Based Health Human Resources Framework (Tomblin Murphy et al., 2012a; Tomblin Murphy et al., 2012c; Tomblin Murphy et al., 2013) are introduced in this chapter as part of the suite of

planning approaches informed by the Health Systems and HHR conceptual framework but were not explicitly used to inform this research.

General System Theory

General System Theory (GST) best suited my doctoral research as it illustrated the interconnectedness and interdependence of multiple systems for health human resources planning. GST is also one of the key underlying theories of the needs-based Health Systems and HHR Conceptual framework and resultant analytical framework that also informed this study.

In contrast to reductionist views of his time, Von Bertalanffy defined a system as a set of interacting, interrelated, or interdependent elements that work together in a particular environment to perform the functions that are required to achieve the system's aim (Von Bertalanffy, 1968). From the perspective of health care, an example of a system is a group of individuals (health providers and patients) who have repeated interactions to form a whole (Hall & Fagen, 1968). This would not be limited to the care environment but may also be other inter-related components that influence the interactions between providers and patients such as health education, provider competencies and system level considerations such as funding.

However, the understanding in System Theory is that no single element has an independent effect on the behaviour of the whole (Martinelli, 2001; Steele, 2003). The concept of 'system' was developed by Von Bertalanffy (1971) to address the limitations of individual disciplines trying to address complex social problems. The intent is that System Theory can be applied across the natural and social sciences and across several 'layers' of understanding from the micro-system through to the meso- and macro-systems (Brofenbrenner, 1979). In other words, systems are embedded within other systems (Straussfogel, 1997; Pattee, 1973). This supports a recognition of how larger social institutions influence smaller groups of people and vice versa. For instance, how health care reform and the introduction of different service delivery models influence how health and health needs are viewed, how care and services are organized and who provides care. Similarly, research that demonstrates how health needs can be met (e.g. through interprofessional collaboration) influences broader policy and planning (Leathard, 2003).

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There are four key principles of System Theory, all of which apply to this research: 1) nonsummativity, 2) interdependence, 3) homesostasis, and, 4) equifinality. **Nonsummativity** is rooted in the Aristotelian philosophy[1] that the 'whole is more than the sum of its parts' (Von Bertalanffy, 1956). In other words, the system as a whole has the potential to work together to create more than what might be accomplished by individual elements. This ability to achieve more through group effort than individual effort has been termed 'positive synergy' (Lasker, Weiss, & Miller, 2001). In a needs-based approach, multiple factors and stakeholders are included so that a complete 'picture' of health needs is obtained based upon a broad definition of health, which is based upon the social determinants of health (Raphael, 2004; Tomblin Murphy, 2004; 2007).

The second principle is **interdependence** (Laszlo & Krippner, 1998). This implies that all elements within the systems are inter-related. Using System Theory, this research identified strategies to improve the interactions of health providers with women and newborns (e.g. how care was provided) and women's and newborns' health needs, experiences and outcomes. This principle also recognizes the complexity of health care and the influence of the social determinants of health on health needs, experiences and outcomes (Mikkonen & Raphael, 2010).

The third principle is **homeostasis**, which refers to the stability of the system(s). It can be either functional or dysfunctional. For instance, in a system wrought with conflict, it may be challenging to achieve the system goals. However, through feedback loops, the system will attain/maintain homeostasis and adapt to a new situation to restore balance (Ball, 1978). For instance, when health human resources and health system planning are based upon the needs of people, then patient, provider and system outcomes are improved resulting in positive feedback to continue care based on needs (Birch et al., 2007; 2009). This also fits with this research as the findings identify the health needs of women and newborns in Nova Scotia.

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[1]Aristotle stated "To return to the difficulty which has been stated with respect both to definitions and to numbers, what is the cause of their unity? In the case of all things which have several parts and in which the totality is not, as it were, a mere heap, but the whole is something beside the parts" Aristotle, M. (1941). trans. WD Ross. *The Basic Works of Aristotle, Random House, New York*, 681-926.

The final principle is **equifinality**, which suggests that there are many ways to achieve the same goal (Von Bertalanffy, 1968). For example, different health providers often share similar competencies and scopes of practice required to provide care for particular patient populations; resulting in similar outcomes (D'Amour., Goulet, Pineault, Labadie & Remondin, 2004; Hueston, Applegate, Mansfield, King, McClaffin, 1995; Laurant, Reeves, Hermens, Braspenning, Grol & Sibbald, 2005). There are several examples of System Theory for planning of maternity care. Most notably, as it aligns in part with this research, Miller and colleagues (1997) used a System Theory informed mixed methods design to explore midwife-physician collaborative practice. Similarly, Sicotte, D'Amour & Morreau (2002) used an interdisciplinary collaborative service delivery model informed by systems and organizational theories to measure collaboration and factors that support or limit collaboration in Community Health Care Centres in Quebec. How and who delivers the care may differ between models of service delivery, but the end result is often similar. This fits with the recent *National Birthing Strategy for Canada* that suggests that no single model of care will work in all settings to meet all needs (SOGC, 2008). Therefore, needs-based HHR research was necessary to determine the best models of primary maternity care in Nova Scotia.

Health System and Health Human Resources Conceptual Framework

The aim of the Conceptual Framework for Needs-Based Health Systems and HHR Planning is to guide the associations between relevant HHR and health system variables to determine the impact of those associations on system, health and provider outcomes. The aim is to determine whether efficient and effective human and non-human resources are achieved within broader health and social systems that take into account multiple contextual and processual factors (Tomblin Murphy, 2007; Tomblin Murphy, Alder, Pelletier & MacKenzie, 2007b; Tomblin Murphy, O'Brien-Pallas, Birch, Wang & Li, 2008; Tomblin Murphy, Alder, Birch, MacKenzie & Lethbridge, 2010a).

Originally developed by O'Brien-Pallas, Tomblin Murphy, Birch, and Baumann (2005), the Health Systems and HHR framework is based upon earlier work by O'Brien-Pallas et al. (2001) and O'Brien-Pallas and Baumann (1997), and is informed by Anderson's (1995) service utilization model, Donabedian's (1966) quality of care

framework, Leatt and Schneck's conceptualization of technology in human services organizations (1981), and work of a Canadian think tank summarized by Kazanjian, Pulcins and Kerluke (1992). The central premise of the Health Systems and HHR Conceptual Framework is to develop health system and health workforce strategies that meet the needs of people. Being needs-based refers to the allocation of health care resources based on the needs of the population being served while also considering the interplay of multiple contextual and process factors that influence health (Tomblin Murphy et al., 2007a). The following key elements in the framework (Figure 1) are outlined below, adapted from Tomblin Murphy (2007) and Tomblin Murphy et al., (2007a; 2008, 2010a).
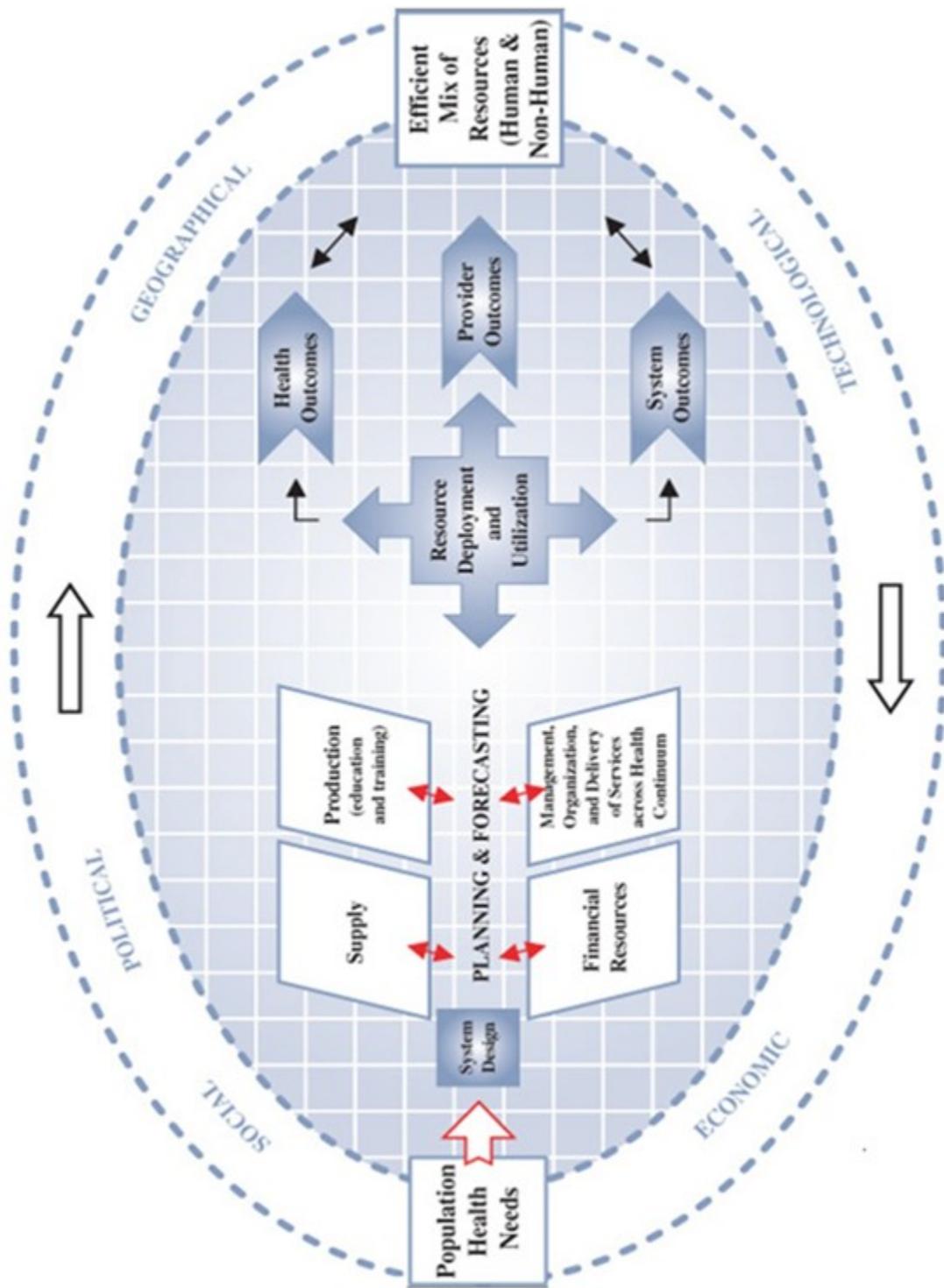
Figure 1: Health System and Health Human Resources Planning Conceptual Framework
(Tomblin Murphy, 2007; Tomblin Murphy et al., 2007a; 2008, 2010a)

Population health care needs relate to a number of individual characteristics that create demand for preventative and curative health care. Health needs are influenced by actual and perceived population health status, socio-economic status, demographics, and health behaviours (Eyles, Birch, & Newbold, 1993). In keeping with a broader definition of health, health needs are also influenced by social, cultural, political, contextual, geographical, environmental and financial factors as well as individual biological constitution and responses. These are also influenced by the quality of and access to health services (McIntyre, Thiede & Birch, 2009). The population health care needs component of the Health Systems and HHR framework informed the overall purpose for this research.

System Design relates to the design of health care services (e.g. delivery models). Planning and design of services is usually determined in partnership between policy and decision makers and based upon current government commitments to meet health needs. Examples of current system design issues in Nova Scotia that are priorities areas for the government include patient safety, surgical and emergency care wait times, chronic disease management, health workforce planning and information technology (Nova Scotia Health & Wellness, 2014). As outlined in Chapters Six and Seven, a number of strategies to improve the maternal-newborn system design were key themes from this study.

Planning and Forecasting relates to the methods used to determine/predict resource requirements and involves several key parameters: *supply, financial resources, production* and *the management, organization and delivery of health services. Supply* refers to the type, number and distribution of care providers. This is influenced by what brings providers in to practice (production, recruitment, immigration), what keeps them in practice and how they practice (influenced by factors such as retention, regulation and licensing, scopes of practice and employment, provider competencies, provider-patient ratios and employment status) and exits from practice (death, retirement, migration, emigration).

Financial Resources refers to the total amount of the Gross Domestic Product (GDP) allocated to health. Resource allocation decisions take into account the levels and distribution of population needs and how HHR (including human and non-human

resources) can meet those needs amidst competing system priorities (WHO, 2006; O'Brien-Pallas, 2002). This involves using best evidence to determine the number, mix and distribution of health services. A comparative analysis of the health systems in OECD countries found that Canada is the third largest spender on health care per capita, but only a "middle-of-the-pack performer" on indicators related to health status, non-medical factors and health outcomes. They concluded that countries that have a greater focus on broad determinants of health seem to have better population health status (Prada, Grimes, McCleery, Nguyen, Pomey, Stonebridge & Roberts, 2004). There are similar findings in the primary care literature where increasing and strengthening primary care leads to improved outcomes and reduced costs (Starfield, 1998; Starfield, Shi & Macinko, 2005).

Production refers to the training and education of future health care providers. This is influenced by the number of seats and the funding for seats in a given program and the qualifications offered per program. Research linking population health care needs and increasing the training of specific health care providers has been explored as one of many possible policy options for adequate health human resources planning (Birch et al., 2007; Tomblin Murphy et al., 2009a, 2010a, 2012a).

Management, Organization and Delivery of Health Services relates to the range of different care providers (e.g. 'the who') and the different service delivery models (e.g. 'the how'). This indirectly influences outcomes and is influenced by the education of health care professionals, organizational and professional cultures of care delivery, the satisfaction of health care providers, costs, structural arrangements and the production and quality of care. This component informed many of the qualitative findings as well as the integrated findings in this study.

Resource Deployment and Utilization reflects the amount and type of resources available to meet population health needs while utilization refers to the use of health services by populations to meet needs. Reasons for unmet health needs are often related to issues of accessibility, acceptability, affordability and availability of health care services (Chen & Hou, 2002; McIntyre et al., 2009; Wellstood, Wilson & Eyles, 2006; York, Grant, Gibeau, Beecham & Kessler, 1996). The deployment and utilization of health care providers also do not often acknowledge a broader understanding of health

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and the needs associated with a broader understanding of health (Jackson & Gracia, 2013; Nivet & Berlin, 2014; Williams et al., 2014). Therefore, the aim of this study was to focus on the importance of a broader understanding of health when decisions are made about the resources required to meet the needs of women and newborns.

Outcomes in the conceptual framework are classified into provider, health and system outcomes. Health outcomes refer to health at the individual, community or population health levels. For overall measurement of health, indicators often focus on rates of mortality and morbidity, rates of disease and prevalent health conditions, access to health services and self-reported health status (Birch et al., 2007; 2009; Tomblin Murphy et al., 2007a; 2008, 2010a). Additional indicators are related to the determinants of health such as clean water, safety and education (World Health Organization Statistical Information System (WHOSIS, 2015). *Provider Outcomes* include, for example: the health status of providers, retention rates, turnover rates, sick time and work satisfaction (Tomblin Murphy et al., 2007a; 2009a; 2011). *System Outcomes* are associated with the provision and use of health care resources in terms such as costs, benefits, and changes. Some general examples of system outcomes include hospitalization and readmission rates, numbers and lengths of home visits and lengths of stay in hospital.

The components of the HHR Conceptual Framework are understood to be all situated within the 'outer circle', which includes the social, political, geographical, technological and economic contexts (Tomblin Murphy & O'Brien-Pallas, 2006). In recent research, regulatory and legislative contexts were also included (Tomblin Murphy, Alder, MacKenzie & Rigby, 2010). Situating HHR within broader health and system planning is one of the key tenets for needs-based HHR (Birch et al., 2007). The 'outer circle' contexts are of particular interest for this study as this research explored the health needs of women and newborns based upon a broad definition of health, that includes the social determinants of health.

Overall, these components are considered and combined to create an *Efficient Mix of Resources* which refers to the number and type of human and non-human resources that are required to achieve the greatest outcomes for health, providers and systems (O'Brien-Pallas, 2002). Specifically, my research aligned with the components of the HHR conceptual framework that focus on population health needs, the 'outer' context

circle, resource deployment and utilization and the management, organization and delivery of services across the health continuum to meet the needs of people. For this research, the population/people were women and newborns in Nova Scotia.

In summary, using the interdependent input-process-output structure of GST (Laszlo & Krippner, 1998), the HHR conceptual framework involves the alignment of population health needs (inputs) with the production, organization and deployment of health workers within interconnected systems of health services (processes) to support positive health (patient and population), provider and system outcomes (outputs). Like GST, the HHR conceptual model is a dynamic system that recognizes the interaction of various contextual factors (geography, technology, economics etc.) on health human resources planning processes. GST also recognizes the organized yet complex flow across permeable boundaries between systems and the environment in which they are embedded (Laszlo & Krippner). Similarly, a key premise for GST is that there is a purpose of the whole system so, that all elements interact for a common purpose. For this research, the purpose was to understand the needs of women and newborns in Nova Scotia and use that information to explore and inform effective models of primary maternity health care delivery.

Needs-based Analytical Framework

Using the conceptual HHR framework, an HHR analytical framework (Birch et al., 2007) was created to provide a quantitative application of needs-based HHR planning. As noted by Birch and colleagues (2009, p. S58), the framework is based upon the following key assumptions: 1) HHR planning occurs within, not independent of, healthcare planning; 2) needs are not indicated by measures of service delivery (utilization), expenditures on care (demand), or availability of providers (supply); 4) need is measured independently of these other healthcare constructs; 5) requirements for health human resources are derived from the need for healthcare services that health human resources produce; 6) healthcare services are produced from a range of healthcare inputs that include both human and nonhuman resources; 7) the production of healthcare services and the use of human resources in the production of those services occur in prevailing social, cultural, economic, and political contexts. These contexts are largely

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determined outside of the immediate remit of human resources policy makers and planners. However, the particular contexts will define the opportunities and constraints within which HHR planning occurs; and 8) the capacity of training programs is just one of many policy levers available to human resources policy makers aiming to respond to estimated gaps between future human resource requirements and supplies. The needs-based analytical framework (Birch et al., 2007) consists of two independent components: provider requirements needed to meet needs and current provider supply.

Provider Supply is dependent upon two determinants: the current stock of health care providers and the flow of services from that stock. Health care provider stock is based upon a number of factors including: the scopes of practice and qualifications of providers based on age, gender, and the numbers of providers actually available to provide direct care. Determining the number of available providers is based upon the number, size and duration of training programs; including the attrition and graduation rates within those programs, recruitment/retention rates within practice settings and the age at which providers enter and exit professional practice. Provider flow also considers the activities of health care providers and the overall productivity, participation (number providing direct care) and activity rate (the quantity of time devoted to provision of care per HCP). Data to measure provider supply are often available via human resources, professional association and administrative datasets in the different clinical settings (Birch et al., 2009; Tomblin Murphy & de Campos, 2006; Tomblin Murphy & O'Brien-Pallas, 2005; Tomblin Murphy et al., 2011).

Provider Requirements refers to the number, mixes of health care providers required to meet population health needs, and is dependent upon four elements: epidemiology, demography, level of service, and productivity (Birch et al., 2007; Tomblin Murphy et al., 2009). *Epidemiology* is considers the distribution and level of needs based upon the degree of illness, risk for illness or health in particular populations. Indicators related to health risk, morbidity, mortality and self-reported measures of health from health databases and national or regional survey data (Birch et al., 2009; Tomblin Murphy, 2007; Tomblin Murphy et al., 2007a; 2009a; 2009b; 2012a). For example, in maternity care, there are increasing numbers of pregnant women with pre-existing or gestational hypertension and diabetes (PERU, 2011). The intent is that the estimation of

prevalence of conditions is independent of the demography variable. This approach takes into account the prevalence differences between two populations with similar size and age/gender distributions (Birch et al., 2009). *Demographics* is population size, including the overall population as well as the size of sub-populations that may have particular health needs related to race/ethnicity, rural and urban disparities, gender or low socioeconomic status. Often national census data is used to populate this component of the framework (Birch et al., 2009). *Levels of service* relates to the amount of service required by a population based on need and grouped by age and sex. This can be determined in two ways: using data regarding existing level of service or data from expert consensus, clinical guidelines and/or in consultation with health care consumers (Tomblin Murphy & de Campos, 2006). Without prospective measures, retrospective indicators related to past experiences and behaviours are used (Birch & Eyles, 1991). For example, in primary maternity care some screening programs are recommended universally while others are recommended for particular sub-populations of women or newborns (Reproductive Care Program (RCP), 2007).

The intent of the needs-based HHR approach is to identify needs of particular populations and link resources to populations, not to suggest that all needs of a particular community be met by provision of all services in that community (Birch & Chambers, 1993). Combining the first three determinants of the provider requirement component (demography, epidemiology, level of service) generates an estimate of the number of health care services required by a population depending on size, demography, levels of health and illness and the services available to respond to the health and illness needs (Tomblin Murphy et al., 2012a). The fourth determinant, productivity is translated as "the number of services required into the number of health care providers required to deliver them" (Tomblin Murphy et al., 2009a, p. 24). In other words, productivity is the rate of service delivery by health care providers per unit of time. It is dependent upon the intensity of work (paid hours devoted to patient care), the organization of work, the use of technology and the work and productivity of other health care providers (Birch et al., 2009). As illustrated in Figure 2, combining the needs (health care services) component with productivity data results in an estimation of provider requirements. My research focused explicitly on the health care services or needs component of the analytical

framework. This study used national survey and provincial database information to determine the needs of mothers and newborns in Nova Scotia. Selected data and health needs indicators for this study are detailed in Chapter Four.

Figure 2: Provider Requirements Equation (Birch et al., 2007; 2009)

$$N^{rt} = (N/Q)^t \times \sum \left[(Q_{ij}/H_{ij})^t \times (H_{ij}/P_{ij})^t \right] \times P_{ij}^t$$

Nrt = (provider/services) × (services/need) ×(needs/population) × (population size)

Simulation Model

Using both the conceptual and analytical frameworks, a visual illustration of inputs, processes and outputs for needs-based health workforce planning was created using Vensim system dynamics software simulation (Tomblin Murphy et al., 2009) (Figure 3). The intent of the simulation model is to operationalize the analytical model to estimate the supply of and requirements for health care providers in an effort to calculate and illustrate shortages or surpluses for the planning period (Birch et al., 2007; Tomblin Murphy et al., 2009; 2012a). In keeping with a System Theory approach, changes in one aspect of the modules in the simulation model will effect change in others (Tomblin Murphy et al., 2009). The *needs* module (upper left of Figure 3) estimates the number of health care providers required to meet the health care needs of a population, based on age and gender as well as the three components outlined above (epidemiology, demography and level of service) (Tomblin Murphy et al., 2007b; Tomblin Murphy et al., 2009a). The *training and supply modules* (lower part of the diagram) use stock-and-flow methods to estimate the current and future size of health care provider supply based on entry and exit to the profession. This is measured as head counts and data to populate these modules include number of training seats, program attrition, program length, rate of new graduate

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entry to the profession, numbers of new graduates who do not enter the local workforce (out–migration), existing provider stock and exit rates (Tomblin Murphy et al., 2007b).
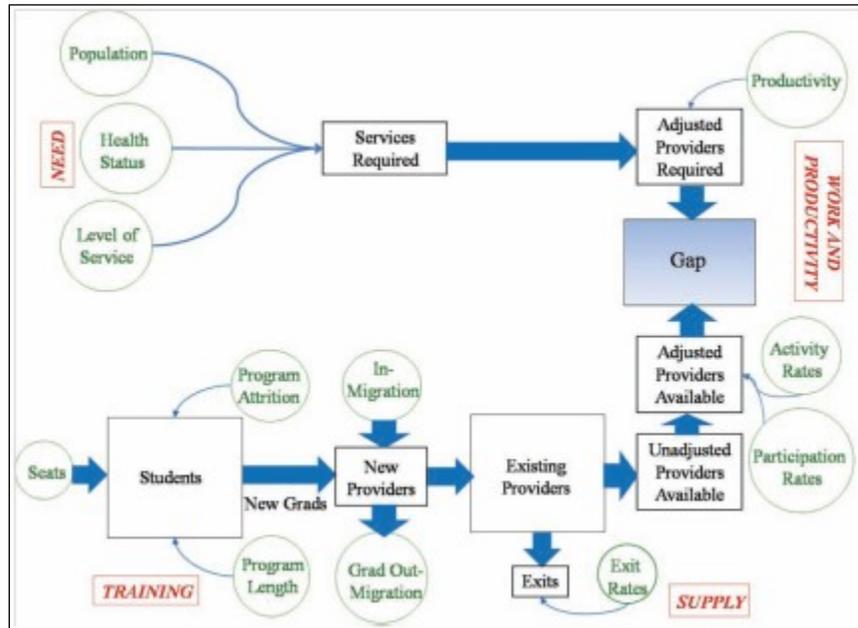
Figure 3: Health Human Resources Simulation Model

(Tomblin Murphy., Alder, Pelletier, & MacKenzie, 2007b).

The *work and productivity* module translates health care provider supply (individual providers or teams) from the head count calculated in the training and supply modules into the proportion of health care providers providing direct patient care (participation) and hours worked (activity).   As described above, productivity is determined by dividing the health care services required (needs) into the number of full-time health care providers to calculate a rate of performance per unit time (Tomblin Murphy et al., 2009a). Different simulations can illustrate an understanding of how different policy changes or combinations of policies could influence the gap between available health human resources and requirements (Birch et al., 2007; Tomblin Murphy et al., 2007a; Tomblin Murphy et al., 2009a; Tomblin Murphy et al., 2012b). The intent is not to provide precise policy options but to illustrate the potential effects of policy interventions on HHR. Specific policy interventions would require careful consideration of the applicability in their specific regions.

Options that close the gap between supply and required health human resources also aim to create balance between the needs of the population being served, the care required to meet those needs and the health, system and provider outcomes. Aiming to close the gap and create balance fits with the General System Theory (GST) principle number three, homeostasis. In GST, feedback loops are key processes for adaptability and resultant homeostasis (Laszlo & Krippner, 1997). Feedback provides opportunity for the design and redesign of services to better meet the needs of patients and providers and ultimately to improve health, provider and system outcomes.

Based on the Analytical Framework (Birch et al., 2007; 2009), a Service-Based Health Human Resources Planning Framework[2] (Figure 4, Tomblin Murphy et al., 2012a; 2012c) was developed to measure service requirements to meet population health needs based on competencies instead of the number of health care providers. Similar to determining the provider supply and requirements in the Analytical Framework, the intent is to determine competencies available and those needed to provide care, in an effort to determine gaps (Goma et al., 2014; Tomblin Murphy et al., 2013).
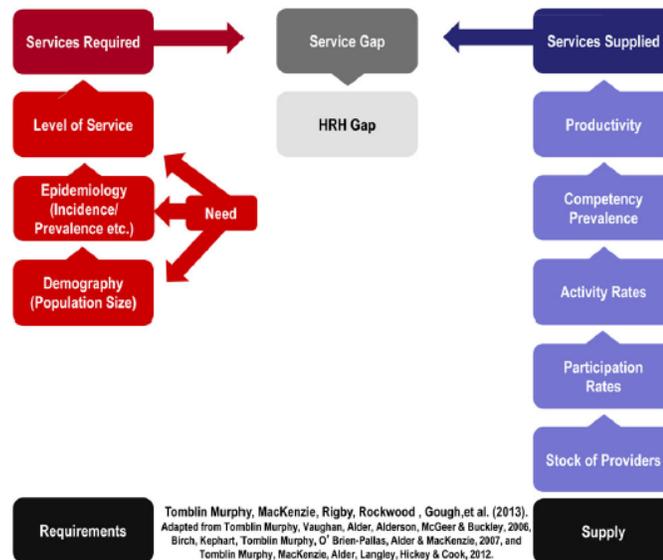
Figure 4: Service-Based Health Human Resources Planning Framework
(Tomblin Murphy et al., 2012a; Tomblin Murphy et al., 2012c; Tomblin Murphy et al., 2013)

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[2] previously referenced as Competency-Based Health Human Resources Planning Framework

Both the Simulation Model and the Service-Based Health Human Resources Planning Framework were not explicitly used to inform this research. The two frameworks are presented here as part of the suite of operational possibilities using the HHR conceptual and analytical frameworks. However, both the Simulation Model and the Service-Based Health Human Resources Planning Framework will be beneficial in conducting future research that connects the maternal and newborn needs identified in this research with the competencies required to meet those needs. Such information will be valuable to inform innovative maternal-newborn care delivery models.

Summary

The Conceptual Framework for Needs-Based Health Systems and HHR Planning and the resultant Analytical Framework together with General System Theory are complementary theoretical and philosophical approaches with established bodies of knowledge and demonstrated utility. As illustrated above, these approaches share principles related to nonsummativity, interdependence, homeostasis and equifinality resulting in processes that are adaptable, emerging and dynamic. For my research, these approaches supported a comprehensive, multifactorial exploration of the perinatal health needs of women and newborns in Nova Scotia to inform the development of different models of primary maternity health care. In addition to the theoretical and conceptual frameworks outlined in this chapter, a synthesis of the literature related to needs-based health human resources and maternity care was completed. In the next chapter, key definitions and background information on health human resources are presented. The remainder of the review is organized around four themes from relevant literature: needs-based HHR, selecting indicators of maternal-newborn health needs, trends in maternity care and interprofessional collaboration (IPC) as a key HHR strategy.

CHAPTER THREE: LITERATURE REVIEW

"The needs-based approach…is a method of severing the link between current levels of use and…resource allocation by basing allocations on the characteristics of populations. Our approach is thus consistent with the overall objectives of protecting, promoting and restoring health."

Birch & Chambers, (1993, p. 612)

According to Cooper (1988), a literature review describes, summarizes, evaluates, clarifies and/or integrates information from primary empirical, theoretical, critical/analytical and methodological work. Cooper created a process for conducting literature reviews that in many ways mirrors the research process (Randolph, 2009). The process includes: 1) creating criteria to determine what evidence to include in the review; 2) retrieving relevant information using established search methods; 3) evaluating, interpreting and analyzing the relevant information; and 4) presenting the information in a standard format (Cooper).

The goals of a literature review are to provide insight into developments in a topic area, to expand upon or verify existing theories, to synthesize existing knowledge and to offer generalizations or themes from existing literature (Cooper, 1988; Randolph, 2009). An additional key goal is to highlight gaps in knowledge and the varying and sometimes divergent perspectives on the topic of interest. Identifying gaps in knowledge substantiates this research study and how this research contributed to new knowledge in health human resources planning and primary maternity health care (Krainovich-Miller & Cameron, 2009).

Since this study was a mixed methods design, there is an opportunity to consolidate existing literature from both the qualitative and quantitative evidence as well as non-peer-reviewed (grey) literature, in an effort to integrate and provide a comprehensive understanding of the topics of interest for the planned research. In an effort to combine literature from diverse methodologies, the literature review for this work was informed by an integrative approach by Torraco (2005) and Whittemore and Knafl (2005) to collect, extract, analyze, synthesize and present key themes related to needs-based health human resources planning in primary maternity health care.

Four main topic areas were searched: 1) understanding maternal-newborn health and health needs as they relate to primary maternity health care; 2) needs-based health human resources; 3) interprofessional collaboration as it relates to health human resources planning, specifically in maternity care; and 4) health human resources planning in primary maternity health care. The empirical evidence was critiqued using guidelines for qualitative and quantitative research developed by Loiselle et al., (2007). Relevant non-peer-reviewed (grey) literature was also reviewed and included if it added to the depth of understanding and provided context related to needs-based health human resources generally and specifically for maternity care. The chapter is organized in three main sections: 1) key definitions to inform the study; 2) background information on health human resources planning; and 3) the presentation of findings from the literature review.

Key Definitions

A broad definition of health. The classic definition of health from the World Health Organization (1946) is that "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (p. 100). This definition supports a broader understanding of health that includes the social determinants of health. Interest in understanding the impact of the social determinants on health was revived after the 1986 Ottawa Charter for Health Promotion international conference, which recognized peace, shelter, education, food, income, a harmonious eco-system, resources, social justice and equity as essential prerequisites for health (World Health Organization, 1986). Social determinants of health have 1) a direct impact on the health of individuals and populations 2) are the best indicators of individual and population health, 3) structure life choices and 4) interact with each other to produce health (O'Hara, 2005). Ten key social determinants have been identified by Canadians: early life, education, employment, and working conditions, food security, health care services, housing, income and its distribution, the social safety net, social exclusion and unemployment and employment security. These have greater impact on the health of Canadians than biomedical issues and lifestyle factors (Raphael, 2009). Gender has also been identified as a key social determinant of health (Phillips, 2005; Marmot, Friel, Bell,

Houweling, Taylor & Commission on Social Determinants of Health, 2008). However, current models of health delivery tend to focus primarily on the treatment of illness (Lantz, Lichenstein & Pollack, 2007), instead of focusing on other key social determinants of health.

At a recent world conference on the social determinants of health, one of the five key areas identified as a priority is the need to explore the role of the health sector in reducing health inequities. A more balanced approach must emphasize health determinants at the individual level as well as the implementation of health policy at the aggregate or population level (WHO, 2011). System and organizational strategies (e.g. policy, organizational change) are important in addressing social determinants of health. However, individual care encounter changes, such as improving the interactions between health care providers and patients, also positively affect individuals' health experiences and outcomes (Assai, Siddiqi & Watts, 2006; Gehlert, Sohmer, Sacks, Mininger, McClintock & Olopade, 2008).

Although a number of policy initiatives and strategies aimed at addressing the social determinants of health have been developed, the focus on health planning tends to still primarily be on biomedical risk factors and to some extent, lifestyle factors (Raphael, Curry-Stevens, & Bryant, 2008; Bryant, Raphael, Schrecker & Labonte, 2011). Therefore, research was required to inform health workforce planning and the creation of models of care delivery that optimize resources and balance population health needs for both acute and chronic care as well as the more complex social factors that influence health now and in the future. For the purpose of my research, the broader WHO definition of health was used in an effort to explore multiple factors that influence maternal and newborn health needs in Nova Scotia.

Health needs. Defining health need is a complex undertaking that requires careful consideration of the different factors that influence need (Asadi-Lari, Packham & Gray, 2003; Culyer, 1998). Key things to consider are that needs are dynamic (change over time), heterogeneous (they differ between and among populations) and they are contextual (impacted by societal, political and economic values and expectations) (Acheson, 1978; Mooney, Jan & Wiseman, 2004). The ambiguity in defining needs continues to challenge the move from service-led to needs-led health service planning

(Parry-Jones & Soulsby, 2001) thus perpetuating the medical-model of health care (Asadi-Lari, Tamburini & Gray, 2004; Birch et al., 2014).

In the classic literature related to health needs, Donabedian (1973) defined need as "some disturbance in health and well being [requiring] medical care services" (as cited in Acheson, 1978, p. 10). Donabedian's definition focused on need as describing states of people. Bradshaw (1972) defined need as normative (identified by health professionals), felt (patients wants and wishes), expressed (how services are used) and comparative (needs of similar socio-demographic groups may be similar). Others focused on the effectiveness of interventions to meet needs (Baldwin, Marvin & Rodine, 1998; Brewin, Wing, Mangen, Brugha & McCarthy, 1987; Culver, 1998), cost containment (Buchan, Gray, Hill & Coulter, 1990; Stevens & Gillam, 1998) or need as a basic human right (Braybrooke, 1987; Doyal & Gough, 1992).

Culyer (1998) suggested that in addition to effectiveness, it is important to consider an ethical or equitable element so that the needs of marginalized groups/people can also be met with given resources. Asadi-lari et al., (2004, p. 2) suggest a broad definition of need to be "what patients – and the population as a whole desire to receive from health care services to improve overall health." Similarly, Birch and Eyles (1991) define need as "the ability to benefit from health care as implied by reducing the risks of deterioration in health status (or health-related quality of life) or improving the probability of improvements to health status (or health-related quality of life)" (p. 10).

Needs-based planning in health care is described based on two broad approaches: absolute and relative. Absolute need aims to estimate the health care resources required to produce a level or target of health for the general population. A relative approach considers the variation in health status and needs among populations and the resources available to meet those needs (Eyles et al., 1995). The relative approach is preferred as there is a risk that planning based on an absolute approach would allocate resources based on demand, rather than need (Tomblin Murphy, 2002). An absolute approach may also exceed expenditures, as it does not consider resource constraints and would therefore be impractical (Birch & Eyles, 1991).

For the purpose of my research, the Birch & Eyles (1991) definition for health needs was used. Informed by the analytical framework developed by Birch and

colleagues (2007; 2009) health needs for this study were operationalized based upon the selection of relevant proxies for health needs. These included health status indicators, indicators related to the prevalence of perinatal health conditions or morbidity, indicators that represent standards of perinatal care and the prominently used standard indicators of self-reported health status and self-reported unmet health needs. The selection of indicators and the analytical approach is described in detail in Chapters Two and Four.

Health indicators. According to the Canadian Institute for Health Information (2009a), a health indicator is a

> single summary measure, most often expressed in quantitative terms, that
> represents a key dimension of health status, the health care system or related
> factors. A health indicator must be informative [for specific contexts], and be
> sensitive to variations over time and across jurisdictions. (p.4)

This definition was used to inform the selection of primary maternity health care indicators for this research.

Health human resources. Hall & Mejia (1978) described 'health manpower planning' or what we know as health human resources planning (HHRP) as

the process of estimating the number of persons and the kind of knowledge, skills and attitudes they need to achieve predetermined health targets and ultimately health status objectives. Such planning also involves specifying who is going to do what, when, where, how and with what resources for what population group or individuals, so that the knowledge and skills necessary for adequate performance can be made available according to predetermined policies and time schedules. This planning must be a continuing and not a sporadic process, and it requires continuous monitoring and evaluation. (p. 18). Similarly, Birch and colleagues (2009) describe HHRP as "ensuring the right number and type of health human resources are available to deliver the right services to the right people at the right time" (p. S56). The Birch et al. (2009) definition of health human resources planning above was used to inform this research as it clearly outlines the intent of the conceptual and analytical frameworks described in Chapter Two.

Primary health care. The philosophical premise of primary health care (PHC) focuses on health care that is developed through mutual understanding to meet the needs

of people in socially just and equitable ways. As outlined in the widely accepted WHO definition (WHO & Unicef, 1978), the underlying principles include the delivery of care that is accessible, acceptable, affordable and appropriate. Specifically, primary health care is defined as

> essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care
>
> (WHO, 1978 , p.1)

The WHO model of primary health care is focused on better health for all using the following key elements: reducing exclusion and social disparities in health, organizing health services around people's needs and expectations, integrating health into all sectors, pursuing collaborative models of policy dialogue and increasing stakeholder participation (WHO, 2015). Similarly, PHC in the Romanow report (2002) was described as interprofessional care for individuals and communities that is available, local and organized to be responsive to the needs of people. Three key benefits of PHC identified by Romanow were that primary health care provides more coordinated care delivery, better quality and improved use of resources. In keeping with a definition of health based upon the social determinants of health, PHC also has been described as "an approach to health and a spectrum of services beyond the traditional health care system. It includes all services that play a part in health, such as income, housing, education, and environment" (Health Canada, 2012, n.p.). Similarly, the Enhancing Interdisciplinary Collaboration in Primary Health Care (EICP) Initiative defines primary health care using a definition from a report from a National Primary Health Care Conference (2004) held in Winnipeg, Manitoba.

> Primary health care is a comprehensive and egalitarian idea. It connects health and health care to social and economic organization. It is organized to meet the needs of everyone, but particularly disadvantaged populations. It strikes a balance

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between health promotion and health care; health and social services; individuals and communities. It entails the transfer of power from professionals to citizens and breaks down many of the traditional hierarchies within health care... (p. 5).

For the purpose of my research, the WHO (1978) definition of primary health care was used as it is comprehensive, includes a broader understanding of health and includes primary care (described below).

Primary care vs. primary health care. There is often confusion between the concepts of primary health care and primary care. Primary care is situated within primary health care and is the first level of contact with the health system. In Canada, primary care is often medical care provided by family physicians. One of the most prominent definitions cited in the literature for primary care is

> that level of a health service system that provides entry into the system for all new needs and problems, provides person-focused (not disease-oriented) care over time, provides care for all but very uncommon or unusual conditions, and coordinates or integrates care provided elsewhere by others"
> (Starfield, 1998, p. 8-9).

The EICP (2006) considers primary care as "an essential subset of primary health care. They are complementary, and neither can be effective or efficient without the other" (p. 5). For the purpose of this study, the focus was on primary maternity health care, which is a system or approach to caring for pregnant women and newborns from conception to six weeks post-partum, by a variety of maternity health care providers, based upon the principles of primary health care and inclusive of both definitions of primary care included above.

Primary maternity health care. In 2003, the Nova Scotia Advisory Committee on Primary Health Care Renewal (2003) adopted the following definition of primary maternity health care:

> Primary Maternity Health Care is part of comprehensive primary care for and within a community. It is based on the philosophy that pregnancy and childbirth are natural processes that require a focus on health and should be individualized. Within the context of primary healthcare, it is an important way of working toward developing healthy communities. The continuum of primary maternity care includes pre- and postconception, pre-natal and intra- and post-partum phases and includes such services as pre- and post-conception counseling (contraception, healthy lifestyle, risk reduction), prenatal education and care (birth planning and screening), supportive and skilled care during labour and birth and supportive and

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skilled care during the transition to self-care, infant care and family integration.

(p. 80)[3]

For my research, the above definition was adapted and did not include pre/post-conception care. My research focused on the health needs of women and newborns from conception to 6 weeks post-partum.

Interprofessional collaboration (IPC). There is varying language around the concept of collaborative health care, which is described as interdisciplinary or interprofessional collaboration, shared care, team-based care and multidisciplinary care (Barker, Bosco & Oandasan, 2005). Not only are there considerable language differences, there are multiple definitions and understandings of the concept of collaboration. These misinterpretations, together with differences in professional cultures, economics, power, gender and differing philosophies of care all contribute as obstacles to collaborative care (Kelleher, 1998; Leppert, 1997; San Martín-Rodríguez, Beaulieu, D 'Amour & Ferrada-Videla, 2005). Since there are a number of definitions related to interprofessional collaboration, experts continue to engage in strategies to clarify concepts, definitions and theoretical approaches to IPC (Goldman, Zwarenstein, Bhattacharyya, & Reeves, 2009; Reeves et al., 2011). A research report by Oandasan et al., (2004) provides an overview of different definitions. One of the most widely accepted and acknowledged definitions of interprofessional education is from the Center for the Advancement of Interprofessional Education (CAIPE) (Barr, 2002), "occasions when two or more professions learn from and about each other to improve collaboration and the quality of care" (n.p.). Way, Jones and Busing (2000) define *collaborative practice* as "an interprofessional process of communication and decision making that enables the separate and shared knowledge and skills of health care providers to synergistically influence the client/patient care provided"(p. 3). Similarly, the World Health Organization (WHO) defines c*ollaborative practice* as "multiple health workers from different professional backgrounds working together with patients, families, carers [those who care

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[3] Prenatal (antenatal or antepartum) care is defined as care from conception to birth. Intrapratum care is care during labour and birth. Postpartum (postnatal) care is care within the hospital and community up to 6 weeks post-birth.

for family members] and communities to deliver the highest quality of care" (WHO, 2010, p. 7). *Collaborative patient-centered practice* is defined by Health Canada (2003)

> as practice designed to promote the active participation of each discipline in patient care. It enhances patient and family centred goals and values, provides mechanisms for continuous communication among care givers, optimizes staff participation in clinical decision making within and across disciplines and fosters respect for disciplinary contributions all professionals

The recent Canadian National Interprofessional Competency Framework (Canadian Interprofessional Health Collaborative (CIHC), 2010) definition for *interprofessional collaboration*, based upon the work of Orchard et al., (2005) is "a partnership between a team of health providers and a client in a participatory, collaborative and coordinated approach to shared decision-making around health and social issues" (p. 24). The authors of the framework consider interprofessional collaboration to be a process of developing and maintaining effective interprofessional working relationships with learners, practitioners, patients/clients/ families and communities to enable optimal health outcomes. The framework highlights the importance of learners, which makes a clear connection between interprofessional education and interprofessional practice, both in pre-licensure and post-licensure formats. Most importantly, it is the most comprehensive definition to date as it not only speaks to the relationships between health care providers; it also includes individual patients, their families and the wider community as key collaborative partners and it considers a broader definition of health that includes social determinants of health. The CIHC definition for IPC was used to inform this research.

Understanding Health Human Resources Planning

A number of scoping and literature reviews of health human resources planning and forecasting have been conducted in recent decades (Cameron Health Strategies Group Limited, 2009; Dubois & Singh, 2009; Dreesch et al., 2005; Kuhlmann, Batenburg, Groenewegen & Larsen, 2012; Markham & Birch, 1997; O`Brien-Pallas et al., 1998; O`Brien-Pallas et al., 2001; Ono, Lafortune & Schoenstein 2014; Proudman, 2004; Roberfroid, Leonard & Stordeur, 2009; Scott, Sivey, Joyce, Schofield & Davies,

2011; Tomblin Murphy, 2002; 2004; Tomblin Murphy et al., 2007a; Wong, MacLeod & Farrally, 2009). The reviews typically cite four main approaches to HHRP: utilization/demand, supply, workforce-population ratios and needs-based.

Utilization-based (demand) approaches are based on past use of resources and changes in population demographics (Lavis & Birch, 1997; O'Brien-Pallas et al., 2000; Tomblin Murphy, 2004). These approaches assume that current health care delivery (programs, services and numbers and types of health care providers) are optimal, that the types, numbers and distribution of providers needed remains constant and do not take into account that multiple factors may affect people's need for health services (Baumann, Birch & Tomblin Murphy, 2000; Lavis & Birch 1997; O'Brien-Pallas et al.,). Most importantly, projections for health human resources using utilization approaches assume that services supplied equates to need. Demand-based approaches for HHRP may also focus on estimating the proportion of the economy available for health care and the number of providers that can be employed based upon existing fiscal parameters. Using this approach in isolation would not provide key epidemiological and demographic information about health needs; therefore, potentially perpetuating existing inequities and unmet health needs in the system (O'Brien-Pallas et al., 2000).

In general, planning for health human resources has relied on workforce-population ratios that offer only numbers of specific providers related to population size. The workforce to population ratio approach (also known as supply forecasting) specifies desired health worker to population ratios (Lomas, Stoddart & Barer, 1985). For example, in Canada, there were 9.4 nurses per 1000 people in 2009 (Organization for Economic Development and Cooperation (OECD), 2013). Although this information is easy to understand, it does not provide insight into how providers work (e.g.: productivity), the specific changing health needs of populations or the context of health systems and it uses past utilization as targets (Birch et al., 2007; Cameron, 2009; Dreesch et al., 2005; Tomblin Murphy et al., 2007a; 2012a). A ratio approach assumes that the needs of populations and/or the types and amount of services will remain the same over time (Tomblin Murphy et al., 2012b). Analyzing only the number of providers per population may lead to over or under-estimation of required resources and impact health care expenses. Similarly, supply approaches include additional information about the stock

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and flow of health care providers in the system (e.g. inflows based on graduation and migration and exits based on retirement and attrition), often with sub-analyses based on specialty, age, practice settings and/or gender (Landry, Rickets & Verrier, 2007; Lavieri & Puterman, 2009; Tennant & Kruger, 2014; Toyokawa & Lobyashi, 2010).

Using scientific methods that have been expanded and improved over the past decade (Birch et al., 2007; 2009; Tomblin Murphy et al., 2009a, 2010a, 2012a), it is possible to determine the health care needs for populations and create service delivery approaches to address those needs that are equitable, effective and efficient (Birch). A needs-based approach to health human resources planning determines needs independent of utilization, demand (health care expenditures) or the supply and availability of providers (Birch et al., 2009; Tomblin Murphy et al., 2012a). This approach takes into account other factors, such as competency, mix, remuneration and professional scopes of practice that influence if and how needs are met (Markham & Birch, 1997). The needs-based approach also acknowledges that healthcare services and HHR occur within complex social, cultural, economic and political systems (Tomblin Murphy, 2007). Therefore, understanding the complex needs and health service use patterns of different populations is important to adequately plan for service delivery that will meet those needs and ultimately improve health outcomes.

Benefits of needs-based HHR. Needs-based HHR has the potential to improve equity, efficiency and effectiveness of HHR and health systems planning. Based on Aristotelian principles, equity can be divided into horizontal and vertical components. Horizontal equity means to treat like cases alike, vertical equity means to give appropriate unequal treatment to 'unequals' (Birch & Eyles, 1991; Cuyler, 1998). In a relative needs-based approach, equal resources are provided for populations with equal needs and unequal resources are provided for populations with unequal needs (Birch & Chambers, 1993). Traditional models of allocating health care resources are based upon past utilization patterns and "historical distributions of populations and the locational preferences of providers" (Birch & Chambers, p. 612) not based upon directing resources based on needs. For example, in my research, analyses of sub-populations of women and newborns (e.g.: based on income, race/ethnicity, geography) were conducted to determine if there were differences in need. An important component of a comprehensive needs-

based analysis is to explore situations of disadvantage where there are unmet health care needs (Eyles, Birch, Chambers, Hurley & Hutchison, 1991; Sibley & Glazier, 2009).

Although only 6.6% of Canadians 18 years or older reported having an unmet health care need in 1998-1999 (Chen & Hou, 2002), self-reported unmet health needs are on the rise. In a study by Sibley & Glazier (2009), using Canadian Community Health Survey data, more than 17% of Canadians reported unmet health needs. This demonstrates that current health care may not be attending to the healthcare needs of Canadians (Raphael, 2004). For maternity care, younger women with less education and lower incomes were more likely to report stress during pregnancy, symptoms of postpartum depression and violence (PHAC, 2009). There is also evidence to suggest that women who identify with a variety of racial/ethnic groups, new immigrant women and women living in rural communities experience greater health challenges related to the social determinants of health (SDH). They also often have challenges related to access and acceptability of health care services (Heaman, Gupton & Moffatt, 2005; Heaman, Green, Newburn-Cook, Elliott & Helewa, 2007; Korinek & Smith, 2011; SOGC/CAM/CAPWHN/CFPC/SRPC, 2012). Findings from quality assessment reviews conducted by the Reproductive Care Program of Nova Scotia show similar disparities for vulnerable populations of women and newborns in Nova Scotia (RCP, 2008, 2012). Together, these findings suggest that there may be unmet needs in the current care of women and newborns; with both similarities and differences in needs across the province.

Reasons for unmet needs are often related to issues of accessibility, acceptability, affordability and availability of health care services (Chen & Hou, 2002; McIntyre et al., 2009; Wellstood et al., 2006; York et al., 1996). Availability is often related to increased wait times or the unavailability of services in a particular geographic area. Challenges with accessibility often refer to unmet needs related to cost or limited transportation. Acceptability involves issues such as the efficacy of health services, if patients felt included (e.g.: based on race/ethnicity, gender, sexual orientation, socio-economic status etc.) and/or perceived and actual power differentials between patients and care providers (Chen & Hou, 2002). In contrast to past definitions of access based only on the availability (Guagliardo, 2004; Perry & Gesler, 2000), use (Wang & Luo, 2005), cost (Katz & Hofer, 1994) or demand for services (Falkingham, 2004), McIntyre and

colleagues (2009) define access to health based on three dimensions: availability (physical or virtual access), affordability (financial access) and acceptability (cultural access). From a systems perspective, it is the interaction between each of these dimensions that provides a full understanding of access.

From an efficiency perspective, using a needs-based approach to HHR planning enables the allocation of health care resources to be based on the needs of the population being served (Birch & Eyles, 1991; Birch et al., 2007). Therefore, a comprehensive needs-based assessment of health human resources may realign the way health care is delivered, create cost savings and decrease health disparities (Birch, 1997; McIntyre, Theide & Birch, 2009). The savings would not only be based on changing to new models of care delivery but also due to improved provider, system and health outcomes. As Birch & Chambers (1993) state "efficiency in this context means maximizing the expected improvement in health status produced from a given amount of health care resources, and, hence, populations with greater potential for improvement are allocated more resources" (p. 608). Additionally, new models of care delivery may increase human resources productivity, therefore enhance outputs, and improve outcomes (Bloor & Maynard, 2003; Evans, Schneider, Barer & Morgan, 2010; Evans, Barer & Schneider, 2010).

From an efficacy perspective, the needs-based approach to HHRP aligns the identified needs of people with the competencies, types and mix of providers and types of services required to meet needs (Tomblin Murphy et al., 2009; 2013; Goma et al., 2014). Unlike utilization approaches that focus on past use or ratios of providers to people that assume a target or ideal number of single groups of professionals, a needs-based approach carefully maps the epidemiological, demographic and level of service needs (Birch et al., 2007) and provides analysis of relative needs for populations. Therefore, services and programs could be designed to maximize impact, support providers to work to their full scope and improve health, system and provider outcomes (Birch et al., 2009; Tomblin Murphy et al., 2012a; Tomblin Murphy et al., 2008).

Summary

A variety of approaches have been used to plan for health human resources (utilization, population-provider ratios, demand and needs-based). A needs-based

approach to HHR determines needs independent of utilization, demand (health care expenditures) or the supply and availability of providers. Needs-based HHR may potentially improve the equitable allocation of resources, enhance effectiveness of health services and reduce inefficiencies in the system by designing services and programs to maximize impact, support providers to work to their full scope and improve health, system and provider outcomes.

Literature Review

Search methods and parameters. The computer data bases used to identify the related literature include: CINAHL, EconLit, Health & Psychosocial Instruments, ABI inform, Web of Science, PsychArticles, PsychInfo, Pubmed, and the Cochrane Library. In consultation with a Dalhousie University information scientist, the following key words were identified and used in various combinations with Boolean operators (and, or, not):

1) For literature related to needs-based HHR, the search included combinations of the following key words: health human resources planning, health human resources, health care delivery, health planning, health workforce planning, manpower, person power, HHR, population health care needs, needs-based planning and population health care needs assessment.

2) For literature related to maternal-newborn health needs, the search included combinations of the following key words: health care delivery, health needs, health needs assessment, determinants of health, health measures, health indicators, primary health care, primary care, primary maternity health care, maternity, perinatal, maternal, newborn, obstetrics, neonatal, prenatal, antenatal, postpartum, postnatal, birth and intrapartum.

3) For literature related to primary maternity health care and interprofessional collaboration, the search included combinations of the key words: IPC, IPP, IPE, interprofessional, interdisciplinary and multidisciplinary collaboration, primary health care, primary care, primary maternity care

4) For literature related to needs-based HHR and maternity care, the search included combinations of the key words: health human resources planning, health human

resources, health workforce planning, HHR, manpower, person power, health care delivery, health planning, health needs, health needs assessment, determinants of health, health measures, health indicators and maternity, perinatal, maternal, newborn, obstetrics, neonatal, prenatal, antenatal, postpartum, postnatal, birth and intrapartum.

In addition to the database searches, reference lists in relevant key articles were hand-searched. All articles were considered first by title, and then the abstract was reviewed. If the article met the inclusion criteria, a full review was completed to see if the article met the inclusion criteria. In addition, an Internet search of non-peer-reviewed literature was carried out using Google and Google Scholar as well as directed searches of relevant government and health department websites primarily in Canada and Nova Scotia but in the United Kingdom, the United States, Australia and Europe using the key words noted above. Key provincial, national and international websites related to health human resources or maternity care were also searched for relevant documents (Appendix A). As the study was based in Nova Scotia, health human resources and related health system documents (e.g.: primary health care and maternity care) from the Nova Scotia Department of Health and Wellness and the Reproductive Care Program of Nova Scotia websites were also reviewed.

There were a number of articles related to health workforce planning in developing countries and maternity care. These were not included in the literature review as the focus of many of the articles was on implementing strategies to attain the Millennium Development Goals number four and five or focused on the post-2015 agenda. As well, the context of care in low and middle income countries is often different from higher income countries and the clinical priorities for maternal-newborn care differ in low and middle income countries as there are high rates of maternal and perinatal mortality.

The following inclusion criteria were used when selecting research literature for the literature review:

Table 1: Inclusion Criteria for Literature Review

Published in English
Published between 1990-2015* (date limits selected since literature related to needs-based health systems planning generally and needs-based HHR specifically began to emerge in the early 1990's)
Was a published or unpublished primary study, thesis or literature review. Also included relevant papers that described, commented or critiqued needs-based approaches to health human resources planning, primary maternity care, determinants of health and defining and measuring health, and interprofessional collaboration and HHR.
Addressed Canadian, US, UK, Australian or Western European health human resources or health systems planning
Clear theoretical and analytical approaches
Clear outline of the research design
Clear discussion of the limitations and/or challenges of the research

*2013-2015 for needs-based HHR only

Using the search parameters and inclusion criteria outlined, a number of research articles and/or reports were included in this literature review that focus on needs-based HHR, health needs generally and maternal health needs specifically as well as relevant information on HHR, IPC and maternity care; set within the context of primary maternity health care. To add to the depth of understanding, seminal reports, classic literature, background documents and non-peer-reviewed (grey) literature are also included throughout the analysis and critique.

Results of literature review. A separate, recent synthesis of the needs-based health human resources literature was completed in April 2013 by Mackenzie, Elliott Rose, Tomblin Murphy & Price (unpublished, 2013). An additional literature search was completed for this research focused on needs-based HHR from April 2013 to March 2015. The search resulted in seven additional articles related to needs-based HHR. Two of the articles from Tomblin Murphy and colleagues related to HHR research in Zambia and Jamaica, so these were not included in the literature review for this study, as they did

not meet the inclusion criteria (e.g. the articles focused on low and middle-income countries). Four articles were included from the additional search after abstract and/or full article review: two from Canadian researchers (Birch and Tomblin-Murphy), one from Australia (Segal) and a review paper by Ono, Lafortune & Schoenstein (2013).

A number of themes and sub-themes were identified from all four literature searches.

Figure 5: Themes and sub-themes from the literature review

Needs-Based HHR
-The estimation of HHR requirements
-Key leaders in HHR
-Data availability for HHR planning
-Needs-based HHR and health systems planning
-Measuring health need

Selecting Measures of Maternal-Newborn Health Needs
-Indicators
-Patient satisfaction

Trends in Maternity Care
-Increasing interventions & changing demographics
-National and provincial initiatives

IPC as a Key HHR Strategy in Primary Maternity Health Care

Needs-based HHR. A recent synthesis of the application of needs-based HHR approaches found that although there is widespread acknowledgement in the literature of the importance of needs-based HHR and health systems planning, comparatively few needs-based health human resources models have been developed (Birch, Mason, Sutton & Whittaker, 2013; Dreesch et al., 2005; Birch, O'Brien-Pallas, Alksnis, Tomblin-Murphy & Thomson, 2003; Bloom, Duckett & Robertson, 2012; Bruckner et al., 2011; Dubois & Singh, 2009; Gallagher, Kleinman & Harper, 2010; Kurowski & Mills, 2006; Litaker & Love, 2005; O'Kane & Tsey, 1999; Ono, Lafortune & Schoenstein, 2013;

Segal & Leach, 2011; Segal, Leach, May & Turnbull, 2013; Sermeus et al., 2011; Tomblin Murphy & O'Brien-Pallas, 2006a). In total, the authors of the synthesis, Mackenzie, Elliott Rose, Tomblin Murphy & Price (2013, unpublished), retrieved 35 articles related to needs-based HHR, involving approaches with varying degrees of theoretical substance and/or analytical application.   Five key themes emerged from the synthesis: the estimation of current vs. future health system or HHR requirements, the identification of key leaders in needs-based HHR, the variation in the use of measures of health needs, the challenge in data availability for HHR planning in general and for needs-based HHR specifically and the need for commitment and partnership across the health care system to support planning for HHR based on health needs (MacKenzie, Elliott Rose, Tomblin Murphy & Price, 2013 unpublished). These themes remained relevant with the addition of the four needs-based HHR articles retrieved from 2013-2015.

The estimation of HHR requirements. The authors of the synthesis describe two main approaches used to estimate needs-based HHR: 1) current requirements only (Birch et al., 2013; Markham & Birch, 1997; O'Kane & Tsey, 2004; Dreesch et al., 2005; Litaker & Love, 2005; Andrews et al., 2006; Segal, Dalziel & Bolton, 2008; Piché, 2010; Segal & Leach, 2011; Tomblin Murphy et al., 2012a; Tomblin Murphy et al., 2013), or 2) forecasting future requirements (Persaud et al., 1999a, 1999b; Kurowski et al., 2003, 2007; Birch et al., 2004, 2007, 2009; Kurowski & Mills, 2006; Scheffler et al., 2008, 2011; Tomblin Murphy et al., 2007; 2009a, 2010; 2011; 2012b; Gallagher, Kleinman & Harper, 2010; Singh et al., 2010; Scott et al., 2011). The length of these forecasts ranged from 10-40 years (Tomblin Murphy et al., 2009b; Birch et al., 2005; 2007). Although there are limitations, often related to the type and availability of data, the needs-based HHR forecasting approaches highlight a number of different policy scenarios (increasing training, decreasing attrition from programs or from professions, increasing productivity etc.) that may be useful in improving the availability of HHR to meet current and projected health needs.

The authors of the synthesis noted that of the 23 published papers on the application of needs-based HHR or health systems planning in Canada, 18 were produced by one or both of Stephen Birch and colleagues at McMaster University or Gail Tomblin

Murphy and colleagues at Dalhousie University. Two additional articles from these authors were retrieved in the 2013-2015 searches. Many of the articles from Birch or Tomblin Murphy also included studies using a needs-based approach in other countries. Additional recognized leaders in needs-based HHR research were Segal and colleagues in South Australia, Scheffler and colleagues in the United States and Kurowski and colleagues with the World Bank. Other than the focus on either present or future HHR requirements, the needs-based approaches were similar operationally as each used methods of determining needs and therefore requirements based on population, demographic and health status indicators.

Data availability for HHR planning. In order to measure the concept of health and health needs, it is important to have accurate and available data (Tomblin Murphy & de Campos, 2006; Tomblin Murphy & O'Brien-Pallas, 2005; World Health Organization, 2009). The availability of reliable data for HHR in general has been an ongoing concern in the literature (Hall and Mejía, 1978; Birch and Chambers, 1993; Dreesch et al,. 2005). In regards to data availability, much of the administrative data used to populate the different models related to hospital-based, acute care. Although improvements are also necessary for hospital-based data, there is currently a general paucity of HHR-related data in primary health care, long-term care and community-based care (Tomblin Murphy et al., 2009a). Due to these data challenges, some researchers using a needs-based HHR approach have extrapolated data from historical patterns of service use and estimates for population growth for specific age groups (Bloom, Duckett & Robertson, 2012) or from national or academic sources (Tomblin Murphy et al., 2011).

Much of the needs-based health human resources research in Canada uses proxy measures for health from national health surveys such as the Canadian Community Health Survey (CCHS) or the National Population Health Survey (Statistics Canada, 2012b). Birch and colleagues also used national survey data from the United Kingdom (Birch et al., 2013). Although these surveys do have self-reported measures of health status, much of the health data collected currently in Canada focuses on access to and the use of health services (Bryant, 2009). Improvements in how health is understood and measured is needed to support a broader definition of health based upon an understanding of unmet health needs and the social factors and determinants that influence health

(Raphael, 2009; Gallagher, Kleinman & Harper, 2010; Litaker & Love, 2005). For this study, both aggregate-level and individual-level data was used from the Canadian Community Health Survey (CCHS) and the Nova Scotia Atlee Perinatal Database (NSAPD). In addition, to attend to the challenges in determining (measuring) health needs using existing data sources, this study used a mixed methods design, which included a qualitative approach to elicit perspectives from health leaders and policy makers, health care providers and Nova Scotia women regarding health needs in primary maternity health care.

Needs-based HHR and health systems planning. Based on recommendations from the First Ministers Accord on Health Care Renewal, the Canadian Advisory Committee on Health Delivery and Human Resources (ACHDHR) was created in 2002 as a national body to provide policy and planning advice and information sharing regarding HHR. Informed by consultations with jurisdictions and stakeholders, and seminal reports on the health care system in Canada (Romanow, 2002; Kirby, 2003), the ACHDHR (2004, 2007) developed a needs-based pan-Canadian framework, based upon the work of O'Brien-Pallas, Tomblin Murphy and colleagues (2001, 2005) to help shape the future of HHR planning and health service delivery (McIntosh, Torgerson & Wortsman, 2007). The Health System and Health Human Resources Planning Conceptual Framework continues to inform HHR planning in both the acute and primary care sectors in several provinces and territories across Canada as well as in a number of international contexts (e.g.: Jamaica, Zambia, and Brazil) (Birch et al., 2005; Goma et al., 2011; 2012; Tomblin Murphy et al., 2007b, 2007c, 2009a, 2010, 2011, 2012a, 2012b, 2013).

For more than a decade, there has been a wealth of policy and planning knowledge to support the implementation of needs-based planning specifically, and generally within broader health systems planning (Bloor & Maynard, 2003; Canadian Labour and Business Centre, 2003; Canadian Medical Association/Canadian Nurses Association, 2005; Fooks & Maslove, 2004; Health Action Lobby, 2006, 2009; O'Brien-Pallas et al., 2007). However, challenges remain for the application and operationalization of needs-based planning in Canada and around the world. These obstacles may be related in part to silo-structured approaches to health systems reform that isolate health human resources planning from broader health and system planning

(Birch, Kephart, Tomblin Murphy, O`Brien-Pallas, Alder & Mackenzie, 2009; Bloor& Maynard, 2003; Tomblin Murphy & O`Brien-Pallas, 2002). The silos prevent sharing of knowledge, information and best practices regarding health human resources planning and may also support the use of short-term solutions to health workforce shortages when multiple policy interventions (both short and long term) involving multiple providers are optimal and/or required (Tomblin Murphy & O'Brien -Pallas, 2002; Dubois & Singh, 2009; Duckett, Bloom & Robertson, 2012; Tomblin Murphy, Birch, Alder et al., 2009). Without supporting a broad understanding of health, which bases health workforce planning on population health needs, planners and decision-makers will continue to support supply and demand approaches to HHR that perpetuate existing inequities and inefficiencies in the health system (Birch, 2007).

  Measuring health need. As there is no 'gold standard' of measure of population health status or need for health care for the direct purpose of health human resources planning (Birch, Eyles & Newbold, 1995), indicators to measure health need must be chosen carefully as the intent is that the selection and analysis of need indicators will inform health care planning and the allocation of health care resources. Birch and colleagues state that need indicators must be reliable (reproducible), valid (measures what it is supposed to measure) and responsive (responds to changes). Birch and colleagues suggest that in order for an indicator to be used as a standard measure of health need, it must be 1) free of the influence of supply or availability of health care; 2) show variation between populations; 3) relate types of morbidity that are responsive to health care services and 4) reflect current population characteristics.

  As outlined in the synthesis by MacKenzie and colleagues (2013), both direct and indirect indicators of health need have been used in a number of health resource planning studies (Birch and Chambers, 1993; Birch, Eyles & Newbold, 1995; Eyles and Birch, 1993; Scheffler et al., 2008, 2011; Tianviwat, Chongsuvivatwong & Birch, 2009; Tomblin Murphy et al. 2009a, 2009b, 2010, 2011, 2012a, 2012b; 2013).

  Direct measures focus on the quantification of how health will be improved and are typically based on health professional assessments and or standardized approaches for population self-assessments. There are two caveats with the use of these direct measures. First, health professional assessments often correlate with health care utilization and

utilization does not necessarily provide a complete picture of health needs. As such, using health care utilization data as an indicator for health care needs may create inefficiencies in the allocation of health resources (Birch & Eyles, 1991). Secondly, population based surveys that measure health status require, as suggested by the health needs definition by Birch and Eyles, the inference of a connection between need for health care and health status. The measures of need used most often in the literature on needs-based HHR were rates of incidence or prevalence of specific health conditions, including chronic (Singh et al., 2010; Scott et al., 2011; Tomblin Murphy et al., 2011; 2012b; Segal, Leach, May, & Turnbull, 2013) and infectious diseases (Kurowski et al., 2003; Kurowski & Mills, 2006; Scott et al., 2011; Tomblin Murphy et al., 2011, 2012b) mental health conditions (O'Kane & Tsey, 2004; Andrews et al., 2006; Segal, Dalziel & Bolton, 2008; Singh et al., 2010; Scheffler et al., 2011; Segal & Leach, 2011; Scott et al., 2011), and injuries (Scott et al., 2011; Tomblin Murphy et al,., 2009b; 2012b).

Two prominent standardized health status assessment tools in the literature used to measure the need for health care and health status are the Standard Form-36 (Ware & Sherbourne, 1992) and the Health Utility Index (Roberge, Berthélot & Wolfson, 1995). Using these tools (and others), a number of studies have demonstrated a correlation between self-reported health status used as a proxy for health need and use of health care services (Pappa and Niakis, 2006; Stahlnacke, Soderfeldt, Unell, Halling & Axtelius, 2005; Laupacis & Evans, 2005; Allin, 2006; Ferguson, Chiprich, Smith, Dong, Wannamaker, Kobau, et al., 2008; Waller et al., 2012). However, in a recent synthesis of needs-based HHR (Mackenzie, Elliott Rose, Tomblin Murphy & Price, 2013) only one paper was found that used a standardized measure of health status to plan for health human resources (Litaker & Love, 2005).

Indirect measures of health needs infer need from some other health or social attribute. Such measures from the literature are mortality and fertility ratios and socio-economic status. Standardized mortality ratios (calculated as the number of deaths in a population as a percentage of the number of deaths expected if the population experienced the same age and gender specific rates of death as the overall population which it belongs) (Mays, 1995; Eyles et al, 1991) or premature mortality rate (deaths before the age of 75 years) (Roos & Mustard, 1987; Carstairs & Morris, 1989) have been

found to be good indicators of need for health care but have limited use in maternity care due to low case fatality and poor correlations between mortality and prevalence of perinatal morbidity (Birch & Eyles, 1991). In contrast, the standardized fertility ratio (measure of birth rate in a population after allowing for age distribution, including still and live births) and the incidence of low birth weight babies (live births, usually defined as less than 1500g) have been demonstrated to be key indicators for maternal and newborn health care needs (Birch, Chambers, Eyles, Hurley & Hutchinson, 1993; Birch & Eyles, 1991). Measures of social deprivation have been used as indirect measures of health care needs based on the association of social deprivation and morbidity (Mays & Bevan, 1986; Townsend, 1990; Eyles & Birch, 1993; Butler, Petterson, Bazemore & Douglas, 2010). The benefit of using these alternative proxies is that the contextual social factors that affect health are considered and this is supportive of a wellness-focused as opposed to solely an illness-focused health system (Birch, Eyles & Newbold, 1995).

Definitions and proxies for population health needs have been developed and tested over the past decade; resulting in an understanding of what current measures best indicate the health needs of people (Birch et al., 2007, 2009; Tomblin Murphy et al., 2004; 2007a; 2009; 2012b; 2013). Using validated direct and/or indirect measures of health, the needs-based component of the Health System and Health Human Resources Planning Conceptual and Analytical frameworks are based upon three key elements: epidemiology, demographics and levels of service (Birch et al., 2007). *Epidemiology* is the prevalence of measures of health and/or incidence of disease in particular populations. For example, in maternity care, there are increasing numbers of pregnant women with hypertension and diabetes (PERU, 2011). The intent is that the estimation of prevalence of conditions is independent of the demography variable. This approach takes into account the differences between two populations with similar size and age/gender distributions (Birch et al., 2009).

The second part of the needs component of the HHR Analytical Framework is *Demographics.* This is population size, including the overall population as well as the size of sub-populations that may have particular health needs related to race/ethnicity, rural and urban disparities, gender or low socioeconomic status. *Levels of service* relates to the amount of service required by a population. For example, in primary maternity

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care some screening programs are recommended universally while others are recommended for particular sub-populations of women or newborns (RCP, 2007). The intent of the Health System and Health Human Resources Planning Conceptual and Analytical Frameworks are to identify needs of particular populations and link resources to populations, not to suggest that all needs of a particular community be met by provision of all services in that community (Birch & Chambers, 1993).

A key issue in this research was to link the selected population health and clinical variables from two secondary databases (the Canadian Community Health Survey[4] and the Nova Scotia Atlee Perinatal Database) as key proxy health needs indicators in order to demonstrate a statistical relationship between health needs and the independent variables related to the social determinants of health (income, rurality, education and race/ethnicity). In the next section, the literature review on indicators provides an understanding of the types of perinatal indicators that are typically selected to reflect maternal and newborn outcomes. In Chapter Four, the rationale for selecting the different indicators is described. The potential influence of system, organizational and individual care factors to address the link between maternal and newborn morbidity, health status and health human resources in primary maternity health care are discussed in Chapter Seven.

Summary. A recent review and synthesis of current needs-based HHR approaches resulted in five key themes: the estimation of current versus future health system or HHR requirements; the leading researchers in the field; measurement of health care needs; types of data sources; and supports required for implementation (MacKenzie et al.; 2013) These themes are similar in the updated literature from 2013-2015. To attend to some of the challenges noted in the literature related to HHR generally and needs-based approaches specifically, the authors of the review (MacKenzie) identified several key areas for future research: 1) the enhancement of measurement and collection of data on health care needs, including consideration of the potential use of prospective data to inform HHR planning; 2) continuing the evaluation of new and existing models of care

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[4] CCHS data could not be used for analysis in the study as the sample was insufficiently powered and sampling weights could not be applied

delivery and the impact of those models on patient, provider and system outcomes; and 3) evaluation of the performance of needs-based health system and HHR planning policies.

Selecting measures of maternal-newborn health needs.

Indicators. For this research, the key is to select maternal and newborn indicators that directly or indirectly signify the need for health care services and therefore, health human resources. Therefore, literature related to indicators generally and specifically, the literature on perinatal indicators was reviewed. For overall health, indicators often focus on rates of mortality and morbidity, rates of disease and prevalent health conditions, access to health services and self-reported health status as well as indicators related to the determinants of health such as clean water, safety and education (World Health Organization, 2012).

Canada's Health Indicators Framework (Statistics Canada, 2011a) outlines five key health indicator dimensions: health status, non-medical determinants of health, health system performance, community and health system characteristics and equity. Characteristics of a good health indicator include: the indicator is clear, interpretable, and actionable, it is based on standard and therefore comparable definitions, whether or not there is a reliable and valid measure and the data used to inform the indicators are available at the national, provincial, territorial and regional levels (Mainz, 2003).

The authors of several recent reviews and consultations on HHR data suggest a need for national indicators for HHR (WHO, 2009; Tomblin Murphy & O'Brien-Pallas, 2005; Tomblin Murphy & de Campos, 2006; CIHI, 2009b). Priority HHR information needs include: population demographics, education/training, geographical distribution, migration, non migration-related attrition, employment/practice characteristics and productivity.

For maternal-newborn care, specific key perinatal indicators highlighted in the most recent national Perinatal Health Report (PHAC, 2008, 2011) include: fetal death, infant mortality, small and large for gestational age rates, preterm birth, post-term birth, maternal mortality, births to teenage mothers, births to older mothers, congenital anomalies, severe maternal morbidity and rates of cesarean birth, multiple birth and breastfeeding. The key then, is to connect selected maternal newborn health indicators

with health human resources needs in an effort to create evidence-based service delivery models.

The standardized fertility ratio (measure of birth rate in a population after allowing for age distribution, including still and live births) and the incidence of low birth weight babies (live births, usually defined as less than 1500g) have been used as key indicators for maternal and newborn health care needs in HHR research (Birch & Eyles, 1991; Scheffler et al., 2008, 2011). Standardized (maternal) mortality ratios are not appropriate for use in planning maternity care as maternal mortality in developed countries and specifically in Canada is low (9.0 per 100,000 deliveries) and lower in Nova Scotia (5.6 per 100,000 deliveries) (PHAC, 2013). Maternal mortality ratios are not reflective of maternal morbidity or health needs, specifically in high-income countries. Therefore, additional measures for maternal and newborn health needs are required to adequately plan for perinatal services. The standardized fertility ratio was not applicable to this research as it describes the birth rate relative to the general population and the entire population of mothers and newborns in Nova Scotia is known via the Nova Scotia Atlee Perinatal Database (NSAPD).

Recent work from provincial perinatal organizations across Canada in British Columbia, Ontario and Nova Scotia and internationally in the United States, Europe and Australia focuses on the development of maternal and newborn health indicators in an effort to inform care planning and policy at all levels (Australian Institute of Health and Welfare (AIHW) National Perinatal Epidemiology and Statistics Unit, 2013; Beck et al., 2011; California Maternity Quality Care Collaborative (CMQCC), 2008; Euro-Peristat, 2012; Perinatal Services British Columbia, 2013; RCP, 2013; Sprague et al., 2013).

A multi-country initiative in Europe, EURO-Peristat (2012), provides maternal-newborn health indicators grouped into four themes: fetal, neonatal, and child health, maternal health, population characteristics and risk factors, and health services. They recommended ten core indicators related to perinatal, infant and maternal mortality, neonatal birth weight and gestational age, multiple birth rate, maternal age and parity and mode of delivery. They also define twenty additional indicators and several that require further development. Similarly, the Australian government has identified ten key indicators for perinatal care. There is one health status indicator (smoking) and one

related to access to care (availability of antenatal care); all other indicators relate to medical interventions or assessments (Australian Institute of Health and Welfare (AIHW) National Perinatal Epidemiology and Statistics Unit, 2013). The California Maternity Quality Care Collaborative (CMQCC) provides data, resources and supports to clinicians and organizations across California (CMQCC, 2008; Korst, Gregory, Lu, Reyes, Hobel & Chavez, 2005). As part of the work of the CMQCC, the National Quality Forum (NQF) Perinatal Care and Reproductive Health Project recommends nine maternity care quality indicators related to cesarean section, episiotomy, birth trauma, antibiotic use, low birth weight infants, use of antenatal steroids and exclusive breastfeeding. For more than a decade, there are also maternal, newborn and perinatal care service indicators available via the Pregnancy Risk Assessment Monitoring System (PRAMS) Reports from the Center for Disease Control and Prevention. The indicators include health status and lifestyle indicators such as maternal smoking and alcohol use, breastfeeding and nutrition as well as prenatal and postnatal care, family planning and mental health (Beck et al., 2011). Data are available in many states across the United States.

In Canada, CIHI released a number of reports in a series entitled *Giving Birth in Canada* (Canadian Institute for Health Information (CIHI), 2004a). The first report focused on the health and health care of Canada's mothers and infants and included information on the scope of maternity care providers and trends in maternal and newborn care. The second report, *Giving Birth in Canada: A Regional Profile* (CIHI, 2004b), highlighted health care and health status indicators for mothers and newborns at the regional, provincial and territorial levels. Indicators included in the report were the use of epidurals, assisted deliveries and women having Caesarean sections for the first time. An additional report explored the costs associated with maternity and newborn care in Canada (CIHI, 2006). Updates and highlights of the selected indicators (CIHI, 2010; 2011; 2012; 2013) as well as focused reports such as a profile on preterm birth (CIHI, 2009), rural maternity care (CIHI, 2013) and hospital-based perinatal interventions (CIHI, 2013; 2014) have recently been produced.

The Canadian Perinatal Surveillance System (CPSS) was part of Health Canada's initiative to strengthen national health surveillance capacity. Supported through the Maternal and Infant Health Section in the Public Health Agency of Canada, the aim of

the CPSS was to provide national surveillance information about maternal-newborn care in Canada. Of the 52 perinatal indicators created by the CPSS, 27 of them were reported on regularly via the Canadian Perinatal Health reports (Public Health Agency of Canada (PHAC), 2013). The 27 perinatal indicators (Table 2) are categorized into determinants and outcomes of maternal, fetal and infant health and further sub-divided into behaviours and practices, health services, maternal health outcomes and fetal and infant health outcomes.

Table 2: Select Perinatal Indicators from the Canadian Perinatal Surveillance System (CPSS) (Public Health Agency of Canada, 2013)

A: Determinants of Maternal, Fetal and Infant Health	
	Behaviours and Practices
	Rate of Maternal Smoking during Pregnancy
	Rate of Maternal Alcohol Consumption during Pregnancy
	Rate of Breastfeeding
	Rate of Low Maternal Education
	Rate of Live Births to Teenage Mothers
	Rate of Live Births to Older Mothers
	Health Services
	Rate of Labour Induction
	Rate of Cesarean Delivery
	Rate of Operative Vaginal Delivery
	Rate of Trauma to the Perineum
	Rate of Early Maternal Discharge from Hospital after Childbirth
	Rate of Early Neonatal Discharge from Hospital after Birth
B: Maternal, Fetal and Infant Health Outcomes	
Maternal Health Outcomes	Maternal Mortality Ratio
	Severe Maternal Morbidity Ratio
	Induced Abortion Ratio
	Rate of Ectopic Pregnancy
	Rate of Maternal Readmission after Discharge following Childbirth
Fetal and Infant Health Outcomes	Preterm Birth Rate
	Post-term Birth Rate
	Small-for-Gestational-Age Rate
	Large-for-Gestational-Age Rate
	Fetal Mortality Rate
	Infant Mortality Rate and Causes of Death
	Severe Neonatal Morbidity Rate
	Multiple Birth Rate
	Prevalence of Congenital Anomalies
	Rate of Neonatal Hospital Readmission after Discharge following Birth

The indicators from the Better Outcomes and Registry Network (BORN, 2015) in Ontario are part of a Maternal-Newborn Dashboard. Using a modified Delphi technique, six indicators were selected that focus primarily on the care related to perinatal interventions (induction, cesarean section, screening) with the inclusion of one indicator related to health practices, formula supplementation for those mothers intending to breastfeed (Sprague et al., 2013). Perinatal Services British Columbia (2013) offers ongoing surveillance information for a number of maternal and newborn indicators (maternal age, parity, smoking, BMI, induction, fetal health surveillance, epidural use, cesarean section, delivery care provider, postpartum length of stay, stillbirths, multiple and preterm births and breastfeeding). In addition to perinatal indicators, a complex consultation process as well as an environmental scan was undertaken in Canada to select primary health care indicators (CIHI, 2006).

The Reproductive Care Program of Nova Scotia has been producing standardized reports for several decades that include the same data as Ontario and BC, with the addition of many more data variables in the Nova Scotia Atlee Perinatal Database (NSAPD) (RCP, 2000). Currently, using NSAPD-specific codes, lab downloads, Vital Statistics information and downloads from the Canadian Institute for Health Information; there are thousands of variables and derived variables available via the Nova Scotia Atlee Perinatal Database. The most recent perinatal indicator report from the Perinatal Epidemiology Research Unit (2012) contains indicator information from the NSAPD. Indicators in the report include: number of births, perinatal and infant mortality, determinants of maternal, fetal and infant health such as parity, age, smoking, obesity, diabetes, hypertension and breastfeeding and labour and birth process information such as induction of labour and mode of delivery as well as outcome indicators such as preterm birth and neonatal complications related to respiratory distress or infection. The local, national and international work related to developing perinatal indicators informed the selection of relevant primary maternity health care indicators for this study. Since the NSAPD was one of the main sources of secondary data for my planned research, the key was to select variables from the NSAPD that directly or indirectly signify the need for health care services and therefore, health human resources. Therefore, using evidence-based information and current data sources, maternal-newborn health indicators were

selected to inform the quantitative phase of my research. The selected indicators and rationale for selection are detailed in Chapter Four.

It is important to note that similar to the work in the US, UK and Australia, many of the perinatal indicators that have been used or that are under development in Canada are clinically-based with data sources from birth/clinical registries (Better Outcomes Registry & Network (BORN), 2012; Perinatal Health Services British Columbia, 2012; PERU, 2011; RCP, 2000). Since clinical diagnoses, interventions and outcomes provide only one perspective of pregnancy, birth and newborn care, satisfaction surveys and questionnaires are also widely used to gather information about patient experiences. These are explored in the next section.

Patient satisfaction. A number of surveys and questionnaires have been developed to measure patient satisfaction and quality of health care in various care settings (Carr-Hill, 1992; Harris, Munagi, Swindle, Tierney & Weinberger, 1999; Jenkinson, Coulter, & Bruster, 2002), including primary health care (Haggerty et al., 2011a, 2011b, 2011c, 2011d; Shi, Starfield & Xu, 2001; Santor et al., 2011) and maternity care (Alexander, Sandridge & Moore, 1993; Melia, Morgan, Wolfe & Swan, 1991; PHAC, 2009; Senarath, Fernando and Rodrigo, 2006; Smith & Lavender 2011). One of the most widely used and validated general patient satisfaction surveys for in-patient use is the *Picker Patient Experience Survey* (PPES) (Jenkinson et al., 2002). The PPES has also been used in research evaluating patient engagement and involvement in health primary health care in the United Kingdom (Parson, Winterbottom, Cross & Redding, 2010).

Coulter (2006) conducted surveys in the United Kingdom, Australia, Canada, New Zealand, Germany and the United States using the PPES. Six indicators of patient engagement: quality of doctor- patient communication, access to alternative sources of information and advice, provision of preventive care and advice, informed choice of provider, risk communication and involvement in treatment decisions and support for self-care and self-management were compared across countries. There were some challenges comparing data between countries. To address such challenges, Haggerty and colleagues (2011a; 2011b; 2011c; 2011d) conducted a comprehensive review and validation of instruments designed to evaluate Canadian primary health care from the

patient's perspective. The authors concluded that there are different valid and reliable subscales from existing primary health care measures that could be used to measure different aspects of care. Recommended measures were the *Primary Care Assessment Survey (PCAS)* (Safran et al., 1998) and the *Primary Care Assessment Tool- Short Form* (Shi et al., 2001).

The most notable, recent questionnaire related to maternity care was the pan-Canadian *Maternity Experiences Survey (MES)* (Dzakpasu, Kaczorowski, Heaman, Duggan & Neusy, 2008). Although, there have been a number of national and regional surveys exploring women's maternity care views and experiences in the United States, Russia, the United Kingdom and eastern Europe (Declercq, Sakala, Corry, Applebaum, Risher, 2002; Green, Baston, Easton & McCormick, 2003; Redshaw, Rowe, Hockley & Brocklehurst, 2007; Scottish Programme for Clinical Effectiveness in Reproductive Health, 1999; Brown & Lumley, 1994, 1998; Waldenström, Hildingsson, Rubertsson, & Radestad, 2004; Chalmers, Muggah, Samarskaya & Tkatchenko, 1998; Chalmers, Samarskaya, Tkatchenko & Muggah, 1999a, 1999b), the MES was the first Canadian survey to gather data from women about their pregnancy, birth and postpartum experiences. The telephone survey was developed by expert consensus and through extensive pilot testing and was administered to over 6000 Canadian women. Findings from the MES suggest that most women were satisfied with the care they received. However, the use of interventions in pregnancy, labour and birth was not in-keeping with current best practice and evidence. Many women reported receiving investigations and interventions that may have been unnecessary. For example: almost 50% of women surveyed had three prenatal ultrasounds, almost two-thirds of women had continuous electronic fetal monitoring (EFM) during labour and ten percent of breastfeeding women reported supplementing their newborns with infant formula within the first week after birth (Chalmers, Dzakpasu, Heaman & Kaczorowski, 2008). Additional findings from the MES related to broader health and family issues identified by women such as challenges with mental health and increased rates of stress and domestic violence, particularly for young women.

Many of the existing instruments/questionnaires for assessing maternal experiences and satisfaction focus solely on specific perinatal time frames, most often

labour and birth. Examples include the Labour Agentry Scale developed by Hodnett and colleagues (1987), the Childbirth Self-Efficacy Inventory (Lowe, 1993) and the Quality from the Patient's Perspective Intrapartal (QPP-I) instrument which assesses women's perceptions of childbirth care (Wilde-Larsson, Larsson, Kvist & Sandin-Bojo, 2010) and the Childbirth Experience Questionnaire (CEQ) (Dencker, Taft, Bergqvist, Lilja & Berg, 2010).

One of the limitations of data retrieved from databases or surveys is that it may be difficult to gather information about complex processes of care such as patient experiences and satisfaction with particular aspects of care and the relationships between patients and care providers (Brookhart, Sturmer, Glynn, Rassen & Schneeweiss, 2010). The details about how care was provided and provider-patient relationships are key to gaining a rich understanding of patients' life contexts and stories (Teijlingen et al., 2003).

The World Health Organization (2005) describes the way individuals are treated and the environment of treatment as *responsiveness*. Based upon a review of patient satisfaction and quality care literature (de Silva, 2000), WHO developed eight domains of responsiveness that can be measured by asking people about their health care experiences (Darby, Valentine, Murray & de Silva, 2000). The eight domains are: dignity, autonomy, confidentiality, clear communication, and prompt attention, access to social support networks, quality basic amenities and choice of health care provider. As these domains include multiple aspects of the potential patient care experience, they were used to inform the questions for the focus groups and interviews in the qualitative phase of this research. The domains were also used in the qualitative analysis, Chapter Six.

There is also a wealth of qualitative literature in maternity care exploring women's perinatal experiences. For example, Hodnett (2002) reviewed 137 reports of factors influencing women's evaluations of their childbirth experiences. She found that personal expectations, the amount of support from care providers, the quality of the caregiver-patient relationships and women's involvement in decision making were most important regardless of maternal age, socioeconomic status, ethnicity, childbirth preparation, the physical birth environment, pain, immobility, medical interventions, and continuity of care. In an integrative review of women's experiences of prenatal care, Novick (2009) reviewed 36 articles published between 1996-2007 and found that

women's care preferences included reasonable waits, unhurried visits, continuity, flexibility, comprehensive care, meeting with other pregnant women in groups, developing meaningful relationships with professionals, and becoming more active participants in care (Novick, 2009). In addition, some studies in the review concluded that vulnerable women (low income or those from different racial/ethnic groups) experienced discrimination or stereotyping as well as external barriers to care. This is similar to findings from local research focused on the childbirth experiences of African Nova Scotia women (Enang, 1999).

Carver, Ward & Talbot (2008) used Bradshaw's taxonomy of needs (felt, expressed, normative and comparative) in a qualitative study with women who had just recently given birth. The authors found that current models of maternity care are dominated by normative needs, which are focused on a biomedical model of health care with a focus on the physiological aspects of pregnancy and birth. In keeping with a broader definition of health, based on the social determinants of health, women in the study described additional health needs related to social, economic, emotional and spiritual factors. In 2007-2008, the SOGC (2009) conducted focus groups with women as part of a focus on health human resources planning for intrapartum care. Women in the focus groups said they would like to have ongoing, reliable, respectful care from a care provider of choice, be provided information about their health and care options and be consulted about decisions related to pregnancy and delivery. Similarly, in Nova Scotia, Aston et al. (2010) conducted interviews with women and found that relationships with care providers, emotional support, control and choice, spending time and continuity of care are important to women. Maternal satisfaction is an important aspect of health care as it is directly related to positive relationships, choice and communication with care providers (Aston et al., 2010; SOGC, 2007; PHAC, 2009) as well as confidence in the maternal role, attachment of mother and child and breastfeeding success (Ip et al., 2007; Ngai, Chan & Ip, 2010; RCP, 2008).

All the elements identified in the literature above---provider education and skills, availability of providers, care encounters between women and providers, continuity of care and the nature of provider-patient relationships as well as the quality and type of care provided and the coordination of services across sectors and settings---are all very

important non-traditional health indicators to consider when planning health human resources. Therefore, in an effort to add to the health needs indicator analysis in the quantitative part of my research, I explored women's pregnancy, labour and birth and postpartum experiences in the qualitative component of this research in an effort to create a fulsome understanding of maternal-newborn primary maternity health care needs. I also explored the experiences of health care providers and health leaders to seek out their perceptions of maternal-newborn health needs. The findings from the interviews and focus groups with women, health leaders and health care providers are presented and discussed in Chapters Six and Seven. Once maternal-newborn primary maternity health needs were identified, the challenge then was to translate those needs into potential strategies to improve health human resources planning.

Summary. A number of perinatal organizations have developed key indicators to measure maternal and newborn health. However, it is recognized that many of the current perinatal indicators focus primarily on interventions and the physiological processes of pregnancy, birth and neonatal care. Data retrieved from databases or surveys are important to populate the selected indicators for the quantitative phase of this research. The challenge in the quantitative phase of my research was to select and populate relevant maternal-newborn health need indicators with available and current data sources in an effort to be inclusive of a broader understanding of maternal-newborn health and to inform health system and health human resource planning (Kephart & Asada, 2009). However, it's difficult to gather information about complex processes of care such as patient experiences and satisfaction, the relationships between patients and care providers and/or patients' life contexts from survey and database sources. Therefore, having both quantitative and qualitative phases in the research was important in identifying gaps and corroborating findings in the analyses in each phase in an effort to fully understand maternal-newborn health needs in Nova Scotia.

In addition to understanding how best to determine women and newborn health needs in Nova Scotia, it is also important to be familiar with the landscape of local maternity care in an effort to understand the gaps and potential opportunities for service and policy change to meet maternal and newborn health care needs. As such, the clinical

and policy trends that have informed maternity care in Canada and specifically in Nova Scotia are reviewed in the following section.

   Trends in maternity care. Like other areas in Canada, most primary maternity care in Nova Scotia is provided by obstetricians or family physicians. This includes any combination of prenatal, intrapartum and postnatal care. However, there has been a dramatic decline in the number of family physicians providing intrapartum care in Nova Scotia (Nova Scotia Department of Health, 2005) and increasing numbers of specialists and sub-specialists providing primary maternity care; even for those women whose needs do not require specialist services. There are increasing numbers of primary health care nurse practitioners and family practice nurses in Nova Scotia; however their involvement in primary maternity care varies. Midwives were legislated and regulated to provide care in the province in March 2009 (Government of Nova Scotia, 2009); however there are currently only nine regulated and practicing midwives in the province. In Canada, the majority of women received their prenatal care from an obstetrician/gynecologist (58.1%) or family physician (34.2%) with an additional 6.1% and 0.6% of women receiving prenatal care from a midwife or nurse/nurse practitioner, respectively (PHAC, 2009). The majority of births are attended by obstetricians. Of the 293 hospitals included in the Canadian Hospitals Maternity Policies and Practices Survey report, (representing 287,003 births), 72% of births are attended by obstetricians, 25% by family physicians, and 3% by midwives (PHAC, 2012). Similarly, in Canada, the majority of women receive their prenatal care from an obstetrician/gynecologist or family physician with less than 10% from midwives or nurses/nurse practitioners (PHAC, 2009).

   Increasing interventions and changing demographics. During this research, Nova Scotia was divided into ten district health authorities (DHAs 1-9 plus the IWK Health Centre). For districts 1-8, there is a regional facility within the district that offers active maternity services. Most primary maternity care providers practice near the regional facilities. In the central district (DHA 9), there are a number of primary maternity care providers clustered around the urban core and the women's and children's tertiary hospital. The other tertiary centre focuses on adult emergency, acute and chronic care services minus obstetrical and gynecological women's health. Of the 6186 vaginal births in Nova Scotia for the 2013-2014 fiscal year, 51.3% were attended by family physicians,

46.3% by obstetricians and 2.3% by midwives. The remaining 0.1% of births were either attended by another health care provider (e.g. registered nurse), were unattended by a health care provider or it was unknown. The estimated numbers of primary maternity care providers currently practicing in Nova Scotia are highlighted in Table 3 below. These numbers are derived from the College of Physicians and Surgeons website (2015, https://cpsnsphysiciansearch.com/search.aspx), the College of Registered Nurses of Nova Scotia website (2015, www.crnns.ca) and from directed searches regarding midwifery services in the three models sites around the province (Antigonish, Halifax (IWK Health Centre) and Bridgewater).

Table 3: Types and Numbers of Primary Maternity Care Providers in NS

Care Provider Type	Population of Primary Maternity Care Providers in NS
Family Physicians	467 (varying combinations of prenatal, intrapartum and postpartum/postnatal care)
Midwives	9
Family Practice Nurses	40
Nurse Practitioners	150 (some primary health care, others specialized)
Obstetricians	72
Total	812

In addition to solo physician practices, there are increasing numbers of group practice clinics in Nova Scotia; some offer full spectrum primary care while others focus solely on perinatal care. Typically the clinics involve shared care between physicians with overall coordination of the clinic by a registered nurse. There are some collaborative primary health care clinics in Nova Scotia. These may be hospital or community-based and often include care services from a variety of health professions including: physicians, nurses and nurse practitioners, midwives, dietitians, social workers etc. In some districts, these clinics are aligned with the Collaborative Emergency Centres (Nova Scotia, 2015). In addition to changes in primary care delivery models, the number of hospitals providing birthing services in Nova Scotia has declined from 40 in the 1980's and 1990's to eight

regional hospitals, one community hospital and the tertiary centre in 2015. Although the reasons the regionalization of maternity care in Nova Scotia were valid (limited human resources, varying levels of confidence to provide care, allocation of health resources), it has resulted in increased travel times for women to access perinatal emergency and labour and birth services (CIHI, 2012).

As illustrated in Table 4, in addition to variations in the service delivery models across Nova Scotia, there are also variations in the interventions and birth outcomes across districts. This is similar to maternity care trends noted in both national and provincial reports (CIHI, 2004, 2007, 2008; PERU, 2011; RCP 2008, 2012). Over the past several decades, there have been significant upward trends in the use of obstetrical interventions such as cesarean section, induction of labour and epidurals for pain management in labour as well as changes in maternal demographics including increased maternal pre-pregnancy weight and gestational weight gain and advanced maternal age.

Table 4: Maternity Care Interventions and Outcomes in Nova Scotia 2013-2014*

	# of Births	C/S (%)	Induction of Labour (%)	Breast feeding (%)	Smoking (%)	Pre-pregnancy BMI >30 (%)
CCHS Zone 1201 (former NS DHAs 1 and 2)	795	28.0	25.0	74.7	17.9	24.0
CCHS Zone 1202 (former NS DHA 3)	701	26.2	18.8	81.9	17.5	17.1
CCHS Zone 1203 (former NS DHAs 4 and 5)	822	20.7	21.3	80.1	19.4	24.3
CCHS Zone 1204 (former NS DHAs 6 and 7)	700	28.7	21.7	77.3	16.8	17.4
CCHS Zone 1205 (former NS DHA 8)	1020	31.5	22.4	70.2	27.4	25.1
CCHS Zone 1206 (former NS DHA 9)	4334	26.4	30.0	89.0	8.0	16.3
NS Total	8387	26.9	23.2	82.9	14.0	19.1

*As of April 1, 2015 Nova Scotia transitioned to two health authorities (the Nova Scotia Health Authority and the IWK Health Centre) and four new management zones: DHAs 1, 2, 3= Zone 1; DHAs 4, 5, 6=Zone 2; DHAs 7 and 8=Zone 3 and DHA 9=Zone 4.

However, the CCHS sampling zones noted in Table 4 do not correspond with the new management zones. Since this study commenced before the health authority transition, data in this study are based upon the CCHS sampling zones and the former Nova Scotia nine district health authorities plus the IWK Health Centre.

National and provincial initiatives. From a policy and planning perspective, there have been a number of initiatives and reports at both the provincial and national levels that continue to inform maternity care planning in Canada. Originally developed in 1968 as standards for maternity and newborn care, the *National Family-Centred Maternity and Newborn Care* guidelines have been revised over the past several decades to reflect the ever-changing landscape of health care generally and specifically in maternal-newborn care. As guiding principles for maternal-newborn system planning across Canada, the guidelines aim to support maternal-newborn care where birth is considered a normal healthy process that is unique to each woman and care involves informed decision-making based on family-centred research. There is also a focus on healthy birth outcomes, the appropriate use of technology and the quality of care is measured with meaningful indicators (PHAC, 2000). In addition to the family-centered care guidelines (PHAC), CIHI (2004) produced a report focusing on the scope of maternity care providers in Canada and the changing health needs of women and newborns. Building on a perinatal indicator report released in 2003, the first report in the series *Giving Birth in Canada* (PHAC, 2004), highlighted the changing landscape of maternal and newborn care. Such changes included more obstetricians and fewer family physicians attending births, increasing numbers of regulated midwives in Canada, shorter post-partum lengths of stay in hospital and challenges related to providing care for women living in rural and remote areas of the country.

The Multidisciplinary Collaborative Primary Maternity Care Project (MCP[2]), funded through the Primary Health Care Transition Fund of Health Canada, brought together representatives from maternity care professional organizations across Canada to review current international and national evidence and consult with providers and women to develop standards and tools to facilitate the implementation of national multidisciplinary collaborative primary maternity care (Peterson & Mannion, 2007).

However, so far uptake of the information developed by the project is limited (Peterson et al., 2007).

In 2003, a program was launched by the Society of Obstetricians and Gynecologists of Canada (SOGC) that provides post-licensure intrapartum education as well as team-building exercises. The MORE$_{OB}$ (Managing Obstetrical Risk Efficiently) program aims to improve patient safety by improving the quality of intrapartum care. Preliminary evaluation in several provinces suggests improvements in team functioning, practice culture and maternal and infant outcomes (Nguyen, Jacobs, Wanke, Hense & Sauve, 2010). The *National Birthing Initiative for Canada* suggests a long-term knowledge translation strategy is required to support collaborative primary maternity care models across Canada (SOGC, 2008). The authors stress that the strategy should recognize that there's not necessarily one 'model' of primary maternity care that will work well. Depending on the needs of the local population and specific contextual factors, some models may work well in some settings but not in others. In addition to the *National Birthing Initiative*, the SOGC (2009) produced a health human resources strategy for emergency intrapartum care. In addition to focus groups with women, the SOGC surveyed obstetrical and gynecological physicians and residents across the country. Using a population to workforce ratio approach and an estimated 150 births per physician per year, they estimated that there will be a shortage of between 584-856 obstetricians/gynecologists per year from 2009 to 2021.

Using the family-centered care principles and in response to looming health human resources shortages in maternity care, provinces across Canada began to focus on developing strategies to plan for maternal-newborn care services. In 2004, the *Ontario Women's Health Council* appointed the *Ontario Maternity Care Expert Panel* (OMCEP) to examine and make recommendations to improve the maternity care system in Ontario (Natale et al., 2006). Members of the panel included family physicians, midwives, nurses, obstetricians, and consumers. Recommendations from the panel included: increasing the number of maternity care providers; establishing an ongoing provincial maternity care program; creating a sustainable maternal and newborn care plan for Ontario with integration of that plan across ministries, all regions and services; aligning the maternity care plan with the government strategies for primary health care; developing ongoing

performance measurement to ensure access to quality services; incorporating women's input into maternity care at all levels; ensuring timely and equitable access to quality maternity care; creating public and professional education campaigns to support a sustainable maternity care system; promoting pregnancy and birth as a normal physiologic process with access to care for complications; attracting, supporting and retaining maternity care providers; removing barriers to care; creating structures that support providers working to their full scope and supporting interprofessional collaboration in education and practice. Similarly, an interprofessional group in British Columbia, the *Maternity Care Enhancement Project*, recommended the development of women-centered collaborative, team-based service models to address the sustainability of maternity care in the province (2004).

In 2004, in response to recommendations from the *Advisory Committee for Primary Health Care Renewal* in Nova Scotia, the *Primary Maternity Care Working Group* was formed. The purpose of this group was to provide a framework for primary maternity care collaborative teams that integrated providers from family medicine, public health and hospitals and to develop a regulatory framework for the inclusion of midwives in collaborative teams delivering primary maternity care in Nova Scotia. In addition to primary health care renewal efforts in Nova Scotia, an initiative focused on improving acute care, the Model of Care Initiative in Nova Scotia (MOCINS) was launched in response to recommendations from a Provincial Health Services Operational Review (Corpes Sanchez, 2007). MOCINS involved the design, planning and implementation of a new collaborative care model in hospitals across Nova Scotia. The intent of MOCINS is to create organize how care is organized and who delivers care based on the needs of patients. An evaluation of the first phase of MOCINS found that the focus on patient needs was resulting in improved care, enhanced job satisfaction and the potential for on-going response to health human resources shortages (Tomblin Murphy et al., 2010). The authors of a recently developed physician resource plan for Nova Scotia recommended a focus on long-term, national planning for physician resources focused on the investment in additional family physicians, improved access and coordination of care of specialists and sub-specialists and the expansion of collaborative care teams (Government of Nova Scotia, 2012).

Although some studies have included planning for specific types of maternity care providers (e.g. family physicians, registered nurses, obstetricians/gynecologists) within other needs-based HHR research, no studies have focused on needs-based HHR research in primary maternity health care. However, one of the key strategies to address the maternity care health human resources 'crisis' identified in all the national and provincial maternity care initiatives described above is a focus on models of interprofessional collaboration (Peterson et al., 2007).

   Interprofessional collaboration as a key HHR strategy. In an effort to address health needs, health disparities, and health system inefficiencies and to improve both provider and patient outcomes, interprofessional education and collaboration continues to be supported by provincial, national and global initiatives (CIHC, 2010; Gilbert, 2010; Gilbert, Yan, Hoffman, 2010; Tomblin Murphy et al., 2010b). Over the last several decades, there has been mounting evidence to support the effectiveness of collaboration to strengthen health systems worldwide and to create strategies for innovative health workforce planning (Gilbert). These efforts parallel national efforts to support interprofessional education (IPE) and interprofessional practice (IPP) through the Canadian Interprofessional Health Collaborative (CIHC) and the development of frameworks for both IPE and IPP (CIHC, 2010). Although components of IPC have been part of health care reform for many decades, recent patient safety literature suggesting health outcomes are improved with enhanced communication and interprofessional collaboration has led to renewed interest in the concept of collaborative health care (Mitchell & Crittenden, 2000). Additional factors cited in the current evidence to support this renewed interest include a focus on patient-centered care and improved patient care experiences and outcomes (DiGioia, Greenhouse & Levison, 2009; Zwarenstein, Goldman & Reeves, 2009) and concern about the economic sustainability of health care (Canadian Institute for Health Information, 2009b). All these have prompted health care funders and decision makers to consider alternate models of care delivery (Barrett, Currant, Glynn & Godwin, 2007). From a health human resources perspective, implementing interprofessional interventions at the education, practice and organization levels may improve the quality of the workplace and increase provider satisfaction as well as reduce the cost of patient care (Suter et al., 2012).

Interprofessional collaboration has also been identified as a key strategy to address health human resources planning in maternity care; particularly for under-serviced and rural areas (Kornelson, Dahinten, & Carty, 2003; Peterson et al., 2007; Price, Howard, Shaw, Zazulak, Waters & Chan, 2005; Rogers, 2003). A number of studies have demonstrated the benefit of interprofessional collaboration for maternal-newborn providers as well as for women and their families (Downe, Finlayson & Fleming, 2010; Jackson, Lang, Ecker, Swartz, & Heeren, 2003; Price et al., 2005; Sutherns, 2004). However, a review of the literature by Schmied et al., (2009) found that for maternity care to be collaborative, it must move from individual providers co-existing to models of cooperation and coordination. Therefore, current models of maternity care may not be as collaborative as touted.

Most of the 'collaborative' maternity care practices in the literature focus on relationships between midwives, nurses and/or physicians (Miller, 1997; Skinner & Foureur, 2010) or comparisons of intervention rates and maternal and neonatal outcomes. For example, women with low risk of complications often had increased potentially unnecessary interventions when cared for by specialists as compared to family physicians or midwives (Hueston, Applegate, Mansfield, King, McClaffin, 1995; Tucker et al., 1996; Homer et al., 2001). Additionally, authors of a Cochrane review found that depending on the context of care, appropriately educated nurses provide care comparable to primary care physicians with similar patient outcomes (Laurant, Reeves, Hermens, Braspenninf, Grol & Sibbald, 2005). Understanding the impact on outcomes of the different provider groups is important in health systems planning, however, it does not reflect the benefit of interprofessional collaboration. In a recent cohort study in Nova Scotia comparing traditional maternity care with collaborative care, the author found that collaborative maternity care where carious care providers are co-located may increase the likelihood of exclusive breastfeeding among new mothers at hospital discharge and one week post-birth as well as increase smoking cessation success (D'Angelo-Scott, 2013).

There are however, some examples of collaborative maternity care demonstrating the benefits of IPC in general and as a key HHR strategy. The *Centering Pregnancy* model was created in the United States as a form of group prenatal care that has three components that all occur in one group space: (1) physical assessment (the prenatal visit),

(2) education and (3) peer support. As outlined in the literature review, use of the model has shown to improve birth outcomes such as decreased preterm birth rates and increased breastfeeding initiation and increased women's satisfaction with care (especially those from disadvantaged groups such as teens or women from various racial/ethnic groups groups). Research using the model has also shown to improve women's overall knowledge and readiness for labour and birth, increase provider satisfaction (Grady & Bloom, 2004; Ickovics et al., 2007; Skelton et al., 2009), and increase women's satisfaction with care (Robertson, Aycock & Darnell, 2009; Grady & Bloom, 2004; Klima et al., 2009). Although there is some conflicting evidence about women's satisfaction with the model (Shakespear, Waite & Gast, 2009), the model has been used successfully for prenatal care in western Canada (McNeil et al., 2012) and has been highlighted by the Health Council of Canada (2011) as a promising practice to address maternal-newborn Aboriginal health care needs.

Similarly, researchers at the University of British Columbia and the Child & Family Research Institute in British Columbia found that women attending a collaborative clinic (the South Community Birth Program) in Vancouver had lower rates of cesarean section, shorter hospital stays and higher breastfeeding rates compared to women receiving standard maternity care at other sites (Harris, Janssen, Saxell, Carty, MacRae & Petersen, 2010). In response to the current crisis in Canadian maternity care and the decline of family physicians providing maternity care, the Department of Family Medicine at McMaster University piloted the Maternity Centre of Hamilton perinatal clinic. The clinic offers a range of perinatal services from a variety of professionals (family physicians, nurse practitioners, social workers, lactation consultants) in one location. Many of the women accessing services at the clinic had a number of psychosocial and life style challenges. Both women and care providers expressed satisfaction with the clinic model. Care providers expressed an overall increased job satisfaction, improved lifestyle and improved maternity care skills.   More than 94% of women stated they would return to the clinic for a subsequent pregnancy (Price et al., 2005).

The success of the collaborative models described above has been outlined by San Martín-Rodríguez, Beaulieu, D'Amour and Ferrada-Videla (2005) as involving

interactional, organizational and systemic determinants. Interactional determinants consider the interactions within relationships that involve issues of trust, mutual respect, willingness to collaborate and effective communication (D'Amour, Goulet, Pineault, Labadie, & Remondin, 2003; D'Amour, Goulet, Labadie, San Martín-Rodriguez & Pineault, 2008; Way, 2000) Organizational determinants consider the organizational supports for collaborative care such as the organizational structure and philosophy, human and non-human (time and shared space) resources, leadership support, and processes for decision-making and communication (Cabello, 2002; Sile´n-Lipponen, Turunen & Tossavainen, 2002). Systemic determinants consider those factors beyond the organization (social, cultural, professional) and often involve power differentials, gender stereotyping and social disparities as well as cultural differences in how collaboration is understood or accepted. In addition, differing professional values, education and philosophies of care can lead to territorialism, domination and control. Professionals are educated and socialized to understand their roles and responsibilities without a clear understanding of other health professionals' expertise; thus impeding collaborative practice. In an effort to address this, a number of interprofessional education strategies have been developed (Gilbert, 2005; Gilbert & Bainsbridge, 2003; MacIntosh & McCormack, 2001; Saxell, Harris & Elarar, 2009). Way and colleagues (2000) reviewed the literature and identified seven key elements for successful collaborative practice: responsibility/ accountability, coordination, communication, cooperation, assertiveness, autonomy and mutual trust and respect.

Advantages of collaboration cited in the primary health care literature include improved patient outcomes, access to different resources, reducing uncertainty and improved use of resources (Zwarenstein, Goldman & Reeves, 2009). Disadvantages include: extra pressure on individuals and organizations to change and provide care differently, collaboration can be time-consuming and there are often questions and concerns about accountability and liability (Barrett Curran, Glynn & Godwin, 2007). Although there is considerable research to support the implementation of collaborative care, there continue to be barriers. Examples of potential barriers cited in the literature include: the failure to set aside time for regular meetings to define objectives, clarify roles and handle change, differences in status, power, and assertiveness among team

members and the assumption that the physicians were team leaders (Brown et al., 2009; Field and West, 1995). Additional barriers include: the heterogeneity of the team, role conflict and role overload, constraints placed on members by the larger organizational structure, funding differences, gender issues, a resistance to change, the need for regulatory and legislative change, lack of organizational rewards and members' lack of knowledge about the process of team development (Cashman, Reidy, Cody & Lemay 2004).

Summary. Building on the Family Centered Maternity and Newborn Care guidelines developed at the beginning of the millennium and perinatal indicators from the Canadian Institute for Health Information, a number of provincial and national groups have come together to strategize on how best to address the looming shortages of health care providers in maternity care and increasing maternal and newborn morbidity. One of the key strategies to address these challenges is the development and support of models of interprofessional collaborative care. Examples of successful models of collaboration, advantages and potential challenges to implementing models of collaborative care were provided. In the next chapter, the methodology and methods used to assess primary maternity health care needs in Nova Scotia and possible models of maternity care delivery to meet those needs are discussed.

CHAPTER FOUR: METHODOLOGY, METHODS AND DESIGN

[mixed methods] "actively invites us to participate in dialogue about multiple ways
of seeing and hearing, multiple ways of making sense of the social world, and
multiple standpoints on what is important and to be valued and cherished."
(Greene, 2007, p. 20)

Much like choosing a theoretical or conceptual framework, choosing a methodological approach for research involves careful consideration of the researcher's own philosophical tenets, the research purpose and questions and the planned methods for data collection, analysis and interpretation. To frame my research, it was first important to discuss my own philosophical or paradigmatic (worldview) perspectives, in an effort to understand what prompted my interest in the research topic and to justify choosing a mixed methods approach for the research. The purpose of this chapter is to discuss my philosophical approaches to research as a background for understanding my choice for the research design. I then define mixed methods research, including the details of the specific mixed methods approach for my research as well as the advantages and potential challenges with the approach. The final sections of the chapter are divided into quantitative and qualitative approaches with details about data collection, sampling, and issues of rigour (reliability, validity, generalizability, transferability and trustworthiness), recruitment and analysis. I conclude with a discussion about the integration of quantitative and qualitative approaches and ethical considerations.

Philosophical and Methodological Considerations

One of the first tasks a researcher needs to undertake is to position themselves paradigmatically. Neuman (2006) refers to a paradigm as "a general organizing framework for theory and research that includes basic assumptions, key issues, models of quality research, and methods for seeking answers". (p. 8). Denzin and Lincoln (2008) describe paradigm as "the net that contains the researcher's epistemological, ontological, and methodological premises...all research is interpretive; it is guided by the researcher's set of beliefs and feelings about the world and how it should be understood and studied" (p. 22). A person's philosophical orientation or paradigm is often related to worldviews based on several factors: epistemology, axiology, ontology and methodology. Epistemology aims to understand the forms and nature of knowledge, how it can be

created—what it means to know and the nature of the relationship between the researcher and the research) (Guba & Lincoln, 1994). Ontology focuses on how reality is framed--- 'the what is' while axiology considers a person's values, beliefs and judgments as key to understanding how a person understands the world (Browne, 2000). Methodology is the process of the research and is concerned with the why, what, from where, when and how data is collected and analyzed (Creswell & Plano Clark, 2011) while methods are the techniques and procedures used to 'do' the research (Crotty, 1998). To frame the discussion, a brief overview of three main philosophical viewpoints (positivism/post-positivism, naturalism [constructivism] and pragmatism) is provided in Table 5.

Table 5: Major Assumptions of Positivism, Constructivism and Pragmatism

	Positivism/Post-positivism	Naturalism/Constructivism	Pragmatism
Epistemology	Researcher independent from those being researched	Researcher interacts with those being researched and findings are the creation of interaction	Focuses on answering the questions with the best approach
Ontology	Reality exists	Reality is multiple, subjective and constructed by individuals	Singular and multiple realities
Axiology	Control for values, aim is objectivity	Subjectivity and values are inevitable and valuable	Objectivity and subjectivity are recognized
Methodology	Seeks generalizations. Emphasis on discrete concepts with fixed design Objective and quantifiable Measured, quantitative information and statistical analyses Decontextualized Focus on outcome	Seeks patterns, emphasis on whole with a flexible design Subjective and non-quantifiable. Narrative information with qualitative analysis. Contextualized with emerging interpretations, grounded in participants' experiences Focus on process and product	Induction and deduction are important. Data collection methods selected that best answer the research questions. Often associated with mixed methods research. Provides context for quantitative findings, uncovers multiple perspectives

(adapted from Loiselle et al., 2007; Polit & Tatano Beck, 2012; Creswell & Plano Clark, 2011).

From a philosophical perspective, I believe in the centrality of relationships and the importance of context in knowing the world. Therefore, pragmatism, defined as "the view that knowledge is derived from interaction among groups of individuals and the artifacts in their environment, which together create a reality" (Schuh & Barab, 2007, p.67) best describes my epistemological and ontological perspectives. From a systems perspective and aligning with the HHR conceptual and analytical frameworks described in Chapter Two, pragmatism rejects reductionist, Cartesian (objective) thinking (Descartes, 1993) in favour of a structure of thinking which acknowledges the existence of wholes within the context of a continuous world view where elements within the system are relational, emergent and dynamic (Tashakkori and Teddlie, 2010; Greene & Hall, 2010).

Many mixed methods researchers and authors maintain that the underlying philosophy of mixed methods research is pragmatism (Creswell, Plano Clark, Gutman, & Hanson, 2003; Feilzer, 2010; Howe, 1988; Johnson & Onwuegbuzie, 2004; Morgan, 2007; Tashakklie & Teddlie, 2010) which provides a set of assumptions that distinguishes mixed methods from quantitative approaches that are based on (post) positivist or reductionist views or qualitative approaches that are typically based on a interpretivism or constructivism (Johnson & Onwuegbuzie, 2004). For mixed methods research, pragmatism offers several possibilities. It may underpin a *fusion of approaches* (Tashakkori & Teddlie, 2010) or be considered a *'third alternative'* –if solely qualitative or quantitative approaches do not fully attend to the research questions (Tashakkori & Creswell, 2007; Johnson, Onwuegbuzie & Turner, 2007). Some researchers may argue that pragmatism is the '*new orthodoxy'* and it is not only permissible to combine research methods but is it necessary to obtain adequate answers (Greene, Benjamin & Goodyear, 2001; Rocco, Bliss, Gallagher & Perez-Prado, 2003). The danger however, is that pragmatism will be considered a '*common-sense'* approach and an associated mixed methods approach may lack a solid philosophical foundation. However, pragmatism is not only associated with mixed methods but can be traced back throughout the last century through the works of symbolic interactionism and there are aspects of pragmatism involved in grounded theory, ethnomethodology, conversational analysis and discourse analysis (Denscombe, 2008). Johnson and Onwuegbuzie (2004) summarize the

philosophical position of mixed method researchers when they make the following statement:

> We agree with others in the mixed methods research movement that consideration and discussion of pragmatism by research methodologists and empirical researchers will be productive because it offers an immediate and useful middle position philosophically and methodologically; it offers a practical and outcome-orientated method of inquiry that is based on action and leads, iteratively, to further action and the elimination of doubt; and it offers a method for selecting methodological mixes that can help researchers better answer many of their research questions. (p. 17)

Choosing a Mixed Methods Research Design

Defining mixed methods. Johnson et al. (2007) provide a detailed overview of the various definitions for mixed methods research, each with varying philosophical and methodological inference. Most of the definitions focus on the process of mixing qualitative and quantitative approaches. For instance, Creswell and colleagues (2003) define a mixed methods study as involving "the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research" (p. 165). To add a philosophical perspective to Creswell's definition, Greene (2006) defines mixed methods as "an approach to investigating the social world that ideally involves more than one methodological tradition and thus more than one way of knowing, along with more than one kind of technique for gathering, analyzing, and representing human phenomena, all for the purpose of better understanding" (p. 96). Mixed methods research has evolved to the point where it is "increasingly articulated, attached to research practice, and recognized as the third major research approach or *research paradigm*" (Johnson et al., p.112). Rooted in the fieldwork of sociologists and cultural anthropologists early in the 20th century (Creswell et al., 2003; Creswell & Plano Clark, 2011; Greene et al., 1989; Johnson et al., 2007), mixed methods has emerged to the point where it is thriving and co-existing alongside quantitative and qualitative methods.

Prominent works on mixed methods research by Creswell (2003), Creswell & Plano Clark (2011) and Tashakkori & Teddlie (2010) cite four defining characteristics of a mixed methods design: 1) quantitative and qualitative methods are used within the same

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research project; 2) the sequencing and priority (weighting) of the quantitative and qualitative approaches must be clearly articulated; 3) there must be an explicit account of the integration of the two research methods; and 4) pragmatism is the underlying philosophical foundation for the research. Moreover, Creswell and Plano Clark (2011) recommend researchers clearly identify a typology for the design, justify and match the research design with the research purpose and questions and articulate whether the design is emergent or fixed and why mixed methods was chosen for the research.

Describing mixed methods designs. Mixed methods research designs are generally described as dynamic or typology-based. Dynamic methods for mixed methods research support the linking of the components (purpose, theory, questions, methods etc.) to unfold in an iterative way. This approach is best suited for an experienced researcher (Creswell & Plano Clark, 2011). A number of mixed methods research typologies have been developed (Creswell & Plano Clark, 2011; Gilbert, 2006; Greene et al., 1989; Johnson et al., 2007; Kelle, 2006; Leech & Ongwuegbuzie, 2009; Morgan, 1998; Morse, 1991; Sandelowski, 2000; Tashakkori & Teddlie, 1998) in an effort to classify the process of including both qualitative and quantitative methods. Typologies provide a flexible organizational structure, they add credibility to multi-method designs and highlight the key differences from mono-method designs, they create a common typological language, they provide guidance and direction for researchers, particularly novice researchers and they are valuable for instruction related to mixed methods design (Tashakkori & Teddlie, 2003). In an effort to consolidate existing mixed methods research design typologies, Leech and Ongwuegbuzie (2009) reviewed the literature and created a conglomerate of existing typologies (Figure 6). Overall, existing typologies were based on three main features: the level of interaction and integration of the quantitative and qualitative methods, the priority of one method over the other and the timing of the two research methods.
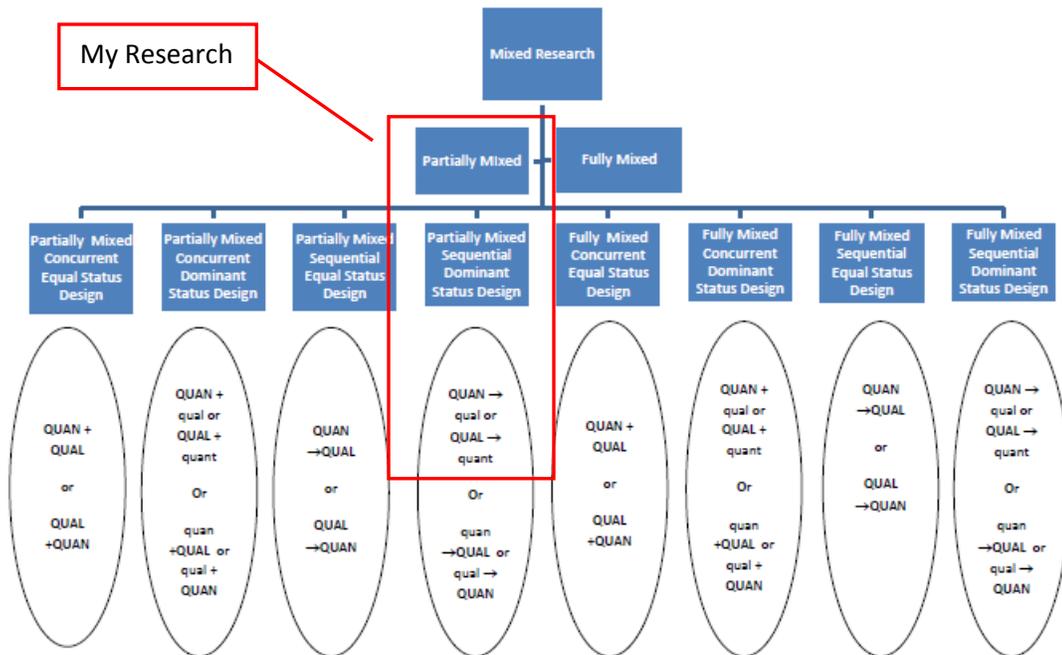
Figure 6: Mixed Methods Research Typology (Leech and Ongwuegbuzie, 2009)

Priority. There are three options for mixing research approaches: quantitative and qualitative have equal 'status' in the research or one approach is more prominent than the other (Leech & Onwuegbuzie, 2009). A number of factors will influence this decision including the philosophical view of the researcher (Gilbert, 2006; Wiggins, 2011); available time and funding for the study and the target audience are important factors that can influence which strand takes precedence (Polit & Tatano Beck, 2012).

Timing. Timing of the research approaches can be concurrent, sequential or a combination. Concurrent timing (also called simultaneous) refers to conducting both the qualitative and quantitative research at the same time. This may involve many different components of the research process (e.g. data collection or analysis). In a concurrent design, the findings from the two approaches are not integrated until the discussion or conclusions of the study. When the design is sequential data for one approach is collected and analyzed prior to the implementation of the other approach. This allows for the initial approach to inform data collection techniques and/or analysis of the subsequent approach. In multiphase combination timing, multiple phases are performed that include

concurrent and/or sequential timing over a program of research (Creswell & Plano Clark, 2011; Leech & Onwuegbuzie, 2009).

Mixing. As inferred in the timing of the two approaches, there is also opportunity to integrate quantitative and qualitative research processes at different levels. The level of interaction is classified as either independent or interactive. As implied, mixing of the two approaches only occurs at the discussion/interpretation/conclusion stage while interactive suggests a blending of the two approaches at various stages of the research. For instance, for my research, the quantitative analysis will inform the final development of semi-structured interviews questions for the qualitative approach (Creswell & Plano Clark, 2011). Mixing of the two approaches may occur at the interpretation phase, during data analysis or data collection and/or during the design phase of the research study (Creswell & Plano Clark). Mixing at the design phase may be embedded (one approach within a larger study), the combination of qualitative and quantitative approaches in one theoretical framework or both approaches in a multi-phased program of research (program-objective framework) (Creswell & Plano Clark). When researchers attend to the multiple selections and decisions regarding mixed methods research design, a solid design emerges to clearly address the research purpose and questions; therefore, maximizing the potential advantages of a mixed methods design.

Leech and Onwuegbuzie (2009) use priority (equal vs. dominant status), timing (concurrent vs. sequential) and mixing (partial vs. fully mixed) to develop a matrix that yields eight mixed-methods designs: partially mixed concurrent equal status; partially mixed concurrent dominant status; partially mixed sequential equal status; partially mixed sequential dominant status; fully mixed concurrent equal status; fully mixed concurrent dominant status; fully mixed sequential equal status; and fully mixed sequential dominant status. Similarly, Creswell & Plano Clark (2011) consider levels of integration, priority, timing and mixing to describe six designs: convergent parallel, explanatory sequential, exploratory sequential, embedded, transformative and multi-phase (Figure 7).
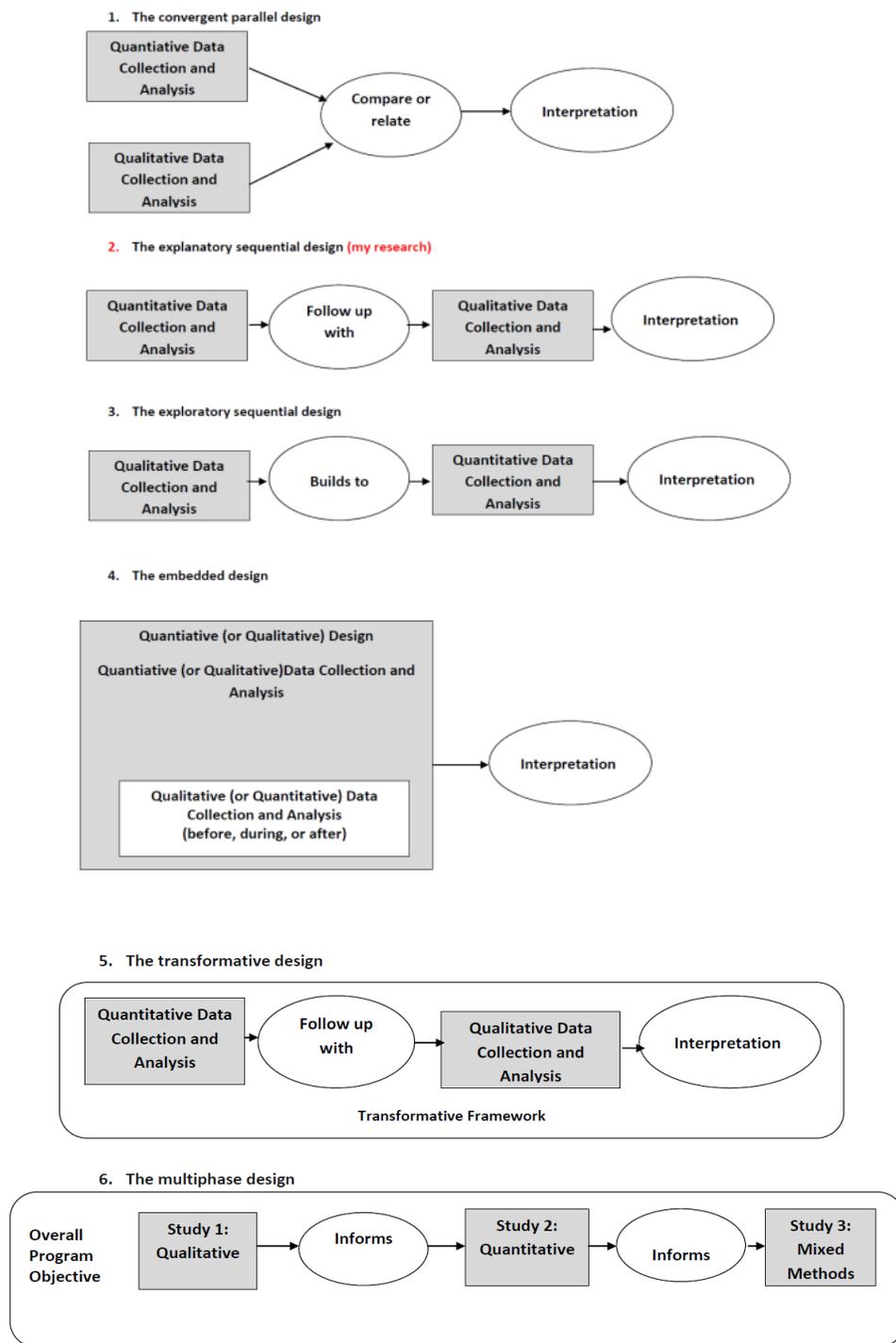
Figure 7: Mixed Methods Research Designs (adapted from Creswell & Plano Clark, 2011)

Morse (1991) created a widely-accepted notation system to illustrate mixed methods approaches:

- 'quan' shorthand indicates a quantitative approach
- 'qual' shorthand indicates a qualitative approach
- '+' plus sign signifies concurrent timing
- ⟶ arrows signify sequential timing
- ( ) parentheses indicate embedded methods (modification by Plano Clark, 2005)
- →← recursive process (modification by Nastasi, Hitchcock, Sarkar, Burkholder, Varjas, & Jayasena, 2007)
- = signifies the purpose of the mixing methods (modified by Morse & Niehaus, 2009)
- [ ] brackets are used to denote a dingle study within a series of studies (modified by Morse & Niehaus, 2009)

Priority is recognized by upper and lower-case letters with upper-case (e.g. QUANT) signifying priority of that approach. If equal, both will be in upper-case. For example, for my research, it is a QUANT → qual=converge results. In other words, it was a sequential study where the quantitative data collection occurred first to inform the qualitative approach, the quantitative approach was priority and the results of each approach converged.

Advantages of Mixed Methods Research

Although mixed methods research can be time-consuming and complex, it offers a number of advantages. These include: development, initiation, expansion, triangulation and complementarity (Greene, Caracelli & Graham, 1989). For this research, results from the quantitative analysis informed the development of questions for interviews in the qualitative phase and the topics of discussion used during interviews and focus groups with women, health leaders and health care providers. Therefore, findings from one method informed the development of the other.

Using multiple methods may also spark the initiation of new research questions or hypotheses or assist in expanding understanding about complex phenomena (Greene & Caracelli, 1997). As outlined in Chapter Eight, a number of topics for future research arose from this study.

Triangulation has been traditionally defined as using two or more methods in order to corroborate the findings from one method with the other. Denzin (1970) identified four types of triangulation: data, investigator, theoretical and methodological. Data triangulation refers to using multiple data sources, investigator triangulation involves using more than one person to investigate a phenomenon and reduce bias, theoretical triangulation involves testing data with different theories and methodological triangulation is when methods from within or across paradigms are used to study the same phenomenon. For mixed methods research, Onwuegbuzie and Leech (2005, p. 383) describe this as a "holistic endeavor that requires prolonged engagement, persistent observation and triangulation." For my research, the two methods have been integrated at different points during the study (e.g. theory, research questions, data collection and data analyses) so that there are both corroborating and additive effects. This promotes both the exploration of contradictions or conflicting results as well as the generation of complementary findings (Bryman, 2006; Tashakkori, & Teddlie, 2003, 2010).

Complementarity involves completeness or comprehensiveness of data using quantitative data to explore associations between factors and qualitative approaches to provide insight into why associations occur. Depending on the design of the mixed methods study and the sequencing of approaches, themes from the qualitative data may inform and/or substantiate quantitative findings. If results are contrasting, the discrepancies are highlighted, providing opportunities for further inquiry. Since quantitative approaches are typically reductive and qualitative approaches holistic, the additive strength of each is that they provide different levels of inquiry (Gorard & Taylor, 2004). In addition to these advantages, Collins, Onwuegbuzie and Sutton (2006) cite four key reasons for combining methods: treatment integrity (assessing interventions), participant enrichment (optimizing sampling, recruitment and selection), instrument fidelity (assessing existing instruments or creating new measures), and significance enhancement (increasing the richness, interpretation and utility of findings). The latter three advantages are important in this research as integrated methods were used to analyze existing data sources used to populate the needs component of the HHR conceptual and analytical frameworks and to explore the insights and experiences of

women, providers and health leaders in primary maternity care to inform the design and implementation of primary maternity care delivery models.

Additionally, the use of multiple methods may minimize some of the disadvantages and associated bias of using singular research methods related to the selection of participants, measurements used and researcher bias (Holdcroft, 2007; Oort, Visser & Sprangers, 2009). There may also be researcher bias during interpretation of data and response bias related to the selection of participants and attrition. Therefore, as in this research, several data collection and analytical approaches were used to reduce bias by triangulating data. As outlined in the results chapters, Five and Six, the quantitative and qualitative data often complemented each other, adding diverse perspectives and richness to the findings (Yauch & Steudel, 2003).

In addition to the five established advantages of mixed methods research outlined above, Bryman (2006) reviewed and synthesized a list of additional advantages:

- Triangulation or greater validity
- Building on the strengths and offsetting the weaknesses of the two approaches
- Ensuring a complete account of the phenomenon of interest
- Qualitative research attends to process and quantitative attends to structures
- The two approaches can answer different research questions
- One approach is used to explain findings from the other
- Unexpected results may emerge using two approaches
- Advantageous for instrument and scale development
- One approach is used to facilitate sampling in the other
- Enhanced credibility
- Enhanced contextual understanding coupled with generalizability
- Qualitative findings are used to illustrate quantitative findings
- Improved usefulness of findings
- The ability to both confirm and discover (qualitative data to generate hypotheses and using quantitative research to test them)
- Including a diversity of views
- Enhancement or building upon quantitative/qualitative findings

Summary

Prominent philosophical paradigms were reviewed to illustrate the importance for me as a novice researcher to explore the worldviews that created my frame of reference for mixed methods research. Various definitions and typologies as well as advantages and challenges for mixed methods research were also considered to 'set the stage' for an in-depth discussion about the selected design for my research in the following section.

Research Design and Methods

This study was a sequential QUANT⟶qual cross-sectional study where data collection and analysis in the quantitative portion was completed prior to completing the semi-structured interviews and focus groups. Creswell and Plano Clark (2011) describe this as an *explanatory sequential design*, consisting of two distinct phases: the quantitative phase and the qualitative phase (Creswell et al., 2003). First, the researcher collects and analyzes the quantitative data and then the qualitative data are collected and analyzed as a means to explain, expand or perhaps even, contradict the quantitative findings. The intent is that the quantitative data and analysis provide a general understanding of the phenomenon of interest (in the case of my research, needs-based planning in primary maternity health care) and the qualitative data explores participants' experiences and provides rich, deep understanding (Ivankova, Creswell & Stick, 2006; Tashakkori and Teddlie, 2003; Creswell, 2003). This provides an opportunity for the quantitative results to inform the development of the interview questions and to focus the questions to address issues and topics identified from the quantitative analyses (Creswell & Plano Clark; Creswell; O'Cathain, Murphy & Nicholl, 2008). In addition, using both quantitative and qualitative approaches provide methods to answer all the research questions (Morgan, 1998). In general, the strengths of this type of mixed methods design are that it is straightforward and provides opportunities to explore a research topic in more detail. It is especially useful when unexpected results are anticipated in the quantitative analysis (Morse, 1991). Limitations typically relate to the time needed to complete both quantitative and qualitative approaches since data collection and analysis are sequential (Creswell & Plano Clark; Ivankova et al.).

In this research, priority was given to the quantitative approach for three reasons: 1) the theoretical and analytical frameworks support a quantitative analysis of needs-based HHR in primary maternity health care; 2) the theoretical and analytical frameworks are established approaches for needs-based HHR planning with a rich field of needs-based HHR literature using the approaches to support the research; 3) the intent was that the qualitative approach in the study provides contextual richness. The qualitative findings validated the findings from the quantitative analysis and provided extending and corroborating results to highlight unmet needs in the current systems of primary maternity health care delivery in Nova Scotia. Both phases of the research also highlighted gaps in current data systems and highlighted areas for future research. Integration (mixing) of the qualitative and quantitative approaches occurred in the development of the research purpose, questions and hypotheses (Teddlie & Tashakkori, 2003). It also occurred when data was analyzed in the quantitative phase to inform the interview and focus group questions for the qualitative phase. As outlined in Chapters Seven and Eight, integration also occurred when data findings were integrated to inform the discussion and conclusions of the study.

For this research, using qualitative approaches contextualized and humanized the experiences of providers, health leaders and women while quantitative methods provided statistically significant and generalizable findings. From a General Systems perspective and in keeping the Health Systems and HHR conceptual and analytical frameworks, this was important to fully understand the inter-relatedness of factors that influence how primary maternity health care is designed and delivered based upon the identified needs of women and newborns. Details about the process and methods for the quantitative and qualitative phases are described below. The details include information about sampling, recruitment, data collection and data analysis. To conclude the chapter, strategies to enhance rigour are outlined as well as the ethical considerations for the study.

Quantitative Approach

Research Question:

1. Were there differences between the identified needs of the general perinatal population and sub-populations of the maternal-newborn population based on maternal education, income, area of residence, race/ethnicity?

   - Hypothesis ($H0_1$): Rationale for $H0_1$: a number of factors including geography, poverty, and racial/ethnic differences impact health. Predictors of health needs based on a broad definition of health and considering sub-populations of women based on maternal race/ethnicity, education, income and area of residence that accounted for age and parity were identified using multivariable regression analyses.

   - $H0_2$: There was no difference in self-reported health status identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

   - $H0_3$: There was no difference in self-reported unmet needs identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

   - Rationale for $H0_2$ and $H0_3$: Self-reported health status is established in the literature as a proxy for health needs. There is a wealth of literature that supports the impact that geographic location, race and ethnicity and socio-economic status have on health, in general and specifically on maternal-newborn health.

Secondary data from the Nova Scotia Atlee Perinatal Database were used to address the research questions above. The original intent was also to use data from the Canadian

Community Health Survey (CCHS); however the sample of women who have given birth was insufficient for analysis. Even though the CCHS data could not be used for analysis, detailed information about the rationale for using CCHS and the limitations are included in this chapter and the following quantitative results chapter.

Nova Scotia Atlee Perinatal Database. The Nova Scotia Atlee Perinatal Database (NSAPD) has aggregate-level and individual-level data for childbearing women and newborns as well as detailed clinical and demographic data since 1988. These data are captured during the woman's hospital birth admission and include information from the pregnancy (e.g. prenatal care), the birth and the early in-hospital, postpartum/postnatal periods. Hence, a limitation of the data is that there are no data available after hospital discharge.[5] Since 2003, the NSAPD has been populated by uploading information in three ways: data from the Canadian Institute of Health Information (CIHI), specific coding by health records staff in Nova Scotia and automated lab downloads. There are a number of ongoing database audit processes including: chart review, investigating and resolving data discrepancies during routine data retrieval and analysis (Joseph & Fahey, 2009), coding manuals that are updated annually and ongoing support for health records staff. Formal data audits indicated the database has high quality and accurate perinatal data (Dodds & Smith, 1995; 2012b audit unpublished). Data from the NSAPD are retrieved through standardized reports and ad-hoc data requests. For the purposes of research, all requests require completion of a detailed data access application, which is reviewed by the RCP Data Access Committee. As the custodian of the NSAPD, RCP (2012c) promotes strict data management principles to protect and promote confidentiality and privacy of data.

The Canadian Community Health Survey. The Canadian Community Health Survey (CCHS) (Statistics Canada, 2011b) is a national, cross-sectional population-based, telephone survey that has information related to health care service use, health status and health determinants for the Canadian population. The purpose of the CCHS to provide timely, easily accessible information using an adaptable survey instrument for a variety of users for the purposes of health surveillance and population health research.

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[5] Postnatal care data is captured sporadically in Nova Scotia by a new provincial Public Health database or information is gathered from national surveys such as the Canadian Community Health Survey (CCHS, 2012) or the Maternal Experiences Survey (MES) (PHAC, 2009).

Data are available in a variety of ways from the CCHS. The public use microdata files (PUMF) are developed from the master files using a technique that protects participant privacy and confidentially by removing any potential identifiers or collapsing information into broader categories. PUMFs are reviewed and approved to ensure they are aligned with stringent data management principles. However, data are available for use at the health region level. The PUMF contains the data collected over two years. It includes questions that were asked over two years. Unless otherwise specified, these questions are usually those included in the annual common content and in the two-year common content as well as the optional content selected for two years by the provinces and territories.

The CCHS uses a complex, multi-staged sampling strategy that includes an integrated weighting approach using both the area frame and the telephone frame depending upon the region sampled. The weighting strategy is used to ensure estimates from the survey data are representative of the population of interest. Each person in the survey has an associated survey weight that is included in the PUMF dataset. The weight corresponds to the number of people in the entire population that are represented by the survey respondent. It is recommended that the person-level weight be used for CCHS data analysis.

Area Frame	Telephone Frame
A0 – Initial weight	T0 – Initial weight
A1 – Sub-cluster adjustment	T1 – Number of collection periods
A2 – Stabilization	T2 – Removal of out-of-scope units
A3 – Removal of out-of-scope units	T3 – Household nonresponse
A4 – Household nonresponse	T4 – Multiple phone lines

Area Frame Household Weight	Telephone Frame Household Weight

I1 - Integration

Combined Frame
I2 – Person-level weight
I3 – Person-level nonresponse
I4 – Winsorization
I5 – Calibration

Final Person-level Weight

Figure 8: CCHS Sampling Strategy

In regards to data accuracy in the CCHS, the response rate for Nova Scotia for 2009-2010 was 75.6%.; which is higher than the overall Canadian response rate of

72.3%. With a self-reported, telephone survey, non-sampling errors may occur related to interviewers misunderstanding instructions, respondents making errors in answering questions, the answers being incorrectly entered on the computer and errors in the processing and tabulation of the data. To account for these, quality assurance measures were implemented at each step of data collection and processing to monitor the quality of the data. These measures included the use of highly skilled interviewers, extensive training with respect to the survey procedures and questionnaire, and the observation of interviewers to detect problems. Testing of the computer-assisted interviewing application and field tests were also essential procedures to ensure that data collection errors were minimized. A major non-sampling error is non-response. This can vary from partial non-response (certain questions on the survey not answered) or total non-response. Partial non-response to CCHS was minimal. However, total non-response occurred when persons refused to participate or when the interviewer was unable to contact the selected person. Total non-response was adjusted for by weighting those who responded to compensate for those who did not. Sampling errors are detected using coefficient of variation (CV) of an estimate, which is obtained by dividing the standard deviation of the estimate by the estimate itself and is expressed as a percentage of the estimate. It is recommended that users of the public use files (PUMF) have at least 10 observations in the numerator and 20 in the denominator. Observations less than these should not be used or published.

Sampling. Data from the NSAPD included all women and newborns (residents of Nova Scotia) in the corresponding time frame comparable to CCHS (2009-2010) (Statistics Canada, 2011b). Home birth data were not included as midwifery was only regulated and legislated in Nova Scotia in early 2009 and very few data were available for the study timeframe. After data cleaning and imputation techniques, the population of women included in the study from the NSAPD was 17,826 for most variables of interest.

CCHS data in the PUMF are available based on age and gender categories, therefore all women of child-bearing age (12-19 years, 20-34 years, 35-44 years) from the 2009-2010 CCHS were included. The CCHS uses a multi-stage sampling strategy stratified based on population size, number of health regions, geography, lists of available telephone numbers and random digit dialing. In 2009/2010, there were approximately

130,000 participants aged 12 or older living in 98 regions in Canada. Of these, 7666 were sampled in Nova Scotia. Table 6 shows the response rates and samples for each of the zones in Nova Scotia. Additional CCHS data were reviewed and included for specific variables (e.g. unmet health needs) from the 2012 CCHS.

Final sample sizes for my population of interest were tabulated once the PUMF file was obtained. Using this information, a power analysis was calculated to determine the study's probability of making correct decisions. The power analysis involved four parameters: sample size, the significance level (α or p value, Type I error false positive), power ($1-\beta$, where β is Type II error or false negative) and the estimated effect size or strength of the relationship between the independent and dependent variables (Cohen, 1988; Polit & Beck, 2007). For this research the widely accepted values for the level of significance (α or p value) of 0.05 and power is of 0.08 were used (Hulley, Cummings, Browner, Grady, Hearst, & Newman, 2013) were used. There are statistical inference strategies that can be used to determine the effect size. These include: pilot testing results, using data from the literature, estimating the structure of the population using mathematical processes and completing sampling in two phases so that the results from the first phase will determine the appropriate sample size (Bruce, Pope & Stanistreet, 2008). However, since previous studies are not available to inform the power analysis in this study, conventional estimates for effect size was used based upon the number of variables and statistical tests (Polit & Tatano Beck, 2012). In this study, multivariate analyses were used to determine predictors of maternal-newborn health needs. Therefore, the effect size was determined by the effect of multiple independent variables on the dependent variables known as R^2. Since there is no information from existing studies available to determine R^2, the conventional values of .02 (small effect), .13 (moderate effect) and .30 (large effect) were used (Cohen, 1988). The intent was to use CCHS data to test the second and third research hypotheses. Therefore, based upon four independent variables and multiple regression techniques and assuming an R^2 of moderate effect (.13), a power level of .80 and a level of significance of .05, the minimum required sample size was 96. Unfortunately, due to the limited number of Nova Scotia women who identified as giving birth in the last five years in the CCHS 2009-2010 sample, statistical analysis was not completed on the CCHS data. In consultation with a methodologist from

Statistics Canada, it was recommended that since the sample size was not sufficiently powered, analysis on either the unweighted or the weighted sample should not be performed. The unweighted data represent only the sample rather than the population. The weighted data is necessary to make inferences about a population. Even descriptive analyses about the unweighted sample are not meaningful as the sampling variances would be very large. Additionally, the cell sizes for in many of the descriptive analyses were less than 30 observations per cell; based on the recommendations from the CCHS user file, cell sizes less than 30 should not be reported.

Table 6: Sampling for Nova Scotia CCHS, 2009-2010*

Sampling Zones	Raw Sample	Response Rate	Sample	Females Only Sample**
1201 (former NS DHAs 1 and 2)	1218	80.8	984	27
1202 (former NS DHA 3)	971	77.8	755	14
1203 (former NS DHAs 4 and 5)	1078	77.6	836	27
1204 (former NS DHAs 6 and 7)	1156	77.3	894	21
1205 (former NS DHA 8)	1201	73.4	882	37
1206 (former NS DHA 9)	2042	71.4	1458	66
Total	7666	75.6	5796	192[a]

* It is important to note that people living on Indian Reserves or Crown lands, those residing in institutions, full–time members of the Canadian Forces and residents of certain remote regions were excluded from the CCHS.

**females only who gave birth in the last five years from CCHS 2009-2010.

[a]raw sample before weighting

Analytical approach. In the Health System and Health Human Resources Planning Conceptual Framework outlined in Chapter Two, provider requirements are determined by two components: provider productivity and health needs (Tomblin Murphy, 2007; Birch et al., 2007; 2009). The focus of this research was on determining maternal-newborn primary maternity care health needs in order to inform future research on provider requirements. Therefore, informed by the Health Systems and Health Human Resources Conceptual and analytical frameworks, the analytical approach for the quantitative phase of this research used selected variables from the NSAPD to determine predictors of perinatal health needs. The intent was to consider the effect of the various

perinatal health indicators on the selected proxies for maternal-newborn primary maternity health care needs. No analyses were recommended with the CCHS data, as the sample size of the unweighted data was small.

The Research Question was:

1. Were there differences between the identified needs of the general perinatal population and sub-populations of the maternal-newborn population based on maternal education, income, area of residence, race/ethnicity?

The null hypotheses for the study were:

H0 1. There was no difference in the needs identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

H0 2. There was no difference in self-reported health status identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

$H0_3$: There was no difference in self-reported unmet needs identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

Informed by the HHR Conceptual and Analytical Frameworks, multiple regression analysis was used to determine the differences between the needs of the general perinatal population and sub-populations of the maternal-newborn population based on maternal income, maternal area of residence, maternal race/ethnicity and maternal education. Specific components of the Health System and HHR Conceptual Framework that were relevant for the quantitative analysis included the core concept related to *population health care needs* and the *'outer' contextual circle* that includes a number of determinants of health. Control variables included age, parity and when appropriate, mode of delivery. This information provided insight into factors that

influence women's and newborns' health needs. Specific dependent, independent and control variables are described below.

Variables for needs-based HHR. As described in the literature review, there are a number of perinatal health indicators that have been identified. However, since a needs-based HHR analysis in primary maternity health care has not been completed, few of these have been tested in health human resources planning research. As noted in the literature review, the characteristics of a good health indicator include: 1) the indicator is clear, interpretable, and actionable; 2) the indicator is based on standard and therefore comparable definitions; 3) whether or not there are reliable and valid measure to populate the indicator; and 4) the data used to inform the indicators are available at the national, provincial, territorial and/or regional levels (Mainz, 2003). Additionally, three key assumptions related to selecting measures for health needs in HHR informed this work:

1. No prospective measure of health care need exists but resources must be allocated based upon existing measures;
2. Health care planning at the population level requires aggregation of individual needs at the community level; and
3. Without prospective measures, retrospective indicators related to past experiences and behaviours are used (Birch & Eyles, 1991).

Based upon relevant needs-based HHR literature, standards of care and best practice in perinatal care and in consultation with experts in needs-based HHR and health systems planning, my supervisor, Dr. Tomblin Murphy and Dr. Stephen Birch from McMaster University, the following health needs indicators were chosen for this study.

Dependent Variables (Maternal-Newborn Health Needs Proxies). Birch and Eyles (1991) defined need as "the ability to benefit from health care as implied by reducing the risks of deterioration in health status (or health-related quality of life) or improving the probability of improvements to health status (or health-related quality of life)" (p. 10). The intent in this definition is for health to be understood using a broad lens. In health services and health human resources planning, measures of social deprivation have been used as indirect measures of health care needs based on the association of social deprivation and morbidity (Lynch & Kaplan, 2000; Mays, 2007; Eyles and Birch, 1993). Measures of risks to health – such as socioeconomic status or

tobacco use have also been used in addition to measures of actual health status to determine health needs (Litaker & Love, 2005; Singh et al., 2010; Tomblin Murphy et al., 2009a, 2012a).

Prenatal Health Needs Indicators/Proxies:

- *Maternal smoking* (from NSAPD): Variables available in the dataset from the NSAPD included pre-pregnancy smoking and smoking at admission for birth care: all based on number of cigarettes per day. For the purposes of this research, smoking at the birth admission was used for smoking in pregnancy. There is a wealth of research evidence on the adverse effects of smoking prior to and in pregnancy. Smoking in pregnancy increases the risk for preterm birth, small babies and fetal anomalies often associated with poor placental perfusion and placental insufficiency (Bickerstaff, Beckmann, Gibbons & Flenady, 2012; Erickson & Arbour, 2012; Vardavas, Chatzi, Patelarou, Plana, Sarri, Kafatos, ... & Kogevinas, 2010).

- *Pre-pregnancy body-mass-index (BMI)* (from NSAPD): BMI is calculated in the NSAPD using standardized categories from the Institute of Medicine (2009) and the Society of Obstetricians and Gynecologists of Canada (2010). Pre-pregnancy weight has increased for women living in Nova Scotia, Canada and North America. Obesity in pregnancy is associated with significant maternal and perinatal health risks such as diabetes and hypertension (Arrowsmith, Wray & Quenby, 2011; Denison, Price, Graham, Wild & Liston, 2008; Robinson, O'Connell, Joseph & McLeod, 2005). Increased BMI is an indication for early diabetes screening in pregnancy and is a risk factor for birth-related interventions such as assisted vaginal delivery and cesarean section. Additional ultrasounds may also be required to assess fetal growth and/or to repeat fetal anatomical scans because of poor visualization due to maternal body habitus (SOGC, 2010). Additionally, obesity is associated with broader health and social factors (Aston et al., 2011; Kirk et al., 2009; Petite & Clow, 2010).

- *Prenatal Ultrasound:* (from NSAPD). The variable in the NSAPD is based upon the gestational age at which pregnant women received the first known prenatal ultrasound. All pregnant women should receive at least one diagnostic ultrasound

at 18-21 weeks gestation to a full fetal anatomy scan (Gagnon, Wilson, Allen, Audibert, Blight, Brock, ...& Wyatt, 2009; RCP, 2007; SOGC, 2005).

- *Prenatal Screening:* (from NSAPD) The two variables in the NSAPD used for this study included maternal serum screening to detect fetal abnormalities and provide opportunities for intervention or pregnancy termination (Chitayat, Langlois & Wilson, 2011) and HIV testing in pregnancy to maximize the use of antiretrovirals to decrease maternal-fetal vertical transmission (Loutfy, Margolese, Money, Gysler, Hamilton & Yudin, 2012). The standard of care in Nova Scotia is that these are both offered to all pregnant women; however discussion or completion of these tests are variable (RCP, 2007). Data about these variables are captured on the prenatal record used by prenatal care providers across the province. Data includes information on whether the test was declined, not completed, completed or whether the information was unknown (e.g. no documentation). For the purpose of this research the screening test documented and coded as not completed or unknown was considered a "No" for prenatal screening and declined or completed was considered a "Yes". Including declined or completed assumes a conversation between the prenatal care provider and the pregnant woman, which was used in this research as a health need proxy related to access to care.

Intrapartum Health Needs Indicators/Proxies:

- *Maternal morbidity score* (from NSAPD): Derived variable based on dividing the number of diagnosis codes related to maternal morbidity available in the NSAPD into quartiles and based upon an increased length of hospital stay for the birth admission. The details of the maternal morbidity scoring methodology are provided in Appendix B. Increased risks in pregnancy that may require additional care include perinatal complications related to diabetes in pregnancy and hypertensive disorders of pregnancy (Diabetes Care Program of Nova Scotia, 2014; de Valk, & Visser, 2011; Magee, Pels, Helewa, Rey, & von Dadelszen, 2014; SOGC, 2014).

As outlined in the literature review, the measures of need used most often in the literature include incidence and prevalence of specific health conditions (Mackenzie,

Elliott Rose, Tomblin Murphy & Price, 2013). Therefore, health conditions related to pre-existing, pregnancy-related and neonatal morbidity are relevant as indicators of health need.

Postpartum/Postnatal Health Needs Indicators/Proxies:

- *Neonatal morbidity score* (from NSAPD): Derived variable based on gestational age (<34 weeks, $34^{0/7}$-36 $^{6/7}$ weeks, >$37^{0/7}$ weeks, sex and birth weight (<1500g, 1500g-2500g, >2500g). Low birth weight has been demonstrated to be a key indicator for maternal and newborn health care needs in needs-based health human resources planning as it is indicative of additional care that will be required for low birth weight infants (Birch, Chambers, Eyles, Hurley & Hutchinson, 1990; Birch & Eyles, 1991; Scheffler et al., 2008). Not only is there more intensive health care use at birth but low birth weight often correlates with preterm birth and other potential long-term health and social needs related to impaired cognitive and motor skill development (Hack, Flannery, Schluchter, Cartar, Borawski & Klein, 2002), poorer education outcomes (Hack et al., 2005) and increased need for health services (Lewit, Schuurmann, Baker, Corman & Shiono, 1995). Further inferences may suggest that populations with a higher incidence of low birth weight infants have increased health care needs (Mercuri, Birch & Gafni, 2013).

- *Breastfeeding* (initiation available from NSAPD): The NSAPD definition is any breast milk or expressed breast milk (EBM) during the hospital stay (birth admission). Breastfeeding is associated with improved short- and long-term outcomes for both mothers and infants (Ip et al., 2007).

Independent variables.

- *Maternal education* (from NSAPD): Defined as highest level of education completed as noted on the prenatal record. Choices include: less than secondary education (some High School); secondary Education (completion of High School); technical/some post secondary education (Community College or working on a Bachelor's Degree); post secondary education (completion of Bachelor's Degree e.g. Arts, Commerce or Science); graduate level (completion

of Masters Degree e.g. Masters in Nursing or Education); post graduate level (completion of Doctorate e.g. Doctor of Philosophy); professional degree (e.g. Physician, Lawyer or Dentist). There are associations between level of education and the ability to understand health information and access health services, employment opportunities and having the resources to make informed lifestyle choices (Culter & Lleras-Muney, 2003).

- *Maternal income* (from NSAPD): This is a derived variable based on neighbourhood income quintiles used by Statistics Canada. Absolute income data is not available from the Nova Scotia Atlee Perinatal Database. As a proxy, neighbourhood income quintiles as determined by Statistics Canada are available. Quintiles are specific to each neighbourhood and adjusted for household size. Separately for each of six areas in the province, all the neighbourhoods are ranked from lowest average income to highest. The quintile is then assigned with each category representing one-fifth of the households. Quintile 1 represents the lowest average household income, using the area-specific thresholds, and quintile 5 the highest. In a Nova Scotia study, socio-economic status was shown to be associated with increased rates of gestational diabetes, small-for-gestational-age live birth and post-neonatal death despite apparent availability of health care services (Joseph, Liston, Dodds, Dalhgren & Allen, 2007).

- *Area of residence—urban vs. rural* (from NSAPD): This variable is based on postal code information. The 6-character-long Canadian Postal Code was used to identify women who lived in rural or urban areas. The first three characters identify a major urban or rural area known as the 'forward sortation area' and the last three characters identify the smallest delivery unit, which may indicate a specific city block, a single building or a larger area. For this study, postal codes in Nova Scotia starting with 'B0' were used as proxies for rural area of residence and all other postal codes are proxies for urban area of residence (Canada Post, 2015). There is a large body of research in Canada about the health and social disparities in rural maternity care related to issues such as safety, access and vulnerability (Grzybowski, Kornelson & Schuurman, 2009). Since Nova Scotia is

relatively small geographically compared to other provinces or territories in Canada, much of the research related to remote areas does not apply.

- *Maternal Race-Ethnicity*[6] (from NSAPD): The information for this variable is documented by pregnant women on the prenatal record or queried by the provider and documented on the prenatal record. Selections include: Acadian, African Canadian, Asian, Caucasian, First Nations, Hispanic, Jewish, Mediterranean, Middle Eastern, Quebecois, Other. Immigrant women and women from various racial and ethnic backgrounds may require additional support and services to meet their health needs (Gagnon et al., 2009; Reitmanova & Gustafson, 2008; Simonet et al., 2010). Women may select any race/ethnicity category on the prenatal record that applies to them. For the purpose of this research, if women selected a category other than or in addition to Caucasian, they were considered identifying as not Caucasian. For the purposes of this research, race/ethnicity data was combined to be either non-Caucasian or Caucasian because of two important reasons. First, the custodians of the NSAPD data are currently exploring the best approaches for the sensitive use of race and ethnicity data. Therefore, based upon the data management agreement, the custodians asked that analyses, beyond descriptive statistics, for specific race/ethnicity groups not be performed and reported until standard approaches for data management are finalized. Secondly, as the principal investigator for this work, I do not have existing or established relationships with community representatives from the various racial/ethnic

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- [6]Definitions for maternal race/ethnicity are not included in the coding manual for the NSAPD. Women and/or providers select any categories that are applicable. Ethnicity may be defined as "the social group a person belongs to, and either identifies with or is identified with by others, as a result of a mix of cultural and other factors including language, diet, religion, ancestry, and physical features traditionally associated with race." (Bhopal, 2004, p. 443)
- Race has been defined "by historical and common usage," as "the group (sub-species in traditional scientific use) a person belongs to as a result of a mix of physical features such as skin colour and hair texture, which reflect ancestry and geographical origins, as identified by others or, increasingly, as self-identified." (Bhopal, 2004, p. 444)

groups. Therefore, in keeping with Tri-Council ethical guidelines and OPAC guidelines (Ownership, Control, Access and Possession) that relate specifically to the use of data about Aboriginal people, the analysis was limited to the two categories (identified as not Caucasian and Caucasian) (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, 2010); First Nations Information Governance Centre, 2014). It is recognized that this is a significant limitation of the data analysis as there are differences, supported in the literature, between different racial and ethnic groups. However, to decrease the possibility of perpetuating stigmatization about particular sub-groups based on race and ethnicity, advanced analysis was not performed. Further research in this area is warranted, once clear participatory data agreements with the various racial/ethnic groups are established.

Control variables:

- *Maternal age* (12-19 years, 20-34 years and 35-44 years in the CCHS PUMF, any age categories available via the NSAPD): Teenage pregnancy is associated with adverse outcomes such as low birth weight, preterm delivery, and small for gestational age and fetal anomalies (Chen, Wen, Fleming, Demissie, Rhoads, & Walker, 2007).   Although numbers of perinatal mortality are low in all age groups, a Nova Scotia-based study by Joseph et al. (2005) showed that the adjusted odds ratios for perinatal mortality/morbidity were OR 1.46 (95% CI 1.11-1.92; P = .007) among women 35-39 years and OR 1.95 (95% CI 1.13-3.35; P = .02) among women 40 years or older. Additional risks for women with advanced maternal age include: risks of stillbirth, preterm birth and cesarean delivery (Benzies, 2008). Age-based data are key in determining specific populations in the needs-based HHR analytical framework (Birch et al., 2007, 2009).
- *Parity* (from NSAPD): This variable includes both nulliparous (p=0) vs. multiparous (parity>0). It is defined as the number of pregnancies, excluding the present pregnancy, which resulted in one or more infants weighting 500 grams or

more at birth or 20 weeks or greater gestational age (regardless of whether such infants lived, were stillborn or died after birth). For the newborn-specific variables, liveborn infants only were included in this study.

- *Mode of Delivery* (cesarean section vs. vaginal, from NSAPD): This variable included delivery by cesarean section (with or without a hysterectomy), assisted vaginal delivery (forceps and/or vacuum) or spontaneous vaginal delivery. Cesarean section is associated with longer postpartum hospital length of stay (the average length of stay in Nova Scotia is 48-72 hours) compared to women who have had a vaginal delivery (average length of stay 24-48 hours). Cesarean section is also associated with increased risks for complications (infection, hemorrhage, thromboembolism, surgical injuries, emergency hysterectomy, pain, readmission to hospital, maternal or neonatal mortality, newborn respiratory difficulties, challenges with breastfeeding (Allen, O'Connell, Liston & Baskett, 2003; Harper et al., 2003; Kacmar, Bhimani, Boyd, Shah-Hosseini & Peipert, 2003; Levine, Ghai, Barton & Strom, 2001; MacDorman, Menacker & Declercq, 2008; Phipps et al., 2005; Rowe-Murray & Fisher, 2001).

What follows are the dependent variables (health needs indicators) from the CCHS that would have been used for analysis if the samples were sufficiently powered. The independent variables from the CCHS would have been similar to the NSAPD: household income, identifying as a visible minority and respondent education. Rurality was not available from the CCHS PUMF file.

- *Self-reported health status* (from CCHS 2009-2010, 2010, 2012): Perceived health refers to the perception of a person's health in general, either by the person themselves or, in the case of proxy response, by the person responding. Health means not only the absence of disease or injury but also physical, mental and social well being. The variable in the CCHS is rated as excellent, very good, fair or poor. Self-reported measures of health have been used as proxies for health need in needs-based human resources planning (Birch, Eyles and Newbold, 1993; Birch et al., 2005; Litaker & Love, 2005; Tomblin Murphy et al,. 2007a, 2009a). As outlined in the literature review, there is an association between self-reported

health status used and the use of health care services (Pappa and Niakis, 2006; Stahlnacke, Soderfeldt, Unell, Halling & Axtelius, 2005; Laupacis & Evans, 2005; Allin, 2006; Ferguson, Chiprich, Smith, Dong, Wannamaker, Kobau, et al., 2008; Waller et al., 2012).

- *Self-reported unmet health needs* (from CCHS 2010 annual component, 2011-2012): This variable involves a question to the respondent as to whether they have experienced an unmet health need in the past twelve months. If answered as yes, the respondent is asked why and provided the following options regarding health services: Not available - in the area, Not available - at time required (e.g. doctor on holidays, inconvenient hours), waiting time too long, felt would be inadequate, cost, too busy, didn't get around to it/didn't bother, decided not to seek care, doctor—didn't think it was necessary and the other (to be described by participant). These variables were not available since 2007 and added back into the CCHS in the annual 2010 component. Several studies have used these data to inform research on unmet health needs in Canada (Sibley & Glazier, 2009; McDonald & Conde, 2010; Wu, Penning & Schimmele, 2005; Bryant, 2009). Reasons cited for unmet needs often related to issues of access, acceptability and availability of health services as well as costs.

- *Self-reported perceived mental health status (from CCHS 2009-2010):* Defined as the population aged 12 and over who reported perceiving their own mental health status as being excellent or very good or fair or poor, depending on the indicator. Perceived mental health refers to the perception of a person's mental health in general. The variable provides a general indication of the population suffering from some form of mental disorder, mental or emotional problems, or distress, not necessarily reflected in perceived health (Statistics Canada, 2010). Women's mental health prior to, during and after pregnancy can have profound effects on perinatal outcomes. Maternal depression is associated with increased preterm delivery, low birth weight and decreased breastfeeding initiation (Grigoriadis, VonderPorten, Mamisashvili, Tomlinson, Dennis, Koren & Ross, 2013; Grote, Bridge, Gavin, Melville, Iyengar & Katon, 2010). Participants in the *Canadian*

Maternity Experiences Survey reported having challenges with mental health (Dzakpasu, Kaczorowski, Heaman, Duggan & Neusy, 2008).

- *Breastfeeding Duration (from CCHS 2009*-2010): The CCHS definition is the duration of exclusive breastfeeding. It is a derived variable based on the length of breastfeeding duration and introduction of liquids or solids. The derived variable specification changed in CCHS 2009-2010 and was used when looking at trends in breastfeeding duration across all cycles of CCHS.

Statistical analysis. Statistical Package for the Social Sciences (SPSS) version 21 software was used for the statistical analysis. Once data NSAPD and CCHS data files were received, data were reviewed for missingness. As detailed in Chapter Five, multiple imputation techniques were used to impute missing data from the NSAPD. Few data were missing from the CCHS data file. Data from the NSAPD were then recoded and transformed to best answer the research questions and test the hypotheses (Tables 9-11). Based on the consultation with the methodologist at Statistics Canada, no analyses of the CCHS were completed.

Descriptive statistics were used to synthesize and describe the basic features of the NSAPD data in the study by using simple summaries, graphics and measures for each variable (Loiselle et al., 2007). For my research, data for each variable with numeric data is displayed using frequency tables to provide the numbers and percentages from lowest to highest for each variable and indicate the distribution of the data. After recoding, there were no interval or ratio variables so means and standard deviations were not reported. Frequencies and modes were reported for nominal measures and modes and medians as well as frequencies for ordinal measures (Loiselle et al., 2007; Trochim, 2006).

Inferential, bivariate testing using contingency tables (e.g. 2X2 tables) provide a two-dimensional frequency distribution of two variables through cross-tabulation. A number of contingency tables were computed for the NSAPD data. As described in Chapter Five, a number of contingency tables were used to identify the initial trends between variables. For my research, associations between categorical variables were calculated using Chi-squared tests.

Multivariate statistics for this study involved using logistic multiple regression with four independent variables (maternal income, maternal area of residence, maternal education and maternal race-ethnicity) to determine if these variables were independent, statistically significant predictors of maternal-newborn primary maternity health care needs using the dependent variables (health needs proxies) outlined above. Control variables related to age, parity and mode of delivery were used in an attempt to control for pre-existing group differences. Multiple regression techniques were only used for the NSAPD data as the CCHS samples were insufficient. The independent and dependent variables with data sources and the analysis plan are outlined in Tables 7-9.

Table 7: Dependent Variables, Data Types, Recoding and Statistical Tests

Dependent Variables Maternal-Newborn Health Needs Indicators (Proxies based on timing of care)		Variable Type/ Recoding	Missing or Unknown Data	Analysis
Prenatal	Pre-pregnancy BMI Based upon self-report maternal height and weight from the first prenatal visit and calculated as a single number using the formula BMI= Weight(lbs or kg)/Height (m or inches)^2	Continuous to Ordinal Recoded to categories underweight (< 18.5), normal weight (18.5-24.9), overweight 25.0-29.9), obese I (30-34.9), obese II (35-39.9) and obese III (>40), to be in keeping with standard BMI categories used to guide clinical care (SOGC, 2010)	Imputation techniques for missing data described in Chapter Five	-Descriptive -Chi-squared -Spearman's rank order with education and income independent variables -Multiple logistic regression
	Maternal smoking Based upon any smoking at the birth admission. Number of cigarettes per day	Continuous to Dichotomous Recoded to smoker (yes) or non-smoker (no)	1.9% missing data not included in the analysis	-Descriptive -Chi-squared -Multiple logistic regression
	Prenatal Screening (based on HIV and/or maternal serum screening) Categories included whether the test was declined, not completed, completed or whether the information was unknown (e.g. no documentation).	Nominal to Dichotomous Recoded to prenatal screening completed (yes) or prenatal screening not completed (no). If either test was discussed or completed, then yes was coded.	Records without documentation of discussion (e.g. not completed or unknown) were included in the No category.	-Descriptive -Chi-squared -Multiple logistic regression
	Gestational Age at First Ultrasound Provided as gestational age in weeks and days.	Continuous to Ordinal Recoded to four categories: • Less than 12$^{6/7}$ weeks • 13$^{0/7}$-17$^{6/7}$ weeks • 18$^{0/7}$-21$^{6/7}$ weeks • More than 22 weeks Further recoded to two categories[1]: • Less than 21$^{6/7}$ weeks • 22$^{0/7}$ weeks or greater	29.5% of data missing, data was coded as 99. Analyses including the missing data were not significantly different from the final dataset.	Descriptive -Chi-squared -Multiple logistic regression

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[1] The standard of prenatal care in Nova Scotia is for women to have at least one diagnostic ultrasound between 18 $^{0/7}$-21$^{6/7}$ weeks gestation (RCP, 2007)

Table 7: Dependent Variables, Data Types, Recoding and Statistical Tests (cont'd)

Dependent Variables Maternal-Newborn Health Needs Indicators (Proxies based on timing of care)		Variable Type/ Recoding	Missing or Unknown Data	Analysis
Intrapartum	**Maternal Morbidity Score** (based on number of diagnoses that increase length of stay) Originally coded as: Low-risk=0 or 1 diagnosis code Low-moderate risk=2 diagnosis codes Moderate risk=3 diagnosis codes High risk=4 or more diagnosis codes	Ordinal	No missing data	-Descriptive -Chi-squared -Spearman's rank order with education and income independent variables -Multiple logistic regression
Postpartum/Postantal	**Breastfeeding Initiation** Original Codes: • Exclusive breastfeeding • Not breastfeeding • Breastfeeding with supplementation • Unknown	Nominal to Dichotomous Recoded to Yes-breastfeeding initiated during hospital birth admission (included exclusive and supplementation) No-breastfeeding not initiated	105 (<1%) records did not have infant feeding information and were coded as missing (99) and not included in the analysis	-Descriptive -Chi-squared -Multiple logistic regression
	Newborn Morbidity Score (composite score based on gestational age-weight-sex) Original codes: • <10th percentile SGA-High Risk • >90th percentile LGA-Moderate Risk • 10th-90th percentiles Appropriate for Gestational Age--Low Risk	Ordinal	45 records did not have all the variables required to compute the composite newborn morbidity score. These were coded missing (99) and not included in the analysis	-Descriptive -Chi-squared -Spearman's rank order with education and income independent variables -Multiple logistic regression

Table 8: Independent Variables, Variable Types, Recoding and Statistical Tests

Independent Variables (NSAPD)		Variable Type/ Recoding	Missing or Unknown Data	Analysis
Maternal Education Original Codes: • Less than Secondary Education (some High School) • Secondary Education (completion of High School) • Technical/some Post Secondary Education (Community College or working on a Bachelor's Degree) • Post Secondary Education (completion of Bachelor's Degree e.g. Arts, Commerce or Science) • Graduate Level (completion of Masters Degree e.g. Masters in Nursing or Education) • Post Graduate Level (completion of Doctorate e.g. Doctor of Philosophy) • Professional Degree (e.g. Physician, Lawyer or Dentist) • 99 Unknown		Ordinal Categories combined: • Less than highschool • Completed High School/Some Post-Secondary • Completed Bachelor Degree • Post-graduate Degree (Master/PhD/MD /DDS/LLB)	Multiple imputation techniques used (see Chapter Five)	-Descriptive -Chi-squared -Multiple logistic regression
Maternal Income Based on neighbourhood income quintile using Statistics Canada approach described above. Quintiles from lowest (1) to highest (5)		Ordinal	Percent missing low—had 95% of the original dataset Records with missing data not included in the analysis	-Descriptive -Chi-squared -Multiple logistic regression
Area of Residence Original Codes: • Yes---Rural • No---Not Rural (based on Canada Post postal codes)		Dichotomous	No missing data in the final dataset	-Descriptive -Chi-squared -Multiple logistic regression
Maternal Race/Ethnicity • African Canadian • Caucasian • First Nations • French Acadian • French Quebecois	• Middle Eastern • Mediterranean • Asian • Hispanic • Jewish • Other	Nominal to Dichotomous Recoded due to ethical reasons and the data management agreement to: • Identified as Caucasian • Did not identify as Caucasian Women who identified in multiple categories, including Caucasian were included in the identified as not Caucasian category	Had 61% of original dataset. Multiple imputation techniques used. Described in Chapter Five.	-Descriptive -Chi-squared -Multiple logistic regression

Table 9: Control Variables, Sources, Variable Types, Recoding and Statistical Tests

Control Variables	Variable Type/ Recoding		Analysis
Maternal Age Original values were single numbers with specific maternal age	Continuous to Ordinal Recoded to categories of age: • Under 20 years of age • 20-34 years of age • ≥ 35 years of age These are established maternal age categories used in the perinatal literature. There are significant risks associated with the extremes of maternal age (e.g. less than 20 and over 35 years).	No missing data	-Descriptive -Multiple Regression (NSAPD only)
Parity (nulliparous or multiparous) Original values were single numbers denoting the total number of pregnancies a woman had that have resulted in a living child or children or in stillbirths which are greater than or equal to 500g or 20 weeks gestation.	Continuous to Dichotomous Recoded to: Nulliparous: no living children or stillbirths greater than or equal to 500 g or 20 weeks gestation Multiparous: has living children Nulliparity is often associated with increased perinatal health risks.	No missing data	-Descriptive -Multiple Regression
Mode of Delivery Original codes were: • Assisted Vaginal Delivery (forceps or vacuum) • Cesarean Section • Cesarean Section & Hysterectomy • Spontaneous Vaginal Delivery	Nominal Collapsed categories cesarean section and cesarean section plus hysterectomy as the numbers were very small in the latter category.	No missing data	-Descriptive -Multiple Regression (for breastfeeding and maternal and newborn morbidity only)

Qualitative Approach

Qualitative approaches are formative inquiries that describe and interpret phenomena (Green & Thorogood, 2004) to further understand and contextualize participant's experiences (Reeves et al, 2010). According to Denzin and Lincoln (2008)

Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible.

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These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them. (p. 3).

The qualitative component of this study identified the primary maternity health care needs of women and newborns in Nova Scotia to document needs relative to and with the purpose of informing health human resources planning. The following factors were examined:

1. Similarities and differences that are perceived to exist among and between the needs identified by women, care providers, leaders and decision-makers compared to those needs identified using the needs-based HHR frameworks;
2. Gaps that women, care providers and/or health leaders and decision-makers identified in the current models of primary maternity health care in Nova Scotia;
3. Service delivery approaches that women, care providers and/or health leaders and decision-makers identified as addressing gaps in service.

Data collection. Focus groups and individual interviews were used to gather data for the qualitative portion of the research. These techniques have been used extensively in social and health research (Krueger & Casey, 2000; Stewart & Shamdasani, 1990). Focus groups and interviews provided forums for participants to share ideas, perceptions and experiences in a semi-structured, facilitated discussion. During the focus groups, participants were encouraged to build upon responses resulting in a combined understanding of concepts, which Wilkinson (2005) describes as the "co-construction of meaning in action" (p. 86). Thus, in keeping with System Theory and the Health Systems and HHR conceptual model, focus group data in the study created a holistic understanding of maternity needs in Nova Scotia by providing contextual knowledge about similarities between the quantitative and qualitative findings. The qualitative

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analysis also identified needs not identified from the analysis in the quantitative component.

Sampling and recruitment. Curtis, Gesler, Smith & Washburn (2000) outline several key considerations for sampling in qualitative research: 1) the method of drawing samples is not based on statistical probability of selection, but on other, purposive or theoretical sampling criteria; 2) samples are small, are studied intensively, and each one typically generates a large amount of information; 3) samples are not usually wholly pre-specified (e.g. may need to modify sampling depending on analysis); 4) sample selection is conceptually driven; 5) qualitative research should be reflexive and explicit about how and why `cases` are selected and 6) qualitative samples are designed to make possible analytic transferability. Purposeful sampling was used for the qualitative portion of the research.

According to Patton (1990), the "logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research thus the term purposeful sampling" (p. 169). A purposive approach provided a sample of participants for this study who "had experiences relating to the phenomenon being researched" (Kruger & Casey, 2000, p. 150) and the sampling was congruent with a qualitative design (Coyne, 1997; Barbour, 2001; Byrne, 2001; Sandelowski, 1995). Creswell (1998) states that between 5-25 participants are needed for a qualitative study. In mixed methods research, it has been suggested that sample sizes between 20-40 participants permit in-depth analysis of phenomena (Castro, Kellison, Boyd, & Kopak, 2010). Guest, Bunce & Johnson (2006) suggest approximately 12 participants for interviews while other authors recommend 6-12 participants for focus groups (Langford, Schoenfeld, & Izzo, 2002; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009; Teddlie & Yu, 2007).

Two focus groups with women for a total of 20 participants and two interviews with women (two participants) from a variety of populations in Hants and Halifax counties* (the catchment areas for Capital District Health Authority and the IWK Health Centre) were conducted to discuss and identify specific primary maternity health care needs. The specific targeted populations of women included: women from various

racial/ethnic groups, women residing in urban and rural areas, younger and older childbearing women, women experiencing challenges related to socioeconomic status, single parenting, lower levels of education, and lifestyle factors such as obesity or smoking. Hants and Halifax counties have been chosen not only for logistical purposes but also because 50% of the births in Nova Scotia happen at the IWK, there are vulnerable and marginalized groups living in the area and there was an opportunity to speak to a wide range of health providers and health leaders and there are women and families living in both rural and urban communities. Approximately 28,000 persons living in Halifax identify as visible minority[7] (Statistics Canada, 2006) and more than 33,000 people who identify as Aboriginal (more than 21,000 are First Nations) live in Nova Scotia (Statistics Canada, 2011c), with approximately 5,900 First Nations people living in Halifax (Nova Scotia Government, 2013).

Focus group scripts and interview guides are provided in Appendix C. Inclusion criteria for women:

- Have given birth in the last 12 months
- Speak/read English
- 18 years of age or older
- Received all prenatal care in Nova Scotia and reside within Hants and Halifax counties[8]
- 22 women participated in the study from 2 focus groups and 2 interviews

Semi-structured, individual, face-to-face interviews and focus groups lasting between 60-120 minutes were conducted with a sampling of primary maternity care providers including registered nurses (in hospital and public health), family physicians, obstetricians, neonatologists, midwives and family practice nurses who practice in Hants and Halifax counties to inform an understanding of priority health needs for women and

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[8] 50% of the births in the province occur at the IWK, which provides delivery and primary care services for women living in the Halifax Regional Municipality. There are opportunities for conversations with women from both rural and urban communities, various age groups and more diverse groups within HRM compared to other places in the province.

newborns in Nova Scotia and to inform maternal-newborn health services planning in the province. Interview and focus group guide Appendix E.

Inclusion criteria for providers:

- Speak and read English
- Attended at least 15 deliveries over the last 12 months
- Clinical practice includes primary maternity care in Nova Scotia (Hants and Halifax counties)[9]
- 16 health care providers were interviewed

Semi-structured, individual, face-to-face interviews and focus groups lasting between 60-120 minutes were conducted with a sampling of health care leaders in various leadership positions at both the provincial, district and organizational levels; some as leaders related to specific professions, some were leaders of agencies, organizations or departments. All had expertise in leadership related to maternal-newborn care.

Inclusion criteria for health leaders/decision-makers:

- Involved in planning, policy and decision-making for maternity care at the local, district or provincial levels (e.g.: health services managers, VPs patient or community care services, provincial perinatal program coordinator and provincial programs director, leaders in Nova Scotia Department of Health and Wellness primary health care)
- 18 health leaders were interviewed. Interview guide Appendix F.

Participants were recruited in two ways:

1. Information about the research study was posted in the waiting room in a number of primary maternity care settings and local community settings where pregnant women frequent (recruitment poster Appendix G). The posters resulted in two women identifying as interested in participating in the study. Therefore, I engaged

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[9] There are a variety of primary maternity care settings in Hants and Halifax counties (solo providers, physician groups, physicians working with family practice nurses and/or nurse practitioners, midwives, obstetricians, maternal-fetal medicine specialists, community and hospital nurses etc.).

in targeted strategies to ensure the study included women with different perspectives. This included purposeful sampling in settings such as family resource centers and the MicMac Child Development Centre. These strategies resulted in a number of focus groups with women in rural and urban settings as well as groups that included women from diverse backgrounds. [10]

2. Email or fax invitations were sent out to clinicians, health leaders and decision makers to invite them to participate in an interview or focus group. This method was highly effective and resulted in positive responses.

Qualitative analysis. In keeping with a sequential explanatory QUANT→ qual mixed methods design, analysis (as described above) of the secondary data from the NSAPD provided information to finalize the development of semi-structured focus group/interview questions for the qualitative component of the study. The intent of the qualitative data from primary maternity care providers, women and health system leaders was to validate, expand upon or contradict the quantitative results and the qualitative data provided context for primary maternity care in Nova Scotia. The scripts outlining the purpose of the study and the interview and focus group guides were finalized based on the quantitative findings. With participant permission, all focus groups and interviews were audio-taped. The taped interviews were transcribed verbatim by a transcriptionist who signed a confidentiality form. The transcribed data were analyzed using NVivo version 10 software; no relevant data were eliminated.

The research questions for the qualitative phase were:

1. What were the primary maternity care needs of women and newborns in Nova Scotia?

2. Were there differences in the identified primary maternity care needs between women, care providers, leaders, decision-makers, and those needs identified using the needs-based HHR frameworks?

3. Did women, care providers and/or health leaders and decision-makers identify gaps in services in the current models of primary maternity care?

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[10] As per provincial guidelines regarding supporting women to attend focus groups, women who participate in the study were provided a $20.00 honorarium to cover the costs of child care, transportation and/ or other costs incurred as a result of participation.

4. If gaps were identified, what service delivery approaches can be used to
   address the gaps in service?

The first two questions were the mixed methods questions for the study.
Questions three and four are the specific qualitative questions for this study.

Table 10: Stages for Qualitative Data Collection and Analysis

Refine interview and focus group questions and approach	• Findings from quantitative analysis were used to frame the dialogue during the interviews and focus groups. The original interview and focus group questions were not revised.
Exploratory Phase	• Recruitment of participants via posters, email and fax • Targeted strategies were used to organize focus groups with specific women (low SES, level of education, area of residence, age, and race/ethnicity). This involved making direct contact via Family Resource Centers and local community organizations where I presented the purpose of the research for consideration by women participating in existing FRC or community-level programming. Some sites were visited up to three times to provide adequate time for informed consent.

Individual semi-structured, face-to-face interviews or focus groups	• Semi-structured, face-to-face, open interviews and focus groups
	      -With women
	      -With primary maternity care providers
	      -With maternity care leaders

Qualitative Analysis	• Analyze transcribed data from interviews and focus groups
	• Develop a codebook • Complete an inter-coder reliability exercise • Conduct a content analysis for all transcribed data • Identify themes using thematic analysis
Integration of Findings	• Compare, contrast and combine results from the quantitative and qualitative approaches
	• Discussion & Conclusions

Thematic analysis. A thematic analysis approach outlined by Braun & Clarke
(2006) and Clarke and Braun (2014) and informed by Ritchie and Lewis (2003) and
Smith and colleagues (2011) was used for the qualitative analysis. Thematic analysis in
general involves the identification, grouping and naming of participant experiences with

subsequent reflection and interpretation of the experiences. According to DeSantis and Ugarriza (2000), a theme is defined as…

> "an abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations. As such, a theme captures and unifies the nature or basis of the experience into a meaningful whole." (p. 362).

Phase 1:Becoming familiar with data
Phase 2: Generating initial codes
Phase 3: Searching for themes
Phase 4: Reviewing themes
Phase 5: Defining and naming themes
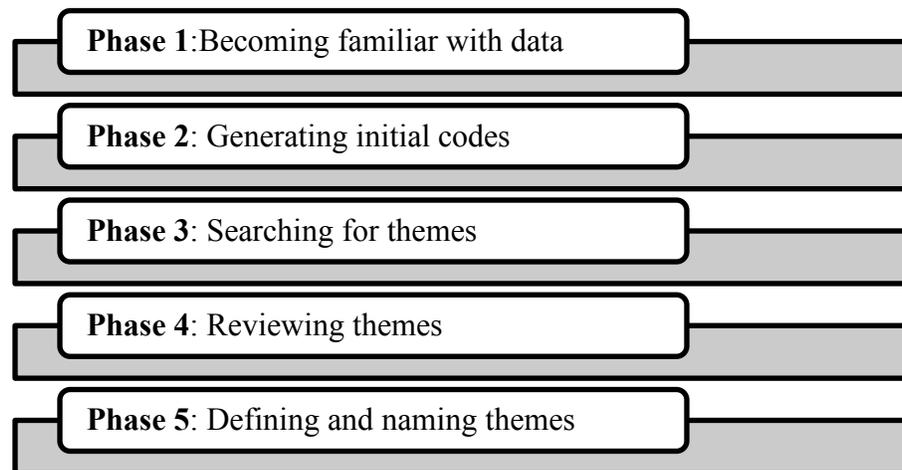
Figure 8: Qualitative Data Analysis

(Braun & Clarke, 2006; Clarke & Braun, 2014; Ritchie & Lewis, 2003; Smith, Bekker & Cheater, 2011)

Phase 1: Becoming familiar with data. All transcribed transcripts were read through entirely at least twice and memo notes were created in NVivo to record initial impressions. The study purpose and questions as well as the focus group and interview questions were reviewed during this phase to continually remind and connect data to the study's intent.

Phase 2: Generating initial codes. A detailed codebook using both 'a priori' and emergent codes was developed with two thesis committee members. The details of the development of the codebook as well as the inter-coder reliability exercise used to confirm the approach for the initial content analysis is outlined in Chapter Six. Content analysis was completed for all transcripts using the codebook.

Phase 3: Searching for themes. The codes and the associated text data per code were reviewed to identify patterns across codes and to reduce and collapse the codes into relevant themes.

Phase 4: Reviewing themes. The themes and the associated text data per theme were reviewed and two meta-themes were identified (System and Service Delivery and Individual Care Encounters).

Phase 5: Defining and naming themes. All themes and meta-themes were reviewed and finalized. Relevant quotes are presented per theme in Chapter Six with an integration of the qualitative and quantitative findings together with relevant literature in Chapter Seven.

Key concepts related to the Health System and HHR Conceptual Framework (Tomblin Murphy, 2007) and General System Theory (GST) (von Bertalanffy, 1968), informed the qualitative analysis. Elements from GST included: 1) nonsummativity ('the whole is greater than the sum of the parts' e.g. many factors impact health); 2) interdependence (all elements in needs-based HHR are inter-related and situated within broader health, social and economic systems); 3) homeostasis (refers to the stability of the system(s)—Are needs being met by the current system(s) or are there unmet maternal and newborn health needs?); and 4) equifinality (there are many ways to achieve the same goal—the goal in this research is to identify the health needs of women and newborns in Nova Scotia).

All components of the Health System and HHR Conceptual Framework were considered during the analysis. As outlined in Chapter Two, five specific components of the HHR framework informed this study: the *Health Needs of Populations, the 'outer' contextual circle of the framework*, *System Design*, *Management, Organization and Delivery of Health Services* and *Resource Deployment and Utilization.*

In keeping with a sequential QUANT → qual mixed methods design, the qualitative phase was informed by the preliminary quantitative analysis. Details are outlined in Chapters Five and Six. As well, the domains for responsiveness developed by the WHO (2005) were used to inform the analysis as it provided a framework to assess satisfaction with care. The guiding principles for the Family Centered Maternity and Newborn Care (FCMNC) guidelines (PHAC, 2000) have been used in maternal-newborn care planning for more than a decade. Using both the domains for responsiveness and the FCMNC guidelines extends the thinking related to maternal-newborn health needs to

include other potentially key components of care such as care relationships and satisfaction with care.

Therefore, in addition to GST and the Health Systems and HHR Conceptual Framework and informed by the findings from the quantitative approach, the domains for responsiveness and the FCMNC guidelines were used to frame the development of the focus group and interview questions and to inform the development of the codebook for the initial content analysis and the thematic analysis. The WHO domains for responsiveness (2005) include: dignity, autonomy, confidentiality, clear communication, prompt attention, access to social support networks, quality basic amenities, and choice of health care provider. The guiding principles for the Family Centered Maternity and Newborn Care guidelines include: a) birth is a celebration - a normal, healthy process; pregnancy and birth are unique for each woman; the central objective of care for women, babies, and families is to maximize the probability of a healthy woman giving birth to a healthy baby; family-centred maternity and newborn care is based on research evidence; relationships between women, their families, and health care providers are based on mutual respect and trust; women are cared for within the context of their families; in order to make informed choices, women and their families need knowledge about their care; women have autonomy in decision making. Through respect and informed choice, women are empowered to take responsibility; health care providers have a powerful effect on women who are giving birth and their families; family-centred care welcomes a variety of health care providers; technology is used appropriately in family-centred maternity and newborn care; quality of care includes a number of indicators; and language is important (PHAC, 2000).

Considerations for the Integration of the Quantitative and Qualitative Approaches

Aforementioned, the integration of quantitative and qualitative approaches in mixed methods research require careful consideration of the philosophical, theoretical and conceptual approaches used in the study and how the two phases are blended at the stages of research development (purpose, questions and hypotheses), data collection and analysis and the interpretation and conclusions of the study. Additionally, it is important to consider how participants were selected, how samples were determined, what data

analysis techniques were used and how findings were interpreted (Creswell & Plano Clark, 2011). If possible, the use of the same participants in each of the phases of the research is preferable. However, this was not possible for my research as secondary data is being used for the quantitative approach. Participants in the qualitative phase may or may not have been participants in the CCHS and although individual level data was used from the NSAPD, the data was de-identified.

Sampling for my research was in keeping with the established approaches for quantitative and qualitative research. Typically, larger sample sizes are required in quantitative research to ensure the analysis is adequately powered and smaller sample sizes are acceptable for qualitative research. The sampling strategy for the CCHS is outlined in the quantitative approach section of this chapter. The entire population of women for 2009-2010 from the NSAPD was included in the study. In regards to analysis, the concern is when findings from one approach are intended to inform the subsequent phase (Creswell & Plano Clark). For my research, the quantitative results informed the interviews and focus groups with participants in the qualitative phase. Since the quantitative results informed the qualitative data collection, I selected variables for the quantitative phase based upon best evidence in both perinatal care and HHR and variables reflective of a broad understanding of maternal-newborn health in Nova Scotia. I also used established, sound conceptual and analytical approaches to needs-based HHR and I chose data analysis techniques (e.g.: multiple logistic regression) to maximize the sensitivity of the analysis. Additionally, as suggested by Creswell & Plano Clark (2011), the interpretation of findings in the study was organized in a sequential fashion to reduce the risk of merging data. This was important as I used findings from the quantitative approach to inform the qualitative approach.

Rigour in Quantitative, Qualitative and Mixed Methods Research

       Validity and reliability in quantitative research. To assess the quality of quantitative research, two criteria are considered: reliability and validity. From a general perspective, validity in quantitative research relates to whether the research design overall provided compelling evidence (Loiselle et al., 2007). There are four aspects of a study's validity: statistical conclusion, internal, external and construct. Statistical conclusion

validity refers to the ability for the statistical tests in the study to detect relationships between the dependent and independent variables. In other words, internal validity is the extent to which the independent variable is truly influencing the dependent variable. There are two major threats to statistical conclusion validity: finding no relationship when there actually is one (Type II error—false negative) and finding a relationship when, in fact, there is none (Type I error—false positive). The degree of risk in making a Type I error is measured using a level of significance (i.e.: the probability of making a Type I error). The level of significance used in this study, referred to as alpha (α) was set at 0.05. For instance, in this study, with a significance level set at .05, there was a 5% chance that the conclusion that mothers living in rural parts of Nova Scotia had increased health needs was incorrect. In other words, there is a 5% chance that the null hypothesis was incorrectly rejected. In hypothesis testing, the null hypothesis is assumed to be true and the purpose of the study is to gather evidence to disprove it. Therefore, using a specified level of probability, the study findings are based on whether or not there was statistical significance (i.e.: the results were not due to chance).

Two key aspects of design to improve statistical conclusion validity are ensuring adequate statistical power usually by having an adequate sample size (Polit and Beck, 2007) and careful construction and definition of the variables of interest so that independent variables are constructed to maximize group differences and thus detect differences related to the dependent variable (Loiselle et al., 2007). After multiple imputation, the entire population from the NSAPD (2009-2010) for this study was17,826; so more than large enough to complete the multiple regression analysis. The probability of a Type II error is referred to as beta (β) and is estimated using power analysis. Power is the study's probability of rejecting the null hypothesis when it is false (i.e.: in making a correct decision). Power is represented by 1-β. B is the probability of making a Type II error of failing to reject the null hypothesis when it is false. Therefore, power is the probability of rejecting the null hypothesis when it is false. The standard desirable study power is 0.80 (Shi, 2008). Power is dependent upon the sample size, the significance level (p value or likelihood of a Type I error which is rejecting the null hypothesis when it is true) and the estimated effect size (difference the study is aiming to detect). To account for type II error, power analyses were performed for the CCHS data.

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Unfortunately, the sample sizes for the CCHS data were insufficient to complete analyses and the sample was not sufficiently powered to use the sampling weights for the CCHS. After amendment and ethics approval, an additional year of CCHS data was added (2011-2012); however, the sample sizes remained insufficient. Therefore, the CCHS variables related to needs-based HHR (self-reported health status, unmet health needs) were not used in the analysis for this study. As outlined in the quantitative data collection and analysis section, the construction of the variables of interest were selected using evidence from needs-based HHR, indicator development in primary health care and existing perinatal indicators based on the variables that were available.

Threats to internal validity include: history (occurrence of events at that same time that can affect the effect of the independent variable on the dependent variable), selection bias (preexisting differences between groups), maturation (any influence related to the effect of time) and mortality (attrition from groups in a study). The aim therefore, of a good quantitative study is to limit these threats and rule out competing explanations. This can be especially challenging in quasi-experimental and correlational studies. For the time frame for this study (2009-2010), potential non-modifiable threats to internal validity would have been the ongoing introduction and development of collaborative care models of perinatal care across the province and provincial health and social initiatives related to healthy living (e.g. targeted at obesity, smoking, breastfeeding support programs) that may have all influenced the clinical and population health data from the NSAPD.

External validity is the generalizability of the research findings to other populations or settings. Improvements to external validity include: adequate sample size and samples that reflect the population of interest (Creswell & Plano Clark, 2011; Onwuegbuzie & Johnson, 2006; Loiselle et al., 2007; Polit & Tatano Beck, 2012). For this study, the entire population for 2009-2010 from the NSAPD was used. As a measurement scale was not part of this study, face, content and criterion-related validity were not relevant (Loiselle et al., 2007; Trochim, 2006).

Generally, reliability of research results refers to making true inferences about a population (Loiselle et al., 2007). Reliability of a quantitative measure or variable is defined as the consistency with which an instrument measures an attribute. For this study,

interrater agreement (IRA) and interrater reliability (IRR) were used to measure the degree of coding agreement in the qualitative phase (Bliese 2000; LeBreton & Senter, 2008).

Trustworthiness in qualitative research. Many qualitative researchers accept the classic work by Lincoln and Guba (1994) related to the trustworthiness of findings in qualitative research. Five criteria are outlined by the authors: credibility, dependability, confirmability, transferability and authenticity.

Credibility, similar to validity in quantitative studies, refers to the confidence in the truth of the data and the interpretations of them. It involves strategies such as prolonged engagement (sufficient time for building relationships and data collection) and persistent observation focus on relevant aspects to the phenomenon of study). In this study, the interviews were face-to-face, semi-structured interviews and focus groups aimed at eliciting participant experiences. Lincoln and Guba (1985) note that "if prolonged engagement provides scope, persistent observation provides depth." (p. 304).

As noted earlier, *triangulation* is one of the key advantages to a mixed methods design. It is also a key strategy to enhancing the credibility of qualitative research findings (Denzin, 1989). In my research, the qualitative findings confirmed many of the findings in the quantitative phase. Additional strategies used in this study to corroborate findings included reviewing the qualitative findings and analysis with the thesis committee members and my supervisor and member-checking with study participants (participants were offered the option of reviewing their text file transcript). During the focus groups for my research, flip charts notes were also taken in an effort to capture and validate participant views. Additionally, researcher credibility also enhances the qualitative research process. Although I have clinical credibility in maternal-newborn care throughout the province, I am a novice researcher.

Dependability, similar to reliability in quantitative studies, relates to the stability of the data over time and various conditions. One of the most common techniques to improve dependability is maintaining detailed research documents (e.g.; an audit trail) that can be audited by an external reviewer. For my research, all research documents were organized and filed so that the research process can be readily reviewed.

Confirmability relates to the neutrality of the data. Audit trails, field notes and

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reflexive journaling are strategies to enhance data accuracy, relevance and meaning. In addition to the notes taken during the focus groups in the qualitative phase of my research, I also took notes to capture my impressions after both the interviews and the focus groups.

Transferability, similar to generalizability in quantitative studies, is the extent to which the study findings can be transferred to other settings. Thick description of the research setting, process and analysis will enhance readers' ability to connect with the research and find contextual similarity (Loiselle et al., 2007). Creswell and Miller (2000) describe thick description as creating

> *verisimilitude*, statements that produce for the readers the feelings
> that they have experienced, or could experience, the events being
> described in a study. Thus credibility is established through the
> lens of readers who read a narrative account, and are transported
> into a setting or situation (p. 128).

In the analysis and discussion of the qualitative findings, I focused on creating rich descriptions of participant experiences in an effort to support readers' connection with the work.

Authenticity refers to "the extent to which researchers fairly and faithfully show a range of realities" (Polit & Tatano Beck, 2012, p. 585). Angen (2000) describes this as creating coherence and comprehensibility aimed at also evoking feelings and creating what Nielsen (1995) describes as "spontaneous validity" (p. 5). Strategies used in this study to enhance authenticity included providing direct participant quotes in the findings (Chapter Six) to illustrate participants' feelings, language and life contexts and careful and rigorous readings of the transcripts. My pragmatic and relational worldviews are described at the beginning of this chapter to inform my 'locatedness' as a researcher.

Rigour in mixed methods. There are limited established approaches to rigour in mixed methods research. Creswell and Plano Clark (2011) suggest that mixing quantitative and qualitative approaches require different strategies to address validity in data collection and analysis depending on the type of mixed methods design. Teddlie and Tashakkori (2003) suggest alternate language for rigour in mixed methods studies such as *inference quality* and *inference transferability. Inference quality* is similar to statistical

conclusion and internal validity in quantitative research and credibility in qualitative research. It relates to whether or not the analysis and conclusions in the study are sound. *Inference transferability* describes the degree to which findings apply to similar populations and research settings. It is similar to external validity in quantitative research and transferability in qualitative research.

Ethical Considerations

Although research enriches and improves our lives, it is also a "step into the unknown. Because it seeks to understand something not yet revealed, research often entails risks to participants and others. These risks can be trivial or profound, physical or psychological, individual or social" (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, 2010, p. 7). The Tri-Council framework for ethical research with humans is based upon three core principles: respect for persons, concern for welfare and justice. *Respect for persons* recognizes the intrinsic value of human beings and includes the obligations to respect autonomy and protect those with impaired or diminished autonomy. As described above, the specific Tri-Council principles related to research with Aboriginal people also apply to this study. Autonomy is defined as the ability to decide and to act based upon a decision. This is influenced by, and can influence, the contexts of a person's life. *Concern for welfare* includes individuals' physical, mental and spiritual health, as well as their physical, economic and social circumstances. It is the responsibility of the researcher to protect and promote the welfare of study participants by outlining any foreseeable potential risks or harms associated with the research. *Justice* refers to equitable and fair treatment for all persons. It is the responsibility of the researcher to attend to potential threats to justice and ensure vulnerable and marginalized people are appropriately considered during all components of the research process. This also includes an understanding of the potential power imbalance that often exists between the researcher and study participants. The two rights related to the principle of justice include: the right to fair treatment and the right to privacy (Polit & Tatano Beck, 2012). There are several ways to attend to these ethical principles: obtaining informed consent from study participants, soliciting ethical approval

from applicable research ethics boards, engaging in strategies to protect participants' privacy and confidentiality and sharing research findings.

Informed consent, outlining the research purpose, process and any potential risks or harms took place prior to each focus group and individual interview and was witnessed by the principal investigator. Participants in this study were informed that they could withdraw from the study at any time and that withdrawal would not affect employment or receipt of health care. As a doctoral student, if a participant had concerns regarding my conduct, they were instructed to contact my PhD Supervisor and the appropriate Research Ethics Board (REB). Contact information for both my PhD Supervisor as well as the REB was included on the consent forms. No participants identified concerns.

A written copy of the consent form (Appendix H-J) was provided to each participant. It is the policy of the Dalhousie University Research Ethics Board to automatically grant ethical approval if the Research Ethics Board of the health care facility has previously approved it; therefore the proposal was submitted to the IWK Health Centre and Capital District Health Authority research ethics boards. There were no anticipated participant physical risks associated with this study. Possible emotional or psychological risks may be associated with providers or health leaders reflecting on needs that are not currently being met or women recalling negative health care encounters or realizing their needs were not met. The possible benefits included: increased awareness of women's and newborns health needs, an awareness of current practice challenges and successes that meet women's and newborns health needs and potential changes to how care is delivered to meet the needs of women and newborns at the levels of practice, policy and planning. No participants identified emotional or psychological effects as a result of participating in this study.

All information was kept confidential and shared only with appropriate people involved with the study (i.e.: myself as principal investigator, the transcriptionist, the statistician and my thesis supervisor and committee members). All information was stored in a locked and secure cabinet. Study data entered on the laptop computer were anonymized and both the word documents and the laptop computer were password protected and backed up regularly using a password-protected external hard drive. The computer was stored in a locked cabinet when not in use. For the qualitative component,

study results were presented as broad themes and when participant direct quotes were used, generalized language (e.g. health care provider, health care leader or woman participant) was used. Names were deleted when participants were referring to others.

Study findings will be shared with participants in a variety of ways (meetings, workshops, and conversations, written findings) to enhance uptake of the findings. Details for knowledge translation are outlined in Chapter Eight. Participation in the knowledge translation strategies are voluntary; open to all participants in the study and were not a required component of participation in the study.

CHAPTER FIVE: QUANTITATIVE RESULTS

As outlined in the previous chapters, this sequential explanatory quantitative-qualitative study is informed by General System Theory, the Conceptual Framework for Needs-Based HHR and Health Systems Planning developed by Tomblin Murphy & O'Brien-Pallas (Tomblin Murphy & O'Brien-Pallas, 2006) and the related Analytical Framework (Birch et al., 2007; 2009) and Simulation Model (Tomblin Murphy et al., 2009). The purpose of this chapter is to provide the results of the quantitative analyses. Methodological challenges are also outlined.

Quantitative Analysis

In keeping with a sequential quantitative-qualitative mixed methods design, recoding, cleaning and imputations for missing data were initially completed and then a preliminary analysis of the quantitative data from the NSAPD was completed prior to the qualitative data collection. The independent, dependent and control variables are outlined in Tables 11 and 12.

Table 11: Independent and Control Variables

Independent Variables
Possible Predictors for Health Needs from the NSAPD
Maternal education
Maternal income (based on neighbourhood income quintiles)
Area of residence (rural or urban)
Maternal race/ethnicity
Control Variables
Maternal age
Parity (nulliparous or multiparous)
Mode of delivery

Table 12: Dependent Variables

Dependent Variables		
Maternal-Newborn Health Needs Indicators from NSAPD (Proxies based on timing of care)		
Prenatal	Pre-pregnancy BMI	
	Maternal smoking	
	Prenatal Screening (combined, based on HIV and maternal serum screening)	
	Gestational Age at First Ultrasound	
Intrapartum	Maternal Morbidity Score (based on number of diagnoses that increase length of stay)	
	Newborn Morbidity Score (composite score based on gestational age-weight-sex)	
Postpartum	Breastfeeding Initiation	

Nova Scotia Atlee Perinatal Database

This study used data from the Nova Scotia Atlee Perinatal Database (NSAPD), which is managed by the Reproductive Care Program of Nova Scotia. The data was for all pregnancies and births occurring at hospitals in Nova Scotia between January 1, 2009 and December 31, 2010. All data in the NSAPD for that timeframe were cleaned and cross-checked by the custodians of the NSAPD to ensure quality and completeness (e.g. checked with other sources such as Vital Statistics). The sample population included mothers who delivered infants in hospital with a birth weight ≥ 500 grams or a gestational age ≥ 20 weeks. No homebirths were included in this study as midwifery was not regulated or legislated until March 2009 and very little home birth data were available for the study time period. Records in the dataset were not automatically excluded if there was missing data for the variables of interest. Instead, multiple imputation techniques were employed to estimate for the missing data. As outlined in Chapter Four, tables 7-9,

the independent, dependent and control variables were also re-coded for the purposes of analysis. A number of continuous variables were converted to ordinal variables before data analyses. For example, based on the SOGC recommendations (2010), pre-pregnancy BMI was categorized as: underweight (less than 18.5 kg/m^2), normal (18.5 to 25 kg/m^2), overweight (25 to 30 kg/m^2), obese (greater than 30 kg/m^2).

Data from the NSAPD included all women and newborns in the corresponding time frame comparable to CCHS (2009-2010) (Statistics Canada, 2011b). As outlined in the previous chapter, data in the NSAPD are retrieved in three ways: automatic uploads, uploads from CIHI data and direct coding by health records staff in facilities in Nova Scotia. All this information is dependent on accurate and available documentation of information and clinical care on the patient's health record. Therefore, if information is not recorded, it cannot be coded by health records staff. There were a number of variables of interest in this study where complete data were not available. The missing data may be related to several factors including: lack of documentation of the information on the health record, the question not be asked and/or the assessment or test not completed by the health care provider, the question not being answered by the patient, the particular documentation tool (e.g. prenatal record) not available on the health record and/or coder error in not finding the appropriate information. The variables of interest with the most missing data were maternal education (55.4% missing), maternal race/ethnicity (28.7% missing), maternal BMI (22.7% missing) and gestational age at first ultrasound (14.7% missing). The first two variables were independent variables and the latter two were dependent variables for this research. As these are all relatively sensitive topics for discussion, it is possible that women chose not to self-report the information. In the case of BMI, maternal weight is measured at each prenatal visit. The missing data point is usually maternal height. It is also possible that perinatal care providers were not comfortable, did not think the information was relevant to clinical care or they did not have the time to gather data on maternal education and maternal race/ethnicity. Sometimes the ultrasound reports are not available on the hospital record and the details of the ultrasound are not recorded on the prenatal record; therefore, the information about ultrasound may not be coded.

Typically missing data are categorized as missing completely at random (MCAR), missing at random (MAR) or missing not at random (MNAR) (Donders, Heijden, Stijnen & Moons, 2006). MCAR involves missingness not related to any other patient characteristics. MAR involves missingness related to the observation of other patient characteristics (e.g. question about breastfeeding duration that includes the answer 'not applicable' for a mother who has chosen to formula-feed her infant). MNAR involves missingness related to unobserved or unknown patient information. As no significant patterns were identified, the missing data in this study was considered either MCAR or MAR.

The records with missing data were first explored using descriptive analysis to determine any patterns in the missingness. No patterns were identified and the missing data was considered MCAR, therefore multiple imputation techniques could be employed. Although there are no universal approaches for attending to missing data, there are several options, depending on the data and the planned analysis (Donders et al.). The most simplistic option for attending to missing data is case deletion (e.g. not including the missing data in the analysis). However, this not only decreases the overall available sample but may also lead to standard errors and bias. Single or multiple imputation techniques have been developed to account for missing data. Single imputation does provide an increased dataset for analysis and is a single computation technique (Patrician, 2002). However, single imputation techniques may overestimate precision and increase the risk of type two errors (e.g. rejecting the null hypothesis when it is true) (Little & Rubin, 2002). The most advanced technique for attending to imputation is multiple imputation where each missing value is replaced by several different possible values and the variation between the imputations are calculated. The multiple imputation approach used via SPSS for this study was a fully conditional specification, which uses an interative Markov Chain Monte Carlo procedure where the available predictor variables are used to impute missing values over multiple cycles/iterations of regression (van Buuren, 2012). Usually three to five imputations are completed. The results are then combined into a single model with pooled data (Sterne, Carlin, Spratt, Kenward, Wood & Carpenter, 2009). Both single and multiple imputation techniques were compared as viable methods to attend to the missing data in this study.

Multiple imputation using five cycles of regression was used to impute missing data in this study as it decreases the risk of type two errors.

The number and percentage of missing data, the imputation technique(s) and the results with the final sample are outlined in Table 13.

Table 13: Missing Values and Imputation Techniques

Variable	Number (%) of Missing	Imputation Technique(s)	Results	Overall Sample
Education	9842 (55.4%)	Collapsed categories, to less than high school, completed high school or some post-secondary, completed Bachelor's degree and post-graduate degree.	5 cycles of multiple imputation using predictor variables age, parity, mode of delivery and the outcome variables, prenatal screening, smoking in pregnancy, maternal and newborn morbidity and breastfeeding. (Moons, Donders, Stijnen & Harrell, 2006; Sterne et al., 2009; van Buuren, 2012)	Values imputed for all records with missingness >5% N=17,826
Race/ Ethnicity	5123 missing + 1216 coded as unknown =6339 (35.5%)	Categories collapsed into Caucasian and non-Caucasian (rationale explained in Chapter Four)		
Body-Mass-Index	4055 (22.8%)	Used standard BMI categories		
Gestational Age at First Ultrasound	2620 (14.7%)	Collapsed to two categories: ultrasound before 22 weeks gestation and ultrasound after 22 weeks gestation. This is in keeping with current best practice recommending at least one diagnostic ultrasound in pregnancy between 18-21$^{6/7}$ weeks gestation.		

After multiple imputation techniques were used, all records had a value for the variables of interest with missing data >5% resulting in a final dataset of 17826. There were some missing values for a few variables that had missingness <5%; these were not imputed. The number of cases from the NSAPD available for analysis for this study represents the population with original and imputed data from 2009-2010. Tables 14 and 15 outline the imputation results.

Table 14: Imputation Models

	Model		Missing Values	Imputed Values
	Type	Effects		
Parity	Logistic Regression	Mode of Delivery, Maternal Age, Ultrasound, BMI, Maternal Race-Ethnicity, Maternal Education, Prenatal Screening, Smoking in Pregnancy, Maternal and Newborn Morbidity and Breastfeeding.	3	15[a]
Gestational Age at First Ultrasound	Logistic Regression	Mode of Delivery, Maternal Age, Ultrasound, BMI, Maternal Race-Ethnicity, Maternal Education, Prenatal Screening, Smoking in Pregnancy, Maternal and Newborn Morbidity and Breastfeeding.	3302	16510
BMI	Logistic Regression	Mode of Delivery, Maternal Age, Ultrasound, BMI, Maternal Race-Ethnicity, Maternal Education, Prenatal Screening, Smoking in Pregnancy, Maternal and Newborn Morbidity and Breastfeeding.	4055	20275
Maternal Race-Ethnicity	Logistic Regression	Mode of Delivery, Maternal Age, Ultrasound, BMI, Maternal Race-Ethnicity, Maternal Education, Prenatal Screening, Smoking in Pregnancy, Maternal and Newborn Morbidity and Breastfeeding.	5123	25615
Maternal Education	Logistic Regression	Mode of Delivery, Maternal Age, Ultrasound, BMI, Maternal Race-Ethnicity, Maternal Education, Prenatal Screening, Smoking in Pregnancy, Maternal and Newborn Morbidity and Breastfeeding.	10375	51875

[a.] This variable with role as predictor only has missing values, which were imputed for internal purposes.

Table 15: Frequencies for Imputed Variables per Imputation Cycle

Imputation Number			BMI	Maternal Education	Gestational Age of First Ultrasound	Maternal Race-Ethnicity
Original data	N	Valid	13771	7451	14524	12703
		Missing	4055	10375	3302	5123
1	N	Valid	17826	17826	17826	17826
		Missing	0	0	0	0
2	N	Valid	17826	17826	17826	17826
		Missing	0	0	0	0
3	N	Valid	17826	17826	17826	17826
		Missing	0	0	0	0
4	N	Valid	17826	17826	17826	17826
		Missing	0	0	0	0
5	N	Valid	17826	17826	17826	17826
		Missing	0	0	0	0
Pooled	N	Valid	17826	17826	17826	17826
		Missing	0	0	0	0

Exploratory/descriptive analysis: NSAPD. Baseline descriptive characteristics of the final sample of women (n=17,826) from the NSAPD are presented in the following tables. Variables with <5% were not imputed, therefore some single variable totals are less than the overall population size of 17, 826. Associations between proxies for health needs and the independent variables (maternal (neighbourhood) income, maternal education, area of residence, and maternal race/ethnicity) are also presented. Kolmogorov-Smirnov test was significant for all variables of interest; therefore all variables had not normally distributed data.

Table 16: Maternal Age

Maternal Age in Years	N	%
Under 20	1092	6.1
20-34	13907	78.0
35 or over	2827	15.9
	17826	100.0
Median and Mode =20-34 years of age		

Table 17: Maternal Income (based on neighbourhood income quintile)

Income (Quintiles)	N	%
1--Lowest	3549	20.9
2	3096	18.3
3	3380	19.9
4	3778	22.3
5--Highest	3115	18.4
Missing	908	4.8
Total	17826	100.0
Median=3.00 Mode=4.0		

Table 18: Maternal Race/Ethnicity (original data before imputation for missingness)

Maternal Race/Ethnicity[11]	N	%
African Canadian	288	1.6
Caucasian	9763	54.6
First Nations	402	2.3
French Acadian	286	2.2
Other	240	1.3
Middle Eastern	214	1.2
Asian	201	1.1
French Quebecois	48	0.27
Hispanic	38	0.21
Mediterranean	45	0.25
Jewish	8	0.05
Missing + Unknown	6339	35.5
Total	17872[12]	100.0
Mode=Caucasian		

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[11] Based on maternal self-report data documented on the Nova Scotia Prenatal Record

[12] This number exceeds 17,826 as women may have identified with more than one category and may therefore be counted more than once in the total group.

Table 19: Maternal Residence in Nova Scotia*

CCHS Sampling Zones & Former Nova Scotia District Health Authorities (DHAs)	N	%
Zone 1 (DHAs 1 and 2: South Shore Regional and South West)	1801	10.1
Zone 2 (DHA 3: Annapolis Valley Health)	1409	7.9
Zone 3 (DHAs 4 and 5: Cumberland and Colchester Health Authorities)	2123	11.9
Zone 4 (DHA 6 and 7: Pictou and Guysborough-Antigonish Strait Health Authorities)	1571	8.8
Zone 5 (DHA 8: Cape Breton District Health Authority)	2201	12.3
Zone 6 (DHA 9: Capital District Health Authority)	8702	48.8
Missing	19	.1
Total	17826	100.0
Mode=DHA 9/Zone 6		

*As of April 1, 2015 Nova Scotia transitioned to two health authorities (the Nova Scotia Health Authority and the IWK Health Centre) and four new management zones: DHAs 1, 2, 3= Zone 1; DHAs 4, 5, 6=Zone 2; DHAs 7 and 8=Zone 3 and DHA 9=Zone 4. However, the CCHS sampling zones noted in Table 17 do not correspond with the new management zones. Since this study commenced before the health authority transition, data in this study are based upon the CCHS sampling zones and the former Nova Scotia nine district health authorities plus the IWK Health Centre.

Table 20: Maternal Area of Residence

Rural or Not	N	%
No	12787	71.7
Yes	5039	28.3
Total	17826	100.0
Mode=urban		

The highest percentage of women giving birth in Nova Scotia are between the ages of 20 and 34 years of age with only 11% who identify as not being Caucasian and almost 60% of women in the lowest three neighbourhood income quintiles.   Based on postal code information[13], 71.7% were living in urban/town areas and 28.3% in rural

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[13] For this study, postal codes in Nova Scotia starting with 'B0' were used as proxies for rural area of residence and all other postal codes were proxies for urban area of residence (Canada Post, 2015). Wilkins R, (2009). Health Analysis Division SC. PCCF+ Version 5F User's Guide: Automated geographic coding based on the Statistics Canada Postal Conversion Files. Wilkins, R. & Khan, S. (2010). *PCCF+ Version 5H User's Guide. Automated geographic coding based on the Statistics Canada Postal Code Conversion files, including postal codes through October 2010* (Statistics Canada, Catalogue 82F0086-XDB).

areas. This aligns with 49% of childbearing women in 2009-2010 living in the Capital District Health Authority (Halifax and Hants counties, DHA 9, CCHS sampling zone 6) area.

Prenatal care. Prenatal care refers to the time when conception is confirmed by pregnancy test and/or ultrasound until birth. Five proxy indicators for health needs during the prenatal care period were selected using data from the NSAPD: HIV testing, maternal serum screening, gestational age at first ultrasound, maternal pre-pregnancy body-mass-index and maternal smoking.

HIV, maternal serum screening (MSS), group B strep (GBS) screening and gestational age at first ultrasound were selected to measure access to prenatal screening as the tests and having an 18-21 week diagnostic ultrasound is in keeping with recommended standards for all pregnant women.

Table 21: Gestational Age at First Ultrasound (original data before imputation for missingness)

Gestational Age in Weeks	N	%
1-6 weeks	74	0.6
7-10 weeks	1554	12.5
11-13 weeks	2083	16.8
14-17 weeks	832	6.7
18-21 weeks	7328	41.1
22-34 weeks	531	4.3
Total	7615	70.4
Missing or Unknown	5424	30.4
Total	17826	100.0
Mode=18-21 weeks Median=18-21 weeks		

Table 22: Prenatal Screening

	HIV Screening		MSS	
	N	%	N	%
Test discussed and offered[a]	16506	92.6	12102	67.9
No documentation of test discussed or offered	1320	7.4	5724	32.1
Total	17826	100.0	17826	100.0

[a] Whether screening test completed or not

More than 90% of women were offered HIV screening or had HIV screening completed and maternal serum screening was discussed and offered to 67.9% of women with only 4.3% of women known to have received their first prenatal ultrasound after 21 completed weeks of gestation. For data on age at first ultrasound, missing data may be true missing data, the inability for health records' coders to find the applicable information on the chart or that no ultrasound was completed.

Maternal body-mass-index (BMI) and maternal smoking were selected as indicators of pre-conceptual and prenatal health status. As outlined in Chapter Four, the variables available in the dataset for this study included smoking prior to pregnancy and smoking at the birth admission. The smoking at birth admission variable was used to indicate maternal smoking status.

Table 23: Maternal Body-Mass–Index[a]

BMI Category	N	%
<18.5	787	4.4
18.5-25	8579	48.2
25-30	4415	24.8
Over 30	4045	22.7
Total	17826[b]	100.0
Mode=18.5-25 Median=18.5-25		

[a] BMI is based on height and pre-pregnancy weight
[b] Includes imputed data using multiple imputation (regression) technique

Table 24: Maternal Smoking

Smoking at birth admission	N	%
No	14271	81.6
Yes	3222	18.4
Missing	333	1.9
Total	17826	100.0
Mode=No Median=No		

Of the 17,826 women in the study, 22.7% had a BMI classified as obese[14], with 18.4% of women in 2009-2010 who identified at their birth admission as smoking during pregnancy.

   Intrapartum care. Intrapartum care refers to the period from when women enter labour until birth. Much of the data in the NSAPD is captured during the delivery admission, which also includes postpartum care up to discharge from hospital. For the purposes of this study, a morbidity scoring approach was used as a proxy for maternal intrapartum health needs. This approach was developed by the data analyst for the NSAPD at the Reproductive Care Program of Nova Scotia (Fahey, unpublished, 2014, Appendix B). More than 300 clinical variables were used in a regression analysis to find the most useful predictors of increased maternal length of stay in hospital. Two particular variables were found most useful in predicting length of stay: the number of obstetrical diagnoses codes (reflective of illness during the hospital stay) and calendar time. Calendar time indicated a temporal trend for decreased maternal length of stay over the last several decades due to changes in standards of care, support for rooming-in of mother and infant, efforts to increase and sustain breastfeeding, philosophical and operational movements from acute care to community-based care and fiscal realities. Since the temporal trend was not significant in determining maternal health needs, the number of diagnoses codes was used to create risk categories. Sensitivity analyses demonstrated no significant errors in this approach with minimal outliers. A detailed description of the approach is provided in Appendix B (Fahey).

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[14] Society of Obstetricians and Gynecologists of Canada (2010). Obesity in Pregnancy. Retrieved from http://sogc.org/wp-content/uploads/2013/01/gui239ECPG1002.pdf

Table 25: Maternal Morbidity Score[a]

Score	N	%
Low-Risk	6238	35.0
Low-Moderate Risk	4606	25.8
Moderate Risk	3315	18.6
High Risk	3667	20.6
Total	17826	100.0
Mode=low-risk Median=low-moderate risk		

[a] Based on number of diagnoses during intrapartum hospital stay

Table 26: Method of Delivery

Method	N	%
Assisted Vaginal Delivery (forceps or vacuum)	1669	9.4
Cesarean Section (with or without hysterectomy)	4952	27.8
Spontaneous Vaginal Delivery	11205	62.9
Total	17826	100.0
Mode=spontaneous vaginal delivery		

More than 60% of women in the dataset were considered low to low-moderate risk (10844/17826). For 2009-2010, the caesarean section (c/s) rate was 27.8%; however 72.3% of women achieved a vaginal delivery (9.4% via vacuum or forceps delivery and 62.9% spontaneously).

Postpartum/postnatal. Two indicators, breastfeeding initiation and a newborn morbidity scoring based on newborn gestational age-weight and sex were used as postpartum and newborn indicators of health needs from the NSAPD.

Table 27: Infant Feeding

Breastfeeding[a]	N	%
Exclusive	8924	50.1
Not Breastfeeding	3997	22.4
Supplementation	4710	26.4
Missing	195	1.1
Total	17826	100.0
Mode=exclusive Median=exclusive		

The breastfeeding initiation rates are based upon the infant feeding experience up to hospital discharge. The breastfeeding initiation rates have been rising over the past decade with 76.5% of newborns across the province who received either some breast milk or breast milk exclusively.

Table 28: Newborn Morbidity Score

Categories of Newborn Morbidity[a]	N	%
SGA--high risk	1499	8.4
Appropriate for Gestational Age--low risk	15002	84.2
LGA--moderate risk	1216	6.8
Missing	109	0.6
Total	17826	100.0
Mode and Median=appropriate for gestational age		

[a] A derived variable using infant birth weight, gestational age and sex based on an established method by Kramer et al., (2001).

Table 29: Newborn Gestational Age[a]

Gestational Age Best Estimate	N	%
Less than 23 weeks	26	0.1
23-28 weeks	77	0.4
29-32 weeks	112	0.6
33-36 weeks	658	3.7
37-38 weeks	2263	12.7
39-41 weeks	9394	52.7
More than 41 weeks	1972	11.1
Missing	3324	18.6
Total	17826	100.0
Mode=39-41 weeks Mode=39-41 weeks		

[a] Derived variable based on last menstrual period, ultrasound best estimate and clinical best estimate so all parameters need to be available to calculate

Seventy-six (76.0%) of newborns were born at term ($\geq$ 37 weeks gestation) and 94.0% had weights of 2500g or more.

Table 30: Newborn Birth Weight

Newborn Birth Weight	N	%
1500g or less	217	1.2
1501-2000g	215	1.2
2001-2499g	610	3.4
2500-4000g	14470	81.2
More than 4000g	2289	12.8
Missing	125	0.1
Total	17826	100.0
Mode and Median=2500-4000g		

Using Kramer's calculations that consider sex, birth weight and gestational age, categories of newborn morbidity can be created to signify the infants that may require additional care (Table 27). Since being small for gestational age is associated with increased risk for morbidity, 8.4% were considered high risk with 6.8% of infants who were large-for-gestational age considered moderate risk. Included in the calculation is the increased risk for morbidity if the infant is male (Kramer, Platt, Wen, Joseph, Allen, Abrahamowicz et al., 2001).

Univariate analyses: Associations between NSAPD variables.

Prenatal health needs. More than 60% of the women in the lower education categories combined (less than high school or completed high school/some post-secondary education) had a BMI higher than 30, which is classified as obese. Conversely, 35% of women who completed a Bachelor's Degree or post-Graduate Degree had a BMI of 30 or higher. This suggests a clear connection between level of education and obesity, perhaps associated with a variety of factors including income, access to nutritional food and access to and affordability of recreational/physical activity services. This is reflected in similar findings with maternal income and area of residence and BMI where 25% of women living in non-rural areas have a BMI over 30 compared to 22% of their rural counterparts. Twenty-five percent of women in the lowest income quintiles had a BMI over 30 while only 19% of women in the upper income quintile had a BMI over 30. Conversely, of those women who were obese (BMI>30), 23.0% identified as not

Caucasian and 77.0% identified as Caucasian. Percentages in the tables represent the percentage of the row total.

Table 31: Maternal Education and Pre-Pregnancy BMI

| | | BMI Categories | | | | |
		<18.5	18.5-25	25-30	>30	Total
Maternal Education	Less than High School	159 (6.7%)	1161 (48.4%)	549 (22.9%)	529 (22.1)	2398
	Completed High School/Some Post-Secondary	360 (4.2%)	4031 (46.5%)	2151 (24.8%)	2120 (24.5%)	8661
	Completed Bachelor Degree	201 (3.6%)	2718 (49.2%)	1415 (25.6%)	1187 (21.5%)	5521
	Post-graduate Degree (Master/PhD/MD/DDS/LLB)	68 (5.5%)	668 (53.6%)	300 (24.1%)	210 (16.9%)	1246
						17826

Table 32: Maternal Area of Residence and Pre-Pregnancy BMI

| | | Rural N (%) | | Total |
		No	Yes	
BMI Categories	<18.5	574 (72.8%)	214 (27.2%)	787
	18.5-25	6335 (73.8%)	2244 (26.2%)	8579
	25-30	3135 (71.0%)	1281 (29.0%)	4415
	>30	2744 (67.8%)	1301 (32.2%)	4045
				17826

Table 33: Maternal Income and Pre-Pregnancy BMI

| | | BMI Categories | | | | |
		<18.5	18.5-25	25-30	>30	Total
Neighbourhood Income Quintile	1- Lowest	199 (5.6%)	1575 (44.4%)	876 (24.7%)	899 (25.3%)	3549
	2	148 (4.8%)	1396 (45.1%)	787 (25.4%)	764 (24.7%)	3096
	3	127 (3.8%)	1639 (48.5%)	821 (24.3%)	792 (23.4%)	3380
	4	142 (3.8%)	1890 (50.0%)	940 (24.9%)	806 (21.3%)	3778
	5- Highest	130 (4.8%)	1615 (51.9%)	775 (24.9%)	596 (19.1%)	3115
						16963*

*908 (0.05%) cases for income are missing

Table 34: Maternal Race-Ethnicity[15] and Pre-Pregnancy BMI

| | | Race/Ethnic Group | | Total |
| | | N (%) | | |
		Caucasian	Identified as Not Caucasian	
BMI Category	<18.5	589 (75.1%)	196 (24.9%)	784
	18.5-25	6604 (77.0%)	1974 (23.0%)	8579
	25-30	3376 (76.6%)	1030 (23.4%)	4406
	>30	3122 (77.0%)	936 (23.0%)	4057
Total				17826

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[15] As detailed in Chapter Four and in keeping with Tri-Council ethical guidelines and OPAC guidelines that relate specifically to the use of data about Aboriginal people, the analysis was limited to the two categories (identified as not Caucasian and Caucasian) (CIHR, OPAC). The spirit of these guidelines also informed the analysis related to other race/ethnicity groups.

Table 35: Maternal Education and Maternal Smoking

		Education Category				Total
		N (%)				
		Less than High School	Completed High School/Some Post-Secondary	Completed Bachelor Degree	Post-graduate Degree (Master/PhD/MD/DDS/LLB)	
Smoked at Birth Admission	No	1560 (10.9%)	6884 (48.2%)	4801 (33.6%)	1026 (7.2%)	14271
	Yes	800 (24.8%)	1621(50.3%)	608 (18.9%)	193 (6.0%)	3222
						17493*

*<1% missingness for smoking variable accounts for lower overall total

Of those women who identified as smoking at the birth admission, 25.0% of women with less than high school education were smokers, while only 6.0% of women with graduate or post-gradute university education that identified as smokers. Similarly, a total of 75.1% of women in the lowest two neighbourhood income quintiles identified as smokers, compared to 28.6% total in quintiles 4 and 5 respectively who were smokers. Of those women who smoked at the birth admission, 18.2% identified as Caucasian and similarly 19.3% identified as not Caucasian; however, there may be sub-group differences if different racial/ethnic groups were identified. Women living in rural areas were more likely to smoke compared to women living in non-rural areas (21.5% vs. 17.2%).

Table 36: Maternal Income and Maternal Smoking

		Smoked at Birth Admission N (%)		
		No	Yes	
Maternal Income*	1-Lowest	2502 (18.5%)	1001 (32.6%)	
	2	2404 (17.8%)	637 (20.7%)	
	3	2738 (18.0%)	559 (18.2%)	
	4	3151 (23.2%)	555(18.1%)	
	5-Highest	2734 (20.2%)	323(10.5%)	
Total[b]		13529	3075	16604[a]

[a] <5% of maternal income has missing data; those variables with <5% were not imputed

[b] Column total

Table 37: Maternal Race/Ethnicity and Maternal Smoking

		Maternal Race/Ethnicity		Total
		Identified as Not Caucasian	Caucasian	
Smoking at Birth Admission N (%)	Yes	778 (19.3%)	2443 (18.2%)	
	No	3256 (80.7%)	11015 (81.8%)	
		4034	13459	17493*

*<1% missing for smoking not imputed

Table 38: Maternal Smoking and Maternal Area of Residence

		Rural		
		No	Yes	
Smoked at Birth Admission	No	10379 (82.8%)	3892 (78.5%)	
	Yes	2156 (17.2%)	1066 (21.5%)	
Total		12535	4958	17493

HIV and MSS screening as well as the timing of ultrasound in pregnancy are proxy indicators for access to health services in keeping with current perinatal standards of care. There were differences in the proportions of women who had HIV testing and maternal serum screening (MSS) completed in pregnancy in different sub-populations based on rurality, maternal race-ethnicity and income. Approximately 73% of women living in rural areas had HIV testing completed compared to 26.7% of women living in non-rural areas, perhaps due to higher rates of declining the test. However, since documentation on the prenatal record about HIV testing and MSS is variable, many of these data are missing (17-29 %). More than 63% of women who identified as not Caucasian either declined or had an HIV test completed compared to 69% of Caucasian women who declined or had an HIV test completed. There were similar rates for HIV testing for the various education and income categories.

Table 39: Maternal Area of Residence and HIV Testing

		HIV Testing				Total
		Declined	Not Done	Unknown	Completed	
Rural	No	332 (62.7%)	437 (55.2%)	3562 (71.6%)	8456 (73.3%)	
	Yes	197 (37.2%)	354 (44.8%)	1413 (28.4%)	3075 (26.7%)	
Total		529	791	4975	11531	17826

Table 40: Maternal Race-Ethnicity and HIV Testing

		HIV Testing N (%)				Total
		Declined	Not Done	Unknown	Completed	
Maternal Race-Ethnicity	Caucasian	462 (3.4%)	621 (4.5%)	3648 (26.6%)	8960 (65.4%)	13692
	Identified as Not Caucasian	67 (1.6%)	170 (4.1%)	1327 (32.1%)	2570 (62.2%)	4134
Total						17826

Table 41: Maternal Education and HIV Testing

		HIV Testing				Total
		Declined	Not Done	Unknown	Completed	
Maternal Education	Less than High School	46 (1.9%)	106 (4.4%)	694 (28.9%)	1551 (64.7%)	2398
	Completed High School/Some Post-Secondary	288 (3.3%)	395 (4.6%)	2388 (27.6%)	5590 (64.5%)	8661
	Completed Bachelor Degree	164 (3.0%)	230 (4.2%)	1531 (27.7%)	3596 (65.1%)	5521
	Post-Graduate Degree (Master/PhD/MD/DDS/LLB)	30 (2.4%)	59 (4.7%)	362 (29.1%)	794 (63.7%)	1246
Total						17826

Table 42: Maternal Income and HIV Testing

		HIV Testing				Total
		Declined	Not Done	Unknown	Completed	
Maternal Income	1-Lowest	94 (2.6%)	113 (3.2%)	1070 (30.2%)	2272 (64.0%)	3549
	2	64 (2.1%)	136 (4.4.%)	859 (27.8%)	2037 (65.8%)	3096
	3	87 (2.6%)	178 (5.3%)	876 (25.9%)	2239 (66.2%)	3380
	4	141 (3.7%)	164 (4.3%)	1153 (30.5%)	2320 (61.4%)	3778
	5-Highest	97 (3.1%)	138 (4.4%)	813 (26.1%)	2067 (66.3%)	3115
Total						16918

Fewer women living in rural areas also had maternal serum screening completed or declined (61%) compared to 58% living in non-rural areas. Similarly, more than 63% of women in the highest income quintile had MSS completed or they declined the test compared to 57% of women in the lower two income quintiles. Similar to income, more women with higher education (60%) had MSS completed or declined compared to 55% of women with less than high school education. More than 53% of women who identified as not Caucasian had MSS completed or declined compared to women who identified as Caucasian (62.2%). There continues to be much confusion about maternal serum screening. It provides risk-based information based upon a number of parameters to provide women information about their risk of fetal anomalies such as trisomy 13. However, it is not diagnostic and sometimes it is difficult for both women and providers to fully understand the information; therefore, some women may decline the screening or providers may not have all the information to provide informed choice. This may be reflected in the relatively large unknown group.

Table 43: Maternal Area of Residence and Maternal Serum Screening

		Maternal Serum Screening				Total
		Declined	Not Done	Unknown	Completed	
Rural	No	2037 (15.9%)	787 (6.2%)	4219 (33.0%)	5744 (44.9%)	12787
	Yes	930 (18.5%)	591 (11.7%)	1505 (29.9%)	2013 (40.0%)	5039
Total						17826

Table 44: Maternal Income and Maternal Serum Screening

		Maternal Serum Screening				Total
		Declined	Not Done	Unknown	Completed	
Maternal Income	1-Lowest	510 (14.4%)	319 (9.0%)	1260 (35.5%)	1460 (41.1%)	3549
	2	563 (18.2%)	224 (7.2%)	1072 (34.6%)	1237 (40.0%)	3096
	3	638 (18.9%)	307 (9.1%)	993 (29.4%)	1442 (42.7%)	3380
	4	627 (16.6%)	232 (6.1%)	1223 (32.4%)	1696 (44.9%)	3778
	5-Highest	493 (15.8%)	233 (7.5%)	933 (30.0%)	1456 (46.7%)	3115
Total						16918

Table 45: Maternal Race-Ethnicity and Maternal Serum Screening

		Maternal Serum Screening				Total
		Declined	Not Done	Unknown	Completed	
Maternal Race-Ethnicity	Caucasian	2468 (18.0%)	1042 (7.6%)	4129 (30.2%)	6054 (44.2%)	13692
	Identified as Not Caucasian	499 (12.1%)	336 (8.1%)	1595 (38.6%)	1703 (41.2%)	4134
Total						17826

Table 46: Maternal Education and Maternal Serum Screening

		Maternal Serum Screening N (%)				Total
		Declined	Not Done	Unknown	Completed	
Maternal Education	Less than High School	401 (16.7%)	267 (11.1%)	811 (33.8%)	919 (38.3%)	2398
	Completed High School/Some Post-Secondary	1479 (17.1%)	723 (8.3%)	2711 (31.3%)	3748 (43.3%)	8661
	Completed Bachelor Degree	914 (16.6%)	305 (5.5%)	1774 (32.1%)	2527 (45.8%)	5520
	Post-Graduate Degree (Master/PhD/MD/DDS/LLB)	172 (13.8%)	82 (6.6%)	428 (34.3%)	564 (45.3%)	1246
Total						17826

In the regression analysis, the HIV and MSS screening data were combined to create a new variable for prenatal screening. If women had HIV and/or MSS completed or declined, they were considered a "yes" for having a conversation about prenatal screening. If women did not have HIV and/or MSS completed or it was unknown, it was considered a "no" for prenatal screening. Using the clinical data that was available, prenatal screening (discussed or completed) was used as one of the indicators for access to care. This also assumes that the unknown category is not indicative of poor documentation but of the test not being offered to women.

Very few women did not have their first ultrasound in pregnancy after 22 weeks gestation. However, 4.5% of women with less than high school education had a later ultrasound compared to 3.9% of women with a post-graduate degree and proportionately more women who identified as not Caucasian had an ultrasound after 21 weeks. In other words, women who identified as not Caucasian had a 40% higher relative risk (1.4 times) of not having an ultrasound prior to 22 weeks gestation compared to women who identified as Caucasian. Similarly, women in the lowest neighbourhood income quintile (4.9%) also had a first ultrasound later than women in the highest income quintile (3.0%) representing a 60% higher risk of women in the lower income quintile not having an ultrasound prior to 22 weeks compared to women in the highest income quintile. Almost

32% of women living in rural areas had an ultrasound after 22 weeks compared to 28% for women living in urban areas. Caution should be taken in interpreting these data as this information may be based upon the availability of ultrasound reports on the chart at the time of coding the information for the NSAPD. Therefore, other ultrasounds may have been completed and not be part of the facility chart. As well, ultrasounds are completed for a variety of reasons in pregnancy and there is no way to determine from these data if the ultrasound completed by $21^{0/7}$ weeks was the recommended 18-20 week diagnostic, full fetal anatomy scan.

Table 47: Maternal Education and Gestational Age at First Ultrasound

		Gestational Age N (%)		Total
		Before 22 weeks	After 22 weeks	
Maternal Education	Less than High School	2286 (95.3%)	112 (4.7%)	2398
	Completed High School/Some Post-Secondary	8345 (96.4%)	316 (3.7%)	8661
	Completed Bachelor Degree	5342 (96.8%)	179 (3.2%)	5521
	Post-Graduate Degree (Master/PhD/MD/ DDS/LLB)	1197 (96.1%)	49 (3.9%)	1246
Total		17170	656	17826

Table 48: Maternal Race-Ethnicity and Gestational Age at First Ultrasound

		Gestational Age N (%)		Total
		Before 22 weeks	After 22 weeks	
Race-Ethnicity	Caucasian	13226 (96.6%)	466 (3.4%)	13692
	Identified as Not Caucasian	3934 (95.2%)	200 (4.8%)	4134
Total				17826

Table 49: Maternal Area of Residence and Gestational Age at First Ultrasound

		Gestational Age		Total
		Before 22 weeks	After 22 weeks	
Rural	No	12330 (71.9%)	4829 (28.1%)	17159
	Yes	456 (68.5%)	210 (31.5%)	666
Total				17826

Table 50: Maternal Income and Gestational Age at First Ultrasound

		Gestational Age		Total
		Before 22 weeks	After 22 weeks	
Income Quintile	1-Lowest	3374 (95.1%)	175 (4.9%)	3549
	2	2982 (96.3%)	114 (3.7%)	3096
	3	3258 (96.4%)	122 (3.6%)	3380
	4	3647 (96.5%)	131(3.5%)	3778
	5-Highest	3022 (97.0%)	93 (3.0%)	3115
Total				16918

Intrapartum health needs. Maternal morbidity and newborn morbidity scores were used as the two health indicators for the intrapartum period. There were comparable proportions of women who identified as Caucasian or not Caucasian in each of the maternal morbidity categories, with slightly higher rates of women who identified as not Caucasian in the high-risk category; 21.4% versus 20.3% for women who identified as Caucasian. There may also be group differences within the non-Caucasian category that were not computed due to privacy and data management issues described in Chapter Four. Women in the lowest income quintile had a maternal morbidity score in the low risk category 33.8% of the time compared to 35.8% for women in the highest income quintile. Interestingly, 42.4% of women living in a rural area were in the low-risk maternal morbidity category compared to 32.1% of women living in urban areas. There were also proportionately more women in the higher-risk category who had more education compared to those with less education (24.3% vs. 16.7%). Perhaps women with both more education and higher neighbourhood incomes choose to have children at a later age, therefore increasing their risks for intrapartum interventions and complications. Age is considered and controlled for in the regression analysis.

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Table 51: Maternal Race-Ethnicity and Maternal Morbidity

		Maternal Morbidity Score N (%) [a]				Total
		Low-Risk	Low-Middle Risk	Middle-High Risk	High Risk	
Race-Ethnicity	Caucasian	4791 (35.0%)	3562 (26.0%)	2556 (18.7%)	2784 (20.3%)	13692
	Identified as Not Caucasian	1447 (35.0%)	1044 (25.6%)	759 (18.4%)	883 (21.4%)	4134
Total						17826

[a] Percentages are of the row e.g. 34.3% of the 9171 Caucasian women were low-risk

Table 52: Maternal Income and Maternal Morbidity

		Maternal Morbidity Score N (%)				Total
		Low Risk	Low-Moderate Risk	Moderate-High Risk	High Risk	
Income Quintile	1-Lowest	1198 (33.8%)	968 (27.3%)	654 (18.4%)	729 (20.5%)	3549
	2	1045 (33.8%)	797 (25.7%)	634 (20.4%)	620 (20.0%)	3096
	3	1221 (36.1%)	871 (25.7%)	588 (17.4%)	700 (20.7%)	3380
	4	1349 (35.7%)	940 (24.9%)	681 (18.0%)	808 (21.3%)	3778
	5-Highest	1117 (35.8%)	792 (24.4%)	566 (18.2%)	640 (20.6%)	3115
Total						16918

Table 53: Maternal Area of Residence and Maternal Morbidity

		Maternal Morbidity Score N (%)				Total
		Low Risk	Low-Moderate Risk	Moderate-High Risk	High Risk	
Rural	No	4102 (32.1%)	3317 (25.9%)	2491 (19.5%)	2877 (22.5%)	12787
	Yes	2136 (42.4%)	1289 (25.6%)	824 (16.4%)	790 (15.7%)	5039
Total						17826

Table 54: Maternal Education and Maternal Morbidity

		Maternal Morbidity Score N (%)				Total
		Low Risk	Low-Moderate Risk	Moderate-High Risk	High Risk	
Education Category	Less than High School	960 (38.7%)	639 (25.8%)	466 (18.8%)	415 (16.7%)	2479
	Completed High School/Some Post-Secondary	3044 (35.8%)	2250 (26.4%)	1561 (18.3%)	1656 (19.5%)	8510
	Completed Bachelor Degree	1809 (32.5%)	1405 (25.2%)	1067 (19.2%)	1286 (23.1%)	5567
	Post-Graduate Degree (Master/PhD/MD/DDS/LLB)	426 (33.6%)	313 (24.7%)	221 (17.4%)	309 (24.3%)	1269
Total						17826

Postpartum/postnatal health needs. A newborn morbidity score based upon an established method using sex-gestational age and birth weight was used as the newborn health needs indicator. Breastfeeding initiation was used as a postpartum health status indicator. Women from the upper and lower ends of the education categories had comparable moderate risk for a newborn to be either large-for-gestational age (~6.0%). Women in the lowest income quintile had 9.2% of newborns in the higher risk category while women in the highest income quintile had 7.4% of newborns in the higher risk category (i.e. 20% relative risk for women in the lowest income quintile). Women who identified as not Caucasian also had a slightly higher rate of newborns in the higher risk category (9.4%) compared to 8.4% for women who identified as Caucasian. There were similar proportions between women living rurally or in urban areas and newborn morbidity.

Table 55: Maternal Education and Newborn Morbidity

		Newborn Morbidity Category N (%)			Total
		<10th %ile SGA-High Risk	10th - 90th %ile Appropriate for Gestational Age Low Risk	>90th %ile LGA-Moderate Risk	
Education Category	Less than High School	251 (10.2%)	2061 (83.6%)	152 (6.2%)	2464
	Completed High School/Some Post-Secondary	704 (8.3%)	7154 (84.6%)	603 (7.1%)	8461
	Completed Bachelor Degree	433 (7.8%)	4720 (85.3%)	377 (6.8%)	5531
	Post-graduate Degree (Master/PhD/MD/DDS/LLB)	112 (8.9%)	1067 (84.6%)	83 (6.6%)	1262
Total					17717*

Note: SGA=small for gestational age   LGA=large for gestational age

*109 cases missing for the newborn morbidity category, these were not imputed

Table 56: Maternal Area of Residence and Newborn Morbidity

		Newborn Morbidity Category N (%)			Total
		<10th %ile SGA-High Risk	10th -90th %ile Appropriate for Gestational Age Low Risk	>90th %ile LGA-Moderate Risk	
Rural	No	1072 (8.4%)	10778 (84.8%)	862 (6.8%)	12712
	Yes	427 (8.5%)	4224 (84.4%)	354 (7.1%)	5005
Total					

Table 57: Maternal Income and Newborn Morbidity

		Newborn Morbidity Category N (%)			Total
		<10th %ile SGA-High Risk	10th -90thile Appropriate for Gestational Age Low Risk	>90th %ile LGA-Moderate Risk	
Income Quintile	1-Lowest	348 (9.9%)	2937 (83.5%)	233 (6.6%)	3518
	2	265 (8.6%)	2609 (84.9%)	200 (6.5%)	3074
	3	289 (8.6%)	2855 (84.8%)	222 (6.6%)	3366
	4	296 (7.9%)	3196 (85.1%)	263 (7.0%)	3755
	5-Highest	222 (7.2%)	2647 (85.4%)	231 (7.5%)	3100
Total					16813

Table 58: Maternal Race-Ethnicity and Newborn Morbidity

		Newborn Morbidity Category N (%)			Total
		<10th %ile SGA-High Risk	10th -90th %ile Appropriate for Gestational Age Low Risk	>90th %ile LGA-Moderate Risk	
Race-Ethnicity	Caucasian	1112 (8.4%)	11562 (87.2%)	946 (7.1%)	13260
	Identified as Not Caucasian	387 (9.4%)	3440 (84.0%)	270 (6.6%)	4097
Total					17717

Table 59: Maternal Race-Ethnicity and Breastfeeding

		Any Breastfeeding N (%)		Total
		No	Yes	
Race-Ethnicity	Caucasian	897 (22.3%)	3176 (78.0%)	4073
	Identified as Not Caucasian	3100 (22.9%)	10458 (77.1%)	13558
Total				17631
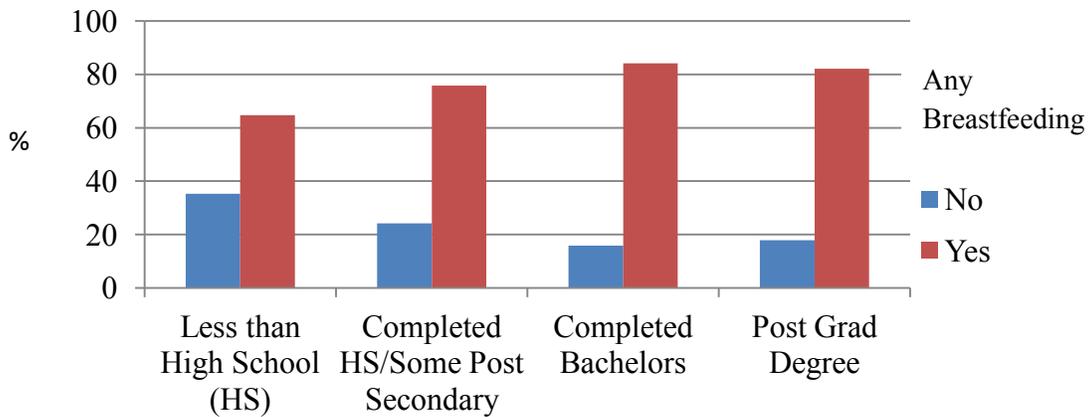
Figure 9: Maternal Education and Breastfeeding
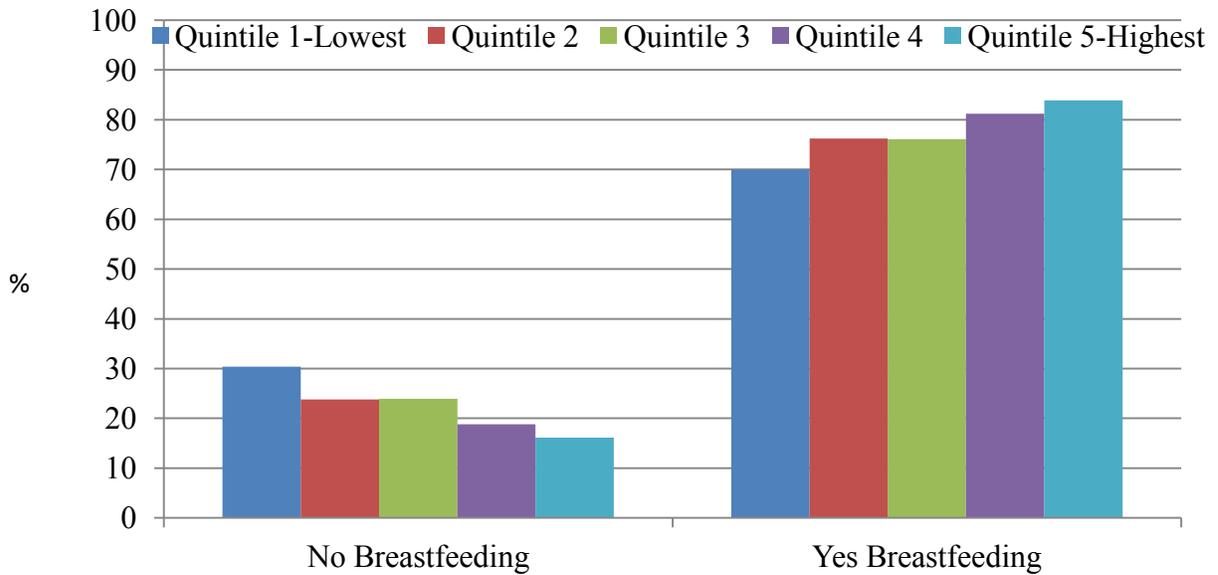
Figure 10: Maternal Income and Breastfeeding

Table 60: Maternal Area of Residence and Breastfeeding

		Any Breastfeeding N (%)		Total
		No	Yes	
Rural	No	2660 (21.0%)	9998 (80.0%)	12658
	Yes	1337 (26.9%)	3636 (73.1%)	4973
Total				17631*

*195 values missing for breastfeeding, not imputed

Women who had completed university education had a more than 80% breastfeeding initiation rate while women who had less than high school, completed high school or some post-secondary education had a 70% breastfeeding initiation rate. Similarly, women who were in the highest income quintile initiated breastfeeding 20% more often than women in the lowest income quintile. Women living in rural Nova Scotia had a breastfeeding initiation rate of 73.1% while those living in urban areas had an initiation rate of 80.0%. For breastfeeding initiation, there were no proportionally different findings between women who identified as Caucasian and those who did not. However, there may be between group differences if various racial-ethnic groups are compared.

To inform thinking about the potential relationships between the independent (possible predictors) and the dependent variables, chi-squared distributions (χ^2) were computed (Table 61). P values were averaged across the five imputation cycles.

Table 61: Contingency Table Tests of Association (NSAPD 2009-2010)

	Dependent Variable (Health Needs Proxies)	Independent Variable	P value	
Prenatal	Pre-pregnancy BMI	Maternal Education	<0.001*	
		Maternal Income	<0.001*	
		Maternal Race/Ethnicity	0.270	
		Maternal Residence (Rural or Urban)	<0.001*	
	Maternal smoking	Maternal Education	<0.001*	
		Maternal Income	<0.001*	
		Maternal Race/Ethnicity	0.067	
		Maternal Residence (Rural or Urban)	<0.001*	
	Prenatal Screening (based on HIV and maternal serum screening)		HIV	MSS
		Maternal Education	0.036*	<0.001*
		Maternal Income	<0.001*	0.016*
		Maternal Race/Ethnicity	<0.001*	<0.001*
		Maternal Residence (Rural or Urban)	<0.001*	<0.001*
	Gestational Age at First Ultrasound	Maternal Education	<0.001*	
		Maternal Income	0.002*	
		Maternal Race/Ethnicity	< 0.001*	
		Maternal Residence (Rural or Urban)	0.033*	
Intrapartu	Maternal Morbidity Score (based on number of diagnoses that increase length of stay)	Maternal Education	<0.001*	
		Maternal Income	0.080	
		Maternal Race/Ethnicity	0.515	
		Maternal Residence (Rural or Urban)	<0.001*	
Postpartum	Breastfeeding Initiation	Maternal Education	<0.001*	
		Maternal Income	<0.001*	
		Maternal Race/Ethnicity	0.150	
		Maternal Residence (Rural or Urban)	<0.001*	
	Newborn Morbidity Score (composite score based on gestational age-weight-sex)	Maternal Education	0.008*	
		Maternal Income	0.018*	
		Maternal Race/Ethnicity	0.038*	
		Maternal Residence (Rural or Urban)	0.759	

*significance value (p) set at 0.05

During the prenatal period, two proxy indicators for health status (smoking and pre-pregnancy BMI) were used. Prenatal screening and ultrasound were used as proxies for access to pregnancy care. In keeping with current best practice and guidelines, pregnant women should have at least one diagnostic ultrasound prior to 22 weeks

gestation and that all women are offered HIV and MSS. In the intrapartum period, two

morbidity scores (one maternal and one newborn) were used as health needs indicators.

Few postpartum variables are available via the NSAPD as the data is gathered during the

delivery admission. However, breastfeeding initiation is available. From the chi-squared

tests, maternal education was associated with all health needs indicators while maternal

income was associated with all health needs indicators except for the maternal morbidity

score. Maternal race and ethnicity has a statistically significant association with the

newborn morbidity score but was not significant with the other dependent variables. This

may be due to combining the racial-ethnic groups into not identified as Caucasian.

Maternal residence being urban or rural was associated with all health needs variables

except for the newborn morbidity score. Further advanced analysis was completed using

multiple regression.

Canadian Community Health Survey (CCHS)

CCHS data in the Public Use Micro-Data File (PUMF) are available based on age

and gender categories. All women of child-bearing age (<19 years, 20-34 years, 35-44

years) from the 2009-2010 CCHS as well as the 2012 CCHS were included in the

datasets. Women who reported giving birth in the last five years were selected from the

CCHS 2009-2010 resulting in an n=192. Women who reported giving birth in the last

year were selected from the CCHS 2012 resulting in an n of 93.

The initial intent in using the CCHS data was for self-perceived health status from

the 2009-2010 and 2011-2012 surveys and self-reported unmet health needs from the

2010 and 2012 annual components to be used as proxy indicators for health needs and

therefore be the dependent variables in the analysis.   Self-perceived health and unmet

health needs have been used extensively in the needs-based HHR literature. CCHS data

have been used in studies related to maternal-newborn care (e.g. breastfeeding, alcohol

and substance use). Many of these focus on data specific to perinatal care such as

breastfeeding initiation and duration (Brown et al., 2012) or focus more generally on the

health and well-being of women who are of child-bearing age (Cormier et al., 2003).

However, for this study, it was difficult to assess whether or not women's self-report of

their health status or unmet health needs from the CCHS was related to care they received or did not receive during their pregnancy, birth and in the postpartum period up to six weeks post-birth. The initial intent for this study was to use the CCHS data for descriptive and univariate analyses only. The only variable in the CCHS datasets for this study that were directly related to perinatal care was breastfeeding duration. Regardless of the challenge associating the CCHS data specifically to perinatal care, the sample sizes were insufficient to complete any useful analyses. This was still the case after an ethics amendment to include the 2012 CCHS. Even with an adequate combined sample from 2009-2010, it would have been difficult to combine data as the time frame women reported giving birth were different in the two datasets and there were definitional and process differences between the two datasets.

In addition to the sampling challenges with the CCHS data, an additional consideration for the CCHS datasets is the number of respondents per characteristic of interest. If the number of observations is less than 30 for an unweighted estimate, the number should not be published regardless of the value of the coefficient of variation. Therefore, even if the unweighted sample was reported, a number of frequencies and cross-tabulations would not have been fully reported due to small cell sizes.

Preliminary Quantitative Analysis informed the Qualitative Data Collection

For a sequential mixed methods design, the intent is for the preceding quantitative data collection and analysis phase to inform the next phase (Creswell & Plano Clark, 2011). For this study, the preliminary quantitative analysis outlined above informed the qualitative data collection in three ways. First, there were clear associations between the independent variables (e.g. race/ethnicity, rurality, education and income) and dependent variables (health needs proxies) in the quantitative analysis. Therefore, the purposeful sampling plan for the qualitative phase was validated and a diverse group of women and care providers working with different populations of women were recruited for the study. As outlined in the methods and qualitative chapters, interviews and focus groups were conducted with women living in both urban and rural settings, women who identified as not Caucasian, women of varying age and with different levels of education as well as care providers practicing in tertiary and community settings. Second, the associations

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between the independent variables (education, race/ethnicity, area of residence, income) and the health needs proxy variables highlighted the need for deeper probing into the care experiences of both women and care providers. The intent of the probing was to see how the health care system (and the indicators and data that are currently available to measure health need) account for or do not account for these factors as determinants of health and health needs. Thirdly, I was able to refer to the preliminary NSAPD quantitative analysis in my conversations with women, health care providers and health leaders to garner their impressions of the results.

Advanced Quantitative Analysis: NSAPD

The intent of the advanced quantitative analysis using NSAPD data was to address research question # 2 and hypotheses 1-3:

Research Question #2: Were there differences between the identified needs of the general perinatal population and sub-populations of the maternal-newborn population based on age, income, area of residence, race/ethnicity? A summary table of the results of multivariable logistic regression analyses for all health needs indicators based on proxy variables from the NSAPD are presented in Table 62. The variances between the imputations for the regression analysis are also presented as well as the regression model summaries. Hypothesis 1 relates to the advanced quantitative analysis of the NSAPD data. The analysis to address Hypothesis 1 and a description of the results is also included. The sample from the CCHS was not sufficiently powered to test $H0_2$ and $H0_3$.

Hypothesis ($H0_1$): There was no difference in the needs identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

H0 2. There was no difference in self-reported health status identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

H0$_3$: There was no difference in self-reported unmet needs identified by women in particular sub-populations (e.g.: women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

Rationale for H0$_2$ and H0$_3$: Self-reported health status is established in the literature as a proxy for health needs. There is a wealth of literature that supports the impact that geographic location, race and ethnicity and socio-economic status have on health, in general and specifically on maternal-newborn health. The analyses for H0$_1$ confirmed that there is good evidence for H0$_1$ to be rejected. There were a number of predictors for maternal and newborn health needs that were statistically significant (p value ≤ 0.05) and there were differences in maternal and newborn health needs based on rurality, ethnicity, income and education as well as the control variables age, parity and mode of delivery. Based on backward elimination multiple regressions, the predictors per health need proxy indicator are outlined in Table 84. Graphs and tables with descriptors outlining the results of the regression analyses are also provided.

Table 62: Predictors for Maternal-Newborn Health Needs

	Dependent Variable (Health Needs Proxies)	Predictor (Independent Variables)		p Value	Confidence Interval	Odds Ratio	Relative Increase in Variance
Prenatal	Pre-pregnancy BMI > 30	Lower Maternal Educ.		0.039	1.056-1.166	1.069	0.851
		Lower Maternal Income		<0.045	1.002-1.221	1.106	0.146
		Maternal Residence (rural)		<0.003	1.051-1.242	1.142	0.058
		Parity (nullip)		<0.00	0.735-0.864	0.797	0.157
		Maternal Age	< 20 yrs	<0.001	0.513-0.788	0.635	0.582
			35 yrs +	<0.001	1.103-1.371	1.230	0.162
	Maternal Smoking (at birth admission)	Lower Maternal Educ.		<0.001	1.528-1.837	1.675	0.103
		Lower Maternal Income		<0.001	1.761-2.105	1.925	0.011
		Maternal Residence (rural)		<0.001	1.115-1.322	1.214	0.002
		Maternal Age	< 20 yrs	<0.001	2.737-3.627	3.151	0.006
			35 yrs +	<0.001	0.511-0.666	0.583	0.011
		Parity (nullip)		<0.001	0.553-0.656	0.602	0.006

Dependent Variable (Health Needs Proxies)	Predictor (Indep. Variables)		P value	Confidence Interval	Odds Ratio	Relative Increase in Variance
Prenatal Screening not completed	Maternal Race/Ethnicity (identified as not Caucasian)		<0.001	1.147-1.422	1.277	0.165
	Maternal Residence (rural)		<0.001	0.619 -0.759	0.686	0.004
	Lower Maternal Educ.		0.017	0.789-0.976	0.878	0.370
	Lower Maternal Income		<0.001	1.123-1.385	1.247	0.003
	Maternal Age	< 20 yrs	0.001	1.138-1.605	1.352	0.001
		35 yrs +	<0.001	0.668-0.853	0.759	0.007
Ultrasound Screening occurred after $21^{6/7}$ weeks	Maternal Age	< 20 yrs	0.013	1.107-2.252	1.579	0.469
		35 yrs +	<0.001	0.443-0.796	0.593	0.185
	Lower Maternal Income		<0.001	1.157-1.677	1.393	0.065
	Parity (nullip)		0.019	0.594-0.950	0.751	0.768
Higher Maternal Morbidity Score	Maternal Residence (rural)		<0.001	0.645-0.744	0.693	0.007
	Parity (nullip)		<0.001	2.527-2.881	2.698	0.008
	Mode of Delivery (caesarean section)		<0.001	1.388-1.594	1.388	<0.001
	Maternal Age	<20 yrs	<0.001	0.545-0.713	0.623	<0.001
		35 yrs+	<0.001	1.284-1.537	1.405	0.481
Higher Newborn Morbidity Score	Lower Maternal Income		0.020	1.019-1.248	1.128	<0.001
	Mode of Delivery (caesarean section)		<0.001	1.307-1.558	1.427	<0.001
	Maternal Age	35 yrs +	0.012	1.032-1.293	1.155	0.001
Breast feeding Not Initiated	Lower Maternal Educ.		<0.001	1.418-1.767	1.583	0.725
	Lower Maternal Income		<0.001	1.400-1.664	1.526	0.009
	Maternal Residence (rural)		<0.001	1.158-1.356	1.253	0.005
	Parity (nullip)		<0.001	0.441-0.517	0.477	0.007
	Mode of Delivery (cesarean section)		<0.001	1.125-1.324	1.221	0.002
	Maternal Age	<20 yrs	<0.001	3.105-4.085	3.561	0.003
		35 yrs +	<0.001	0.493-0.624	0.555	0.004

*significance value (p) set at 0.05

The left margin contains rotated labels: "Intrapartum" spanning the Higher Maternal Morbidity Score rows, and "Postpartum" spanning the Higher Newborn Morbidity Score and Breast feeding Not Initiated rows.

In the prenatal period, pre-pregnancy BMI, prenatal screening (HIV, MSS) and any smoking during pregnancy were the health needs indicators. Women who were greater than 35 years of age, had lower income or who lived in a rural area had a 1.1-1.2 odds of having a BMI over 30. Women with a lower education (1.675) or income (1.925) who were less than 20 years of age (3.151) or lived rurally (1.214) had a greater odds of smoking in pregnancy while those women who were greater than 35 years of age or having their first pregnancy had a lower odds of smoking (0.583, 0.602 respectively). Women who identified as not Caucasian, were younger or who had a lower income had a 1.277, 1.352 and 1.247 odds respectively of not having prenatal screening tests (HIV or maternal serum screening) discussed with them and/or accepted by them. Surpisingly, women who had lower education and who lived rurally were more likely to have prenatal screening completed. Women with lower income and who were younger had a 1.393 and 1.579 odds respectively of having an ultrasound later in pregnancy.

In the intrapartum period, a maternal morbidity score was used as a health needs proxy based on the number of diagnoses codes and length of stay in hospital during the birth admission. Women having their first pregnancy (2.698), who had a caesarean section (1.388) and who were greater than 35 years of age (1.405) had increased odds of a higher maternal morbidity score. The two health needs proxies from the NSAPD from the postpartum period were breastfeeding and a newborn morbidity score. The newborn morbidity score was based on standardized calculations using the newborn's gestational age, sex and birth weight. Newborns with a mother who had lower income (1.128), were older (1.155), or were delivered by caesarean section (1.427) had increased odds of having a higher newborn morbidity score. Women who had less education, less income, were less than 20 years old, had a cesarean section or who lived in rural areas were less likely to initiate breastfeeding while first-time mothers and women 35 years of age and older were more likely to initiate breastfeeding.

The Likelihood Ratio Test provides information about the goodness-of-fit of the model to the data. The likelihood ratio test provides model fitting information or the difference between the null model (does not control for any predictors variables) versus the fitted model with all predictor variables of interest. A p value is calculated for each variable in the model for each log likelihood ratio test as well as for the overall model.

The overall p value is the probability of getting a likelihood ratio test statistic equal to or greater than the null model. A small p value at or below a specified level (e.g. for this study $p<0.05$) means that at least one of the regression coefficients model is not equal to zero and the predictor variable(s) does have an effect on the dependent variable of interest. The average of the overall model p values for the likelihood ratio tests for the five imputed cycles included in the regression analysis were all <0.001 indicating that there are predictor variables in the models that have an effect on the dependent variables.

Methodological Challenges

Although there was some missing data for a few variables of interest in the NSAPD, with multiple imputation techniques (Steme et al., 2009), the population size was still restored for most variable to complete all the analyses. Therefore, the findings are representative of the entire population of women and newborns in the NSAPD from 2009-2010. The relative increases in variances between the different imputations ranged from <0.001 to 0.854. Most variances were very small; however, the variances for maternal education were larger as there was more than 50% missingness. The predictors used for the multiple imputations involved both the control variables and the dependent variables for imputation and the regression analysis used to test $H0_1$ and answer the research questions. This is supported by current evidence (Moons et al., 2006; Sterne et al., 2009), although there is the chance for 'circular' dependence and Type II error, the accuracy of the imputations is enhanced when all relevant predictors are used.

The limitations related to person-level sample size and the inability to attribute responses in the CCHS to women's childbearing experiences are outlined in detail above. As with any survey data, there is always the limitation of it being self-report data. With self-report data, respondents may under or over-estimate their experiences or attributes and there may be recall or social desirability bias (Vound et al., 2001; Stone et al., 2000). Similarly, variables from the NSAPD related to smoking and pre-pregnancy weight gain (used to calculate maternal BMI) are also self-report data. However, the NSAPD data have been used with success widely in general and perinatal health research.

As described in Chapter Four, no sub-analyses (i.e. per racial/ethnic group) were planned or executed for the maternal race/ethnicity data as this would not be in keeping

with OCAP guidelines and Tri-Council Ethics guidelines. Advanced analysis of the race/ethnicity data was also not performed as part of the data management agreement with the custodians of the NSAPD. Once research partnerships with community representatives from the different race/ethnic groups are established, further research, specific to different racial/ethnic groups may be possible. It was recognized that this is a significant limitation in the data analysis as all women who identified as not Caucasian were combined; therefore, between-group differences related to maternal-newborn health needs were not identified. Combining the groups does pose a risk for a Type II error as each of the race-ethnicity groups have different experiences.

As identified by the p values for the likelihood ratio tests, the variables had some statistically significant effect on the dependent variables. However, there may be predictors related to each of the health needs proxies that were not included in the analysis. The intent of this study was to explore the influence of pre-selected independent variables (income, education, race/ethnicity and area of residence). These were all selected based on relevant literature not because of the regression analysis. Therefore, the findings reflect the focus of the study on those particular predictors.

At the individual record level, income in the NSAPD is a derived variable based on neighbourhood income quintiles and not on actual or self-reported individual or household income. Rurality was also determined based on postal code information. Therefore, there was potential for ecological fallacy in attributing the neighbourhood income quintile and/or the area of residence information to all individuals in that geographic area. *Ecological fallacy* is "when data that exist at a group or aggregate level are analyzed and interpretations are then made (generalized) as though they automatically apply at the level of the individuals who make up those groups" (Lavralcas, 2008, p. 420). *Atomistic or individualistic fallacy* is defined by Diez Roux (2002) as occurring

> when drawing inferences regarding variability across groups (or the relation
> between group level variables) based on individual level data, or more generally,
> the fallacy of drawing inferences regarding variability across units defined at a
> higher level based on data collected for units at a lower level. The atomistic
> fallacy arises because associations between two variables at the individual level

may differ from associations between analogous variables measured at the group level" (p. 588).

The use of combined data sources (individual and aggregate) may be beneficial since aggregate level data alone does not account for individual variations in health need or health use within municipalities (Birch, Stoddart & Beland, 1998). However, it can be challenging to use combinations of aggregate level and individual level data for analysis (Birch, Stoddard & Beland, 1998; Carr-Hill, Sheldon, Smith, Martin, Peacock & Hardman, 1994). For income, it is understood that there would be within group (e.g. neighbourhood) differences that may influence the analysis.

For urban vs. rural information, the specific methods to determine rural status was based on postal codes, which in some areas of the province, cover large areas. Postal codes are also continually changing due to residential growth and development. Therefore, another methodological challenge for this study was small area variation. Small area variation (SAV) describes how rates of health care events or use vary between geographic areas (Wennberg & Gittelsohn, 1973; Mercuri, Birch & Gafni, 2013). The analysis was limited to the geographic data available in the NSAPD dataset (e.g. rural or urban geographic residence). Since these are large geographic areas, it is anticipated that there are variations in health needs within the areas. However, the focus of this study was to consider the broad differences between women living in rural and urban areas. It is recognized that variations in health needs exist within and between different areas due to different population characteristics and morbidity, access to care, clinical decision-making, and the quality of care, patient demand/request for services or random variation (Parchman, 1995). To address this, women and health care providers were sampled purposefully in both urban and rural settings. The qualitative data provides additional insight in to the factors associated with the variations in how and why women and providers identify different health needs.

The health needs indicators or proxies used in this study were based on available evidence related to needs-based health human resources planning and standards of care and clinical practice guidelines. The indicators used for the study are a combination of service use (e.g. screening, ultrasound), health status (e.g. smoking, BMI) and perinatal morbidity indicators (maternal morbidity score, newborn weight-age-gender-based

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morbidity score). In keeping with the parameters for health needs indicators outlined by Birch and colleagues (2007; 2009) and in consultation with Dr. Birch, the health needs indicators selected for this study aimed to be reliable (reproducible), valid (measures what it is supposed to measure) and responsive (responds to changes). Birch and colleagues suggest that in order for an indicator to be used as a standard measure of health need, it must be 1) free of the influence of supply or availability of health care 2) show variation between populations 3) relate types of morbidity that are responsive to health care services and 4) reflect current population characteristics. It is recognized that some of the selected health needs indicators in this study, although based on best practice and standards of care, may reflect the interaction of supply and demand factors in the system. As this is a mixed methods study, participants in the qualitative phase did discuss both unmet needs and unnecessary services for maternal-newborn care (e.g. specialist services in low-risk clinical situations) to inform a comprehensive picture of health needs.

The person-level sample from the CCHS was not sufficient to do analysis, therefore even weighted samples that represent the population could not be used descriptively or to identify predictors for the current standard proxies for health needs, self-reported health and unmet health (Birch et al., 2007, 2009; Tomblin Murphy et al., 2004; 2007a; 2009; 2012a). There is also a substantial body of literature that uses incidence and prevalence of health conditions and health status indictors as proxies for health need, which were used in the advanced analysis of the NSAPD (Singh et al., 2010; Scott et al., 2011; Tomblin Murphy et al., 2009b; 2011; 2012a; 2012b; Kurowski et al., 2003; Kurowski & Mills, 2006; O'Kane & Tsey, 2004; Andrews et al., 2006; Segal, Dalziel & Bolton, 2008; Scheffler et al., 2011; Segal & Leach, 2011). A future linkage study between the clinical NSAPD database and the CCHS over a longer time period would provide a complete picture of both need (as reported by women) and relevant clinical and population health variables. Since no needs-based HHR study solely in maternal-newborn primary health care was available, there are few standards for measuring primary maternity health care needs. Therefore, this study may advance the knowledge about needs-based planning in primary maternity health care and advance knowledge about health needs indicators that consider a broader definition and

understanding of health, given the data that are currently available to measure health needs.

Summary of the Quantitative Results

After multiple imputation techniques were used, the full population size of 17,826 was available for most variables of interest from the NSAPD. There were only 192 women who identified as having given birth in the last five years in the CCHS for 2009-2010 and 93 in the CCHS 2011-2012. In 2011-2012, the question related to timing of birth changed to asking women if they had given birth in the last year. Regardless, it is not possible to attribute women's answers to the questions in the CCHS as relating to their pregnancy, birth and immediate postpartum health care experiences. As well, both descriptive and advanced analysis of the CCHS data was not possible with the insufficiently powered, unweighted sample.

Once imputation was complete for the Caucasian and non-Caucasian categories only, almost 77% of women in the NSAPD sample were Caucasian. Women were more often between the ages of 20 and 34 years with somewhat even distribution of income across the five income quintiles. Almost half the women lived in the Capital District Health Authority area, with 72% of women living in urban areas. For those women whom data about access to ultrasound was available, 70% received a prenatal ultrasound within the recommended timeframe (by 21 completed weeks) and women had HIV screening discussed or offered 90% of the time and MSS discussed or offered 68% of the time. 22.7% of women had body-mass indices classified as obese[16], with 18.4% of women in 2009-2010 who smoked during pregnancy. Just over 39% of women were considered either moderate or high risk based upon diagnoses that increased the intrapartum length of stay. For 2009-2010, the c/s rate was 27.7%; however 72.3% of women achieved a vaginal delivery (9.4% via vacuum or forceps delivery and 62.9% spontaneously). Over 80% of newborns were born at term (>37 weeks gestation) and almost 77% has some breastmilk in hospital. Of the 17,826 infants born in 2009-2010 in Nova Scotia and included in this sample, 8.4% were considered high risk and small for gestational age,

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[16] Society of Obstetricians and Gynecologists of Canada (2010). Obesity in Pregnancy. Retrieved from http://sogc.org/wp-content/uploads/2013/01/gui239ECPG1002.pdf

while 6.8% were considered moderate risk and large for gestational age. Just over 81% of newborns were between 2500-4000g at birth. Tests of association (Chi-square tests) were completed for the independent and dependent variables resulting in a number of statistically significant associations. These relationships were important in informing the recruitment and interview/focus group questions for the qualitative data collection.

From the multiple regression analysis, statistically significant predictors for various health needs were identified. In the prenatal period, having less education, less income, extremes of maternal age, being a first time mother and living in a rural area were all predictors for increased pre-pregnancy BMI and for smoking during pregnancy. Being non-Caucasian, having lower maternal income and being a younger mother were predictors for not receiving prenatal screening while being younger and having less income were predictors of having an ultrasound earlier in pregnancy. Being a first time mother, being more than 35 years of age and having a cesarean section were predictors for increased maternal morbidity whereas less maternal income, having a cesarean section and being greater than 35 years old were predictors of increased newborn morbidity. For the postpartum period, breastfeeding initiation was selected as the only health needs proxy indicator from the NSAPD. Lower maternal education and income, living rurally, being a younger mother and having a cesarean section were all predictors for not initiating breastfeeding.

From these quantitative results, it is clear that there are significant differences based on maternal education, maternal (neighbourhood) income, living in rural areas and maternal race/ethnicity that influence women's and newborns' health. Therefore, $H0_1$ is rejected. There was an insufficient sample from the CCHS to complete any analyses or to test $H0_2$ and $H0_3$.

CHAPTER SIX: QUALITATIVE RESULTS

Qualitative Data Collection

Using purposeful sampling and poster and email recruitment strategies, focus groups and interviews with women, health care providers and health leaders was used to gather data for the qualitative phase of the research. Purposeful sampling is a type of non-probability sampling that is most effective when a researcher wants to include participants with the knowledge and experience of a particular phenomenon. Data for the qualitative phase were collected between January and August 2014. During the interviews and focus groups, participants completed an optional demographic data sheet. All participants completed the form; however, on several occasions some participants opted to not answer all questions. The final sample size was 55 participants overall; 18 health leaders and 16 health care providers who were interviewed and 22 women from 2 focus groups and 2 interviews. As outlined in Chapter Four, this sample size is congruent with qualitative design (Sandelowski, 1995).

Ninety-eight (98%) percent of the sample of health care providers and health leaders were female and all were employed full-time with 2-5 years to more than 30 years' experience. Ninety-nine percent of nurses working in maternal-newborn care in Canada are female (Canadian Nurses Association, 2012), all the midwives currently practicing in Nova Scotia are female and 44.2% of family physicians in Nova Scotia are female (National Physician Survey, 2014). Just over 50% of obstetricians in Canada are female (Canadian Medical Association, 2013). Providers practiced in both acute care and community-based settings in urban and rural communities. Leaders included clinicians from all three provider groups (nurses, midwives and physicians) as well as leaders at the provincial, health authority and organizational levels at both the mid and senior levels with between 2-5 years and more than 30 years' experience.

Two women self-identified via a research study poster in a primary care clinic. One woman was interviewed and the other was not eligible, as she had given birth more than a year ago. The other 20 women were recruited from pre-existing community-based mother-baby groups via several local family resource centres. Women participants ranged in age from 18 years up to 38 years and education ranging from some high school to

completion of a Bachelor's Degree. Most women were a 30-60 minute drive to the facility where they delivered their baby but some were more than 60 minutes from the delivery hospital. More than half the women identified themselves as a visible minority (primarily First Nations), two-thirds of the women had more than one baby and just under one-third of the sample of women lived in a rural setting. All interviews and focus groups were audio-taped and notes were taken during and after each of the sessions. All audio-taped files were transcribed by an experienced transcriptionist and converted to text files for analysis. Prior to the qualitative data analysis, the advanced quantitative analysis was completed.

Participant validation or member checking was conducted by providing an opportunity for participants to review their transcripts. Five participants chose to review their transcripts. There were minor wording changes from the participant's reviews and the updated files were included in the analysis. This validation exercise enhanced the accuracy, credibility, validity and will enhance the transferability of study findings (Braun & Clarke, 2006; Clarke & Braun, 2014). Member checking also ensures that the participants are in agreement with the transcribed data. At the end of each focus group or interview, participants were asked if they would like to review themes or receive the findings at the end of the study. All participants opted to receive findings when the study is completed and knowledge translation options were introduced and will be further explored with participants when the findings are ready for dissemination. For example: many women who participated stated that they would prefer an interactive and informal session, health leaders preferred a condensed version similar to a learning or policy brief and many health care providers stated an article or formal presentation would work well.

Qualitative Data Analysis

Four of the five research questions related specifically to the qualitative phase. Question 1 is the primary question and together with question 2 were the mixed methods questions for the study. Data from both phases addressed these questions. Questions 3 and 4 below focus specifically and solely on data collected from the interviews and focus groups with women, health care providers and health leaders.

1. What were the primary maternity care needs of women and newborns in Nova Scotia?
2. Were there differences in the identified primary maternity care needs between women, care providers, leaders and decision-makers and those needs identified using the needs-based HHR frameworks?

3. **Did women, care providers and/or health leaders and decision-makers identify gaps in services in the current models of primary maternity care?**

4. **If gaps were identified, what service delivery approaches can be used to address the gaps in service?**

A thematic analysis approach outlined by Braun and Clarke (2006), Clarke and Braun (2014) and informed by Ritchie and Lewis (2003) and Smith and colleagues (2011) was used for the qualitative analysis outlined in Chapter Four. Prior to the analysis, an inter-coder reliability exercise was conducted with three coders (the doctoral candidate and two thesis committee members) using a pre-determined method to review a sampling of transcripts to ensure the 'codings' of text by multiple coders was similar (Bradley et al., 2007). The process for the inter-coder reliability approach is outlined in Figure 16 with the results in Table 86. Details of the inter-coder reliability approach and the codebook are found in Appendices K and L.

Step 1: 'A priori' codes

Developed a list of "a priori codes" derived from General Systems Theory and the HHR and Health Systems Conceptual Framework as well as the research purpose and the research questions.

Step 2: Emergent Codes

To begin, 3 transcripts were selected (one from each participant group---providers, leaders and women). Using the initial steps of Braun and Clarke's interpretive thematic analysis approach, data was coded using the a priori codes and emergent codes were added as appropriate.

Step 3: Testing the Coding Scheme

Content Analysis: Once the initial coding scheme was developed, a transcript was selected at random and the principal investigator as well as two additional researchers (2 thesis committee members) all coded the same transcript.

Coding of the transcript by the 3 individual researchers was entered into NVivo 10 and inter-rater reliability testing was conducted (based on Cohen's Kappa coefficient). Percentage of agreement was also available in NVivo but this alone is not considered optimal.

Step 4: Refining the Coding Scheme

With the aim of achieving an inter-rater coefficient of 0.8 or higher, the coding scheme was revised based upon coding in step 3 and discussions between the PI and thesis committee members so as to ensure intercoder agreement. It was not necessary to retest the revised scheme as only one code was added and there was inter-coder agreement on the codebook and approach.

Figure 11: Process for Intercoder Reliability Testing

Table 65: Intercoder-Reliability Results

Code	Source*	Agreement (%)	Disagreement (%)	Kappa Coefficient**
Access	AER vsMA AND JG	98.45	1.55	0.9547
Broad Definition of Health	AER vs. MA AND JG	98.32	1.68	0.9456
Changing Maternal Demographics and Lifestyle Factors	AER vs. MA AND JG	99.61	0.39	0.9763
Cultural Competency	AER vs. MA AND JG	93.94	6.06	0.7820
Cultural Safety	AER vs. MA AND JG	98.52	1.48	0.7602
Fiscal/Monetary	AER vs. MA AND JG	96.12	4.88	0.8991
Interprofessional Collaboration	AER vs. MA AND JG	95.46	4.54	0.8002
Paradigm Shift	AER vs. MA AND JG	88.76	11.24	0.5929
Patient-Centered Care	AER vs. MA AND JG	94.89	5.11	0.7983
Relational care	AER vs. MA AND JG	95.28	4.72	0.7257
Shortages	AER vs. MA AND JG	97.97	2.73	0.8974
Social Determinants of Health	AER vs. MA AND JG	97.67	2.33	0.8651
Policy	AER vs. MA AND JG	93.74	6.26	0.6487
Unmet Needs and Gaps in Care	AER vs. MA AND JG	96.4	3.60	0.8763
Vulnerable Populations	AER vs. MA AND JG	95.74	4.26	0.7692
Women's Experiences and Satisfaction with PMHC	AER vs. MA AND JG	96.51	3.49	0.8894

*NVivo only allows the comparison of two coders at once so comparisons were completed between AER and JG, then AER and MA and then MA and JG and then averaged.

**Average Kappa: 0.8238

One of the most common measures for intercoder reliability is the Kappa coefficient, with measures ranging from 1 to negative values no less than –1. As the coefficient nears 1, agreement is increased (Cohen, 1960). Several conventions have been proposed for the Kappa coefficient. Landis and Koch (1977) proposed that between 0.81–1.00 is *almost perfect* and 0.61–0.80 is *substantial*. Based on the need to consider clinical applications, Cicchetti (1994) adapted Landis and Koch's work and provided the following conventions: 0.75–1.00 = *excellent*; 0.60–0.74 = *good*; 0.40–0.59 = *fair*; and < 0.40 = *poor*. Similar criteria were outlined by Fleiss (1981) and Miles and Huberman (1994) suggest that intercoder reliability should be between 0.80 and 0.90 (Hruschka et al., 2004). However, there is no consensus in the literature regarding reliability standards (Lombard et al., 2002). In a review by Neuendorf (2002) he concluded that "coefficients of .90 or greater would be acceptable to all, .80 or greater would be acceptable in most situations and below that, there exists great disagreement." Others consider lower coefficients acceptable if it is new research with rich analysis (Riffe, Lacy & Fico, 2005). Qualitative data for this study were coded using NVivo 10 software and inter-coder reliability measures were calculated using this software. The aim was to have an intercoder reliability coefficient greater than 0.8.

The qualitative analysis involved two distinct phases of analysis using the steps outlined by Braun and Clarke (2006). First, based on the codebook, a content analysis of all interview and focus group data was completed using NVivo 10. Then, the codes were collated into relevant themes across participant groups and the themes were reviewed to ensure the themes were consistent with the coded data and the gestalt of the entire dataset. As described in Chapter 4, the thematic analysis was informed by the HHR and Health Systems Conceptual Framework, General System Theory, the WHO domains for responsiveness (2005) and the guiding principles for the Family Centered Maternity and Newborn Care guidelines (PHAC, 2000). From the analysis, ten themes were identified, which fit into two meta-themes: the system and service delivery and individual care encounters.

Table 66: Themes

System and Service Delivery	Individual Care Encounters
The need for a paradigm shift	Relational care
Fiscal matters	Culturally safe and appropriate
The 'wicked' social determinants of health	Know me, know my story
Lack of patient/people centeredness	Cookie-cutter approach
Interprofessional/intersectoral collaboration	

What follows is a detailed analysis of each theme and the associated sub-themes.

The System and Service Delivery

System Design relates to the design of health care services (e.g. delivery models). Planning and design of services is usually determined in partnership between policy and decision makers and based upon current government commitments to meet health needs (Tomblin Murphy, 2007). Five sub-themes related to system factors and service delivery were identified in the analysis: the need for a paradigm shift, a lack of patient/people/family-centeredness in the system, fiscal matters, the need for interprofessional and intersectoral collaboration. and the 'wicked' social determinants of health. These themes relate to the *System Design* and *Management, Organization and Delivery of Health Services* components of the HHR and Health System Conceptual Framework. The themes also align with the contextuality of General System Theory and the 'outer circle' of the HHR and Health Systems Conceptual Framework, where broader health and social policy and context are considered in the planning of health human resources (Tomblin Murphy, 2007).

Paradigm shift. Many care providers and leaders and some women identified the need to change the philosophical and as a result, operational way health care is provided. The move was away from predominantly illness-focused care where many care encounters were not relationship-based, respectful and the encounters lacked cultural competence or safety. For women, this meant consistency in care provider, acknowledgement for strengths and abilities, respect and understanding for them as people---culturally and socially and a focus on their health as individuals and as women. This is in keeping with the FCMNC guidelines and the WHO domains that are focused on the uniqueness of pregnancy and birth for each woman and the need for choice of health care provider. It is also important in understanding the multiple factors that influence women's and newborns' health, which is in keeping with the concept of non-summativity (the whole is greater than the sum of the parts) in General System Theory and the contextual nature of both GST and the HHR and Health Systems Conceptual Framework. One woman stated her wish was for…

> Somebody who follows you from the beginning to the very end. Having that person who knows what you've been through, any problems that you've had or concerns so you don't have to explain it to each new person that comes into the room with you.

Many women commented that having midwives available to provide care would offer women that consistent care provider throughout pregnancy, birth and the early postpartum period. Many women participants in the study stated they have a regular primary care provider, usually a family physician or sometimes a nurse practitioner. For many of the women participants, their primary care provider did not provide prenatal care after a certain gestation (typically past the first trimester) and they did not provide birth care. Telling their story repeatedly to different care providers was noted by a number of the women participants as concerning. Another commented on the blatant racism she experienced "There's more underlying racism than most people think." while one woman shared how the nurses did not recognize her knowledge and abilities…

> When we were down there, a lot of those nurses, knowing that he was taken from my care and all that stuff, right, a lot of them looked down on me and treated me differently and acted like I had no clue what I was doing with a baby. I do know what I'm doing with them and I'm actually pretty good at it.

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Another woman participant recognized the opportunity for care providers to consider her health and well-being when she was receiving pregnancy care…

> I actually think that when doctors… Like not just because you're pregnant, I think that they should also like, you know, not just for the baby's health but more about your health as well... But I think that if they had more time to think about how our feelings are too that it would be more better.

For health leaders and health care providers, the required paradigm shift was explicitly described as moving away from an illness-focused model to a model where a broad definition of health is the central, driving concept. A health leader participant stated...

> We've got lots of illness care. I think if you have a high risk pregnancy, if you have a complicated time, if you really have a postpartum depression, I think we're probably reasonable at dealing with all those issues. What I think we have a harder time grasping is how do we support health, which is much more than just treating illness?

Similarly, care providers and health leaders wondered about how to move health care towards a holistic approach to health that includes tailoring care based on an understanding of a woman's individual health needs and life context. This is aligned with balancing evidence-informed practices in primary maternity health care with an individualized approach to care that focused on caring for women in the context of their families (WHO, 2005; PHAC, 2000) as opposed to framing care based primarily on diagnoses and risks. Several clinicians in the study were optimistic that the approach and attitude of care providers and the system overall is changing.

> A huge piece of what we teach is a trusting relationship and a positive attitude no matter what your circumstances are. And people do get it. I think lots of times people just aren't exposed to it. And in our own ignorance, we apply our own value system which is important to us and we have no appreciation of what it's like to somebody else. So I think you can learn those things. And I think it's changing slowly. I mean you see in healthcare, health professional curriculums that are now talking about social determinants. They're talking about mental health, they're talking about psychosocial issues which, you know, 20 years ago were sort of never talked about. It was a very rigid medical model. So it is changing.

One health leader participant moved the conversation further to say that perhaps only considering the formal, professional models of care is not the best approach. She said

> We've made some assumptions that professional models are the only ones that work and this is not to let the health care system off the hook in any way but I don't think the professional model is always the best way to meet the needs of a basically healthy population. I think absolutely that health care providers are needed to orchestrate services for the more vulnerable and for just the, I think new moms and babies are inherently vulnerable but with lots of strengths. There are others who have different challenges that perhaps need more assistance from established programs

Interestingly, many clinicians noted that there has been an increase in the number of specialists and sub-specialists providing 'low-risk' primary maternity health care. A number of health leader and health care provider participants stated that this is not the best use of resources nor is it conducive to building the critical mass of family physicians and midwives in the province. Most importantly, it is not the best fit to meet the needs of women, newborns and families. One provider noted that "the lack of midwifery care---there's still an awful lot of low risk women who aren't getting sort of low risk sort of care and not getting that continuity." Similarly, an advanced practice clinician noted that the current challenge in the system is that we do not have the numbers of midwives required to provide care for women in the province. Therefore, it is a situation where an influx and investment in strengthening primary maternity care is required but this requires a move from existing care arrangements. As one participant noted...

> In terms of scope of practice, you know, I think that in some instances, specialists and subspecialists perhaps caring for low risk women, low risk pregnancies that could be cared for by either family practitioners or midwives, if we had a reasonable number of midwives providing that service. So at the moment, we have very few.

The same participant noted that it is not only about how to organize medical services but also how we organize and support the entire maternity care team and if and how we include women as central members of the team. He stated …

That's just speaking on the medical level. You know, there's also the resources required from nursing, doulas, and as importantly, the needs of patients themselves and their expectations and who they would like to have provide their care and where they'd like their care provided. You know, perhaps they would prefer to have their care provided in their own community or even in their own home versus coming to a tertiary care centre.

Although some health leader and health care provider participants were optimistic about the opportunities for a paradigm shift, others, primarily health care providers, seemed deflated in the efforts to move from traditional models of care to more innovative, needs-based or woman-centered approaches. With pressing fiscal demands and the elimination of nursing roles in some areas, one clinician participant expressed uncertainty that…

Unfortunately what often happens and may happen is that the physicians continue to operate in the way they've always operated, and instead of giving the 10 minutes, they're giving even less because they're doing a lot of the other extra paperwork and whatnot that might have been taken care of by nurses. So they're not necessarily spending more time. They're actually spending less. And you know, they're feeling rushed and etc. So if physicians are independently providing prenatal care, and they're still motivated to see large volumes, then those patients are losing out on the continuity of the nurses. You know, because that was the stable foundation of their connection. So that's an unfortunate event perhaps, or a change. But it may result in something better, possibly.

However, some health leader and health care provider participants provided concrete examples of how service delivery has moved out of the acute care world into community settings and has become more focused on the needs of women, newborns and families. She provided an example of how locating services locally has made a difference in how/if women access services.

I think access to prenatal care is good, and I think that moving it into the community helps. So we actually moved our clinics out of there a few years ago and moved them into the community so that we could have more access for people in the community. So I feel like people are accessing the care that they need.

One of the health leader participants agreed that a move to community-based services is essential. She stated …

> Because we still as a society do feel and do look and say, oh, you know, I need my health care; I'm going to go to a healthcare provider. But do it where the people are rather than having the people come to us.

Another primary health care participant expressed the challenges in moving to new ways of thinking and delivering care when people are territorial about their expertise. She stated…

> The models of care and scopes of practice [topic] are very, very touchy because people like to believe that they own a certain set of skills that nobody else has. I think the time for that thinking is gone. When you have scarce resources, everybody needs to work to the full ability of what they can so that you can get the best for the patient population you're serving. So I think some of the turf war time is over.

As described above by participants in all groups---health leaders, health care providers and women there are examples of how the approach to care could be different if services included a focus on health care as opposed to primarily illness-focused care. Many health leader, health care provider and women participants spoke about the lack of patient and family-centered care in our current primary maternity health care system.

Lack of patient/people/family/woman-centeredness. All care providers and health leaders and a number of women participants identified a lack of patient-centredness in the current system---at all levels---local and provincial and as it pertains to policy, organizational practices and care delivery. Similar to the FCMNC and WHO guidelines, principles of patient-centered care provided in a recent literature review (Spragins & Lorenzetti, 2008), include having coordinated, comprehensive care that is timely and convenient, involves clear, reliable communication and information; all supported by respect and validation for patients stories and feedback. A prominent health leader participant with clinical and leadership expertise stated...

> I mean it's a provider-centred model…where the providers want to live, where the providers are prepared to give care, whether they're prepared to work out of hours or not, or travel to communities or not. You know, by and large, providers decide what their practice is going to be. And the patients have to fit into that, whatever that is, that model.

Similarly, a physician participant reflected on the hierarchies in health care and that the power for deciding how care is organized and delivered has traditionally been with physicians. She frankly stated that…

> physicians traditionally have had all of the power. Now that is shifting, that is changing. We are having more collaborative teams. But it's still in a very medicalized model. So we talk about family-centred care, ha-ha. It's not family-centred care. Institutional-centred care where we give lip service to families.

Health leaders at the system level also agreed that there is a provider-centric medical model in the current maternity care system. One leader thought that the principles of patient-centered care are happening within individual care encounters.

> We as a system, no, we are provider-centric. Individuals are patient-focused and family-focused. And I don't necessarily fault the system for that, I think we are on the brink of changing that… I think there's a commitment to doing that differently now, we really haven't had the systems to give us that information

However, many women described their care as being in a 'machine'; one new mother stated, "Yeah, it was a bit of a factory. Like pee, blood pressure. Very little interaction. Any questions were, 'Yeah, you're pregnant'" Having options and choice of care providers were key messages from women participants. Many expressed the desire for midwifery care and there was considerable discussion in both focus groups about the eligibility for and availability of midwifery services.

> I would have loved to have a midwife but I didn't know… Like a friend of mine had a midwife but they live in the HRM [Halifax Regional Municipality]. So I just assumed that the reason I couldn't have a midwife is because I didn't live in HRM. That was just what was in the back of my mind.

Two women (one from an interview and one from a focus group) stated they overall had very positive pregnancy, birth and postpartum experiences. One of these women was also from another country and noted how her expectations for care were based upon the experiences of women from her home country. For her, having the option of a specialist as a care provider was in keeping with usual care in her home country. Similarly, one clinician noted how although his belief was that specialist and sub-

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specialist care should be 'high-risk' only, he recognized the importance of women having a choice. He said…

> I mean some women would prefer to be followed by an obstetrician. And I think that should be permitted. But I would still… I think the focus of specialists and subspecialist practice should be for the most part within their scope, which is problems, whether they be obstetrics or medical.

Many participants saw opportunities for improvement and the need for identifying ways for people to give and receive feedback about care. One stated

> However, if you've done certain things in certain ways for many years, you may not realize that they are talking about you so I think what we haven't necessarily done is development structures to provide that individual feedback so if there's something that you're doing consistently that's not helpful and you're not a person who has a lot of insight into what you're doing, how do we get that information to people.

One health care provider participant shared her thoughts around what she believed patient and family centred care to be. She stated that…

> So for me, patient and family-centred means that they are completely a part of the team, and that team provides them with all of the information about best practices, about resources that are available to them or not available to them, what options are, what risks and benefits are, and then they get to make the choice. But it's completely neutral. I don't know that all of us understand that being completely neutral is a really difficult thing to do. And I think we all influence, whether we want to or not, some of that neutrality. And it pushes people to what we personally believe is in someone's best interest.

Other provider participants had concrete examples and ideas on how to enact patient-centered care. Several gave examples of the adapted forms of the *Centering Pregnancy* model where women come together prenatally in groups to learn and share but also have individual opportunities to meet with the appropriate prenatal care provider (Baldwin, 2006; Baldwin & Phillips, 2011). One health leader participant clearly articulated the need for those options in our current system.

> And I think that we need to involve women more in establishing our practice, if you will, or our provision of prenatal care. I mean unfortunately the current fiscal situation and the government is making it difficult to address those issues and to come up with… I mean resources

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are being cut but there isn't necessarily investment in exploring other models such as empowering women to provide care for themselves. And whether that be Centering Pregnancy or other terms used for where women are basically educated and provide each…they provide their own and each other's prenatal care. And the role of the physician becomes one of dealing with problems rather than dealing with normal prenatal care. And that the prenatal care is provided by either, and I guess I'm referring primarily to obstetrics, but the primary care may be provided by a single or a couple of family practitioners within a group of women, or a midwife, or… I wouldn't think that that would be appropriate for an obstetrician because the obstetrician really should be there for complications or for guidance related to past history or whatever the case may be.

In other practice settings, approaches and principles similar to the *Centering Pregnancy* model is well-integrated into their approach to prenatal care. One example of a modified centering pregnancy approach included, as one physician participant noted...

Everyone comes and waits with her...And so the patients will sit there and discuss things with [the facilitator], asks her whatever questions they want. She has a lot of resources and things there. And then they talk to each other and meet each other as well. But we don't do a group medical visit. We pull the patients from there to have individual medical visits.

Another care provider group brings women together at a local community centre. One of the health care provider participants in the study recalled her involvement in the group which includess…

… 8 sessions, teaching sessions, throughout the pregnancy. One hour is teaching. The second hour is just doing your checks. And we teach them how to do that. So it's done in a group setting. We always have food. And it's very informal. So people can participate in all of it or some of it. They don't have to… You know, if they've had 3 children before and they don't want to sit and listen to the discussions about preparing for birth then they don't need to. But it's completely informal. And one of the amazing things to me about it is that I learn way more about them than… When I was in the office, it was me dispensing information. It was kind of… And I'd ask certain questions. But I didn't learn anything like I do now about their life and their circumstances and what challenges they're facing because it just comes out.

However, one primary care participant stated that the system is not designed for patients (for this study, women, newborns and families). Although there are examples of

woman-centered strategies and there is evidence to support initiatives to improve access to services, he openly said that there is…

> Talk and there are examples. But you know, I think that when you really look at it, if you want to be frank and honest, even though our rubric is patient-centred, it's very much provider-centred… I mean it's a provider-centred model where the providers want to live, where the providers are prepared to give care, whether they're prepared to work out of hours or not, or travel to communities nor not. You know, by and large, providers decide what their practice is going to be. And the patients have to fit into that, whatever that is, that model. I mean by and large. I mean that's not universally across the board of course. I mean there's variation. But in general, I think it's a provider-centred care model, not a patient-centred care model.

Another clinician agreed that…

> You know, I think there needs to be like an overall kind of philosophy for something like a birth unit. There needs to be an overall philosophy valuing that [patient-centered care]. Because I don't think it comes from sort of individuals. Just thinking about my own supportive care in labour philosophy. In the 20 years that I've worked [in maternity care], that [patient-centered care] has never been a predominant kind of thinking.

Fiscal matters. Although care providers and health leaders recognized that care is provided with the intent of providing the best care for the best outcomes, there were also a number of factors (e.g. history, power, funding and lack of time) that impeded the ability to provide patient-centered care. The findings that support this theme align with both the determination of health needs and the economic context of health human resources planning in the HHR and Health Systems Conceptual Framework (Tomblin Murphy, 2007). An expert nurse commented on what she perceived as a constant focus on funding where…

> Budget is the widget, not the patient. And that's been my experience for a long time now in that I think… And I don't believe there's ever malice. Like I don't think people sort of say, well, we don't care about patient care. I think everybody… The early care is about the quality of care. But I think the pressures have skewed us, and it is all budget-focused economics. We have an economic system.

Several health leader and health care provider participants expressed concern over traditional funding models (particularly for physicians) that impede flexibility in delivering care and set up the expectations for increased volumes (from both the system and by physicians). This results in people accessing services and moving through the system but the planning and evaluation of that care is not based on health needs, health experiences and perhaps may negatively affect health outcomes. It is also difficult to build in accountability structures in the system when a large group of primary care providers are self-employed and each has different approaches and standards of care.

One health leader expressed that...

> we're still dealing with independent physicians--they're their own business owners, they are not employed by anyone so that's a challenge. Is there a way to change that? I'm sure there are ways to change it---how palatable it is to that population and how easy it would be, I'm not so sure.

Another health leader participant was hesitant in sharing a perspective that she said may be considered as identifying an 'elephant in the room'.

> I'm going to say something perhaps incorrect but they [physicians] are paid by the province, they are, by the public purse as we all are and but for whatever reason and it isn't limited in Nova Scotia by any means or nothing we've done incorrectly here but it's the way, the power and balance in society has given certain groups a sense of entitlement to call the shots themselves and I have huge respect for physicians and other health care providers but there isn't the same sense of accountability---they just haven't grown up with that---they haven't been educated that way so as now there are ways you can encourage and carrots you can offer but we don't currently have a system where we can, where we are, where we have structures that I guess that bring people into the fold and make them feel as though this is a shared responsibility. You know, that being said, I know, you know the vast majority of physicians that we come across are very much aware that they are part of a system but there's always a breaking point for, well but I'm not going there.

Similarly, a physician participant noted that the fee-for-service model is both prominent but perhaps antiquated to support current directions in health care. He stated that

> We have to recognize that provision of care is also income generation. And naturally obstetricians and family practitioners in a fee-for-service based system, which is what we're in because all obstetricians in NS are

on a fee-for-service, and many family practitioners are. And so there is motivation to see pregnant patients or to see prenatal patients because that results in deliveries which is quite lucrative compared to other activities.

However, he also saw the potential flexibility in alternate funding models, in improving the workload and work life of physicians but also cautioned that change would require considerable planning and monitoring as there are advantages and disadvantages to both funding approaches. He said…

> I am in favour of an academic funding plan. So that the activities of…the wide and varied activities of a group of clinicians are recognized as equal. So that if somebody is focused on research, and productive and accountable, or is focused, interested and productive in education, the time that they spend is seen to be equivalent to the clinical work that's provided by people who are interested and proficient and productive in clinical care…I believe that an alternate funding planning model would remove some of the incentive for basically increasing volume to ensure an income level, whatever is considered the expectation of the individual or whatever. And then of course then there's always the concern raised, and perhaps with some reason, if you go to a completely socialized model, as was the case in Britain, you know, waiting lists increase, and the provision of care may be influenced in a negative way as well. So I think you have to look at that as well. And it really comes down to accountability. You know, if you go to an alternate funding model, the expectation is people are going to provide what they've agreed to provide. So that has to be monitored.

However, participants also recognize the workload and time challenges of current primary care practices. One woman participant stated that "it's [in primary care settings] non-stop, so, that's so they don't have time the way their work is structured and that might change too if we paid them differently."

Similarly, a woman participant noted that the way current primary maternity health care is structured and funded might influence primary care providers' ability to attend to needs when they have competing demands for service. She noted that…

> So if you're a pregnant mom and you're coming in for your, I don't know, 3 month assessment or whatever those date lines are, the doctor only has so much time that he can bill for. Right? And an assessment. And he has 20 other people waiting in the waiting room to be seen. So I think there's… I think probably that physician knows that this mom could probably use some extra support. Without even going through any formal

assessment, could probably, you know, make that just based on that history with the family or whatever. But maybe doesn't even know who's out there that can provide that. That's where I think there's probably a gap maybe.

Interprofessional and intersectoral collaboration. From a policy perspective, a number of health leader and health care provider participants expressed a need for sectors within and across government to work together to address the broader determinants of health. One health leader expressed that…

> I think it's informing various levels of government because we do not hold the entire public purse. It's to inform the levels of government to what the needs are to influence policy setting and funding in those specific areas...there's been, for example, there's been some work on the diabetic population to help inform what the needs are, you know looking at the alternatives to expensive health services, what the alternatives would be in terms of food security so we worked with other government departments to look at what those alternatives are and try and cost them and make a decision within government in terms of the best way to approach a particular area---so it would be the same for the families, newborns, maternity area.

Similarly, another participant with both policy and operational leadership experience stated that

> At a policy level of different departments working together in a way that traditionally may not have always been the case and coming together for, around an issue that unite all of us and as you say we have a shared accountability, shared responsibility and so where I sit which is one foot in the policy arena and one foot in more of the operational end of things than I could also see facilitating or encouraging at the district level (I'm going to say district because that's what we have right now) so that health (and health of course, is not all acute care) primary care, public health are working in harmony around identifying and recognizing the importance of addressing those issues and working with other groups that may have, that may be outside health, family resource centres being a very obvious group that have a lot of responsibility and a lot of success working on some of those issues and they are not within health but those relationships in some districts are very, very strong with health

Another health care leader participant expressed the need for intersectoral collaboration as well as policy and advocacy work to enhance the profile of maternal-newborn care in the province. The need for connection and harmony between sectors is

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aligned with the concept of *homeostasis* in GST and the embedded systems within systems nature of the HHR and Health Systems Conceptual Framework (Birch, 2009, Tomblin Murphy, 2007; Tomblin Murphy, 2013). She stated that…

> Maternal, newborn and pediatric care is dwarfed in the system compared to the overwhelming needs of adults and particularly elders. While I respect and completely support that that's important, I think that the province is constantly at risk of losing a focus on early intervention in every area. And I have a very strong bias that as a society, that's a fundamental value that has to be preserved. And I don't believe that we are seeing that reflected in policy and actions, government actions, to the degree it should be. I'd like to see a lot more of an activist approach in terms of looking at all policy briefings and using a lens that looks at the needs of infants, newborns, mothers, applied to every policy.

A participant from one of the focus groups with women provided a concrete example of how supportive social policy has influenced the health and well-being of women and newborns. The example was extended maternity leave. However, the participant noted that some women could not benefit from the extended leave because of factors related to the determinants of health. She said…

> And some of the other things that impact health and the wellness of the child as well as the mother are maternity leaves. I mean these things that affect healthcare are so tied up in the determinants of health. Like if a woman can't be off for let's say a year and she can't be able to, you know have the opportunity to provide breast milk or whatnot when she goes back to work, that also has an impact on your health.

The need for intersectoral collaboration is also recognized by clinicians. One primary care provider noted that....

> You can't separate health from social policy. And so there needs to be better integration and understanding that health outcomes are directly related to the circumstances in which you live… So it's that piece, is being better integrated and really having health professionals truly understand how the social determinants of health are. Because health professionals are the societal leaders in a lot of ways, and have the ability to influence policy. And what I see in healthcare is we advocate for within our little medicalized field kind of and we don't make a great attachment. And so we don't advocate.

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As expressed by several participants, there is a sense that there continue to be improvements in how groups across the system work together. One health leader participant stated that

> those partnerships, what I've seen in the last five years, have improved, there has been stronger, ahh, collaboration amongst the various government departments that have to do with health so there were formal, formal committees established with Deputy Ministers---they called them the Better Health Care Deputy table. You could bring issues across health, education, community services and justice.

However, many participants identified the obvious challenge in continuing to support and improve intersectoral initiatives with as one health leader described... "every new government [that] brings about new structures, new ways of working". At the community level, the lengthy process of creating partnerships was described by another health leader participant as

> Groups who have different accountabilities, different structures, [and] it takes a while to establish those relationships first of all and then it takes longer to get things done. It's better in the end and you are going to accomplish way more but it's a lot faster to do whatever you can do on your own. Public Health always says 'faster alone--further together'

Most of the women participants in the study expressed concern about lack of information, inconsistent information and a general disconnect between health care providers where relevant information is not shared and women are expected to be the conduits of clinical information. One woman shared her experiences in having a primary care provider who was not aware of current evidence. She stated that…

> They [physicians] need to be up-to-date, and they're not. For babies anyway. Like you know, let me have a crappy doctor but I want my daughter to have a really good doctor. But it's also important for me to have a good doctor so I can take care of her.

There was some discussion with health leader and care provider participants about the use of an electronic health record (EHR) and how we are currently in a state of transition in the province regarding EHRs. One health leader participant stated that

> I think the province has done alot of the right things around this--- providing incentives [for using an electronic health record… if we were doing this today, it would be easier because we would probably be able to say, we can link with any health record that meets these---that is industry

standard—however you define that and it requires this kind of interface-but we're in a period of transition so we're kind of stuck with the situation that was in place at the time when the EMR was created. I don't know what it would take to move it to a different level but I generally think that incentives are a better way than deterrents---to get people on board and eventually because you can't do it all at once anyway, some of it fixes itself as people retire or decide that they are just going to come on board finally.

The appropriate use of technology, such as an EHR, is part of the larger system context in HHR planning but also a key non-human health resource (Tomblin Murphy, 2007, 2012). However, as a number of participants noted, the current structure of many primary care practices are not conducive to creating and supporting connections. One health care provider participant stated that…

They [primary care physicians] don't have time the way their work is structured to build in collaboration time which I think is a huge benefit of the collaborative practices---you're just on your hamster wheel the whole time so no wonder they feel isolated---it's hard to reach out to them and they don't have time to reach out to other people We have a system that's set-up for people working in silos.

The benefits of collaborative practice settings were recognized by many participants. One health leader participant stated that

The multidisciplinary team approach tends to work very well, particularly in… Well, I think it should work on any setting, whatever level of risk a particular woman or group of women have. And at the low risk level, there's no reason why prenatal education can't be a significant part. Rather than sitting in a waiting room for 2, 3 hours to see somebody for 10 minutes, you know, there's a significant portion of that time could be spent as a group learning, sharing, etc. And for the actual answers to questions perhaps that individual women or concerns or problems that they may have, then you have physicians available to augment that

Another clinician participant expressed that we need to support more collaborative practice models in order to meet women's and newborns' health needs. She stated that…

I think it [perinatal care] needs to be done in a more collaborative model rather than less. I mean it can't be saving the system to rely on physicians alone to be providing all the different layers of education and information support that the patient needs in a pregnancy, coming up to a delivery, and then coming up to taking care of a new baby. And I think… I mean the

system is relying on individuals to do more but, you know, the prenatal time… There's just so much that they have to already do. I really see unfortunately things being left out more and more. So yeah, so more of a collaborative model, you know, in different…ideally in different communities. That that model be supported in multiple different communities.

Similarly, clinicians and health leaders stated that there are examples of group practice settings across the province that seem to be working well to support the number of waning family physicians doing full spectrum maternity care (pregnancy, birth and postpartum care). One health leader stated that

The numbers of family practitioners involved in obstetrics has continually been decreasing. Although I think there is a positive change in that area is that groups of family practitioners who are interested in obstetrics have come together as groups, as sharing call, sharing prenatal care, etc. And the ones that I am thinking of are functioning particularly very well

In regards to health human resources planning, a number of health leader and health care provider participants expressed concern about recent and impending retirements of providers. The issues were not only about the numbers of health care providers available to provide care but also the types of care providers with the specialized skills to offer certain types of services, particularly emergency obstetrical services. One health care provider stated that

I think it's both numbers and not always, it's as much the stability as it is numbers because there's always some place that's in crisis. You know, somebody who has a retirement coming up or an illness or a something that's going on, there's no kind of flex in the system and with small volumes, we can't really build that in easily because we have, we don't have interchangeable scopes for a lot of our providers so if there's..you gotta have somebody who can do interventions…a small portion of the population that needs them but you gotta have that so but not, if you don't have the person who can do a c/s there isn't necessarily someone who can just jump in to do that so I think it's maintaining a sufficient number of care providers in small volume places but it's also confidence and its, part of maintaining competent people in a particular environment is the right kind of recruitment, so finding the people who are, that are well-suited to that kind of environment

In keeping with HHR shortages, a number of participants noted gaps in the current services, including women expressing a need for closer to home prenatal care and

care providers and leaders concerned with the follow-up of women, newborns and families in the post-partum period. One nurse participant stated that

> I think there is concern about close-to-home post-natal services when it's a little harder to get in the car and go somewhere or you don't have transportation so and we know that in some areas of the province, finding a family doctor for a new baby or a primary care provider like an NP is a challenge

While other participants shared inefficiencies in the system that could offset some of the current challenges and improve care for women, newborns and families. Some solutions were born out of recognized gaps in care that require attention but often are designed or situated within an acute care system. A health leader noted that

> I think what seems to happen in hospitals is that because we don't, we only have control in the part of the system we work in, if there is an unmet need then and this is why I think we have a bunch of postnatal clinics in hospitals, they say at least we could do this, we could set up a post-natal clinic so people can get their first visit and this has happened in a couple of places, people get their first visit and then babies won't fall through the cracks at least for that first week---although it does fill the short-term need as long as the parents can travel back to see you so it's meant to be population-focused but the model is provider-centric and I think that in some ways is inevitable because you are the system that you are and it's an investment as it is for the acute care system to say they are going to do that.

In an effort to create sustainable, patient-centered responses to gaps and redundancies in the system, some areas in the province are investing in interprofessional and collaborative models of primary maternity health care (Nova Scotia, 2012). Although these models tend to improve the coordination and sharing of information there is still considerable debate, especially with overlapping scopes of practice as to who should be the one to provide particular aspects of care. One provider participant noted that…

> They've had to talk about overlapping scope, which is not a popular topic because people do want to hold their own expertise and believe that they are indispensable but we all want to believe that…[we need to] focus on the needs of families instead and it takes a champion and someone willing

to listen to a lot of complaints and keep encouraging people and moving it forward...It is an attitude shift that takes time.

However, both health leader and health care provider participants cited examples of interprofessional and intersectoral work focused on addressing the needs of women and newborns. In addition to efforts to engage the public, one community-based provider participant noted how "some of the interprofessional work and the cross-sectoral work,…collaborative practices are the things we are doing really well." One example she provided was in the area of an

> Increased emphasis on breastfeeding, which we're struggling with, I know we're struggling, it never feels like we have enough resources and with all the competing resources, it's difficult. We're, I feel like we're almost at a tipping point, it's just, you have to compare the progress over several years, not months at a time but I feel like we're really making a difference because it's not just coming from health care, it's not just coming from a few breastfeeding advocates, I think we're really starting to see a shift. A shift in society. And at the policy level too, really appreciating how important that is. I think that's, we're still a long way from having a breastfeeding friendly culture

Another primary care provider participant reflected on the differences in her practice before and after being in a collaborative practice setting. She said…

> You know, like I think that I still wanted to do those things before but I didn't have the resources or the time to do them. And now that I'm in this practice where I have so many people helping me. Like if you think about me running a prenatal clinic, I've got [people named] helping me, and I've got 1 or 2 residents helping me see 10 or 12 patients. Like that's a lot of people and a lot of resources. Plus all those other people that I can access to help. Plus, I have no financial worries seeing those patients. Like I feel like I've got all the time. If they're really complicated and we haven't gotten to the bottom of everything, it's not a big deal for me to say like, "Okay, well, come in tomorrow and we'll spend half an hour talking."

The 'wicked' social determinants of health. The most prevalent answer to the question about the health needs of women, newborns and families in Nova Scotia focused on the social determinants of health. Women, health leaders and health care providers all cited examples of people struggling to gain and maintain good health because of poverty, food insecurity, situations of violence, experiences of discrimination and racism and

limited access to health services. Thinking about the intersection of these determinants and the cumulative effect of these factors on maternal and newborn health and health needs is in keeping with General System Theory, which is a foundational theory of Complexity Theory, which often informs thinking about complex and seemingly, 'wicked' or insurmountable problems (Head, 2008; Raisio, 2009; 2011). Although most participants in the study cited the social determinants of health as the number one health need of women and newborns, many health care provider participants stated that they think questions are not asked about the social determinants of health. This may be because many providers are not sure what to do with the answers; particularly if the answers require time-consuming assessment and follow-up.

One perinatal care provider shared that…

> the determinants of health [are important health needs]. Like those are really, really important, and we don't have time for it. That's what we tell ourselves….So while on the one hand, the determinants of health are really, really important, we want to know about that, we want to know about food security, for example, well, you know what, we're not going to have time to ask that question just in case the answer is not what we want to hear because we don't have time for it…. Sometimes we do have our priorities messed up. And I believe that as well, that we have focused on what has been sort of what we see as being medical problems. We focus on those and not understanding that the "non-medical" issues significantly impact on outcomes

Another physician stated that there were

> So while on the one hand, we are saying the determinants of health are really, really important, we want to know about that, we want to know about food security, for example, well, you know what, we're not going to have time to ask that question just in case the answer is not what we want to hear because we don't have time for it… I think that that is a shortcoming with the care that we provide, is that understanding.

Other health care providers described how factors influence women's ability to access health care services. One physician stated that…

> considerable demographic factors that are affecting outcomes in pregnancy - socioeconomic, disadvantaged, minorities…. and there are concerns and issues related to human resources in some of the outlying areas and at the regional centres as well… [there are] areas in the province

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where there are great distances to travel and some difficulty in determining what centre is their [women's] birth centre.

Similarly, a health care provider participant described how health care service delivery approaches require change to attend to the challenges women have in accessing appropriate services…

So there are a number of areas where I don't think that the prenatal care availability is… It's not the same. It's not equally available to all women. And also, why should women be… Why should it be necessary… I mean it may be necessary to receive very, very high levels of care. But why should it be necessary for women to travel hours and hours to get an ultrasound or some consultation? Why isn't that available to them in their own community? Or even with technologies, you know, through Telehealth and whatever to avoid all this driving around and coming into the central location.

One health leader participant noted how health care is organized not based on a broader understanding of health but on the patient's medical needs or diagnoses. He has found that…

The social, psychological and circumstantial needs of women, I don't think by and large are served as well as the medical needs. And it's a medical-based system…people are grouped by their medical diagnosis rather than by their individual needs.

Similarly, a nurse participant noted the difficulties in having a woman's length of hospital stay extended when she was cleared for discharge based on her medical diagnosis; however, she has multiple social issues that require attention. In some cases, women are being discharged to uncertain and challenging circumstances when they require additional support. Once women are medically stable there is great pressure from the 'system of care' to move them through.

I work a lot with women and addiction. And so one of our challenges once we have this little baby born, particularly if the mom is on methadone, the baby goes to NICU to be withdrawn. Now, what we know, this is in our best practice, this is where our system can manage things right now. So what happens is that women, as soon as they're medically ready, so that means obstetrically ready for discharge on postpartum, they've got to go. Right?...Now, I work with physicians who are very aware of the importance of skin to skin and breastfeeding and keeping the

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moms and dads close to their little babies to facilitate withdrawal. And there's strong support from the baby's team. But the huge pressure. And nurses, sadly so, are the biggest pressure for these physicians to discharge because they feed into the system, that they're being good nurses by keeping people flowing through the beds. So once that woman hits 48 hours…

This was supported by another participant's reflection that… "We're not doing an optimal job of addressing psychosocial issues in pregnancy but probably better than outside of pregnancy. And then once the pregnancy is over, as soon as the baby is delivered, it changes."

Similarly, one physician participant noted that the priority needs of women, newborns and families are…

> …an easy answer. The social determinants. I mean again, you know, the area that I work in is in an under-resourced community. And I've worked in primary care for 27 years. And you know, living in poverty, not having employment, education are huge determinants of health. And I see the glaring differences between, you know, well-resourced families and those that aren't very well resourced. And you know, in a society that we have supposedly socialized healthcare where it doesn't cost anybody, that's actually completely untrue. Because the access to appropriate care is really unbalanced in favour of those with resources.

However, as noted by another hospital-based provider participant, having resources available or care delivery structured in a way to ask the questions related to the social determinants of health is not often a priority. She stated that…

> …the determinants of health. Like those are really, really important, and we don't have time for it. That's what we tell ourselves. And what we tell ourselves is probably true. I mean take, for example, what's just happened down in the [clinic]. We will not have the providers down there to do what they did before – which is ask questions about that kind of thing [social determinants]. So while on the one hand, we are saying the determinants of health are really, really important, we want to know about that, we want to know about food security, for example, well, you know what, we're not going to have time to ask that question just in case the answer is not what we want to hear because we don't have time for it… I think that that is a shortcoming with the care that we provide, is that understanding. And as I said, I think that for many people, it's easier just to say, you know, here's a blood test, we're going to get a blood test done, rather than try to delve into, you know, do you feel safe in your environment at home? Thinking

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about issues of abuse and what not. Those are complicated questions to ask. And they do require time.

Moreover, a health leader noted that women with supports are often able to access resources so targeted strategies are required to meet the needs of vulnerable populations. She stated that…

> But I really think we need to be targeting that more vulnerable population. Because the other folks have means. They know how to access other resources. They know how to tap into those other resources that are out there. So we just need to, I think, be more diligent and intentional about reaching out to those vulnerable populations.

Individual Care Encounters

Four sub-themes related to individual care encounters, defined as the care women received from perinatal care providers, were identified in the analysis: *Relational Care, Culturally Safe and Appropriate Care, Know Me…Know my Story* and a *Cookie-Cutter Approach.* Overall these themes align with the inter-dependent and relational nature of GST (Von Bertallanfy, 1968), the situated and contextual inter-connectedness of the components of the HHR and Health Systems Conceptual Framework (Tomblin Murphy, 2007) and the FCMNC (PHAC, 2000) and WHO (2005) guidelines.

Relational care. All women in the focus groups and interviews as well as a number of health care providers and health leaders identified the need for women to connect and build relationships with care providers as a key component of 'good' care. The connection did not always have to be a physician; for some it was the nurse in a primary care clinic, for others it was a midwife. Therefore, the thinking about relational continuity can be expanded to include a variety of members of the primary health care team. A trusting relationship with health care providers is a key component of the FCMNC and WHO guidelines (PHAC, 2000; WHO, 2005). It is also supportive of interprofessional and collaborative approaches to care that acknowledge and respect both the unique and the shared roles and competencies of health care providers. Informed by the HHR and Health Systems Conceptual Framework, a competency-based approach to designing health care and health care services has been used by Tomblin Murphy and colleagues to inform planning locally, nationally and internationally (Tomblin Murphy et

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al., 2006; 2011. 2012b; Goma et al., 2014). One nurse participant shared that it has been a…

> been a longstanding element of continuity, is that there are nurses generally assigned to particular clinics. And even when there are physicians that are either filling in or alternating or whatever the case may be, there is continuity there. In the multidisciplinary settings such as the high risk ones…there is continuity because the nursing staff are the same, generally speaking the same nursing staff from week to week to week even though the physicians are changing.

Similarly, a physician participant noted that…

> again it's the nursing staff, the dieticians, the physiotherapists, the clinical nurse specialists who really are the ones that form those key relationships with women, and who they would call as a first step or first call if they had concerns or questions.

In the postpartum, many of the women living in rural areas relied primarily on the public health nurse for support regarding baby and self-care, breastfeeding and the expected physiological and emotional transition of becoming a parent. One woman shared …

> Public health nurses are awesome…And I wish they could be around a little longer because I felt like I was bothering the nurse like after a while. … I wish they could be around longer because they were really helpful. If it wasn't for them, I wouldn't still be breastfeeding her today. But I don't think there's enough… Also there's not enough with respect to postpartum depression and anxiety. There's not enough resources.

Some women who received recent midwifery care compared and contrasted the care they received in one pregnancy with alternate care in a subsequent pregnancy and unequivocally agreed that the support, information, care, attention, closer to home or in-home service they received from the midwife far exceeded their previous pregnancy, birth and postpartum experiences. The holistic, relational approach the woman described is aligned with the WHO domains as well as the FCMNC guidelines (PHAC, 2000).

A provider participant noted that women often share their previous birth experience with her. She recalled…

> Oh, it's awful. Like the number of women that …tell me about their first experience, and, you know, they're bawling and their husband is sitting there traumatized, or partner. And I'm just like, "I'm so sorry that

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happened to you. I'm so sorry that I'm a part of a system that that happened to you."

One of key components to supporting the relationship with their care providers was having mechanisms for continuity of care. Several women shared that their challenges in finding a consistent prenatal care provider. One stated that…

> I liked her as a doctor when I could see her. And I wanted it, like my prenatal doctor, to be consistent throughout my pregnancy. And I didn't get to experience that. So I had to change doctors when I was… It was in April. So I guess I was like about 5 or 6 months pregnant.

While another woman felt more strongly about the current availability and motivation of primary care physicians…

> And I'm always constantly struggling with finding a good doctor. It's almost like… The way they set it up is that it's not…doctors aren't doctors to be doctors anymore. They're doctors to like push patients in and out.

As one health leader participant noted, consistency did not need to be seeing the same provider each time but recognition of a team-approach or at least coordinated approach to care. One participant described this as…

> Continuity of care is best delivered if you have a practitioner providing care to a woman individually, you know, through the entire pregnancy and delivery. And that's certainly the model with midwifery and has been the model with family practitioners in the past. It's pretty much disappearing among family practitioners because they're forming call groups because of lifestyle. They're trying to balance their work and lifestyle. So therefore, you know, women are now seeing multiple people. And the ability to develop a real bond with those individuals can be difficult. Again, unless you have it organized such that you have a like-minded group that isn't too large. And ideally, you know, 1 or 2 or 3 or 4 at the most. And that women who are undergoing prenatal care are scheduled to meet with whatever that number is during the course of their pregnancy. And they appreciate… So they've actually had contact with the individuals who are most likely to be there for their delivery. And that's becoming increasingly difficult because of physicians' expectations in terms of their time and also other commitments. So that their ability to actually be available 24 hours a day, 365 days per year for their prenatal patients is becoming very, very limited to a very few. And I guess the few ultimately will be midwives because that's their model of provision of care. Unfortunately with that model, unless you have many, many midwives, that also provides

limitations to their ability to care for large numbers of women. So there's pluses and minuses to…

Another health leader participant reflected on the successes of the current system of maternity care in Nova Scotia but then wondered about if we are measuring the 'right' things in our assessments of health care (such as relationships) and whether we are missing opportunities to connect with women during a time in their lives when they are very motivated to change.

> Like perinatal adverse outcomes and maternal adverse outcomes are as good as or better than in other jurisdictions. So that when you actually say, okay, what are we measuring here? If it's just measuring how many…what is the rate of perinatal death, what is the rate of this, that or the other, you know, you're going to say, well, it's pretty good. But are we giving the population what they need? And I would say to a large degree, we are, I think. And there is a connection that the healthcare providers make with women during their pregnancies. I think that's… And there is a special relationship that's developed. Even in settings where there are multiple providers. But I do think that that's the case. It's a very motivating and special period in a woman's life. And so, you know, because of that, women are incredibly compliant. I mean whether they are compliant by reading and getting information and doing the right thing that way or whether they're given recommendations to follow, they follow them. I mean it's just amazing…they make a huge change in their lifestyle. And unfortunately that doesn't necessarily…it's not necessarily sustained for all kinds of reasons. I mean it really is remarkable what women are capable of in general but also in that timeframe. And so I think we should be listening and changing our models.

While another health care provider participant reflected on what makes the collaborative practice setting she works in different and how the learning experiences for health care students is different in her setting…

> [learners want to come here] Because it's an interesting model of care but a huge piece of what we teach is a trusting relationship and a positive attitude no matter what your circumstances are. And people do get it. I think lots of times people just aren't exposed to it. And in our own ignorance, we apply our own value system which is important to us and we have no appreciation of what it's like to be somebody else. So I think you can learn those things.

Learning experiences such as the one described above enhance health professionals' interpersonal and relational skills. As noted by one provider participant,

building a relationship is about…"an attitudinal approach of how you're willing to perceive and understand somebody's context within their life, not just the gallbladder or the baby or the caesarean section."

For some care providers, building a relationship with women is key to providing services. In Public Health for instance, women are screened in hospital to see if they require additional in-home services. As noted by one health provider participant…

> I think generally speaking the [public health] nurses are good at building relationships because I think in our world, it's voluntary, right, whether they're going to let you in the door. So that conversation on the phone is critical in order to get your foot in the door or not. So I think our nurses are very skilled at being able to do that. And then to get that next visit in is another skill, right.

However, the same participant also noted that...

> Learning to build a relationship with a mom that's really struggling and has a lot of challenges can be difficult, right. And because they don't trust the system, they don't trust anybody from government or, you know, whatever. So that can be a challenge.

But building that relationship is required in order to create a safe space for women. One clinician participant noted that…

> I think providing women with time and space to feel safe, and to be in a relationship where they trust their care provider, and where they're empowered to be the best that they can be at whatever it is that they're doing. It's really common feedback. And I mean you see it. Like I mean, what can you really achieve in 10 or 15 minutes? Well, you can't achieve much. And you certainly can't achieve a trusting relationship.

Similarly, a health leader noted that…

> conversation is connection. That's what it is. You know, you build connections that way. And I would say… You see, it's not… From my point of view, and again I always feel like I'm very…like I live in some kind of unreal…you know, it's not realistic or something, but I will say, I'll just say… Because I think also what's important about conversation is not simply relationship building for its own sake. What it's about for me is confidence building. It's the building of the woman's sense of her own capacity not only to give birth but to be a good mother, you know. And that's so vital for parents to feel.

Culturally safe and appropriate care. There were many stories from both women and health care providers about how women have been ill-treated in care settings and how these experiences taint women's belief and comfort in accessing care. One provider noted that many of the women and families she worked with have had challenging care experiences.

> But I think a huge piece of it is an attitudinal piece and an understanding of what people's circumstances are without making judgement about them. So what I see in maternal newborn care in especially the population that I see, they technically have access to all these things. But they come into hospital, they're treated in a white, middle-class way. So it alienates them. And then when the home care nurse calls, the public health nurse calls to say, "Well, we'd like to come make a visit," well, you're not coming into my house because when I was in hospital, you treated me badly and you didn't acknowledge my social circumstance, and I'm afraid when you come to my house, you're going to call Social Services and say I'm not a fit mother. So no, you're not coming in.

Women were very forthcoming about their experiences of racism and discrimination. One told of how she was treated differently because of her past history of substance use.

> But the nurses there, they just… Yeah. Some of them were okay. There was a couple here and there that were okay. But a lot of them did look down on me for my past. That's past, man. That's not right. And if you're going to be like that then you shouldn't be working in a place like that…..

Few of the care providers involved in her care asked about her story or what she had overcome in the recent months to participate successfully in a methadone program. Similarly, another woman switched primary care providers a number of times because she felt judged by her challenges with substance use. She stated...

> And when I told her I was pregnant, I said I'm really worried about my baby because I was drinking and I didn't know I was pregnant. And she said… I said, but I'd only have like 5 or 6 drinks a night. And she's like, "Most women only have a couple, [participant]." So she made me feel really bad and I left there crying. And so I was like… That's when I wanted to find a new doctor.

This can be challenging for both women and care providers, when as described in the previous sub-theme, a relationship is so important. In the focus group with First Nations women, many participants shared stories of racism and discrimination. One

participant expressed that 'there's more underlying racism than you think". Others provided examples of how care providers make assumptions about where you live or the resources you have based upon being First Nations. One woman shared…

> And the nurse was like, "Oh, are you guys from Cape Breton?" because there's a lot of reserves in Cape Breton. I'm like, "No." …We said where we were from. We talked for a while. And she's [the nurse] like, "Oh, I love Natives from Cape Breton." Like she still didn't even hear where we were from and just said, "Oh, yeah, you're still from Cape Breton." And my eyes like… Because that's where all the Indians are.

This is a stark example of how stereotyping and stigma contribute to and perpetuate misunderstanding regarding women's histories and life contexts. It demonstrates the importance of listening carefully and learning about a woman within the context of a therapeutic care relationship. Similarly, one woman recounted how she had a private room in hospital because she required quarantine and the care providers who visited her seemed surprised that she had a private room and joked with her that she must be rich. She said she felt like they were making the assumption that… "You're Indian, you should be poor."

One woman participant reflected on the current educational and practice strategies used to improve cultural competency. In her perceptive description, she expressed concern about how information about culture is an add-on in health professional education--made to appear inclusive.

> Like you know, like our society. And so you can't say you're a culture of no culture. And I'm sure that in nursing school or whatever school, it's like, okay, this is right because this is what it is. And then let's stick different things in the appendix here, just like the DSM. So it's almost like they're not teaching diversity throughout their courses… And it's almost like they put something in the appendix and it marginalizes the… Who goes to the appendix?

A number of women offered examples of disrespectful behaviour from care providers. One woman directly said "There's a lot of abuse to pregnant women". She provided examples of times when the nurses in hospital seemed more concerned about completing their tasks. She said…

> And like their body language [nurses]. Like they don't want to even… I don't know how to explain it. You go through a lot enough after you have

a kid. You don't need somebody to push their weight around on you just because they have to do something.

Some providers recognized the importance of creating safe spaces for women and families. One health care provider participant in this study noted that "a key element again of the success of that [good care] is that people feel they're in a safe environment and they feel they have a trusting relationship with the people that are offering the program or services."

Know me, know my story. Of the two women participants in this study who expressed having overall positive pregnancy, birth and postnatal experiences, the common feature in their stories was that they felt connected to someone(s) who knew their story and understood the context of their lives. This is in keeping with the FCMNC guidelines and the WHO domains of responsiveness (PHAC, 2000; WHO, 2005). Women participants had varying responses regarding whether they were asked about their life situations and experiences. Some had one-time or intermittent questions about housing, food security, support networks, previous and current trauma or violence. Some women did not have anyone who asked these questions while others stated their primary care provider asked on multiple occasions. Only a few women expressed feeling safe to answer these questions truthfully and in situations and relationships where they would not feel judged or vulnerable. As outlined above, a number of women experienced situations where they were treated with disrespect, contempt, discrimination and racism.

Care providers and health leaders expressed concern about changing maternal demographics and the acuity and complexity of pregnancy, birth and postpartum for increasing numbers of women; many of whom go into pregnancy with pre-existing conditions. One clinician reflected on the increasing acuity in maternity care.

> there are other demographics such as advanced maternal age, greater numbers of advanced maternal age prevalence, I guess, and obesity which of course is leading to an increased rate of diabetes which has adverse outcomes. And in general, I think that pregnancies are becoming more complex as women who have medical complications and obstetric complications related to their medical health or obesity are increasing, and that pregnancies are now occurring in women with very complicated medical conditions such as liver transplants and congenital heart defects, etc. So that the complexity is increased.

In addition to the physical complexities that often put women at risk for obstetrical complications and interventions, participants also noted that women are generally less healthy going into pregnancy and often women lose faith in their abilities. One health care provider participant noted that…

> women going into their childbearing years being not as healthy in general means that they're set up for more intervention right from the beginning. So they're set up with the intervention around the fact that their bodies are not really prepped and ready for birth. Whether they are or they're not, there's certainly enough doubts I think that are placed in women's minds that do have a high BMI. Like they're literally… We had a high BMI consult just last week. And she's told she has a higher risk of an obstructed birth. She has a higher risk of having an epidural. She has a higher risk of having a general anesthetic because an epidural might not be successful because of her high BMI. None of those things are untrue. They're all true. But you already take somebody who's physically not healthy and then you make them emotionally unhealthy going into it because now they actually don't believe their body can do this or they don't believe that they're going to be well supported in the process.

While another primary care provider noted that we need to get to know women, ask about their lives, know their stories.

> It's lack of… Well, not even the individualized care because those are more my words. Lack of listening. They're not listening. No one listens to who they are…or understands their circumstances and that they're just people like the rest of us. And they do have different circumstances and they make different choices because of that. And that… Like if you don't have enough money to buy antibiotics for your kid with an ear infection, well, you do buy the antibiotics because you have to because your kid is sick. So then you don't have food.

Similarly, a health leader noted that knowing the woman was fundamental to providing the best care with her. She noted that ”the fact is also that knowing the patient, knowing the woman actually supports your confidence as a care provider in her abilities…You actually know kind of who she is, what she's capable of, what she's done in her life.”

Women shared profound stories of life histories that have left indelible effects on their lives. One described needing understanding and flexibility on not wanting vaginal examination. She shared...

But I have post-traumatic stress disorder [from a history of violence]. And I was not okay with having any vaginal exams done if it wasn't my doctor. Like it took Dr. X 6 years to be able to get me to do a pap smear. There wasn't any way that I was going to have some random doctor… Do you know what I mean? Like I just couldn't. And also like while I'm in labour, that's the last thing that I could handle, would be to have that examination.

Another woman participant recalled an experience where her knowledge of her body and birthing was not acknowledged by the nurse. She stated...

Because I wasn't screaming or crying or showing any kinds of pain. Even though I was feeling pain, I was calm and quiet, she didn't believe me that I was having my baby. I pressed the button and she comes in and I said, "I'm ready to give birth." And she said, "No, you're not." And I said, "Yes, I am." She said, "No, you're not." I'm like, "Do you want to check?" And she come and checked and she ran out of the room. And when she brought the doctors back, she was apologizing because her head was already coming out [the baby's head was crowning].

One health leader commented that care providers do not consider the impact of women's life experiences and contexts on their current state of well-being. She stated…

And I think sometimes we misinterpret what they've gone through. So that we would say, oh, surely to god this couldn't have really made that woman feel that inadequate or hurt her self-esteem that much with this interaction. But what you don't realize is the kicks that they've had to get there. So this is just one more. And it might be just the one that actually turns them to the point that they break and they don't cope with it anymore. So I think if we're actually thinking about when we have moms coming in and, you know, are struggling…But there's no dialogue. So it's sort of like the dialogue doesn't happen because people feel like, "Oh, I can't really speak about that to the mother. I can't…" And I don't know why. I don't know why that seems to be taboo. Because they certainly speak about it outside of the mother, the conversation.

A few women did share that they had care providers who asked them about their health and their life contexts. One woman said

There's one appointment, I think it was like around 26 weeks or 30 weeks, something like that, where they said like is there any violence at home? Like the checklist kind of... do you have a safe environment for the baby?

One woman did express that care providers could be more focused on the health and well-being of the woman as well as the baby. She stated that…

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I actually think that when doctors… Like not just because you're pregnant, I think that they should also like, you know, not just for the baby's health but more about your health as well. Because most doctors just like, you know, because you're pregnant, they're all about babies, babies, babies. But they're not asking, oh, what do we need or how we're feeling. It's like, you know, caring about the baby. But I think that if they had more time to think about how our feelings are too that it would be more better. They're more focused on babies than they are yourself.

Cookie-cutter approach. A number of health leaders expressed the need for nimble systems of care that are focused on meeting the health needs of women and newborns. This is the central premise of the HHR and Health Systems Conceptual Framework that informs this study (Tomblin Murphy, 2007). One health leader participant expressed that what is needed is to have...

Different models of care delivery and different ways within the same care provider groups of offering those services, depending on the needs, that should be population-needs driven. Some of which is predictable when you are talking about a maternal-newborn population but some of which, even in a small province like ours, needs to be tailored to the population. Some of the providers that we do not have widely available in the province, like midwives, would be a great addition to some areas of the province.

A number of care provider participants expressed the flexibility of practicing in a collaborative clinic setting where there was the ability to individualize care based on the needs of the woman when she presents to the clinic. One provider participant said...

But then I have like half an hour of time that I can take that woman aside and just talk to her about whatever I want to talk to her about. So if she's saying, you know, she's feeling a little bit sad or she's feeling a little bit stressed or she doesn't have the supports that she wants, because I've got so many care providers there, I can say, "Okay, I'm not seeing patients for the next half an hour. You go do this, you go do this, and I'm going to go into here and spend the time that I want."

While another care provider participant shared how the approach can be framed with a simple opening statement….“Tell me about yourself.” Such a question is important to open-up the space for women to feel safe and comfortable sharing their concerns. As one health care provider participant noted, … “ I think there's always tremendous tension between what health professionals think the needs of women and

families and children are, and what women and families actually think their own needs are."

On a similar note, one provider participant identified how important it is to ask and listen to a woman's story. She said that often providers make assumptions about women's needs based on the woman's particular attributes. The example she noted is in the early days of parenting, when women and families may feel overwhelmed and need support as they transition to becoming parents.

> I think we need to not have an assumption that because somebody is well-educated and well-off financially that they have all the support and information that they need to be a new parent. It doesn't mean that they have the structure of support around them necessarily that can be helpful to point out certain areas that they should pay attention to

Another clinician noted that there are life experiences, like violence that cross all socio-economic levels and that health care providers and leaders need to be open to asking the questions and providing support to all women.

> It's getting people to truly park their own value system and open their eyes and listen and look. And some people will do that more easily than others. But I mean the same could be in reverse. You know, I'm talking about the population that I serve but there's the woman in the south-end who, you know, is a partner to a CEO who's being abused and doesn't… She can go to a hotel, no problem, and sure, her eyes are blackened…..because she's got the money to do that [go to a hotel]. It doesn't change how it's affecting her.

The same participant stated the need for innovative approaches to sharing information with families…

> there is no one way that reaches everybody so if you're somebody who has a large maternity care practice and you have information that you really want to make sure gets to families, it's a challenge to figure out the various ways to do that.

One physician participant provided an example of how care should be organized around the individual and current needs expressed by women. This 'patient-centred' and individualized approach to care is part of the FCMNC guidelines.

> I remember one time listening to this resident, and this woman said at the end that she finally admitted for the first time having really severe anxiety.

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And he was like, "Okay, we'll talk about that at the next appointment." I was like I just jumped in that room and I was like, "Why don't you come with me for a little while and we'll sit down and we'll talk."… I'm like that's not a wait until your next appointment thing. If someone is disclosing for the first time that they're having anxiety, you need to know why. You need to sit down and you need to talk to them about it, you know.

While another care provider expressed her belief in women as experts in their own bodies and how that attitude has helped her be open to knowing the stories of women so that the care she provides to them is improved. She shared...

You know, again, it's that sort of attitude that I know better than you do when it comes to your body. Well, I don't. I know lots of things that you don't know. And that's why I'm here, to offer that resource. But you actually are the expert about your life, your body, and how this pregnancy is going. So that's the difference. It's not a sort of hierarchical model where we're doing the teaching and they're doing the receiving. It's just an open discussion that allows for, you know, back and forth. And as I say, what really was wonderful for me is that I'm learning way more about them. Which really helps me understand the context of when you're in the birth room, what's going on here. Like you know, what's happening with that person standing over by the side, you know, being all huffed out or whatever. I mean really understanding what's going on in their life is a huge…really changes my ability to help them in labour.

Many of the women, health leaders and health care providers shared examples of health needs in maternal and newborn care. Many of the stories related to breastfeeding challenges. Breastfeeding support, particularly in the early days postpartum was seen by many as a priority need that required individual attention and individualized planning. It is a key example of how individualized, contextualized care will promote a practice that has proven short-term and long-term health outcomes for the mother, the newborn and society (Ip et al., 2007). One primary care provider participant noted that…

And they've [public health] identified the most vulnerable are those who have factors affecting the social determinants of health. And I get that. But I also know that there are many new parents who are not struggling with any of the social determinants of health but are struggling with breastfeeding. And Public Health is moving away from universal breastfeeding support. Who in the system then is going to meet that need because there is a huge need? We are never going to increase our breastfeeding rates if that support is not there.

Methodological Challenges

The qualitative phase of this research was conducted with participants from the former CDHA (Capital District Health Authority--Hants and Halifax counties). This was due to both the logistics and funding available for this research. However, for the most part, the sub-populations of interest (e.g. women living in a rural setting, women from different racial and ethnic backgrounds, women from different education and socio-economic backgrounds) are living in CDHA and almost half the births in Nova Scotia are from residents of CDHA. The quantitative phase of the study included all of Nova Scotia.

It would have been preferable to include a focus group with women from additional racial/ethnic communities. Women participants in the study included those from First Nations, new immigrants as well as women living in rural areas. Several attempts were made to conduct specific focus groups with immigrant women and African Nova Scotia women; however, the principal investigator had limited to no connections with either of these groups. Without a well-established and trusting relationship, it is sometimes challenging to conduct research with specific groups and may be considered intrusive by participants (O'Neil, Elias & Wastesicoot, 2005). Future research would also include focus groups and interviews with health care leaders, health care providers and women from around the province.

Summary of Qualitative Results

Overall, care providers, health leaders and women shared numerous examples of ways in which the general health system as well as the different primary health care practices was not patient and family centered. From a system perspective, there was a general call for a change in the current paradigm of health care to move from illness and acute care to one that considers a broader definition of health and the whole person. There was also the sense that there is movement in improving collaboration between providers and between sectors in government and in community-based care; however there is still work remaining. The word cloud below was created based upon a four-letter minimum word frequency search of all the qualitative data related to the meta-theme, *System and Service Delivery.* The larger the word, the more often it occurred in the data.

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In this cloud, 'health care', 'people', 'needs' and 'women' are the central words.

Figure 12: Word frequency word cloud representing the meta-theme, *System and Service Delivery*

Although visually on par with many of the findings in this meta-theme, caution should be exercised in interpreting the word clouds as it is based solely on the number of times the word appears in the data and therefore, could be heavily weighted by one or a few participants.

A number of providers and leaders expressed concern about the various funding models and how these impact the timing and type of care that is provided. There were a number of stories from women about their experiences of racism, discrimination and ill-treatment. There were also reflections by care providers about the need to 'get to know' women and families so that providers have a full understanding of what factors are influencing women's lives, including understanding the histories of women so that care can be individualized to meet women's and newborns' health needs. The two word clouds above represent the two main theme areas.

Figure 13: Word frequency cloud representing the meta-theme, *Individual Care Encounters*

The word cloud above was created based upon a four-letter minimum word frequency search of all the qualitative data related to the meta-theme, *Individual Care Encounters*. The larger the word, the more often it occurred in the data. Interestingly, 'know' and 'women' are the central words in the cloud. However, caution should be exercised in interpreting the word clouds as it is based solely on the number of times the word appears in the data and therefore, could be heavily weighted by one or a few participants.

CHAPTER SEVEN: DISCUSSION

"The knowledge indicating a crucial role for socioeconomic and related social factors in shaping health has become so compelling that it cannot be ignored insofar as public health and health-care personnel are committed to health."

(Braveman & Gottlieb, 2014, p. 28)

Over the last number of decades peer-reviewed and non-peer-reviewed literature call for reform to the health care system that focuses on strengthening primary health care (Martin-Misener et al., 2004; Hutchison et al., 2011; Hutchison et al., 2013; Starfield, 2008; Strumpf et al., 2012; Van Lerverghe, 2008; Health Council of Canada, 2009; 2014; Nova Scotia, 2003; Romanow, 2002; Kirby, 2002). The message is to acknowledge the need for a focus on the social determinants of health, transparent and accountable funding processes, improved access to health services supported by appropriate information technology and interprofessional practice where quality and outcomes are regularly monitored (Tomblin Murphy et al., 2012; van Souren et al., 2007). Evidence suggests that health care should be designed and delivered to support patient- and family-centered health care (Epstein & Street, 2011; Scherger, 2009; Snowdon, Schnarr & Alessi, 2014). Much of the re-design that is recommended focuses on models that embrace interprofessional education and practice with health team members who are supported to practice to full scope and who understand each other's roles (Barrett et al., 2007; Frenk et al, 2010; Gilbert, 2013).

There are a number of social determinants that impede health and well-being; however present health care systems are predominantly focused on illness-care (PHAC, 2010; Solar & Irwin, 2010; Marmot, Bloomer & Goldblatt, 2013; Mikkonen & Raphael, 2010). Add to this, the health human resources crisis that is occurring worldwide (O'Brien-Pallas et al., 2007; Tomblin Murphy & O'Brien-Pallas, 2005; Joint Learning Initiative, 2004; Action for Global Health, 2011; Chen et al., 2004; World Health Organization, 2006; Global Health Workforce Alliance, 2013) and the ever-expanding health budgets that are not sustainable and do not seem to result in improved health outcomes (Davis et al., 2014; Ivany, 2014). Therefore, how we understand and measure health needs is important to inform the design of health human resources and the delivery of health care. Specifically for this study, understanding the primary maternity health care

needs of women and newborns is important to plan for services that are responsive to the needs of women and newborns.

The purpose of this chapter is to align the findings from the results chapters (five and six) with relevant evidence and to integrate the findings from the quantitative and qualitative phases to provide a more fulsome understanding of maternal-newborn health needs. The intent is to also highlight the similarities and differences in how we understand health needs using a mixed methods design. The chapter is organized by research questions. The strengths and limitations of the study are also presented.

Quantitative Questions and Hypotheses

1. Were there differences between the identified needs of the general perinatal population and sub-populations of the maternal-newborn population based on maternal education, income, area of residence, race/ethnicity?

- Hypothesis (H01): There was no difference in the needs identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population. Rationale for H01: a number of factors including geography, poverty, education and racial/ethnic differences influence health. Predictors of health needs based on a broad definition of health and considering sub-populations of women based on maternal race/ethnicity, education, income and area of residence that accounted for age and parity were identified using multivariable regression analyses.

- $H0_2$. There was no difference in self-reported health status identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or with different levels of education) versus those in the general perinatal population.

- $H0_3$: There was no difference in self-reported unmet needs identified by women in particular sub-populations (e.g. women living in rural vs. urban settings, women's race/ethnicity, women in different income quintiles or

with different levels of education) versus those in the general perinatal population.

- Rationale for H02 and H03: Self-reported health status is established in the literature as a proxy for health needs. There is a wealth of literature that supports the impact that geographic location, race and ethnicity and socio-economic status have on health, in general and specifically on maternal-newborn health.

As outlined in Chapter Three, there are a number of different indicators that continue to be used in maternal-newborn care to measure outcomes. The indicators selected for the quantitative phase of this study were informed by two key components of the Health Systems and HHR Conceptual Framework (Tomblin Murphy, 2007) and the related analytical framework (Birch et al., 2007; 2009). The first component is *population health care needs*, which refers to the individual characteristics that create the demand for both curative and preventative health care. Understanding and measuring population health care needs is based upon data about the actual and perceived population health status, socio-economic status, demographics, and health behaviours.

Based on the analytical framework (Birch et al., 2007; 2009), needs are calculated using demographic, epidemiological and health service data. Informed by both these components, several maternal and newborn health needs indicators were selected. For prenatal care, maternal body-mass-index and maternal smoking were chosen as key health status indicators and gestational age at first ultrasound and standard prenatal screening were selected as health service access indicators. For intrapartum care, maternal and a newborn morbidity scores were used as health status indicators. In the postpartum/postnatal period, breastfeeding initiation and duration were used as health status indicators. All these health needs indicators were considered in relation to the four independent variables for the study: maternal income, maternal education, maternal race-ethnicity and maternal area of residence.

These independent variables align with a second component from the Health Systems and HHR Conceptual Framework, the outer circle of the framework (Tomblin Murphy, 2007). The outer circle situates health human resources planning within broader

health systems and social policy planning (Birch et al., 2007). Key considerations for HHR included in the 'outer circle' include the social, political, geographical, technological and economic contexts (Tomblin Murphy & O'Brien-Pallas, 2006; Tomblin Murphy et al., 2012a). The selection of the health needs indicators (dependent variables) and the independent variables were also informed by the interdependent nature of elements in a system from General System Theory (GST), and current evidence. The definition of health used to inform this study was, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948, p. 100).

In keeping with current evidence about the impact of the social determinants on health (Mikkonen & Raphael, 2010), results from this study indicate that women (and their newborns) who lived in rural areas, had a lower socio-economic status, less education and in some cases, women who identified as non-Caucasian, often had increased health needs in all three phases of perinatal care--- prenatal, intrapartum and postpartum/postnatal. What follows is a description of the findings of the quantitative analysis as they relate to relevant evidence for each of the independent variables: maternal area of residence (urban vs. rural), maternal race-ethnicity, maternal income and maternal education. The control variables, maternal age and parity are also discussed.

Living in a rural area. Findings indicate that 30% of women and newborns in the study population live in rural Nova Scotia. Based on the regression analysis, living rural was a significant predictor for increased maternal body-mass-index (BMI), increased smoking and decreased breastfeeding initiation. People living in rural communities often have lower incomes and less than secondary education, elevated rates of smoking and obesity and higher mortality related to circulatory and respiratory diseases, injuries and suicides (Desmeules Pong, Read Guernsey, Wang, Luo, Dressler, 2012; Desmeules, 2006; De Peuter & Sorensen, 2005; McCray, 2000). Living in rural and remote areas limits people's access to services due to limited availability, longer distance to travel to amenities (including health care services) and lack of a public transit system (Ostry, 2012; Grzybowski, Stoll, & Kornelsen, 2011). There have also been health infrastructure changes in the last several decades in Nova Scotia, which may influence women's access to services. In the mid-1990's, there were a number of

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community hospital closures in Nova Scotia due to regionalization. However, a retrospective population-based cohort study using data from the NSAPD showed some regional variations in obstetrical interventions and perinatal outcomes. Overall the hospital closures did not result in population-level adverse perinatal outcomes in the province (Allen, O'Connell, Liston & Baskett, 2004). This may be due to the relatively small geography of the province where women are not usually any further than two hours away from a hospital that provides birth services. The other factor is that regionalization only moved hospital-based birth services to the regional hospitals with prenatal and postnatal care remaining at the community-level as much as possible. The perinatal outcomes measured in the study by Allen et al. also did not account for population health variations related to maternal income, education, race-ethnicity or rurality that are the four independent variables in this research. Research from other areas suggests that women living in rural communities have increased stress and anxiety related to accessing services and overall birth outcomes (e.g. preterm birth, low birth weight, small for gestational age infants and neonatal and post neonatal deaths) tend to worsen with increasing rural isolation (Luo & Wilkins, 2008). There are also challenges recruiting health care providers to rural and remote areas as there are often limited professional development opportunities, critical shortages of staff and equipment and decreased opportunities for their families to access education, other employment and leisure activities (Grobler, Marais, Mabunda, Marindi, Reuter & Volmink, 2009; Habjan Kortes-Miller, Kelley, Sullivan, Pisco, 2012; Minore, Hill, Pugliese & Gauld, 2008; Daniels, VanLeit, Skipper, Sanders & Rhyne, 2007; Laurant, 2002; Munro, Kornelsen & Grzybowski, 2013; Pong et al., 2010).

For women in this study, living in a rural area in Nova Scotia was also a significant predictor for decreased breastfeeding initiation and increased BMI. There are a number of studies that suggest various collaborative care models to support and strengthen rural maternity services (Grysbowski Kornelson & Schuurman, 2009; Martin-Misener, Downe-Wamboldt, Cain & Girouard, 2009; Martin-Misener, Reilly, Robinson & Vollman, 2010). A retrospective cohort study by Stoll and Kornelson (2014) found that those women living in rural areas who received midwifery care had lower rates of obstetric intervention and low rates of adverse neonatal outcomes. Similar to the

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qualitative findings in this study, the authors suggest that given the shortage of maternity care providers in rural areas, perhaps strengthening midwifery services would be a viable solution to improve women's access to perinatal care. However, it's important to note that access alone does not guarantee a positive or effective health care encounter. Altering how care is delivered is required to impact women's health outcomes related to factors such as smoking or BMI. Grysbowski and colleagues (2009) created a model to determine the appropriate level of maternity service for rural communities and found that three elements were key: population birth numbers, the social vulnerability of the local population and the degree of isolation of the community. In keeping with the Health Systems and HRH Conceptual Framework that informs this study, the Grysbowski and colleagues suggest that a viable approach to planning would be to determine the needs of the local population, assess the feasibility of providing services to meet the identified needs and prioritizing services based on needs and contextual factors related to politics, funding and available and supportive infrastructure.

Although not specific to primary maternity health care, authors of a longitudinal, mixed methods study in Nova Scotia found that Nurse Practitioner and Paramedic models were effective both from a cost and outcomes perspective, particularly in rural areas. Participants from the community reported increased accessibility to primary care services, general satisfaction with the model of care and increasing satisfaction with the NP-Paramedic services over the three-year study period. There were also reductions in the use of physician and emergency room services. Provider participants in the study reported positive, collaborative experiences with all members of the health care team (Martin-Misener et al, 2009; Martin-Misener et al., 2010). Similar service delivery strategies related to midwifery care or collaborative care approaches were provided by participants in this study in the qualitative phase of the research.

Racial and ethnic disparities. After multiple imputations, approximately 23% of women in the NSAPD population from this study identified as not Caucasian. Findings from this study suggest that maternal race-ethnicity is a significant predictor for women having less prenatal screening in pregnancy. In keeping with these findings, multiple authors have found that immigrant women and women from visible minorities have different health needs and outcomes compared to other maternal populations (Gagnon et

al, 2009; Gagnon et al., 2013; Simonet et al., 2010). For example, a retrospective cohort study identified large and persistent disparities in fetal and infant mortality, a 1.5 times increased risk for preterm birth and an increase in newborns who were large-for-gestational age among First Nations and Inuit versus other populations in Quebec. These findings suggest a need to improve perinatal care for First Nations and Inuit women and children. However, living in urban centres, where there is traditionally better availability of health services, including tertiary services, was not associated with better birth and infant outcomes for Inuit and First Nations people. This suggests that other strategies, such as improved socioeconomic status and culturally safe and competent care are required to improve health (Simonet et al., 2010). Gagnon and colleagues (2009; 2013) conducted several studies with newcomer Canadians and refugees and found that women from these groups had a number of significant unmet health needs including mental health challenges and concerns regarding the social determinants of health (e.g.: food security, clothing for infants).

Women in the study who identified as not Caucasian did not have prenatal screening as often as other women. Similarly, authors of a large survey study of more than 24,000 women in the United Kingdom found that women from minority ethnic groups tended to access prenatal care later in pregnancy, having fewer prenatal visits, fewer ultrasound checks and less prenatal screening (Henderson, Gao & Redshaw, 2013). The authors suggest that interactions with staff and negative communication and decision-making experiences may influence the perinatal experiences of women from minority ethnic groups. These findings are corroborated by several reviews where the authors found that communication difficulties, disrespectful care encounters, unfamiliarity with the health system and experiences of racism all impacted immigration women's perinatal care experiences (Fisher & Hincliff, 2013a, 2013b; Small et al., 2014). The findings from this study are reflective of the need to improve how health care services (e.g. prenatal screening options) are explained and understood by women who identify as non-Caucasian, the need to improve both access to and the acceptability of services and/or the need to improve culturally safe and competent services.

It is important to note that the analyses in this study related to women who did not identify as Caucasian include all non-Caucasian women and therefore between group

differences are likely. Comparisons were not possible as the numbers of women in some groups were small and due to ethical and data privacy issues.[17] In keeping with the findings from this study, these studies demonstrate a clear association between racism and discrimination and overall health and perinatal health resulting in increased risk for preterm birth, small- and large-for-gestational age newborns and stillbirth (Fullilove & Wallace, 2011; Kramer, Hogue, Dunlop & Menon, 2011; Krieger, Kosheleva, Waterman, Chen, & Koenen, 2011; Bloch, 2011; Schaaf, Liem, Mol, Abu-Hanna & Ravelli, 2013). A review by Nestel (2012) outlines the negative impact of experiences of racism and discrimination on the health of people, regardless of other social determinants of health such as socioeconomic status. Recent research comparing the health status of African American women from a variety of social and socio-economic situations, demonstrates how race is a singular predictor of health status (D'Anna, Ponce & Siegel, 2010; Willis, McManus, Magallanes, Johnson, & Majnik, 2014).

In keeping with the quantitative findings, participants in the qualitative phase of the study identified the need for improved culturally competent and safe maternal-newborn care. Therefore, cultural competence education and training of the existing health workforce and commitment to improved pre-licensure education is required. It is important that there are continued efforts to increase the diversity of the health workforce so that women and families see cultural heterogeneity in their health care providers (McGinnis, Brush & Moore, 2010; Williams et al., 2014). These findings may inform change at the individual micro-situational level but also to broader policy and planning at the macro-structural level to make visible how the health outcomes of racialized groups are affected (Waldron, 2010).

Less formal education. In this study, lower maternal education was a significant predictor for increased pre-pregnancy BMI, increased maternal smoking and decreased breastfeeding initiation. These findings are in keeping with the general literature about the connection between education and health. Women who initiated breastfeeding less and who breastfed exclusively for shorter periods of time are often young, single, have

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[17] Analyses involving groups of women who identified as not Caucasian (e.g. First Nations and African Nova Scotian) were not completed for data privacy and confidentiality purposes. In future studies, once clear relationships have been established and data sharing agreements have been completed, analyses based on these groups may be possible (First Nations Information Governance Centre, 2014).

less formal education and less income (Dubois & Girard, 2003; Ibanez, Denantes, Saurel-Cubizolles, Ringa & Magnier, 2012). Similar to findings in this study, Currie and Moretti (2003) found that infants of women with more education are less likely to be low birth weight and less likely to die within the first year. Findings from the review may explain, in part, why women in this study who have lower levels of education also have higher rates of smoking and obesity and lower rates of breastfeeding initiation. Increasing education is linked to improved employment opportunities, the ability to understand health information, access to health services, having the support and resources to make healthy lifestyle choices and the ability of a person to process information and make decisions (Cutler & Lleras-Muney, 2006).

As demonstrated by the findings in this study, women with less formal education may benefit from targeted support and programs that enable them to make different choices and provide them with viable employment opportunities and health education information that is tailored to women's unique needs and abilities. What is currently offered is a standardized approach to care. Similarly, authors of a Nova Scotia longitudinal, population-based cohort linkage study between the NSAPD and a district-level public health database involving more than 8500 records found that less than high school maternal education was a significant predictor of early cessation of exclusive breastfeeding (Brown et al., 2013), which has an impact on maternal and infant health outcomes (Duijts, Jaddoe, Hofman, & Moll, 2010; Ip et al., 2007).

Control variables (age and parity). Although maternal age was used as a control variable in this study and not necessarily a predictor of health needs, it is important to note that extremes of maternal age (<20 years and $\geq$ 35 years) were associated with increased perinatal health needs. The findings of this study suggest that women who were <20 years of age were less likely to have increased BMIs, more likely to smoke, more likely not to have prenatal screening, more likely to have an ultrasound later than 22 weeks, less likely to have higher maternal morbidity and less likely to initiate breastfeeding. Women who were $\geq$ 35 years of age were more likely to have increased BMIs, less likely to smoke, more likely to have earlier ultrasounds in pregnancy and to have screening completed, more likely to have increased morbidity related to longer lengths of intrapartum stays in hospital, more likely to have a newborn with higher

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morbidity and more likely to initiate breastfeeding. There is a wealth of literature on the increased risk for adverse perinatal outcomes (fetal and early neonatal mortality, preterm birth, birth asphyxia, low birthweight and admission to the neonatal intensive care unit (NICU) associated with advanced maternal age that require increased antenatal surveillance and potentially increased birth interventions (Carolan, 2013; Carolan & Frankowska, 2011; Jacobsson, Ladfors, & Milsom, 2004; Laopaiboon et al., 2014; Lisonkova, Joseph, Bell & Glinianaia, 2013). Women of young maternal age also have increased risks for adverse outcomes such as preterm birth, congenital anomalies, NICU admission and perinatal mortality (Shrim et al., 2011; Malabarey, Balayla, Klam, Shrim & Abenhaim, 2012; Chantrapanichkul & Chawanpaiboon, 2013).

Parity was also used as a control variable. Being nulliparous was associated with lower BMIs, lower smoking, increased prenatal screening, having ultrasounds prior to 22 weeks, a higher maternal morbidity score and increased breastfeeding initiation. Nulliparity is associated with perinatal risks often related to unknown risks as the woman has not yet experienced pregnancy and birth. For example, the risk of preeclampsia is almost threefold for nulliparous women (Duckitt & Harrington, 2005).

The impacts of poverty. Twenty-one percent of women in the population from the NSAPD data in this study identified in the lowest income quintile. Poverty is one of the top factors influencing health and well-being (Mikkonnen & Raphael, 2008; Tjepkema, Wilkins & Long, 2013). Globally, one seventh of the world's population (about 1 billion people) live below the poverty line of $1.25/day (World Bank Group, 2015). The gap between the wealthiest and the poorest people is widening in Canada. In 2012, the top 10% of Canadians accounted for almost half (47.9%) of the wealth in Canada and the bottom 30% accounted for less than 1% of the wealth in Canada (Broadbent Institute, 2014; Raphael, Macdonald, Colman, Labonte, Hayward & Torgerson, 2005). More than 830,000 people in Canada are accessing food banks (Food Banks Canada, 2013) and over 235,000 Canadians experience homelessness each year (Gaetz, Gulliver & Richler, 2014).

From the regression analysis, income was a predictor of maternal-newborn health needs i.e. low income was related to increased BMI, increased rates of smoking, higher newborn morbidity and being less likely to initiate breastfeeding. Women with a lower

income also had less prenatal screening and more ultrasounds after 22 weeks. This is corroborated by recent studies on maternal income using NSAPD data where lower income was found to be associated with increased risk for gestational diabetes, small for gestational age infants, higher risk of perinatal death, preterm birth and early breastfeeding cessation (Joseph et al., 2014; Goy, Dodds, Rosenberg, & King, 2008; Shankardass et al., 2014; Joseph, Liston, Dodds, Dahlgren & Allen, 2007) but risks were not increased for cesarean section or induction of labour (Joseph et al., 2006).

Research over the last half century demonstrates a clear association between lower socio-economic status and stillbirth (Baird, 1945; Cnattingius et al., 2002; Copper Goldenberg, Dubard & Davis, 1994; Huang, Usher, Kramer, Yang, Morin & Fretts, 2000; Pasupathy & Smith, 2005; Stephansson, Dickman, Johansson & Cnattingius, 2001). Infant mortality overall has declined from 6.5 per 1,000 live births in 1991 to 4.9 per 1,000 live births in 2011, (Public Health Agency of Canada, 2013; Statistics Canada, 2013). However, there is still an overall higher risk of neonatal death post-neonatal death and Sudden Infant Death Syndrome for people in the lowest income quintile compared to those in the richest income quintile. This illustrates persistent socio-economic inequalities (Gilbert, Auger, Wilkins & Kramer, 2013). In addition to the immediate health concerns for the newborn, women experiencing poverty in pregnancy may also have children with long-term cognitive and behavioural challenges (Larson, Russ, Crall & Halfon, 2008).

Generally, poverty affects women's ability to access education, health services, find employment, safe housing and be food secure and physically active. Women often have profound stress and anxiety and may also be depressed and have challenges with substance use (Ontario Prevention Clearinghouse, 2003). Poverty has been associated with increased total fertility rates (Yee & Simon, 2014; Joseph et al., 2009), unintended or teenage pregnancy (Fedorowicz, Hellerstedt, Schreiner & Bolland, 2014) and being a single mother (Rousou, Kouta, Middleton & Karanikola, 2013). Women living in poverty tend to have poor nutritional status (Delisle, 2008) and in keeping with findings from this study, women living in poverty are more likely to have lower levels of education (Tyer-Viola & Cesario, 2010) and are more likely to smoke (Joseph et al., 2009; Haustein, 2006; Tuthill, Stewart, Coles, Andrews & Cartlidge, 1999). In this study, lower maternal income was a predictor for less prenatal screening or later ultrasound.

Women with lower incomes may not be able to attend or be on time for scheduled appointments due to transportation, childcare issues and perceived and actual non-welcoming care environments (Doeksen, St. Clair, & Eilrich, 2012; Heaman, Gupton & Moffatt, 2005; Thomson, Dykes, Singh, Cawley & Dey, 2013).

All these factors related to poverty impact women's health and put them at risk for complications and risk factors prior to pregnancy such as pre-existing chronic illness and obesity (Hollowell, Pillas, Rowe, Linsell, Knight & Brocklehurst, 2013; Kirk et al., 2010) which are in turn risks for fetal anomalies, developing gestational diabetes and/or pre-eclampsia, and experiencing preterm birth. Moreover, women experiencing poverty who have less education often have health literacy challenges and may not be able to understand information and make informed choices about care (Berkman, Sheridan, Donahue, Halpern & Crotty, 2011). Women living in poverty also have variable supports available during pregnancy and in motherhood (Nkansah-Amankra, Dhawain, Hussey & Luchok, 2010). The stress, anxiety and potential risk of depression or other mental health challenges associated with poverty (Braveman et al., 2010) may also impact women's ability to bond with their newborn (Alhusen, Gross, Hayat, Rose & Sharps, 2012). As identified by the findings of this study, women living in poverty are also less likely to breastfeed their infants, which has profound short and long term impacts on their health as well as their child's health (Brown et al, 2012; Ip et al., 2007; Tursksin, Bel, Galjaard, & Devlieger, 2014). These multiple and complex factors support a cyclical and intergenerational nature of poverty that perpetuates health and social inequities and contributes to increased income inequality (Aizer & Currie, 2014; Devaux & De Looper, 2012; Saulnier, 2009).

As demonstrated by both the descriptive analyses and the regression analysis, low income was a significant predictor of maternal-newborn health needs in this study. Therefore, for maternal-newborn health care planning, the recommendation from these findings is that the impact of poverty needs to be considered at individual patient, organizational and system levels. At the individual level, the impact of poverty should inform how providers understand its impact on women's ability to access health services, make choices that influence her health and her perinatal health risk as well as her own health. This requires a change in how maternal-newborn health care is designed and

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delivered so that care providers use their time more effectively to assess women's resources and ask the important questions about food security and safe housing. At the organizational and system levels, policies and planning are required that support women and families to navigate the health and social systems, maximize their resources and therefore enhancing their abilities to be healthy. A commitment to such policies and planning requires ongoing advocacy for changes in social policies and support for social programs. For example, increases in the minimum working wage can have a profound impact on population health (Kim & Leigh, 2010; Meltzer & Chen, 2009).

How rurality, maternal income, maternal education and maternal race/ethnicity influence health needs and HHR. Considering these factors alone, it's clear that each significantly affects women's health and the health of women in pregnancy and birth as well as their newborns. Many of these factors are experienced by women simultaneously so there is a cumulative impact of these factors on the health of women and newborns; resulting in increased health needs due to increased risks for perinatal complications. It is not surprising then that the health status and resultant health needs of birthing women and their newborns are changing. These changes, often influenced by the determinants of health described above, have resulted in differences in maternal demographics and health (e.g. increased BMI, increased co-morbidities prior to and during pregnancy, extremes of maternal age) resulting in increased risk for large or small for gestational age infants, preterm birth, stillbirth, preeclampsia, gestational diabetes and birth and labour interventions (PERU, 2013; PHAC, 2013). Much of the focus in current health care design and delivery is on the resultant illness and potential risks associated with the social determinants described above. System and organizational responses as well as care encounter strategies are required to address the social determinants of health and the resultant risks and illness. As outlined in the next section, system approaches include advocacy and policy changes with coordination across sectors. Organizational and care delivery approaches require change in how care is designed and delivered and the relationships between women and care providers. Without these various approaches, the 'causes' of the increased health needs and declining health status of women and newborns, especially those from vulnerable populations, may not change or in some cases, may worsen.

The findings from the quantitative analysis in this study support a broader understanding of health that includes measuring health needs based upon social determinants such as income, rurality, race-ethnicity and education. Measuring health in this way provides insight into how these broader social factors influence potential risks for illness and increasing needs for health care services. Using a broad understanding of health and health systems planning aligns with the HHR and Health Systems Conceptual Framework, which considers multiple contextual factors (social, geographical, economic, and political) that influence health. Matching the health needs of people with health system design and human resources is at the core of the framework. The dynamic and cyclical nature of General System Theory and the HHR framework also supports a focus on the potential changes in populations' health status and health needs that require responsive health human resources and health and social system strategies (Jackson & Gracia, 2013; Tomblin Murphy & MacKenzie, 2013). Building upon the quantitative analysis, the next section will integrate findings from the qualitative analysis with relevant evidence to outline the gaps in services as well as strategies to improve women's and newborn health at the individual, organizational and system levels.

Qualitative Questions

2. Did women, care providers and/or health leaders and decision-makers identify gaps in services in the current models of primary maternity care?
3. If gaps were identified, what service delivery approaches can be used to address the gaps in service?

Similar to the findings in the quantitative analysis, the maternal-newborn health needs identified by participants in the qualitative phase of the study focused primarily on the social determinants of health. Additional concerns noted by participants included women's changing demographics and pre-existing health conditions, which as most participants in the study noted, are influenced by the social determinants. Study participants noted a number of potential strategies to meet maternal-newborn primary maternity health care needs. In addition to being aligned with health needs and the contextual 'outer circle' of the Health Systems and HHR Conceptual Framework, these strategies are also aligned with three additional key components of the HHR framework:

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System Design, *Management, Organization and Delivery of Health Services* and *Resource Deployment and Utilization.* *System Design* refers to the overall design and delivery models for health care services, which is often based on wider system policy and government priorities. *Management, Organization and Delivery of Health Services* refers to the different types of care providers and how care is delivered. This is influenced by a variety of factors including individual and organizational cultures, costs, health professional education and competencies, health care provider satisfaction and the structure, production and quality of health care services (Tomblin Murphy et al., 2012b; Goma et al., 2014). *Resource Deployment and Utilization* refers to the amount and type of resources available to meet needs (Tomblin Murphy, 2007). Access to services to meet needs is often related to issues of acceptability, affordability and availability (McIntyre, Thiede, & Birch, 2009; Wellstood, Wilson & Eyles, 2006). Many of the strategies identified by study participants to address the gaps in services to meet maternal-newborn primary maternity health care needs were related to how most current models of primary maternity health care do not fully attend to the complexity of women's lives. In keeping with the Health Systems and HHR Conceptual Framework, this was examined on three levels: during individual provider-patient care encounters, at the organizational level and at the system level.

Individual level.

  Relational and culturally safe care. At the individual level, participants in the study stated that there was often not a safe or welcoming space and/or adequate time for relationship-building with primary maternity care providers. Many women in the study shared experiences of overt racism, discrimination, disrespectful treatment and a lack of concern for their beliefs, values and being experts in their own bodies. Pregnancy and childbirth are life-altering, personal and profound experiences for women and families informed by socio-historical and cultural contexts as well by health services and social supports, age and developmental stage and socio-economic status (Brathwaite & Williams, 2004; Urwin, Hauge, Hollway & Haavind, 2013). Therefore, as identified by women participants in this study and in keeping with the quantitative analysis where

race/ethnicity is a significant predictor of health needs, health care services must be designed where respectful, culturally competent relationships with care providers are possible (Birch, Ruttan, Muth & Baydala, 2009; Oelke, Thurston & Arthur, 2013). In focus groups with women in Nova Scotia (Aston et al., 2010) and across Canada (SOGC, 2009), women shared that relationships with care providers, emotional support, control and choice, having information and spending time and continuity of care are all important. These important elements of care are echoed in research with women from various racial and ethnic backgrounds, where communication and relationships are essential to having positive care experiences (Fisher & Hinchliff, 2013; Etowa, Wiens, Bernard & Clow, 2007; Etowa & McGibbon, 2012). Additionally, in her research with African-Canadian women, Etowa identified the need for cultural competence at the individual, organizational and system levels. The author suggests that nurses advocate for culturally competent[18] care policies and best practice guidelines to support relationships between women and care providers that promote mutual understanding and common goals for patient care. For HHR, cultural competence[19] not only relates to the education and competencies of health care providers but also to HHR strategies that support recruiting and retaining a diverse health workforce (LaVeist & Pierre, 2014). As identified by both the quantitative and qualitative findings of this study, cultural competence is important to promote understanding about the social determinants of health and health inequities. However, participants in the study provided a number of examples of how this is not happening in the current system; resulting in a lack of knowledge and understanding of the whole person (woman) in the health care encounter.

These studies all support how relationships with care providers are key to improving the care experiences and outcomes of women. A relational model of care proposes that

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[18] Cultural competence is defined as 'care that takes into account issues related to diversity, marginalization, and vulnerability due to culture, race, gender and sexual orientation' (Meleis, 1996, p. 2)
[19] Cultural competence is also 'a congruent set of workforce behaviors, management practices and institutional policies within a practice setting resulting in an organizational environment that is inclusive of cultural and other forms of diversity' (Bowen, 2008, p. 54)

the best environment for emotional growth and change is within the context of one or more mutual, empathic, authentic relationships. Such relationships allow individuals to better understand themselves and others, lead to the desire for more connection, and create a feeling of excitement and zest that stimulates people to action.

(Markoff, Finkelstein, Kammere, Kreiner & Prost, 2005, p. 228)

Women participants in this study, particularly those living in rural areas, expressed how important the relationship with the PHN was in helping them, particularly during the postpartum period. The support from the PHN included with breastfeeding, in acquiring accurate information and in feeling supported during a time of transition to motherhood when women felt vulnerable and overwhelmed. The importance of relationships in perinatal care was highlighted in a recent study by Aston et al. (2013) exploring the power of relationships between women and families with public health nurses. The authors found that the strategies used by PHNs assisted in building positive, supportive relationships with women. With their expertise in providing on-the-ground care for vulnerable women and families and their expertise in population health initiatives, Public Health staff are well-positioned to meet the needs of women identified in this study. This includes needs related to the social determinants of health (e.g. rural living, poverty, less education and race/ethnicity) and specific perinatal health needs (e.g. transition to being a new parent, mental health, breastfeeding).

Continuity of care. Women participants in this study also commented on continuity as a key component of relational care but also in continuity as it related to consistent information and access to services closer to home. Continuity is often associated with relational continuity or having a consistent care relationship with one or more care providers (Baker, Boulton, Windridge, Tarrant, Bankart & Freeman, 2007; Haggerty, Reid, Freeman, Starfield, Adair & McKendry, 2003). Although relational continuity is often associated with a positive birth experience (Dahlberg & Aune, 2013), authors of a qualitative study with Australian women found that the concept of continuity was understood by women in several ways. This understanding included continuity of relationship, care location and health care staff as well as having consistent information and care within and across pregnancies (Jenkins, Ford, Todd, Forsyth, Morris, & Roberts, 2015). This broader understanding of continuity is important in future planning for health human resources as the tensions between continuity and collaborative models of care are

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negotiated. Although having one primary maternity care provider for pregnancy and birth may be possible in some settings, it may not be possible or sustainable from both a provider and system perspective in other settings. In keeping with the HHR framework that guides this study, it is important to consider all the impacts of how health care services are designed and delivered—including the health (patient), provider and system outcomes (Tomblin Murphy et al., 2012a, 2013, 2014). More importantly, a one-provider model (e.g. only a physician providing all perinatal care) may not meet the full spectrum of women and newborn's health needs as different primary maternity care providers have both unique and complementary scopes of practice. As illustrated in the discussion on the determinants of health, future models of primary maternity health care services require the space, time and provider competencies to care for women and newborns based on a broad understanding of health and that consider the whole person. Thinking about continuity in a variety of ways opens up the possibilities for health human resources planning. For example, in Finland, continuity is with a nurse in the integrated maternity and child health clinic. The same nurse cares for the family from pregnancy until the child reaches school age (Tuominen, Kaljonen, Ahonen, & Rautava, 2014). The authors of a cross-sectional, survey design evaluation of the integrated maternity and child health clinic approach found that parents' satisfaction was increased with the integrated model and there was an increased number of home visits (Tuominen et al.). Similarly, women participants in this study noted that many times it was the nurse in Public Health or in the primary health care clinic with whom they had a consistent relationship.

It is important to note that continuity across domains of care is important so that there are ongoing connections and relationships between primary care team members and the woman and family to address and support other areas of health. These ongoing, long-term relationships are important to support women and families for comprehensive, life-long primary health care including episodic illness care, chronic disease prevention and management and routine wellness care for all members of the family (Starfied et al., 2005; Hollander, Kadlec, Hamdi & Tessaro, 2009). Thinking of health care in this 'one-stop-shopping' kind of way creates a coordinated hub of services for families and as shared by several women participants in the study, is important to attend to their maternity care needs, their needs as women and in supporting the health of their families.

Women's health needs. As detailed in the quantitative analysis, rurality, less education, race-ethnicity and low income were significant predictors of increased maternal-newborn health needs. Women participants in the focus groups had similar stories where they struggled to afford the basics for living and many noted that they were not asked about their life contexts during perinatal care experiences. They were not asked or were not asked consistently about whether they had safe housing, had been or were exposed to violence or whether they worried about food security. In many circumstances, women in the study reported feeling judged and they stated that they did not have a safe space or adequate time with health care providers to disclose their health concerns. In some cases, women in the study described having difficulties adhering to treatment and intervention plans when their resources (food, transportation, money) were limited. Several women in the study commented on not feeling able to raise concerns or ask questions with care providers and so they would leave prenatal appointments feeling anxious and uncertain and/or would look to other less credible sources (e.g. the Internet) for answers to their concerns. It is also difficult for women to adhere to treatment and intervention plans when their resources are limited. Often these women are labeled difficult or non-compliant when they do not/cannot follow care plans (Vermiere, Hearnshaw, Van Royen & Denekens, 2001). The issue then, is that the system is organized to be provider-centric and medically-focused.

In addition to understanding the factors that may influence women's perinatal health needs, relationship-based care also provides a foundation and opportunity for providers to address women's health needs related to pregnancy as well as their present and future health as women (Bloch & Parascandola, 2014; Kulie, Slattengren, Redmer, Counts, Eglash & Schrager, 2011). Without knowing the factors that influence women's health and well-being, care providers are offering interventions and care plans based solely on best evidence but not adequately translating or customizing the care to women's life circumstances. Building a trusting, respectful relationship with a woman also helps to lateralize the power[20] differential inherent in the provider-patient relationship and

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[20] Power is defined by Foucault (1983) as relational where 'what defines a relationship of power is that it is a mode of action which does not act directly and immediately on others. Instead, it acts upon their actions: an action upon an action, on existing actions or on those which may arise in the present or the future' (p. 789). Some participants in the study noted being in situations where they felt there was a significant power

create relational spaces that support open communication and bi-directional sharing of knowledge and expertise between the woman and provider (Hunter, Berg, Lundgren, Ólafsdóttir & Kirkham, 2008; Goldberg, Ryan & Sawchyn, 2009; Morgan, 2008). The connection between non-compliance and relational, contextual care demonstrates the need for therapeutic relationships with patients that take into account their unique life contexts, values and beliefs. For example, a woman in this study compared and contrasted her experience in her first pregnancy with her experience in her second pregnancy. For both pregnancies she was diagnosed with gestational diabetes. She had multiple social challenges including food security challenges and could not afford the diet regimen prescribed to her. In her first pregnancy, she shared that having the assistance of care providers in making healthy food choices that are available to and possible for her (Aston et al., 2012; Kirk et al., 2014) would have changed her ability to self-manage her diabetes. Therefore, in her first pregnancy her diabetes was not well-controlled and she required hospitalization and intervention. In her second pregnancy, she had several key relationships with the diabetes nurse, the social worker and her family physician. She felt supported and able to navigate the health, social and community-based care systems in order to maximize her resources (Frood, Johnston, Matteson & Finegood, 2013).

Organizational level.

Collaborative care. At the organizational level, participants in this study shared the need for improved interprofessional collaboration so that primary health care practice settings could be flexible and adaptable to the health and social needs of women and families. The benefits of interprofessional education and practice are well established and include improved patient outcomes and experiences, opportunities for sustainable systems of care and improvements in the quality of the practice environment (Barrett et al., 2007; Canadian Institute for Health Information, 2009b; DiGioia et al., 2009; Gilbert, 2013; Gocan et al., 2014; Harris et al., 2012; Mitchell & Crittenden, 2000; Schmitt et al.,

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imbalance. For women participants this was often in care situations with providers, where women felt they could not ask questions or discuss their concerns. For provider and health leader participants, the discussion relating to power often revolved around not feeling able to influence or change how care was designed or delivered.

2013; Suter & Deutschlander, 2012; Zwarenstein et al., 2009). Interprofessional collaboration continues to be identified as a key strategy to address the health human resources crisis in maternity care (Kornelson, Dahinten, & Carty, 2003; Peterson et al., 2007; Price et al., 2005; Rogers, 2003) with proven benefits for both providers and women and their families (Jackson, Lang, Ecker, Swartz, & Heeren, 2003; Price et al., 2005; Sutherns, 2004).

Within primary health care, primary care has the opportunity to transform into a responsive system where coordinated, patient-centered and tailored care is provided using collaborative, relational approaches that connect patients to wider social systems (Edwards, Smith & Rosen, 2013; Mayo Bruinsma, Hogg, Taljaard & Dahrouge, 2013; Starfield, 2005; Sidani & Fox, 2014). One of the health care provider participants also shared how a collaborative care setting provided her with the flexibility to negotiate how much time she spends with a woman, depending on the woman's identified needs. The participant also shared that having ongoing collaborative relationships with other health and social care providers also made it easier for her to connect women with other resources and supports. A number of the health leader participants noted that collaborative care approaches may be key to addressing current and impending health human resources shortages, particularly the shortages of family physicians providing full spectrum maternity care (prenatal, intrapartum and postpartum/postnatal). Similarly, the authors of a review concluded that shortages of primary care physicians could be mediated by providing care in team-based settings, maximizing the use of non-physician providers and using appropriate technology such as an electronic health record (Green, Savin & Lu, 2013).

Recommendations for increased interprofessional collaboration have been echoed in report after report across the country for more than a decade. All health care provider and health leader participants and many of the women participants shared improved collaboration between care providers as a key strategy to meet women's and newborns' health needs, to support team members to practice to full scope and to potentially improve the recruitment and retention of care providers. In a recent series by Dinh and colleagues (2014), the authors provide an overview of the benefits of collaborative models of primary health care on patient outcomes, direct and indirect costs and access to

health services. Most health leader, many health care providers and a number of women in this study cited improved inter-sectoral and interprofessional collaboration, innovative funding models, full scope practice and the use of technology (e.g. an electronic health record) as key elements to meet maternal-newborn health needs. In addition to these, the authors of a recent review suggest that leadership and governance, standardized care processes and targeted strategies to improve patient access to care, supported by monitoring, evaluation and accountability processes are all essential for successful team-based care (Dinh, Stonebridge & Thériault, 2014).

In 2004, participants on the *Ontario Maternity Care Expert Panel* (OMCEP) concluded that in addition to increasing the number of maternity care providers and creating patient-informed policy and infrastructure to support maternal newborn care in Ontario, creating equitable and timely access to care requires acquiring maternity care providers who are practicing to full scope supported by both interprofessional education and practice settings. Similar recommendations were made in British Columbia (British Columbia Department of Health, 2004) and Nova Scotia (Nova Scotia Department of Health, 2003; 2004) as well as by participants in a national interprofessional project funded through Health Canada, the Multidisciplinary Collaborative Primary Maternity Care Project (MCP[2]) (Peterson & Mannion, 2007). However, so far uptake of these recommendations remains slow (Peterson et al., 2007). Interestingly, as part of the MCP[2] work, leaders of national perinatal associations were interviewed and they described collaborative care as a model that could bring improvements to maternity care for women by improving access to care, choice of care provider, and appropriateness of care providers (Peterson et al.). As outlined by participants in this study, the reasons for the lag in implementing collaborative approaches at both the direct care and organizational and system levels may be due to issues of professionalization, power, territorialism and funding. These are explored in the section on models of care delivery and full scope practice.

In keeping with the strategies outlined by participants in this study, investing in family physicians and collaborative care requires a shift in thinking and planning that moves the emphasis on primary care and primary health care, with the necessary team mixes to respond to the needs of local populations. What is required is an investment in

the types of providers and/or programs that focus on meeting the health needs of women and newborns. The authors of a recently developed physician resource plan for Nova Scotia recommended a focus on long-term, provincial planning for physician resources focused on the investment in additional family physicians, improved access and coordination of care of specialists and sub-specialists and the expansion of collaborative care teams (Government of Nova Scotia, 2012). However, without a maternal-newborn clinical services plan that is responsive to a broad definition of health and/or a comprehensive HHR plan that includes at least the 'core' maternal-newborn health care providers (nurses, physicians and midwives), it would be challenging to conclude how perinatal services should be optimally organized. Health leader and health care provider participants in this study stated that there is no one model of primary maternity health care that will meet all needs but that services should as much as possible be tailored to the needs of the local population. The needs for various models depending on the local context and needs is echoed in the *National Birthing Initiative for Canada*, which suggests a long-term knowledge translation strategy is required to support collaborative primary maternity care models across Canada (SOGC, 2008).

Health leader and health care provider participants in this study provided local examples of collaborative primary maternity health care practices that are working well to meet the needs of women and newborns. Several local primary maternity care settings are using modified *Centering Pregnancy* models (Reid, 2007) to meet the prenatal education and support needs of women. These are facilitated sessions where women come together to discuss and debate topics of interest. The full Centering Pregnancy model, developed in the United States, typically involves opportunities for prenatal (physical) assessments, education and peer support (Reid). The Nova Scotia models focus on the latter two. As outlined in the quantitative findings in this study, lower maternal education is a key predictor for increased women's and newborns' health needs In addition, peer support has been found to have a positive self-reported impact on women's knowledge and interpersonal support (McNeil et al., 2012; Risisky et al., 2013). Evaluations of the full model have shown to decrease preterm birth rates (Skelton et al., 2009), increase breastfeeding initiation (Ickovics et al., 2007; Klima et al., 2009; Sheeder et al., 2012) and women's satisfaction with care (Klima et al.; Medley et al., 2015;

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Robertson et al., 2009; Sheeder et al., 2012) as well as improve women's knowledge (Baldwin, 2006; Baldwin & Phillips, 2012; Sheeder et al., 2012) and readiness for labour and birth.

McNeil and colleagues (2012) also found that providers working in the *Centering Pregnancy* model reported increased work life satisfaction. Modified versions of the model are currently being used in other sites across Canada (British Columbia Women's Hospital and Health Centre, 2010) and may be considered a viable strategy to address Aboriginal perinatal health needs as the model can be adapted to be culturally safe and appropriate (Health Council of Canada, 2011). Women participants in this study reported a number of negative, racist and discriminatory health care experiences. As detailed in the quantitative analysis, maternal race and ethnicity can have a profound impact on perinatal health and outcomes. Therefore, models of care delivery that create culturally safe spaces are important to improve access and acceptability of health care services and in turn, meet the health needs of Aboriginal mothers and newborns. Quantitative findings from this study also identified a number of predictors of women's health care needs (e.g. intrapartum maternal morbidity, breastfeeding initiation and duration) that could potentially be improved with collaborative care. Collaborative primary maternity care clinics in British Columbia and Ontario report lower rates of cesarean section, shorter hospital stays and increased breastfeeding rates (Harris et al., 2010; Price, Howard, Shaw, Zazulak, Waters & Chan, 2005).

As well, a number of health leader and health care provider participants stated there are concerns about health human resources shortages in maternity care. They stated that perhaps collaborative care practice settings would provide a more palatable practice environment to recruit and retain new providers to perinatal care. Authors of studies in both Canada and the United States found that collaborative care increased both patient and provider satisfaction, improved provider maternal-newborn care skills and improved clinical outcomes as a result of their collaborative approaches to maternity care (Avery et al., 2012; Blanchard & Kriebs, 2012; Harris et al., 2010; Price et al., 2005).

Midwifery services. Many health care leaders, health care providers and women participants cited providing options and choice of care providers for women as required organizational and system changes. Women and some health leader and health provider

participants suggested the need for the availability of midwives. Women participants in this study who had received midwifery care commented on how having a consistent care provider who built a trusting, respectful relationship with them as key to their sense of having a satisfied pregnancy and birth experience. In keeping with the literature, having a consistent care provider was key to their positive experiences related to informed choice, birth setting options and support for infant care and breastfeeding and as they transitioned into motherhood (Aston et al., 2010; Renfrew et al., 2014; Stoll & Kornelson, 2014; ten Hoope-Bender et al., 2014).

A number of studies have compared and contrasted experiences and outcomes of women and newborns who have had midwifery care versus care from other perinatal care providers and found that experiences were generally more positive and outcomes were comparable or better. Midwifery care is associated with reduced maternal morbidity and mortality (Duley, Gulmezoglu, Henderson-Smart & Chou, 2010; Hofmeyer, Lawrie, Atallah & Duley, 2010), reduced interventions such as oxytocin augmentation, analgesia use, caesarean section and operative vaginal deliveries (Kettle, 2012; Hodnett, 2012; Sandall, 2013) and reduced complications such as postpartum hemorrhage (Begley, 2011), infection (Conde-Agudelo 2011) and reduced anxiety and postpartum depression (Smith, 2012; Dennis, 2013). As well, evidence supports that women are more satisfied with their birth experiences and have increased breastfeeding initiation and duration (Hodnett, 2012; Smith, 2011).

In a recent *Lancet* series on midwifery care, Renfrew and colleagues (2014) used a comprehensive, systematic literature review process to create a framework for maternal and newborn care where the authors developed more than fifty short, medium and long-term outcomes that could be improved by midwifery care. As outlined above, examples include the reduction of maternal and newborn morbidity and mortality, decreased interventions and complications and improved health behaviour lifestyle and mental health outcomes as well as the potential for improved use of resources. The authors recommend a system-level shift where the care of women and newborns focuses on preventive and supportive care using respectful relationships, plans of care individualized to women's needs with access to specialized and emergency care when needed. These recommendations are similar to the findings in the qualitative phase of this research.

Similar to a recent review of midwifery services in Canada (Marmot et al., 2013), many women participants in this study stated repeatedly how midwifery services would improve their ability to access care, their satisfaction with care experiences and their overall health outcomes. Accessing care for women and families living in rural Nova Scotia can be especially challenging as there is varied or no public transportation and birthing and early postpartum care are located in regional hospitals or the tertiary centre. Therefore, having midwives available to provide care in women's homes or in their communities would improve access and overall outcomes. As identified in the quantitative analysis of this study, living rurally is a significant predictor for decreased breastfeeding initiation, increased smoking and increased maternal BMI.

Midwifery was regulated and legislated in Nova Scotia in March 2009. However, there remain only three 'model' sites in the province. A number of health leader, health care provider and women participants in this study cited the need for midwifery as key to meeting maternal and newborn health needs. There is also ample evidence in the literature and from other provinces highlighting that midwifery care results in positive perinatal and health experiences and outcomes for women and newborns. However, in Nova Scotia there remain a number of philosophical and operational challenges. These challenges include the shortage of midwives in the province, the cyclical nature of political commitment to supporting the service and tension in integrating midwives in existing perinatal teams.

As noted by a number of health care provider and health leader participants in this study, the lack of integration is associated, in part, with team members not understanding the scope and philosophical model of midwifery practice. Perhaps opportunity for collaborative care would enhance the understanding of all team members' roles. A full scope evaluation of midwifery services in Nova Scotia has not yet been possible (Morrison, 2014; Taylor, 2013). An external review of midwifery services in Nova Scotia was completed in 2011. Recommended strategies to strengthen midwifery in the province included leadership support, quality review processes, targeted organizational and change management, funding for second attendants at birth and government commitment for the growth of midwifery services (Kaufmann, Robinson, Buhler & Hazlit, 2011). Additionally, the reviewers suggested formalizing the accountability of

midwives to provide services for vulnerable populations, exploring educational opportunities for midwifery in the Atlantic region and strengthening overall primary maternity health care in parallel with midwifery (Kaufmann et al.). These recommendations are in keeping with the qualitative findings from this study where many participants cited midwifery care as a key strategy to meeting the needs of women and newborns. As identified in the quantitative analysis, there are a number of social determinants of health (poverty, less education, living rurally and race/ethnicity) that increase maternal-newborn health needs. Expanding midwifery services would also improve the access of services for these vulnerable women and newborns.

Models of care delivery that support full scope practice. Provider and health leader participants also shared the need for all types of providers to be practicing in models of care delivery that support full scope practice. In a synthesis of the literature on nursing full scope practice in team-based primary care, the author found that nursing full scope practice is cost effective and improves quality, patient satisfaction, access and equity; particularly in underserviced areas and populations (Jacobson, 2012). In this study, a number of participants noted that having registered nurses, including advanced practice nurses (e.g. family practice nurses, nurse practitioners, clinical nurse specialists) as full members of the primary maternity health care team was essential to meet the complex health and social needs of women and newborns (MacPhee, 2013; McGee, 1995; Kowalski, Gennaro, McGee, Murphy, & Littleton, 1995). Nurses are educated with a holistic[21] lens so that all facets of a person's health and well-being are considered when planning and delivering care (McEvoy & Duffy, 2008; Erickson, 2007). Nursing education also promotes developing therapeutic relationships with patients and families to understand their stories and life contexts fully in order to individualize care plans and assist people in navigating the health and social systems (Arnold & Boggs, 2015).

Nurses can also be influential in creating organizational change using a holistic perspective (Allen, 2014). However, in keeping with the literature on barriers to interprofessional collaboration, participants in the study noted a number of challenges related to interprofessional collaboration and full scope practice. Power differences

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[21] Holism is based on the recognition of 'inextricable links between social and economic conditions, the physical environment, individual lifestyles and health' (World Health Organization, 1998).

between team members, regulatory or employment restrictions and territorial issues (Dower, Moore & Langelier, 2013; Kenaszchuk, Wilkins, Reeves, Zwarenstein & Russell, 2010; MacMillan, 2012; Reeves et al., 2008) related to shared scopes of practice were shared by many participants in this study as barriers to having their expertise and knowledge valued. In some cases, participants noted changes to service delivery based upon this lack of value. For example, participants in the study noted that nursing positions were eliminated in one care area. The perspective of a number of health care provider and some health leader participants was that the care the nurses provided, often associated with complex health and social needs, was considered time-consuming and expendable.

Different care providers are also educated and professionalized specific to their discipline, with limited understanding of the expertise and knowledge of other health team members (Suter et al., 2009). A number of health care provider participants noted the philosophical differences between health care providers that may influence how and what care is delivered. Interprofessional education is vital to addressing the lack of knowledge providers have about other health care providers. It also teaches different care providers how to negotiate issues of shared scope and knowledge as well as decision-making (Barr, 2009; Gilbert, 2013; Gilbert et al., 2010). As noted by a number of participants in this study, the key is to not only have interprofessional education programs but also to have interprofessional practice settings to support this new way of learning about how to work together (Reeves et al., 2008; Herbert, 2005).

A number of participants in the study also cited funding for different provider groups, particularly physicians as a potential barrier to changes in services delivery. Although changes in what and how services are provided are intended to be responsive to maternal and newborn health needs, some system and service delivery changes would potentially affect the compensation and salaries of various health team members. Many participants discussed the fee-for-service model and how it restricts changes to service delivery (Birch et al., 2014: Browne, Roberts, Byrne, Gafni, Weir & Majumdar, 2009; Browne, Birch & Thabane, 2012). Both provider and health leader participants cited the challenges as not having the time to develop other key components of their practice, such as leadership opportunities, research and education. Physician expertise is often sought at

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policy and planning tables but the current funding approach limits their availability to participate. A common comment by participants in the study was how there were differing philosophical attitudes about what and how care should be provided to meet the needs of women and newborns (Talbot & Verrinder, 2010). Many participants stated that a move from a predominantly illness-focused model to one that includes preventative, health promotion care is required. It is challenging to change the philosophical underpinnings of the health system and the philosophical beliefs of health care providers when health care needs tend to be prioritized based upon physiological and biomedical parameters (Cahill, 2001; Savage, 2002; Goldberg, 2002; Ryan, 2008; Parry, 2008). This is problematic when there are multiple factors that influence people's health and well-being. As noted by Hippocrates more than two thousand years ago, "it is more important to know what sort of person has a disease than to know what sort of disease a person has" (Donzelli, 2014, p. 2).

System level.

   Intersectoral collaboration. At the system level, participants suggested the need for additional policy and planning to address the social determinants of health and the intersect of those determinants. This requires collaboration across sectors such as education, justice, community services and health. In keeping with the *System Design* component and the contextual 'outer circle' of the Health Systems and HHR Conceptual Framework (Tomblin Murphy, 2007), participants noted challenges between wider system policies aimed to support patient-centered and culturally competent care and what is actually happening in clinical settings. An example is the lack of culturally competent care experienced by many women in the study. There are a number of initiatives and policies, including Cultural Competence Guidelines for Primary Care Providers in Nova Scotia (Nova Scotia Department of Health, 2005). However, women participants reported having a number of negative care encounters that they perceived were associated with their race, ethnicity or culture. McGibbon and Etowa (2009) suggest the need to move toward connecting situations of stereotyping and discrimination with oppression in all facets of the health care system---individual care encounters, educational institutions and government. The authors suggest that social change requires recognition and overt conversation about racism and the intersecting factors that support and perpetuate

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oppression in order to understand and connect the paths of oppression with effective policy, education, legislation and action.

In a recent systematic review focused on the impact of intersectoral collaboration on the social determinants of health, Ndumbe-Eyoh & Moffat (2013) found that there was limited literature and few examples and further research and evaluation is required. However, in a report for the World Health Organization (Loewenson, 2010), the author found that having a conceptual framework for intersectoral action for health is required to outline change pathways, key indicators and measures of success. This aligns with the Health Systems and HHR Conceptual Framework that informs this work in that the design of the system, including the policies and processes between and across sectors in both the health system and the broader social system are important factors to support health human resources planning to meet the needs of populations (Tomblin Murphy, 2007). The findings from this study provides additional thinking about the impact of the social determinants of health on maternal and newborn primary maternity health needs and how to connect the system policies related to how health is measured and designed with how health care services are delivered.

Health care funding. One of the key topics of discussion for many of the health care provider and health leader participants in this study was the need for continued commitment to alternate funding models, particularly for physicians. The participants cited the need for care to be organized based as much as possible on health care needs not on a volume basis (Asadi-Lari et al., 2004; Cohen, 2014; Birch et al., 2014; Browne et al., 2012; Tomblin Murphy, 2007; Wranik, 2012). Research suggests that alternative funding models support preventative care, collaboration and continuity of care but require monitoring systems to ensure optimal physician productivity. Some literature suggests blended physician remuneration may be best as it maximizes the benefits of both fee-for-service and salaried approaches (Wranik & Durier-Copp, 2009; 2011; Peckam & Gousia, 2014). Additional research suggests that alternative funding approaches also support physician professional equity (i.e.: contributions versus rewards received) (Peña-Sánchez et al., 2013). Interestingly, Sarma and colleagues found that physicians in salaried funding environments might not necessarily spend as much time in direct patient care but spend comparable overall hours as physicians working in a fee-for-service model (Sarma

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et al., 2010; Sarma et al., 2011). Moreover, evidence suggests that metrics for evaluating primary health care require more complex and comprehensive thinking to move thinking beyond volume to include concepts of value, quality and satisfaction (Burge et al., 2011; Haggerty et al., 2011; Lévesque et al., 2011; Heath, Rubinstein, Stange & van Driel, 2009; Stange et al., 2014; Snowdon, Scharr & Alessi, 2014).

There is great variation in the remuneration models and overall salaries for both general practitioners (GPs) and specialists across high-income countries; related to remuneration methods, hours worked, 'gatekeeping'/consultation systems and the availability of different physicians. For instance, based on 2007 data, Canada ranks ninth out of twelve OECD countries for wages for GPs but GP salaries in Canada are three times the average wage; ranking Canada fourth compared to the other twelve countries. Medical specialists in Canada rank fifth overall for salaries compared to the other countries, resulting in salaries five times the Canadian average wage. There is also variation among the specialist group with obstetricians/gynecologists ranking second (just after surgeons) for the highest salary in Canada (Fujisawa & Lafortune, 2008). Therefore, with limited health care dollars and increasing health budgets that have not necessarily resulted in overall improvements in health, further research to explore various health system cost drivers, including the models for physician remuneration, are required (Blake & Carter, 2003; Constant, Petersen, Mallory & Major, 2011; DiMatteo, 2014; Marchildon & DiMatteo, 2011).

As noted by a number of health care provider and health leader participants in this study and in keeping with a needs-based (Tomblin Murphy, 2007) and a competency-based approach (Tomblin Murphy et al., 2012a) to care planning and health human resources planning, collaborative primary care settings should be funded and evaluated based upon the needs, experiences and outcomes of patients, not solely on the number of patients who receive care. In the United States and in some places in Canada and Europe, there is more and more focus on 'Pay for Performance' models where quality and value are key components of how care is evaluated and compensated (Petersen et al., 2006). Although there are differences in how health care is organized and funded in the different countries, perhaps, as suggested by participants in this study, the concepts and attention

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to value and quality should be key components in the future planning for health system design and delivery in Nova Scotia.

  Patient and family-centered care. Women, health leaders and health care providers in the study also expressed concern about the lack of patient and family-centered care in the current system. Participants suggested that in order to achieve patient and family-centered care, integrated and coordinated efforts are required from system level policy to patient care encounters. Such efforts suggested by study participants included the use of information technology, improved communication, time within the care encounter for care providers to develop respectful relationships with women, continuity of care and focusing on emotional as well as the physical health. In addition to these, strategies identified in the literature to support and patient- and family-centered care include time for patients to express their needs and be heard, fairness in providing care and attention based upon needs and smooth care transitions (Lewis, 2009; Sidani & Fox, 2013; Silow-Carroll, Alteras & Stepnick; Spragins & Lorenzetti, 2008). These strategies are also supported by the national Family-Centered and Newborn Care guidelines (PHAC, 2000) (currently under revision), which focus on evidence-informed strategies to celebrate the uniqueness of pregnancy and birth for each woman. A patient-centered-care focus is also the central mantra and one of the key design principles for health care restructuring in Nova Scotia (Nova Scotia Government, 2014).

  For example, women participants in the study commented on the need for improved coordination and communication between and among care providers concerning patient information. There was often disbelief by women participants when care providers had not shared pertinent health information with each other and women often had to recount their health histories and present concerns. Some studies suggest that coordinated health information systems, supported by appropriate technology improve patient and family-centered care (Richardson et al., 2015) and enhance communication across care settings and between providers (Holroyd-Leduc et al., 2011) However, recent reviews of the literature recommend further research to evaluate the effectiveness of health information technology for improved health outcomes (Holroyd-Leduc, Ludwick & Doucette, 2009). Currently, in Nova Scotia, more than 50% of primary care physicians use an electronic medical record, with recent commitment by

government to support developing a coordinated system for one record per patient (Province of Nova Scotia, 2013).

Women, health leader and health care provider participants all cited poor system and organizational design as barriers to health care providers having patient-centered and respectful interactions with women. Kitson and colleagues (2013) conducted a narrative review and synthesis of the literature on patient-centered care (PCC) and found that patient involvement, relational care and the context of care were all important common core elements in PCC (Kitson, Marshall, Bassett & Zeitz). Several strategies have been recently introduced to increase patient-centered care in primary care settings.

In addition to collaborative care practices detailed above, the medical home concept is now being introduced in Canada. Initiated in the United States, the medical home is a patient-centered, quality improvement and patient safety concept involving patients having a personal family physician that provides holistic coordinated and comprehensive care with access to interprofessional team members (Jackson et al., 2013). Authors of a cross-sectional, retrospective study found that a medical home approach might increase continuity of care and patient satisfaction, improve the coordination and communication of care and reduce errors through the use of electronic health records (Scobie et al., 2009). There are also anecdotal reports of increased access to appointments and the successful use of an electronic health record as well as specific physician funding that supports the model. To date, few evaluations of the impact of the medical home on patient, provider and system outcomes have been conducted (Jackson). There are also measures emerging to assess the implementation of patient-centered care in health care provider practices (Sidani et al., 2014). Therefore, the strategies to support patient-and family-centered care noted above are not possible without a conscious re-design of and improved funding mechanisms for health care services.

More and more the focus in the literature is on 'integrated service planning' where there is adequate time for patients to feel engaged and have multiple and complex needs addressed. The intent is to consider the whole patient and her needs using patient-focused versus provider convenience strategies (Silow-Carroll et al., 2006; Sidani et al., 2014; Lewis, 2009). An integrated approach to planning is in keeping with a contextualized, interdependent and non-summative nature of both General System

Theory (GST) (Von Bertalanffy, 1972) and the Health Systems and HHR Conceptual Framework (Tomblin Murphy, 2007). Using GST and the conceptual framework, multiple factors interact to understand health needs situated within complex contexts and supported by an understanding of how service design and delivery interact and create feedback loops that influence both outcomes and needs. Women participants in the study shared multiple stories of care encounters where they waited long periods of time for appointments and then had limited time with care providers; often leaving without a full assessment of their concerns and their questions unanswered.

Paradigm shift. In keeping with data from the focus groups and interviews with health leaders, health care providers and women, there was also an identified need for a paradigm shift from an illness-focused to a health-focused primary maternity health care system. This aligns with the findings in the quantitative analysis of this study, as it is clear that there are increased health needs and unmet health needs for women and newborns experiencing challenges related to the social determinants of health. Therefore, the health system needs to commit more resources to health promotion and illness prevention and population health strategies as well as targeted strategies for vulnerable populations across sectors, which focus on a broad definition of health (Snowdon et al., 2014; Davies, Winpenny, Ball, Fowler, Rubin, & Nolte, 2014). Historically, between 1.3% to 2.1% of the Nova Scotia health budget is designated for public health (Moloughney, 2006), which includes both universal programming for women, newborns and families as well as targeted programming for vulnerable women and families through the *Enhanced Home Visiting* program. In a recent report on the personalization of health care, Snowdon and colleagues (2014) provide a mandate for a personalized health system that is informed by population values, where there is collaboration between people and health system leaders to design services focused on value, quality of life and health and wellness and care is personalized based on priority health outcomes. I would suggest that a needs-based approach to health care where health needs are defined based on a broader definition of health would support a personalized design.

Integrating the Findings

Data from both the quantitative and qualitative phases were combined to answer the two mixed methods research questions. This integration of findings provided an opportunity for triangulation and validation of findings but also expanded the understanding of the combined impact of the results of the quantitative and qualitative analyses. It is also an opportunity to highlight any contradictions that were noted in the two analyses (Teddlie &.Tashakkori, 2009; Creswell, 2013; O'Cathain et al., 2010). The mixed methods research questions (i.e.: pertaining to both the quantitative and qualitative phases) were:

5. What are the primary maternity health care needs of women and newborns in Nova Scotia?
6. Were there differences in the identified primary maternity care needs between women, care providers, leaders and decision-makers and those needs identified using the needs-based HHR frameworks?

From the quantitative analysis of the NSAPD data, women who had extremes of maternal age, decreased maternal income, decreased maternal education, who lived in rural areas of Nova Scotia and/or who identified as non-Caucasian had increased health needs compared to other women who had given birth in the same time period. More compelling than the singular impact of these factors (rurality, poverty, education and race/ethnicity) is the intersectionality[22] of these factors and the cumulative impact of the factors on overall health. This was apparent in the regression analysis where several factors were indicators of multiple and individual indicators of health need. In contrast to the current standardized approach to care, perhaps what is needed to attend to the various

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[22] Based in feminist theory, intersectionality theory has been used widely to describe and study issues of oppression, domination or discrimination. For the purpose of this discussion, it is defined as "a theory of knowledge that strives to elucidate and interpret multiple and intersecting systems of oppression and privilege. It seeks to disrupt linear thinking that prioritizes any one category of social identity. Instead, it strives to understand what is created and experienced at the intersection of two or more axes of oppression (e.g. race/ethnicity, class, and gender) on the basis that it is precisely at the intersection that a completely new status, that is more than simply the sum of its individual parts, is formed." (Hankivsky & Christoffersen, 2008, p. 275).

factors that intersect to impact needs is a customized approach to care where it is tailored for various populations.

In the qualitative analysis, participants from all three groups (women, health leaders, health care providers) noted the social determinants of health and the combination of those determinants as having the most impact on the health of women, newborns and families in Nova Scotia. Women in particular, noted the limited opportunities in the current health delivery system for providers to build relationships with them and understand their life contexts. The reasons for the limited opportunities were often related to lack of time, the structure of the appointments and the focus on the physiological parameters of pregnancy. From the qualitative analysis, most women have had negative experiences related to discrimination, lack of respect, limited time to have questions adequately addressed or addressed at all, and limited opportunities to be involved in decisions regarding their care. These findings are similar to care providers and health leaders who expressed concern over what they consider a lack of patient-centeredness complicated by provider-focused design in Nova Scotia's primary maternity health care system where fiscal realities are paramount, collaboration in care or policy is sporadic and both care delivery and the system overall remain disconnected.

Together these findings create a fulsome picture of the health needs of women that are impacted by various social determinants of health resulting in poor health status and higher health needs, both specific to pregnancy, birth and postpartum/postnatal and to overall women's health. The qualitative and quantitative findings of this study also map onto the key components of the HHR and Health System Conceptual Framework related to the central importance of designing systems and service delivery based on health needs within the complex contexts of people's lives and health and social systems (Tomblin Murphy, 2007).

In keeping with the connections between health needs, context and system design and delivery, Braveman and Gottlieb (2014) reviewed the literature over two decades and provide plausible pathways that explain the connection between the social and socioeconomic factors that impact health. Not surprisingly, as indicated by the quantitative findings described above, these factors have profound impacts on women's perinatal and health outcomes as they are in part 'the causes of the causes' that influence

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rising rates of obesity, smoking and poor nutritional status that all increase the risks associated with pre-existing or gestational disease (e.g. hypertension, diabetes). Such a focus on risks also perpetuates a provider-focused system. These are also profound factors in supporting a healthy intra-uterine environment and therefore, contribute to rates of underweight or overweight infants, preterm labour and delivery and congenital anomalies. As indicated by the multiple regression analysis, the social determinants of health are significant predictors of both breastfeeding initiation and duration and there is solid evidence of both the short-term and long-term benefits of breastfeeding for both infant and mother. Considering the intersectionality[23] of these factors on women and newborns' health and the resultant vulnerability of these women and newborns, it is not surprising that these factors have been shown to influence and predict the health needs of women and newborns. Vulnerability in this context relates to both the person's biological characteristics and also to their environmental supports and resources (Browne, et al., 2009). Such vulnerability if not adequately addressed and attended to, will result in health inequities and overall increased costs in health care (Browne).

System level strategies and approaches to address the social determinants of health. A number of provinces across Canada have adopted approaches to designing and delivering care that focuses on the social determinants of health (National Collaborating Centre for Determinants of Health, 2013; Vancouver Island Health Authority, 2006). As described in the results chapter, participants highlighted examples of and the continued need for intersectoral and interprofessional strategies to address the social determinants of health. In Nova Scotia, a number of provincial strategies are aimed at meeting the needs of the most vulnerable in the province. For instance, Public Health is moving towards providing targeted programming for the most vulnerable and population health programming to address widespread issues related to smoking, obesity and chronic disease (Government of Nova Scotia, 2010). Similarly, primary care has increased the number of collaborative clinics available in communities to improve access to services and provide a full spectrum of health and social care (Province of Nova Scotia, 2013) and the midwives currently practicing in Nova Scotia focus a large proportion of their practice to supporting vulnerable women and families.

As noted by a number of study participants, the Early Years initiative in Nova Scotia is an example of inter-sectoral work aimed at creating coordinated services for children and families from birth to school-age to maximize the chances of children being healthy and well-adjusted. Four Early Years Centres were just opened across Nova Scotia with plans for several more over the coming months (Province of Nova Scotia, 2012b; 2012c; 2015). From a broader health and social planning perspective, Nova Scotia introduced a healthy eating and activity initiative, *Thrive* in 2012 (Province of Nova Scotia, 2012) and a poverty reduction strategy focused on the most vulnerable, including children, was launched in 2009 (Province of Nova Scotia, 2009). However, as demonstrated by the quantitative analysis and corroborated by all participants in the study, gaps in services remain.

Based upon participant data and best evidence, there are viable strategies to address current gaps in the primary maternity health care system. These strategies require commitment and championing by health leaders, engagement and involvement by health team members and clinicians and most importantly, a focus on patient-centred-care (Browne et al., 2010). In addition to system and organizational approaches to addressing the social determinants (policy, advocacy, inter-sectoral collaboration, changes to funding) (Williams et al., 2008), approaches targeted at individual patient-provider care encounters (Beach, 2006; Mead & Bower, 2002; Goberna-Tricas, Banús-Giménez, Palacio-Tauste & Linares-Sancho, 2011) are also important for providers to understand the different factors that impact the unique life experiences of women and when possible, modify care plans accordingly (Gehlert et al., 2008; Braveman et al., 2011). From a health equity perspective, using system, organizational and individual care encounter approaches to address the social determinants of health results in plans of care that are tailored to women's unique life contexts, maximizes our understanding of their challenges and assists them in navigating health services to improve their experiences and outcomes—not only for pregnancy but for their own health as women and as the gatekeepers of the family's health (Gaunt, 2008).

Connecting the social determinants to HHR. In keeping with the Health Systems and HHR Conceptual Framework, this means that health care and health human resources planning, within the broader social system context needs to be inclusive of a

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broad definition of health that is also inclusive of all the factors that impede and support health. From the Health Systems and HHR Conceptual Framework, these components include the economic, political, social, geographic and cultural factors that influence health systems and health human resources planning as well as the regulatory and legal frameworks. It also includes the overall design of the health system and how health care services are managed, organized, delivered, deployed and used (Tomblin Murphy, 2007). This study adds to a broad understanding of maternal and newborn health and health needs to inform health human resources and health systems planning. The study demonstrates how a mixed methods approach provides a comprehensive account of maternal and newborn primary maternity health care needs. The study advances the measurement of maternal-newborn health needs by demonstrating a clear association between health status and health needs indicators with four key social determinants of health (education, income, race-ethnicity and rurality). Having a full scope understanding of health needs is paramount to meet the needs of the most vulnerable families and improve health care experiences and outcomes for women and newborns in Nova Scotia.

       'Wicked' problems. Given the results of this study and other relevant general and perinatal-specific literature on the social determinants of health, it is surprising that individual care encounters and organizational and system structures have not adapted to address the broader health and social concerns that intersect to create situations of vulnerability and health inequity. Perhaps this is because the issues related to a broader understanding of health are complex and overwhelming. Some of the more pervasive, complex and often seemingly insurmountable health and social issues have been termed 'wicked problems'.

       A wicked problem is defined as a social or cultural problem that is difficult or impossible to solve for as many as four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems" (Kolko, 2012, p.). One of the key challenges with wicked problems is that is it difficult to clearly measure the impact of interventions and strategies to address these problems as they are often inter-related with other problems. Wicked problems require attention by the whole system as they often cross multiple sectors and services (Rittel & Webber, 1973; Blackman et al.,

2006). This is problematic as our current system is set up in silos and traditionally does not work well together. Similar to the strategies suggested by participants in this study, authors of a review focused on health system reform concluded that four strategies are important to address 'wicked' problems. These include: government involvement in health care, a move to responsive, decentralized systems, increased patient and public participation and the important role of public health (Hunter, 2008; Raisio, 2010). However, as in Nova Scotia, Public Health and associated population health initiatives around the world are not central in health policy or institutionalized in the same way as health (or illness/medical) care services. This lack of embeddedness has resulted in limited power in health care planning and limited financial commitment (Hunter, 2008) and ultimately increasing global health inequities (World Health Organization, 2008). As outlined above in the qualitative results discussion section, strengthening a comprehensive primary health care approach that embodies responsive, coordinated, community-focused and located systems of care, may not only improve the care of women and newborns but also support a broader understanding of health for all.

As there are no proven strategies or standardized templates to address wicked problems, then there is no one solution. In the way that systems are embedded within systems in General System Theory, the problems are and remain complex and inter-related. Therefore, the focus needs to be on improvement of a 'wicked' problem, not complete resolution. This can be challenging in a health care delivery system that is focused on short-term political impact and providing patients with illness-focused interventions. Perhaps a strengths-based approach that focuses on the capacities and motivation of the individuals and the overall system for change will provide the momentum to move so-called 'wicked' problems to be seen as transformative opportunities. I would suggest that the thinking that these problems are beyond the scope of health systems, health human resources planning or beyond the scope of health care providers is incorrect. Health leaders and health care provider participants in the study reflected on the challenges in addressing the determinants of health and often stated that they did not feel they were able to impact and for some, that they do not have a responsibility to address, these broader determinants of health. However, there are changes to the design of infrastructure that can mitigate the negative consequences of

wicked problems to effect policy, planning and practice change (Head, 2008; Hunter, 2008; Raisio, 2009; 2010).

As illustrated by the inter-related components in the Health Systems and HHR Conceptual Framework, mitigation strategies in one sector have the potential to profoundly influence processes and outcomes in other sectors. As indicated by the qualitative findings in this study, to meet maternal-newborn primary maternity health care needs, such mitigation strategies require a re-design of the system. Re-designing the system requires support for interprofessional and intersectoral collaboration in both education and practice across health and social sectors (economics, technology, politics, health, justice, education etc.). It also requires a sense of accountability by everyone to engage in strategies to address the problem (Fisher et al., 2014; Raisio, 2009; Signal et al., 2014). From an HHR policy perspective, Wranik (2008) concluded that there is a large disconnect between the top-down and bottom-up approaches to HHR planning in Canada. Similar to challenges cited by participants in this study, current challenges for HHR planning outlined in her analysis included challenges with current remuneration mechanisms, organizational structures and barriers, the need for standardized data collection, a lack of data specific to HHR, professional hierarchies, the political context and the fragmentation of government. As suggested by study participants, addressing these challenges will require effective leadership and innovative strategies for change management.

However, as identified in the qualitative analysis, strategies to meet maternal-newborn health needs are not only at the larger policy and system levels. The strategies are also at the organizational level in how care delivery is designed, delivered and valued as well as at the individual level, in how care providers engage and build relationships with women to understand and meet their health care needs. Most importantly, addressing any wicked problem, including the social determinants of health, requires perseverance and a celebration of the small changes that may lead to large system transformation (Fisher et al., 2014; Fraser & Greenhalgh, 2001; Raisio, 2009; Signal et al., 2014; Weber & Khademian, 2008).

The intent of this research was to add to the understanding of ways to measure and understand primary maternity health care using a broad, social determinants lens,

informed by established system and HHR frameworks (Tomblin Murphy, 2007; von Bertalanffy, 1968). Such an understanding may inform different approaches to how we measure, design and deliver health human resources in primary maternity health care to more effectively meet the health needs of women and newborns. A potential challenge is that if and when health care is planned based upon needs, there may be, as illustrated in this study, identified unmet needs that require attention. Therefore, reorganizing healthcare based upon a broader understanding of health to meet those unmet needs may increase expenditure and influence sustainability (Birch et al., 2014). So, in the short term, resources may be required to see long-term population health benefits. It comes back to the argument of the 'causes' of the 'causes' of the 'causes'. Without increasing attention to the social determinants of health (e.g. rurality, maternal education, maternal income, race/ethnicity---primary causes) in a more organized and integrated way (at the system, organizational and care encounter levels) then more women will have risk factors (mid -range 'causes') that increase their chances of having pre-existing or pregnancy-related complications (end-point 'causes') (Figure 20). All these 'causes' also increase women's and newborns' chances of experiencing illness later in life, particularly chronic illness. At present, the efforts tend to focus primarily on the end results of the social determinants with growing attention on interventions to address the mid-range factors like obesity and smoking (Dodd, Grivell, Crowther & Robinson, 2010; Lumley, Chamberlain, Dowswell, Oliver, Oakley & Watson, 2009; Sassi, Devaux, Cecchini & Rusticelli, 2009). Over the past several decades, costs for health care have increased for chronic illness. Therefore community-based prevention, care coordination and supports for improved patient well-being are required to attend to the rising rates of chronic illness (Thorpe et al., 2010) and to offset economic impacts (Brown et al., 2009; Goldman, Michaud, Lakdawalla, Zheng, Gailey & Vaynman, 2010; Michaud, Goldman, Lakdawalla, Gailey & Zheng, 2011).
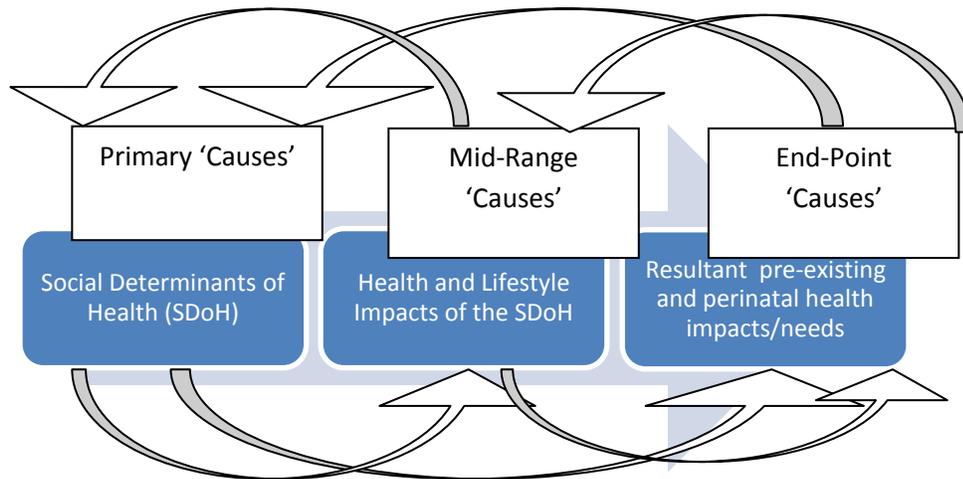
Figure 14: The Impact of the Social Determinants of Health on Pre-Existing and Perinatal Health

Care providers and health leaders in this study stated that they often feel helpless in addressing the social determinants of health. However, as outlined in Figure 21, there is a responsibility at the individual patient level, the organizational level and at the system level to both design and deliver care in a way that recognizes and responds to the challenges women are facing that impact their health. Perhaps as suggested in the literature on health system transformation and complexity theory[24], we are nearing a 'tipping point' where the status quo can no longer be maintained and then change will be possible (Durie & Wyatt, 2007;Walby, 2007). At that 'tipping point' in health system design, perhaps the handle will come off the proverbial pump[25] and the focus on illness care will be balanced with an equal and at some point, greater priority for health care based upon a broader understanding of health (Bauer, Briss, Goodman, & Bowman, 2014; Davies et al., 2014). At that point, the resources, including the health human

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[24] Rooted in General System Theory, which also informs this study, the underlying theoretical framework to understand and address wicked problems is complexity theory. Complexity theory involves interactions and relationships between parts or "agents" within multiple, open, non-linear systems. All parts are interrelated yet independent thus each system forms part of a larger system, yet each has its own individual properties. This supports the premise that systems may be nested or arranged in a hierarchy. The value of this arrangement is that the relationships between the parts or agents add to our understanding of a greater 'whole'. It also allows for some agents to interact or overlap differently. Through positive or negative feedback loops, the interactions of agents may create emerging properties that are different from the behaviors of individual agents.

[25] The story of John Snow, MD is often quoted as a pivotal transformation in health care in 19th century England when he took the handle off the pump of the public water supply that was contaminated with cholera. Ball, L. (n.d.). Cholera and the Pump on Broad Street: The life and legacy of John Snow. Available at: http://www.ph.ucla.edu/epi/snow/Snow_Laura_Ball.pdf

resources required for health care will need to change to include teams of providers who have the knowledge, skills and competencies to meet the complex health and social needs of women and newborns (Tomblin Murphy et al., 2012a; Tomblin Murphy & MacKenzie, 2013).

Based upon the findings in this study, the changes to health human resources include creating diverse health workforces with the competencies for culturally sensitive, community-focused care provided by a team of providers that is grounded in the principles and skilled with the practices to address the social determinants of health (Jackson & Gracia, 2013; Nivet & Berlin, 2014; Williams et al., 2014). This will require a re-design of how health is currently defined and measured. It will also require a strong fortitude to attend to issues of power, professionalization, and territorialism, funding and overlapping and increasing scopes of practice so that women enter care encounters as full partners in their care and with the space and time to share their stories. It will also require the education of health care providers that focuses on building competencies to support a broad understanding of health (Johnson, Donovan & Parboosingh, 2008) and the education of health system leaders to design health care systems and models of care delivery to attend to identified needs (Marmot et al., 2013). Such education and planning will also require ongoing needs-based research and evaluation to inform cross-sectoral health and social policy at the system and organizational levels. This may be possible if the central premise is to base health care planning and health human resources planning on the needs of people.
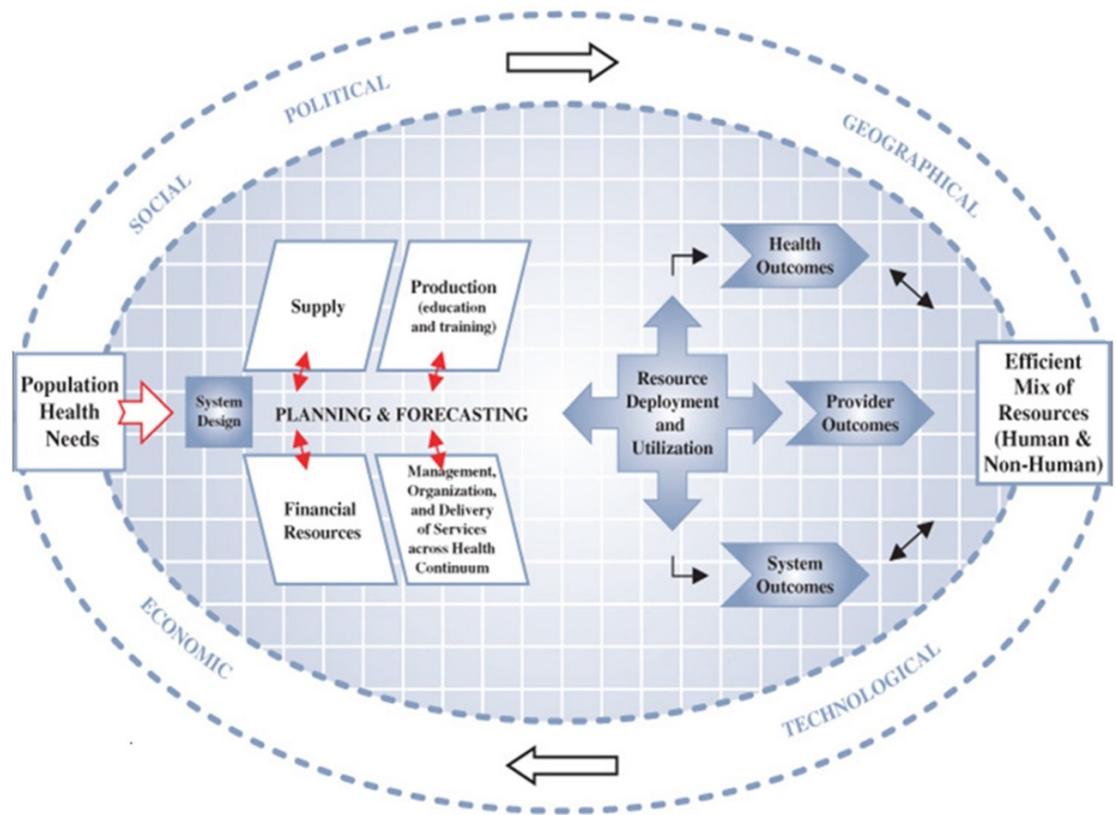
Figure 15: Health System and Health Human Resources Planning Conceptual Framework
(Tomblin Murphy, 2007)

Figure 16: Schemata of Integrated Findings

Tomblin Murphy, 2007

- Informed by the analysis of maternal-newborn health needs based on a broad understanding of health, the competencies to meet the identified needs will be determined
- The gaps in services in the current system to meet the identified needs will be determined
- Plan services and care delivery models based upon the competencies required to meet maternal-newborn health care needs
- Determine the impact of changes in service deliver on health (patient), provider and system outcomes

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Figure 21 is an illustration of the integrated findings from this study. On the right of the figure are the specific findings from this study. On the left of the figure are the related components from the Health Systems and HHR Conceptual Framework (Tomblin Murphy, 2007). The blue, green and red boxes contain the independent and dependent variables from the quantitative analysis. The arrows between demonstrate the statistical association between the independent variables in this study (income, education, race/ethnicity and area of residence) with the perinatal health needs proxies (dependent variables) used in this study. In the qualitative phase of this study, participants provided a number of gaps in services to meet existing maternal-newborn health needs and individual, organizational and system strategies to address those gaps. These are illustrated in the lighter blue, purple and red boxes on the bottom. The lines between the different components illustrate the inter-connectedness of these factors and strategies in understanding and addressing maternal-newborn primary maternity health care needs. The dashed orange box contains potential future research in needs-based maternal-newborn care.

The specific findings illustrated in Figure 21 align with several key components of the Health Systems and HHR Conceptual Framework (left side of the schemata in light green). Based upon a broad definition of health and informed by the broader geographic, political, economic and social factors in the 'outer circle' of the Health Systems and HHR Conceptual Framework, the quantitative findings identify key predictors of the health needs of women and newborns. Identifying the health needs of people is the core concept of the HHR framework. In addition to corroborating and extending the understanding of maternal-newborn health needs, the qualitative findings outline the potential gaps in services and strategies to improve services at both the organizational and system levels. This is aligned with the *Management, Organization and Delivery of Health Care Services* as well as the *Resource Deployment and Utilization* and the *System Design* components of the HHR framework.

For *Management, Organization and Delivery of Health Care Services*, the findings from this study inform models of care delivery that are interprofessional, focused on building respectful, culturally-competent and safe relationships with women supported by various forms of continuity. The models of care delivery would also

include perinatal health care providers with the competencies to attend to issues related to a broad understanding of health (e.g. the determinants of health). For *Resource Deployment and Utilization*, the findings from this study inform changes to how health care providers are recruited and retained in rural areas and the access of and options for various perinatal health care team members working to full scope, including midwives. For *System Design*, the findings inform policy changes related to intersectoral collaboration and blended physician funding models that support patient and family centered maternal-newborn primary maternity care informed by a paradigm shift to a broader understanding of health.

The integrated findings are also in keeping with General System Theory and the inter-dependent, contextual understanding of primary maternity health needs. Corroborated by the literature, the study findings provide a foundation for future research focused on translating the identified maternal-newborn health needs into the required health human resources competencies, services and models of care delivery to meet maternal-newborn needs. As illustrated by the Health Systems and HHR Conceptual Framework, (Figure 20) the intent of informing different ways to design and deliver care is to improve health, provider and system outcomes.

Strengths and Limitations

Using a mixed methods approach provides a comprehensive account of the primary maternity health care needs of women and newborns in Nova Scotia. Due to logistics and since the sub-populations of interest were in the Capital District Health Authority geographic region, the qualitative phase of the study was only conducted in CDHA. However, the quantitative phase included all of Nova Scotia. Future research would include focus groups and interviews with health care leaders, health care providers and women from around the province. As detailed in Chapter Five, there were two key challenges with the CCHS data: 1) the sample sizes were insufficient to complete any analyses; and 2) the respondents identified as either giving birth in the last year (2012 CCHS) or last five years (2009-2010 CCHS), however their responses could not necessarily be attributed to their perinatal experiences.

The data from the NSAPD included all women who gave birth in 2009-2010 who had complete data for the variables of interest resulting in an n=17,826 once multiple imputation was completed. Therefore, study findings are based upon recent and for the most part, complete information about the population of interest. However, specific sub-analyses of the maternal race-ethnicity data was not possible due to ethical concerns and the agreed upon data management plan. There were however a number of indicators from the NSAPD that could be and were used as valid proxies for health needs. The preference, however, would have been to link CCHS and NSAPD data so that self-reported measures of health (self-reported health, self-reported perceived mental health, self-reported unmet health needs) could have been used with specific perinatal population health and clinical data. As detailed in Chapter Six, it would have been preferable to include a focus group with women from additional racial/ethnic communities. However, women participants included those from First Nations, new immigrants as well as women living in rural areas.

It is important to note that the focus of the HHR and Health Systems Conceptual and Analytical frameworks is to inform health human resources and health systems planning for populations. The quantitative findings focus on the maternal-newborn health needs of populations of women and newborns based upon several key factors (e.g. income, education, race/ethnicity and are of residence). Although the qualitative findings are credible and may be transferable, the findings are based upon the experiences and perspectives of individuals and small groups of people. However, the strength in the mixed methods design is that the qualitative findings both extended and corroborated many of the quantitative findings as well as provided context and a deeper understanding of maternal-newborn care in Nova Scotia.

One of the key strengths and contributions of this research is that it uses a broad definition of health to identify predictors of health needs and therefore, the work extends our thinking about measuring needs for needs-based health human resources planning, specifically for primary maternity health care. This study also adds to the existing literature on the impact of the social determinants of health on maternal and newborn health and health needs.

Chapter Summary

From both the qualitative analysis and the quantitative analysis of the NSAPD data it was clear that the context of women and families lives (e.g. income, education, culture and place of residence) all have profound effects on health. Moreover, participants also shared the complexities in the design and delivery of health care as well as the challenges related to the accessibility and acceptability of primary maternity health care services. This is in keeping with how the Health Systems and HHR Conceptual Framework as well as General System Theory inform this study as the different contexts in health system planning and the complexity of the design and management of health services are explicitly considered.

Corroborated by relevant literature, this chapter outlines how the analyses in this study provide insight into the impact of the social determinants of health and the intersectionality of those determinants on women and newborns' health needs. Supported by the evidence, key strategies identified by participants to meet maternal-newborn health needs included improvements to funding models, the need for intersectoral partnerships and policy, the importance of interprofessional collaboration and full scope practice as part of the various primary maternity health care delivery models and the need for time and space within those delivery models to provide patient and family-centered, culturally safe and respectful care. The integrated findings illustrate the importance of considering the 'causes' of the 'causes' of the health needs so that care is designed and delivered to also attend to the root sources of increased health needs, the social determinants of health. Although the impact of the social determinants is complex and for the most part, overwhelming, system, organizational and individual strategies are required to impact health needs. This work has multiple implications for policy, planning, education, research and practice for the care of women and newborns. The implications of this research as well as future research and knowledge translation are described fully in Chapter Eight.

CHAPTER EIGHT: CONCLUSIONS

"Diversifying the nation's health-care workforce is a necessary strategy to increase access to quality health care for all populations, reduce health disparities, and achieve health equity."

Williams et al., 2014, p. 32

The following chapter provides a summary of the overall findings and implications of this dissertation and the policy, practice, education and planning implications. Knowledge translation strategies are discussed as well as methodological implications of this work and potential areas for future research.

This PhD dissertation advances what is known in primary maternity health care planning and needs-based health human resources planning. It focused on maternity needs based health human resources planning using a broad definition of health. Specifically, the primary maternity health care needs of women and newborns in Nova Scotia were identified using a sequential quantitative-qualitative mixed-methods approach informed by General System Theory and established needs-based HHR conceptual and analytical frameworks. The benefits of the mixed methods design is that it provides statistically significant and generalizable findings as well as contextualized qualitative findings, which add to the depth and breadth of understanding of maternal-newborn health needs. As summarized below, the findings provide evidence for decision and policy-makers, health care providers and organizational leaders for primary maternity health care and health human resources.

Summary of Quantitative Findings

Based on the multiple regression analysis using NSAPD data in the quantitative phase, statistically significant predictors for various health needs were identified. In the prenatal period, having less education, less income, extremes of maternal age, being a first time mother and living in a rural area were all predictors for increased pre-pregnancy BMI and for smoking during pregnancy. Being non-Caucasian, having lower maternal income and being a younger mother were predictors for not receiving prenatal screening while being younger and having less income were predictors of having an ultrasound earlier in pregnancy. Being a first time mother, being more than 35 years of age and having a cesarean section were predictors for increased maternal morbidity whereas less

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maternal income, having a cesarean section and being greater than 35 years old were predictors of increased newborn morbidity. For the postpartum period, lower maternal education and income, living rurally, being a younger mother and having a cesarean section were all predictors for not initiating breastfeeding.

From these quantitative results, there are significant differences based on maternal education, maternal income, living in rural areas and maternal race/ethnicity that impact women's and newborns' health. Therefore, $H0_1$ was rejected. $H0_2$ and $H0_3$ were not tested due to small sample sizes for the CCHS.

Summary of Qualitative Findings

In the qualitative phase, health care providers, health leaders and women shared numerous examples of ways in which the general health system as well as the different primary health care practices is not patient and family centered. From a system perspective, there was a general call for a change in the current paradigm of health care to move from illness and acute care to one that considers a broader definition of health and is person-focused. There was also the sense that there is movement in improving collaboration between providers and between sectors in government and in community-based care. There is still much work to be completed. A number of providers and leaders expressed concern about the various funding models and how these impact the timing and type of care that is provided. There were a number of stories from women about their experiences of racism, discrimination and ill-treatment. There were also reflections by care providers about the need to 'get to know' women and families so that providers have a full understanding of what factors are influencing women's lives, including understanding the histories of women so that care can be individualized to meet women's and newborns' health needs.

Summary of Integrated Findings

When the quantitative and the qualitative findings were integrated, it was clear that the context of women and families lives (income, education, culture and place of residence and other factors associated with the social determinants of health) have

profound effects on health. Participants shared their perspectives on the complexities in the design and delivery of health care and the challenges associated with the accessibility and acceptability of primary maternity health care services. These complexities and different contexts in health system planning and management are explicit components of the HHR and Health Systems Conceptual Framework (Tomblin Murphy, 2007) and Analytical Framework (Birch et al., 2007; 2009) as well as General System Theory (Von Bertalanffy, 1968), which informed this study. Supported by a wealth of health and social evidence, the findings from this study provide insight into the impact of the social determinants of health and the intersectionality of those determinants have on women and newborns' health needs.

Informed by the evidence, key strategies identified by participants to better meet maternal-newborn health needs included: 1) improvements to funding models, particularly for physicians. This may include blended models with both fee-for-service and salaried approaches; 2) the need for intersectoral partnerships and policy to support changes across the system to how services are provided for women and newborns; 3) the importance of interprofessional collaboration and full scope practice as part of the various primary maternity health care delivery models. Optimizing the scope of the various perinatal health care providers may also improve health system efficiency and sustainability. Having diverse maternal-newborn care health teams with unique and over-lapping scopes of practice would maximize the potential for meeting women and newborns' health needs, particularly needs relate to the social determinants of health; 4) there is a need for adequate time and philosophical and operational 'space' within those delivery models to provide patient and family-centered, culturally safe and respectful care and; 5) there is a need to move away from a provider-centered, risk-based approach to care that is illness-, risk- and deficit-focused to an approach that supports whole person-focused, strengths-based care. Together these strategies would improve women's and newborns perinatal health experiences and outcomes and potentially have a long-term effect on the health of women, children and families by maximizing the opportunities to promote health now while at the same time potentially preventing future illness, particularly chronic illness.

As illustrated in the HHR and Health Systems Conceptual Framework, the integrated findings illustrate the importance of considering the multiple factors—historical, social, health, economic, political---that influence health needs. Understanding how these factors impact maternal-newborn health needs is required so that care is designed and delivered to also attend to the root causes of increased health needs. Designing and delivering care to attend to the root causes requires individualized care that takes into consideration the unique and varied lives of women, newborns and families.

Although the impact of the social determinants is complex, system, organizational and individual care encounter strategies are required to influence health needs. Individual care encounter approaches include improving relational, culturally-competent and individualized care. System and organizational changes include improvements to interprofessional and intersectoral collaboration, improved funding and policies focused on patient and family centered care. Specifically for HHR, these findings suggest a need for designing and delivering health care using diverse health workforces with the competencies for culturally sensitive, community-focused care, with both the philosophical and relational practices to address broader issues of health. Such care should be supported by interprofessional collaboration within team-based settings that maximize the expertise and scopes of practice of all team members (Jackson & Gracia, 2013; Nivet & Berlin, 2014; Williams et al., 2014). From a system and organizational perspective, this requires re-designing how health is currently defined and measured. It also requires a strong fortitude to attend to issues of power, professionalization and funding so that women enter care encounters as full partners in their care and with the space and time to share their stories.

Planning for HHR and health system design based upon the determinants of health also requires ongoing needs-based research and evaluation to provide evidence-informed strategies to diversify the health workforce and meet maternal-newborn health needs. Needs-based research is also required to inform cross-sectoral health and social policy so that changes to service design and delivery are reflective of the health care needs of women and newborns. As outlined below, this study has multiple implications for policy, planning and practice in the care of women and newborns.

Implications for Planning, Policy, Practice and Education

This research provides enhanced understanding of the primary maternity health needs of women and newborns in Nova Scotia. This information is necessary to adequately plan HHR and to plan for models of service delivery that meet identified needs and that are designed to improve health experiences and outcomes (Suter & Deutschlander, 2012; Birch, Mackenzie, Tomblin Murphy & Cummings, 2015; Tomblin Murphy, 2012; 2014). Although a costs analysis or sustainability component was not part of this work, existing literature supports that planning based upon comprehensive approaches to health care that consider the factors that increase vulnerability and health needs, is also cost effective (Browne et al., 2009). In addition, with knowledge about maternity care needs, organizational policies and models of service delivery can be created based upon an alignment between the needs of women and newborns and the competencies of members of the health care team. Tomblin Murphy and colleagues developed both the health human resources conceptual and analytical frameworks, which have been used to inform human resource and health system planning in Nova Scotia, across Canada and internationally (Birch et al., 2007, 2009; Tomblin Murphy & O'Brien-Pallas, 2006; Tomblin Murphy et al., 2007a; Tomblin Murphy et al., 2008; Tomblin Murphy et al., 2010; Tomblin Murphy et al., 2011). The analytical framework informed the selection of health needs indicators for this study and the conceptual framework informed both phases of the study. This is the first needs-based HHR research focused on primary maternity health care in Nova Scotia.

Implications for policy and planning. From a systems perspective, it is anticipated that findings will validate the importance of inter-sectoral collaboration to achieve improved health, provider and system outcomes. Building on recommendations from the Nunn Commission (2006), the Nova Scotia government has made a commitment to work that supports children and families through the Early Years (before birth to 6 years) project (2012) and the Child and Youth Strategy (2007).   Part of that commitment is to improve support for families to build strong foundations and to create systems of care that identify problems and offer early intervention but also identify families' strengths and capacities. As stated in the Early Years report (2012), "Many factors influence health – genetics, biology, gender, lifestyle, culture, education,

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employment, family income, and support networks…The experiences of a mother before birth, at birth, and after, greatly influence the best possible start in life for a child" (p. 4).

From a policy and planning perspective, it is anticipated that findings from the study will inform transformative policy and decision making in primary maternity health care in Nova Scotia at both the system and organizational levels. This will include policies and decision-making regarding HHR planning and the development of different maternity care delivery models aligned with the needs of women, newborns and families. For example, findings from this study will inform the selection of models of care delivery for the perinatal clinical services planning that is currently underway in the province. Specific policy and planning changes informed by this study may include: 1) providing insights into funding models for perinatal health care providers; 2) the introduction or expansion of different health care providers (e.g.: midwives) and; 3) approaches to care delivery to provide individualized care in the context of current best practice and standards of care. The importance of having a consistent connection with the primary care system, which can be with a single provider such as a family physician, nurse practitioner or midwife or with a team of providers was also highlighted in this work.

Implications for practice. For individual woman-provider care encounters, the findings were clear that there is an opportunity to improve approaches to care that support relational and culturally safe and appropriate care where the unique context of the woman and newborn's lives are understood and considered in care planning. From a practice perspective, primary maternity health care providers in community-based and acute care clinical settings as well as health leaders were included as participants in this study. Participants from all groups—health leaders, health care providers (nurses, midwives and physicians) and women provided examples of various ways in which all primary maternity health care providers could better meet the primary maternity health care needs of women and newborns in Nova Scotia. Therefore, the findings from this study support ongoing primary maternity care practice that is patient/woman-centered and that considers all the factors and determinants that influence the health of women and newborns. Moreover, participants in the study shared strategies that can be used (improved interprofessional collaboration, providing safe and culturally competent care,

answering women's questions and concerns, having respectful care relationships with women etc.) that are meaningful for enhanced perinatal practice.

Additionally, the strategies included recommendations for collaborative practice models that support full scope of practice for all primary maternity care providers. This may be through the expansion of collaborative primary health care teams, the introduction of midwifery services in other parts of the province and/or the support of prenatal support programs such as Centering Pregnancy. For many health care providers, practicing to full scope and being engaged with health colleagues, increases autonomy (Kramer & Schmalenberg, 2008), improves practice satisfaction (O'Brien-Pallas, Duffield & Hayes, 2006) and improves recruitment and retention (Tomblin Murphy, Alder, Birch, MacKenzie & Lethbridge, 2010). For both the nursing and midwifery professionals, participants cited the need for advanced practice nurses (e.g. perinatal and/or women's health NPs and family practice nurses) and midwives to be available to provide all aspects of perinatal care (prenatal-birth-postpartum/postnatal). The findings also support changes to care delivery that promote interprofessional and collaborative practice environments focused on holistic, patient-centered care.

Implications for health provider education. The findings from this study also inform ways to enhance how health care providers are educated and what is included in preparing providers for practice. In keeping with the qualitative findings from this study that call for improved interprofessional collaboration, improvements to the education of health care providers (and health leaders) require structures, processes and philosophical support for interprofessional education. The philosophical support aligns with one of the sub-themes in this study related to the need for a paradigm shift in health care from predominantly illness-focused care to also include an understanding of multiple factors that influence health. The integrated findings from the study focus on the importance of understanding the social determinants of health and the impact these have on women and newborns' health needs. Therefore, at the individual patient level, health education should include knowledge about how the social determinants of health influence overall health and well-being and strategies to support health promotion, cultural competence and relational care. Findings from the study related to the organizational and system levels clearly identify the need for, improvements and commitment to interprofessional

and intersectoral collaboration with a focus on a broad definition of health. A comprehensive view of health based within the context of interprofessional collaboration would require the availability of clinical placements for students that support team-based comprehensive care.   To promote system level changes, perhaps additional information in health education curricula are required to support leadership and advocacy for changes to the health and social systems based on health equity.

Methodological and Research Implications: Understanding and Measuring Health Needs

The current data sources in Canada that are used as proxy measures for health were created to support remuneration systems for providers and to monitor the use of health care services (Wolfson, 1994). Currently, most of the data collected related to Canadians' health focus on health care utilization and access (Bryant, 2009) despite recognition that many determinants influence health (Raphael, 2009). This is also despite a growing body of research and knowledge in HHR and health systems research on needs-based HHR planning (MacKenzie et al., 2013). This research also provides an approach to measuring maternal-newborn health needs based upon a broad definition of health using available data sources. Therefore, improvements in data access and quality are needed so that data is based upon a broad definition of health and that includes the multiple determinants that influence health (Raphael, 2009). Improvements in having access to data require a commitment to the development of health indicators and the ongoing collection of data (with appropriate sample sizes) inclusive of the determinants of health. As outlined in the literature review for this study, current measures to inform primary maternity health care focus on indicators that are primarily illness or intervention focused when uncovering the etiology of specific illnesses or conditions is important. Focusing on the etiologies requires measuring and understanding health using a broader understanding of health focused on the social determinants of health (O'Campo & Urquia, 2012). Therefore, the metrics for determining maternal-newborn health needs would include the indicators included in this study such as those related to access, health status and morbidity. However, it is clear from the integrated findings in this study that additional metrics are required to determine the effectiveness of the care encounters (e.g.

culturally-competent, relational, holistic, person-centered etc.), the effectiveness of changes to service design and delivery (e.g. collaborative models, full scope practice) and the impact of policy changes at the system level (e.g. various funding models) on health (patient), provider and system outcomes.

The challenges in measuring health based upon a broad understanding may be for three reasons: 1) the data that is currently available is primarily clinical in nature and reflective of the illness/intervention focus in perinatal care; 2) there is a lack of an agreed upon definition for health and how to measure health; and 3) the value and priority for health system planning remains focused on illness, risk and intervention with minimal attention to the social determinants that impact health. Therefore, investments will not be made into collecting data reflective of a broader understanding of health and health research is limited by the available data. This is problematic, as overall the bulk of health and health system research remains focused on illnesses and interventions resulting in a lack of knowledge about the actual needs and potential unmet health needs in the system. This is despite the growing needs-based research available over more than a decade.

The intent of this study was to understand the primary maternity health care needs of women and newborn in Nova Scotia using a broad definition of health. As such, this work extends the understanding of how the current system is not attending to the health care needs of women and newborns in Nova Scotia; specifically, the health needs related to the social determinants of health. This work highlights the current provider-focused design of perinatal health care that focuses on risk-based, illness- and deficit-focused care that does not consider the complex and unique context of women's lives. It also highlights the need for new and expanded metrics and data sources to fully measure maternal-newborn health care needs to inform health human resources planning. Although there were some caveats related to the NSAPD, these were attended to, as appropriate, with established statistical imputation techniques and analysis. The quantitative analysis, corroborated by the qualitative analysis identified multiple predictors of health needs based on a broader definition of health. Therefore, this study supports and further informs the Health Systems and HHR Conceptual Framework through the consideration of multiple and varied parameters of health to determine a comprehensive understanding of primary maternity health care needs. It also adds to the

knowledge of needs-based HHR planning for maternal-newborn care. This knowledge is critical for planning, evaluating and monitoring the effectiveness and/or efficiency of health human resources strategies to meet the health needs of women and newborns and improve health, system and provider outcomes.

As there is no 'gold standard' of measure of population health status or need for health care (Birch, Eyles & Newbold, 1995), indicators to measure health need must be carefully chosen, as the intent is that the selection and analysis of need indicators will inform the health care planning and the allocation of health care resources. The best indicators, supported by rigourous study in HHR, include self-reported measures of health, health status indicators (Birch et al., 2007, 2009; MacKenzie, Elliott Rose, Tomblin Murphy & Price, 2013; Tomblin Murphy et al., 2004; 2007a; 2009; 2012a) and health professional assessments using standardized measures (Litaker & Love, 2005). Health status indicators were also included in this study. However, as noted in the literature, additional measures of need, in particular for unmet health needs or using a broader understanding of health are required to inform health workforce planning so that services are designed to meet population health needs, patient, system and provider expectations and health care use (Gallagher, Kleinman & Harper, 2010; Litaker & Love, 2005).

Focusing on a broader definition and understanding of health is aligned with findings in a synthesis of the literature on needs-based HHR planning, where the authors found that the current available measures of health needs do not necessarily reflect a complete and accurate picture of health (MacKenzie, Elliott Rose, Tomblin Murphy & Price, 2013). The need for improved data to understand health status and health needs has also been identified for the predictors in this study (socioeconomic status, race/ethnicity, education and area of residence). How we measure health influences the research that is conducted and the evidence that is created, valued and then used to inform health system and health human resources policy and planning. When much of the evidence used in evidence-informed decision-making still focuses primarily on illness or interventions, which is only one component of health, then the decisions that are made and the allocation of resources may contribute further to health inequalities and inequities (Birch, 1997; Birch, 2002). For health human resources and health systems planning, the

World Health Organization/Pan-American Health Organization Collaborating Centre on Health Workforce Planning and Research at Dalhousie University continues to support and extend thinking regarding needs-based research with local, national and international partners. Using secondary clinical and administrative as well as primary data from multiple sources, the research and evaluation initiatives via the Centre create a composite understanding of health needs, provider competencies and requirements and potential strategies to address gaps in services (WHO/PAHO Collaborating Centre on Health Workforce Planning, Research and Evaluation, 2015).

Knowledge Translation

An integrated knowledge translation plan was used for this study (CIHR, 2011). The plan included both involvement of key stakeholders throughout the research process and traditional and non-traditional end-of-grant KT strategies. Integrated KT understands the complexities of policy and decision-making and involves potential research/knowledge users at the outset of the study so that research is prioritized, planned and generated to meet the health needs of communities. Knowledge users are engaged partners who contribute to the research process by helping define the research questions, being involved in analysis and interpretation of findings and crafting messages to move research results into practice (Grudniewicz et al., 2014).   Using funding from a knowledge translation grant, I engaged in a number of knowledge translation activities to support this research. The activities included a comprehensive review, synthesis and analysis of primary care literature (research, government and non-government documents) to determine the relevant research users, the inclusion of a primary health care provider/decision-maker as a thesis committee member and consultations with policy and decision makers from the Nova Scotia Department of Health and Wellness (NSDHW) in both primary health care and workforce planning. These important policy and practice partners are content experts in interprofessional collaboration, primary health care and workforce planning and have provided feedback on the research proposal development to ensure the research question(s) were aligned with current health priorities and practice. In my consultations with policy and decision makers in primary health care and workforce planning at NSDHW, I used a summary of the planned research to

highlight how the research findings may inform system and organizational change, including women's health policy and primary maternity health care reform. Networking between researchers and research users is important to build partnerships, have open dialogue and create cooperation, ownership and uptake of research results (Parry, Salsberg, & Macaulay, 2009). Traditional knowledge translation approaches such as presentations and publications have also been completed or are in progress.

Knowledge translation strategies were negotiated with participants during the study. Many health care leaders asked for a summary of the findings (e.g. policy brief); while healthcare providers prefer publications and presentations. Women participants from the study prefer to have the results shared in community-based forums and/or via social media. Plans are underway to present the findings at the community centres where the focus groups were held. Consultation with a knowledge translation expert and a plain language writer will inform how best to share the results with women via social media. Social media strategies for knowledge translation have been used locally by nurse researchers with tremendous success (Price, Arbuthnot, Benoit, Landry, Landry & Butler, 2007).

Future Research

This research provided an understanding of the primary maternity health care needs of women and newborns in Nova Scotia based upon a broad definition of health. As there were small sample sizes for the selected years from the CCHS, a linkage study spanning a longer time frame, between the NSAPD and the CCHS would provide a comprehensive picture of women's health needs using population health data, clinical data and the measures of self-reported health from CCHS. Additionally, with a linkage study and using a similar approach to this study, a matrix or composite scoring of maternal and newborn health needs could be created to assist in our understanding of how multiple factors intersect to influence health. This could support a strengths-based as opposed to deficit-based understanding of perinatal health needs. Based on the HHR and Health Systems Conceptual Framework, the next step is to use the associated analytical and simulation frameworks, to determine the gaps in competencies and services for HHR in primary maternity health care. Aligned with the findings from this study, additional analysis would also include the team requirements to meet existing health needs. Using the simulation model, various policy interventions to address the gaps in services outlined by participants in this study as well as those determined by the use of the needs-based analytical and service-based frameworks would provide direction on the types of policy interventions that may be successful in addressing current and future requirements for health human resources in primary maternity health care.

Developing and implementing an evaluation framework related to the various models of primary maternity health care is important. In addition, an analysis of various health care provider funding models would also be valuable information to inform future health system planning and policy. Additional qualitative studies would also include focus groups and interviews with women from a variety of racial/ethnic and cultural backgrounds as well as from sites across the province to inform our understanding of maternal-newborn health needs for particular sub-populations or geographic regions. An additional analysis of the qualitative findings in this study to compare and contrast the experiences of women with those of health care providers and leaders may also further inform the differences in how health care needs are understood and how they influence the design and delivery of perinatal health care services.

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By considering a broad definition of health to identify women and newborns' health needs, this research contributes to knowledge about how health is understood and measured to inform health human resources and health system planning. The indicators and mixed methods approach of this research will inform future research focused on people's health needs to inform health system planners and clinicians in designing and delivering health care that attends to a comprehensive understanding of health. As suggested by Sir Michael Marmot in the seminal report from the World Health Organization on the social determinants of health, we need to "measure the problem, evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness about the social determinants of health" (Marmot, 2008, p. 2). So, there is much work to be done.

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Appendix A: Websites for Literature Review

Websites searched for relevant non-peer-reviewed (grey) literature included:

- Canadian Health Human Resources Network (CHHRN)
- Health Human Resources toolkit on the Nova Scotia Health Research Foundation website,
- Canadian Institute of Health Research (CIHI),
- Health Canada,
- Society of Obstetricians and Gynecologists of Canada,
- Canadian Nurses Association
- Canadian Medical Association
- Canadian Association of Perinatal and Women's Health Nurses
- Canadian Association of Midwives
- Nova Scotia Midwifery Regulatory Council
- College of Registered Nurses of Nova Scotia
- Doctors Nova Scotia
- Centre for Health Economics and Policy Analysis
- Canadian Interprofessional Health Collaborative (CIHC)
- Enhancing Interdisciplinary Collaboration in Primary Health Care (EICP) Initiative
- Quality Worklife Quality Healthcare Collaborative (QWQHC)
- Health Council of Canada (HCC)
- Canadian Health Services Research Foundation (CHSRF)
- Canadian Institutes for Health Research (CIHR) – Spotlight: Health Human Resources,
- Public Health Agency of Canada (PHAC),
- Canadian Policy Research Networks (CPRN)
- Canadian Women's Health Network (CWHN)
- WHO Collaborating Centre on Health Workforce, Research and Planning.

Fahey, J. (2014). Description of Risk Scoring Methodology using the NSAPD. Unpublished. Halifax: Author.

In order to obtain an objective measure of "maternal risk", one needs to determine "risk of what". Catastrophic outcomes such as death are sufficiently rare that it is not possible to find reliable factors that are associated with it. Severe morbidity is a nebulous and debatable construct and hard to quantify: is a postpartum haemorrhage more or less severe than sepsis, say. The simplest objective measure of bad outcome for mothers is length of stay, or such is our premise at least. That is, however, only half of the equation. We also have to decide what constitutes valid predictors. For this one has to consider the use to which such a risk level might be put. If it's to be used to provide guidance as to suitability for vaginal birth after cesarean (VBaC), say, or home birth, or some medical intervention during labour and delivery, then it must be able to be ascertained readily before or at the time of hospital admission or at the onset of labour.

The approach taken to determine what factors best predict risk, then, involved finding candidate variables available from the Nova Scotia Atlee Perinatal Database the value of which would be known to care providers at the time at which they would need to make a decision based on the level or score that the mother would be assigned. These candidates were then used in a multiple linear regression model with length of stay as the dependent variable.

For the initial version of this model, the best predictor was plurality – an unsurprising result given that twin pregnancy have a much higher complication rate, notably preterm delivery. The next best was 'year of delivery'; consistent with a known temporal trend of reduced hospital stays for mothers and infants. Third on the list was gestational hypertension, with an additional 3.3 days expected, presumably much of it antepartum to manage the risk of eclampsia. Fourth was number of previous C-sections, as it is strongly associated with a C-section for the current delivery and this typically adds a full day to length of postpartum admission. Rounding out the top 5 and, perhaps most interesting, is a simple count of the number of ICD-10 codes assigned from the chapter "Pregnancy, Childbirth, and the Puerperium", Chapter 15. This implies that, instead of a complicated algorithm assigning points to particular obstetrical, medical conditions or

history, that noting the number of 'significant' ones is highly correlated with length of stay – and hence overall morbidity. Who makes this determination of significance and using what criteria is, of course, problematic. For purposes of dichotomizing risk based solely on the database, however, the answers to these can be 'health record coders' and 'their judgment', with a cut-off based on the percentiles of the distribution of this Chapter 15 count. Eight percent of mums have no O code, 28% have a single one, 27% have two, 18% have three and 18% have four or more. One can then adjust ones assignment of a 'high risk cohort' based on what seems to be a sensible proportion to allot to that group, e.g. about 10% would mean a cut-off of 5 or more codes.

A more-sophisticated approach, and complicated and time-consuming both to produce and to consume, would involve taking the top 10 predictors and using them to determine, for each mother, an expected length of stay, and simply use that as a quantitative risk score (or qualitative, depending on whether one wants to assign an arbitrary boundary between two or more risk levels). We leave that undertaking as an exercise for the reader.

Good Morning/Afternoon/Evening. Thank you for agreeing to participate in this focus group. I am a PhD candidate at the Dalhousie University School of Nursing, Halifax, Nova Scotia. As part of my PhD program, I am conducting a study to explore the pregnancy, labour/birth and postpartum health needs of women and the health needs of newborns in Nova Scotia. The title of my study is "Centering Women and Newborns in Health Human Resources Planning: A needs-based analysis of primary maternity health care in Nova Scotia".

In order to conduct research, details about the study are reviewed by a research ethics board. This study has been approved by both the IWK Health Centre Research Ethics Board and the Capital District Health Authority Research Ethics Board. Part of the approval is to provide you with detailed information about the study and the potential risks and benefits of the study. All this information is part of the consent form which I will distribute shortly. Please read it carefully. There will be opportunity to ask questions about the information in the consent form. The purpose of the meeting with you today is to discuss your experiences in pregnancy, labour, birth and after you had your baby. I am interested in hearing about your health and the health of your baby.

Specifically, the purpose of my research is to 1) explore the health needs of women and newborns in Nova Scotia and 2) see if women and newborns have health concerns or needs that are not being met. As outlined in the consent form that you reviewed prior to the focus group, I will be audio-taping the session. As well, the research assistant, _____insert name_____, will be taking notes on the flip chart to ensure we are accurately capturing your experiences.

Focus Group Questions:

1. Please tell me about your personal stories when you were pregnant, in labour, giving birth and then up to about 6 weeks after you had your baby.

The following may be used as probes during the focus group discussion:

During those times, please tell me about how healthcare providers:

- showed you or did not show you care and compassion
- protected or did not protect your dignity and privacy
- provided or did not provide adequate information to you
- provided or did not provide competent care

2. During those times, please tell me about your involvement with decision making regarding your care.

3. Please provide examples of how health care providers addressed other health care issues beyond your pregnancy (May require a probe such as…please think about issues related to your general health)

4. Were there things that you thought your health care providers could have done or asked you about that would have helped you in your life? (May require examples or probes such as finances, safety in your home or relationships or issues related to work)

5. Please tell me about the times during your pregnancy, labour, birth and just after your baby was born when you felt that you received the very best care.

6. Is there anything else you would like to share?

**APPENDIX D: DEMOGRAPHIC INFORMATION FOR WOMEN
PARTICIPATING IN FOCUS GROUPS**

Demographic Data: Please check √ one answer

Age: □ 12-19 years   □ 20-34 years   □ 35-44 years

Level of Education: □ Some High School

□ Completion of High School

□ Community College or working on a Bachelor's Degree

□ Completion of Bachelor's Degree

□ Completion of Masters Degree

□ Completion of Doctorate

□ Professional degree (e.g. Physician, Lawyer or Dentist)

How far do you live from where you delivered your baby?

□ Within a 30 minute drive

□ Within a 60 minute drive

□ More than a 60 minute drive

Would you describe yourself as being a visible minority? □ Yes   □   No

Have you had more than one baby? □   Yes   □   No

APPENDIX E: INTERVIEW GUIDE FOR FOCUS GROUPS OR INTERVIEWS WITH PRIMARY MATERNITY HEALTH CARE PROVIDERS

Demographic Data: Please check √ one answer

Please select the category that indicates your profession

□ RN □ Family Physician

□ NP □ Obstetrician

□ Sub-Specialist □ Midwife

□ FPN □ LPN

□ Other _____

Employment status: □Full-time (FTE)   □Part-time (PTE)   □Casual

Gender: □ Male   □ Female   □ Transgender

Please select the answer that best describes your practice setting:

□ Community-based care

□ Hospital-based care

□

Other_____

How many years have you been providing maternal and newborn care?

□ Less than 1 year

□ 2-5 years

□ 6-10 years

□ 11-20 years

□ 20-30 years

□ more than 30 years

1. What do you think are the most important factors affecting maternal and newborn health?

2. What do you think would improve the health status of pregnant women, new mothers and newborns in Nova Scotia?

3. In your role, what do you think has the most impact (improves) the health of pregnant women, new mothers and newborns in Nova Scotia?

4. How do you think we can best provide care to meet the health needs of pregnant women, new mothers and newborns in Nova Scotia?

APPENDIX F: INTERVIEW GUIDE FOR FOCUS GROUPS OR INTERVIEWS WITH HEALTH LEADERS

Demographic Data: Please check √ one answer

Please select the category that indicates your leadership role:

□ Leader at the unit level

□ Leader at the organization level (e.g. a number of units in your portfolio)

□ Leader at the DHA/IWK level

□ Leader at the provincial level

Employment status: □Full-time (FTE)   □Part-time (PTE)   □Casual

Gender: □ Male   □ Female   □ Transgender

How many years have you been involved in leadership or decision-making for maternal and newborn care?

□ Less than 1 year

□ 2-5 years

□ 6-10 years

□ 11-20 years

□ 20-30 years

□ more than 30 years

Interview/Focus Group Questions:

1. What do you think are the most important factors affecting maternal and newborn health?

2. What do you think would improve the health status of pregnant women, new mothers and newborns in Nova Scotia?

3. In your role, what do you think has the most impact (improves) the health of pregnant women, new mothers and newborns in Nova Scotia?

4. How do you think we can best provide care to meet the health needs of pregnant women, new mothers and newborns in Nova Scotia?

APPENDIX G: RECRUITMENT POSTER

RESEARCH STUDY

Exploring Women's Health Needs in Pregnancy, Labour and Birth and as New Mothers

If you have had a baby in the last 12 months, and are interested in sharing your experiences about your pregnancy, labour and birth and about being a new mother, please contact:

Annette Elliott Rose

aelliott@dal.ca

494-XXXX

STUDY TITLE: Centering Women and Newborns in Health Human Resources Planning: A needs-based approach to primary maternity health care in Nova Scotia

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**ASSOCIATE
INVESTIGATORS:** Dr. Megan Aston
                            Dr. John Gilbert
                            Dr. David Gass

STUDY FUNDER: Nova Scotia Health Research Foundation Scotia Scholarship

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about it for a while. Mark anything you don't understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- Discuss the study with you
- Answer your questions
- Keep confidential any information which could identify you personally
- Be available during the study to deal with problems and answer questions

We do not know if taking part in this study will help you. You may feel better. On the other hand it might not help you at all. It might even make you feel worse. We cannot

always predict these things. We will always give you the best possible care no matter what happens.

If you decide not to take part or if you leave the study early, your usual health care will not be affected.

Information about the study

Canada has a shortage of health care professionals in all settings, including for the care of pregnant women, new mothers and newborns. In order to plan for enough people to care for pregnant women and newborns, we need to know the health needs of women, new mothers and newborns.

The purpose of this study is to identify the needs of pregnant women, new mothers and newborns in Nova Scotia and to identify any gaps in care (in other words, needs that are not being met).

The main question the study is designed to answer is:
What are the primary maternity health care needs of women and newborns in Nova Scotia?

To make sure we know what is important to pregnant women, new mothers, their newborns and their families, we need to have conversations with women and families. Having conversations is part of this research.

You have been asked to join this study because you have received care in your pregnancy and for you and your newborn in Nova Scotia within the last two years.

Participation in this study will involve one focus group lasting approximately 60-90 minutes. There are no other study activities that will require your time.

This study is being done only in Nova Scotia. It is expected that approximately 40-50 women as well as 40-50 care providers and 10 health leaders and decision makers will participate in this study. Additional information for this study will also come from a national survey, the Canadian Community Health Survey and a local database, the Nova Scotia Atlee Perinatal Database with information on women and babies.

There are four main parts to this study:

1) Information from the database and survey described above
2) Focus groups with women who have had a baby in the last year
3) Interviews or focus groups with health professionals who care for pregnant women, new mothers and newborns
4) Interview with health leaders and decision makers who are involved in planning for the care of pregnant women, new mothers and newborns

The information from the database and survey will be added together to determine health needs of pregnant women, new mothers and newborns in Nova Scotia. However, the information from the database and surveys may not give all the information about the health needs of pregnant women, new mothers and newborns. Therefore, it is best to ask women and to ask care providers and decision makers about the health needs of women, new mothers and newborns. Once we've gathered this information then we can plans the best ways to provide care to meet those needs. Time commitment for this study is a one-time focus group lasting 60 -90 minutes.

What Will Happen If I Take Part In This Study?

The study involves one focus group lasting 60-90 minutes. There are no other activities involved in this study. Participants are invited to participate in the study if they have given birth in the last 12 months and received all their pregnancy, birth and baby care in Nova Scotia. Women identify themselves as participants through advertisements (posters) in the waiting room in their care provider's offices. As we want to be sure we have many different women providing information about their health needs, women may also be contacted via family resource centers, Immigrant Settlement and Integration Services (ISIS) groups, the Supportive Housing for Young Mothers (SHIM) program and the Mic Mac Native Friendship Centre. As well, contacts will be made with professionals in the system who have frequent contact with women and families to see if there are existing opportunities (e.g.: programs, classes, meetings) to speak with women about their maternity care and newborn health needs.

Are There Risks To The Study?

There are risks with this, or any study. To give you the most complete information available, we have listed some *possible* risks. We want to make sure that if you decide to try the study, you have had a chance to think about the risks carefully. Please be aware that there may be risks that we don't yet know about.

- There are no anticipated participant physical risks associated with this study.
- Possible emotional or psychological risks may be associated with women recalling negative health care encounters and/or realizing their needs were not met.
- There may also be questions asked during the focus group or interview that make you feel uncomfortable. You will not be <u>required</u> to answer any questions during the focus group or interview that make you feel uncomfortable. However, if there is something you want to share but not in the group setting, arrangements will be made for you to meet with the researcher at another time.
- The privacy of participants in focus groups cannot be guaranteed.
- If you experience distress during the focus group, please let the researcher know right away. The researcher will talk with you about your feelings and offer you a follow-up appointment with a health care professional if you want to talk more about your feelings.

- As a doctoral student, the researcher also has a supervisor who oversees the research. The researcher may discuss any concerns about participant distress with the supervisor to make sure all was done to address participants' feelings and concerns.

The possible benefits of this study include:

- increased awareness of women's and newborns health needs
- an awareness of current practice challenges and successes that meet women's and newborns health needs
- potential changes to how care is delivered to meet the needs of women and newborns at the levels of practice, policy and planning.

What Happens at the End of the Study?

Study findings will be shared with participants via a negotiated approach (meetings, workshops, and conversations, written findings) to enhance consciousness regarding needs-based health human resources planning in primary maternity care. Participation in the strategies to share study findings will be voluntary; open to all participants in the study and will not be a required component of participation in the study.

What Are My Responsibilities?

As a study participant, we are asking you to:

- Participate in a one-time focus group, 60-90 minutes length with other new mothers
- Follow the directions of the Principal Investigator

Can I Be Taken Out Of The Study Without My Consent?

Yes. You may be taken out of the study at any time, if:

➢ There is new information that shows that being in this study is not in your best interests.
➢ The Capital Health Research Ethics Board or the Principal Investigator decides to stop the study.
➢ You will be told about the reasons why you might need to be taken out of the study.

What about New Information?

It is possible (but unlikely) that new information may become available while you are in the study that might affect your health, welfare, or willingness to stay in the study. If this happens, you will be informed in a timely manner and will be asked whether you wish to continue taking part in the study or not.

Will It Cost Me Anything?

There are no costs to participants. Women who participate in the focus group will be provided a $20.00 stipend to cover transportation or child care costs. All babies in arms will be welcome to participate in the focus group with their mothers.

<u>Research Related Injury</u>

If you become ill or injured as a direct result of participating in this study, necessary medical treatment will be available at no additional cost to you. Your signature on this form only indicates that you have understood to your satisfaction the information regarding your participation in the study and agree to participate as a subject. In no way does this waive your legal rights nor release the Principal Investigator, the research staff, the study sponsor or involved institutions from their legal and professional responsibilities.

What about My Right to Privacy?

Protecting your privacy is an important part of this study. A copy of this consent will be provided to you.

When you sign this consent form you give us permission to:

- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

The research team will collect and use only the information they need to complete the study.
This information will only be used for the purposes of this study.

This information will include:
- Your age
- Your level of education
- The distance you had to travel from your home to your delivery facility
- Race/ethnicity (e.g. if you consider yourself part of a visible minority)
- Questions related to your experiences and insights about your health needs while you were pregnant and as a new mother and the health needs of your baby.

<u>Access to records</u>

The study principal investigator and members of the research team will see study records that identify you by name.

Other people may need to look at the study records that identify you by name. These might include:
- the CDHA Research Ethics Board and Research Quality Associate
- a research assistant who may assist with note taking during focus groups
- the transcriptionist who listens to the audio tapes from the focus groups and interviews and transcribes the information into type-written notes

Your name and contact information will be kept secure by the research team at Dalhousie University. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study. Information collected for

this study will kept as long as required by law. This could be 7 years or more.
If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. All information will be kept confidential and shared only with appropriate people involved with the study (i.e.: the principal investigator, the transcriptionist and the thesis supervisor and committee members). All information will be stored in a locked and secure cabinet. Study data entered on the laptop computer will be anonymized and both the word documents and the laptop computer will be password protected. The computer will be stored in a locked cabinet when not in use. For the qualitative component, study results will be presented as broad themes and when participant direct quotes are used, pseudonyms (e.g. fake names) will be used. Pseudonyms will also be used when participants are referring to others.

You may ask the study principal investigator to see the information that has been collected about you.
You may also be contacted personally by Research Auditors for quality assurance purposes.

WHAT IF I WANT TO QUIT THE STUDY?

If you chose to participate and later change your mind, you can say no and stop the research at any time. If you wish to withdraw your consent please inform the Principal Investigator. All data collected up to the date you withdraw your consent will remain in the study records, to be included in study related analyses. *A decision to stop being in the study will not affect your care.*

Declaration of Financial Interest

The funder is paying the Principal Investigator and/or the Principal Investigator's institution to conduct this study. The amount of this payment is sufficient to cover the costs of conducting the study. The Principal Investigator has no financial interests in conducting this research study.

What about Questions or Problems?

For further information about the study contact Ms. Annette Elliott Rose, Principal Investigator and Phd Candidate. Ms. Elliott Rose's work telephone number is (902) 494-4333. If you can't reach the Principal Investigator, please refer to the attached Research Team Contact Page for a full list of the people you can contact for further information about the study.

The Principal Investigator is Ms. Annette Elliott Rose

Telephone: (902) 494-4333

What Are My Rights?

After you have signed this consent form you will be given a copy. If you have any questions about your rights as a research participant, contact the Patient Representative at (902) 473-2133. In the next part you will be asked if you agree (consent) to join this study. If the answer is "yes", you will need to sign the form.

Consent Form Signature Page

I have reviewed all of the information in this consent form related to the study called:

Centering Women and Newborns in Health Human Resources Planning: A needs-based approach to primary maternity health care in Nova Scotia

I have been given the opportunity to discuss this study. All of my questions have been answered to my satisfaction.

This signature on this consent form means that I agree to take part in this study. I understand that I am free to withdraw at any time.

_____ _____ ___ / ____ / ___
Signature of Participant   Name (Printed)   Year   Month Day*

_____ _____ ___ / ____ / ___
Witness to Participant's   Name (Printed)   Year   Month Day*
Signature

_____ _____ ___ / ____ / ___
Signature of Investigator   Name (Printed)   Year   Month Day*

_____ _____ ___ / ____ / ___
Signature of Person   Name (Printed)   Year   Month Day*
Conducting Consent Discussion

If the consent discussion has been conducted in a language other than English, please indicate:

_____ Language

_____ _____ ____ / _____ / ___
Signature of Translator   Name (Printed)   Year   Month   Day*

Note: Please fill in the dates personally

I Will Be Given A Signed Copy Of This Consent Form

Thank you for your time and patience!

APPENDIX I: CONSENT FORM FOR FOCUS GROUPS OR INTERVIEWS WITH PRIMARY MATERNITY HEALTH CARE PROVIDERS

STUDY TITLE: Centering Women and Newborns in Health Human Resources Planning: A needs-based approach to primary maternity health care in Nova Scotia

**PRINCIPAL
OR QUALIFIED**   Annette Elliott Rose
INVESTIGATOR

Phd Candidate, School of Nursing
5869 University Avenue
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P.O. Box 15000
Halifax, N.S. B3H 4R2

DOCTORAL SUPERVISOR: Dr. Gail Tomblin Murphy

SUPERVISING INVESTIGATOR: Ms. Michelle LeDrew (IWK); Ms. Mary Ellen Gurnham (CDHA)

**ASSOCIATE
INVESTIGATORS:** Dr. Megan Aston
                         Dr. John Gilbert
                         Dr. David Gass

STUDY FUNDER: Nova Scotia Health Research Foundation Scotia Scholarship

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about it for a while. Mark anything you don't understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- Discuss the study with you
- Answer your questions
- Keep confidential any information which could identify you personally
- Be available during the study to deal with problems and answer questions

We do not know if taking part in this study will help you. You may feel better. On the other hand it might not help you at all. It might even make you feel worse. We cannot always predict these things. We will always give you the best possible care no matter what happens.

If you decide not to take part or if you leave the study early, your employment will not be affected.

Information about the study

Canada has a shortage of health care professionals in all settings, including for the care of pregnant women, new mothers and newborns. In order to plan for enough people to care for pregnant women and newborns, we need to know the health needs of women, new mothers and newborns.

The purpose of this study is to identify the needs of pregnant women, new mothers and newborns in Nova Scotia and to identify any gaps in care (in other words, needs that are not being met).

The main question the study is designed to answer is:
What are the primary maternity health care needs of women and newborns in Nova Scotia?
To make sure we know what is important to pregnant women, new mothers, their newborns and their families, we need to have conversations with women, with health care providers and with health leaders/decision-makers. Having conversations is part of this research.
You have been asked to join this study because you provide/have provided primary maternity health care to women in pregnancy, as new mothers and/or to newborns within the last two years.
Participation in this study will involve one focus group or interview lasting approximately 60-90 minutes. There are no other study activities that will require your time.

This study is being done only in Nova Scotia. Focus groups and interviews for this study are being done only in Halifax and Hants counties. It is expected that approximately 40-50 women as well as 40-50 care providers and 10 health leaders and decision makers will participate in this study. Additional information for this study will also come from a national survey, the Canadian Community Health Survey and a local database, the Nova Scotia Atlee Perinatal Database.

There are four main parts to this study:

1) Information from the database and survey described above
2) Focus groups with women who have had a baby in the last year
3) Interviews or focus groups with health professionals who care for pregnant women, new mothers and newborns

4) Interview with health leaders and decision makers who are involved in planning for the care of pregnant women, new mothers and newborns

Information from the database and survey will be used to determine health needs of pregnant women, new mothers and newborns in Nova Scotia. However, the information from the database and surveys may not give all the information about the health needs of pregnant women, new mothers and newborns. Therefore, it is best to ask women and to ask care providers and decision makers about the health needs of women, new mothers and newborns. Once we've gathered this information then we can plan the best ways to provide care to meet those needs. Time commitment for this study is a one-time focus group or interview lasting 60 -90 minutes.

What Will Happen If I Take Part In This Study?

The study involves one focus group or interview lasting 60-90 minutes. There are no other activities involved in this study. Participants are invited to participate in the study if they have cared for pregnant women, new mothers or newborns in Halifax and Hants counties in the last 12 months. Email and fax invitations to participate in this study have been sent out to a variety of health care providers as we want to be sure we have included multiple perspectives from a variety of different types of providers involved in the care of pregnant women, new mothers and newborns.

Are There Risks To The Study?

There are risks with this, or any study. To give you the most complete information available, we have listed some *possible* risks. We want to make sure that if you decide to try the study, you have had a chance to think about the risks carefully. Please be aware that there may be risks that we don't yet know about.

- There are no anticipated participant physical risks associated with this study.
- Possible emotional or psychological risks may be associated with health care providers recalling negative health care encounters and/or realizing that women's and newborns' health care needs were not met.
- There may also be questions asked during the focus group or interview that make you feel uncomfortable. You will not be <u>required</u> to answer any questions during the focus group or interview that make you feel uncomfortable. However, if there is something you want to share but not in the group setting, arrangements will be made for you to meet with the researcher at another time.
- The privacy of participants in focus groups cannot be guaranteed.
- If you experience distress during the focus group or interview, please let the researcher know right away. The researcher will talk with you about your feelings and offer you a follow-up appointment with a health care professional if you want to talk more about your feelings.
- As a doctoral student, the researcher also has a supervisor who oversees the research. The researcher may discuss any concerns about participant distress with the supervisor to make sure all was done to address participants' feelings and concerns.

The possible benefits of this study include:

- increased awareness of women's and newborns health needs
- an awareness of current practice challenges and successes that meet women's and newborns health needs
- potential changes to how care is delivered to meet the needs of women and newborns at the levels of practice, policy and planning.

What Happens at the End of the Study?

Study findings will be shared with participants via a negotiated approach (meetings, workshops, and conversations, written findings) to enhance consciousness regarding needs-based health human resources planning in primary maternity care. Participation in the strategies to share study findings will be voluntary; open to all participants in the study and will not be a required component of participation in the study.

What Are My Responsibilities?

As a study participant, we are asking you to:

- Participate in a one-time focus group, 60-90 minutes in length with other health care providers -OR- a one-time, one-on-one interview, 60-90 minutes in length
- Follow the directions of the Principal Investigator

Can I Be Taken Out Of The Study Without My Consent?

Yes. You may be taken out of the study at any time, if:

➢ There is new information that shows that being in this study is not in your best interests.
➢ The IWK Research Ethics Board or the Principal Investigator decides to stop the study.
➢ You will be told about the reasons why you might need to be taken out of the study.

What about New Information?

It is possible (but unlikely) that new information may become available while you are in the study that might affect your health, welfare, or willingness to stay in the study. If this happens, you will be informed in a timely manner and will be asked whether you wish to continue taking part in the study or not.

Will It Cost Me Anything?

There are no costs to participants.

Research Related Injury

If you become ill or injured as a direct result of participating in this study, necessary medical treatment will be available at no additional cost to you. Your signature on this form only indicates that you have understood to your satisfaction the information regarding your participation in the study and agree to participate as a subject. In no way does this waive your legal rights nor release the Principal Investigator, the research staff,

the study sponsor or involved institutions from their legal and professional responsibilities.

What about My Right to Privacy?

Protecting your privacy is an important part of this study. A copy of this consent will be provided to you.

When you sign this consent form you give us permission to:

- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

The research team will collect and use only the information they need to complete the Study. This information will only be used for the purposes of this study.

This information will include:
- Type of health care provider
- Years of experience as a health care provider
- Gender
- Employment status
- Practice setting
- Questions related to your experiences and insights about the health needs of women and newborns

Access to records

The study principal investigator and members of the research team will see study records. These will contain some demographic information but they will not identify you by name.

Other people may need to look at the study records that identify you by name. These might include:
- the IWK Research Ethics Board
- a research assistant who may assist with note taking during focus groups
- the transcriptionist who listens to the audio tapes from the focus groups and interviews and transcribes the information into type-written notes

Your name and contact information will be kept secure by the research team at Dalhousie University. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study. Information collected for this study will kept as long as required by law. This could be 5 years or more.
If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. All information will be kept confidential and shared only with appropriate people involved with the study (i.e.:

the principal investigator, the transcriptionist and the thesis supervisor and committee members). All information will be stored in a locked and secure cabinet. Study data entered on the laptop computer will be anonymized and both the word documents and the laptop computer will be password protected. The computer will be stored in a locked cabinet when not in use. For the qualitative component, study results will be presented as broad themes and when participant direct quotes are used, pseudonyms (e.g. fake names) will be used. Pseudonyms will also be used when participants are referring to others.

You may ask the study principal investigator to see the information that has been collected about you.

You may also be contacted personally by Research Auditors for quality assurance purposes.

WHAT IF I WANT TO QUIT THE STUDY?

If you chose to participate and later change your mind, you can say no and stop the research at any time. If you wish to withdraw your consent please inform the Principal Investigator. All data collected up to the date you withdraw your consent will remain in the study records, to be included in study related analyses. *A decision to stop being in the study will not affect your employment.*

Declaration of Financial Interest

The funder is paying the Principal Investigator and/or the Principal Investigator's institution to conduct this study. The amount of this payment is sufficient to cover the costs of conducting the study. The Principal Investigator has no financial interests in conducting this research study.

What about Questions or Problems?

For further information about the study contact Ms. Annette Elliott Rose, Principal Investigator and Phd Candidate. Ms. Elliott Rose's work telephone number is (902) 494-4333. If you can't reach the Principal Investigator, please refer to the attached Research Team Contact Page for a full list of the people you can contact for further information about the study.

The Principal Investigator is Ms. Annette Elliott Rose

Telephone: (902) 494-4333

What Are My Rights?

After you have signed this consent form you will be given a copy. If you have any questions about your rights as a research participant, contact IWK Research Services at (902) 470-7548. In the next part you will be asked if you agree (consent) to join this study. If the answer is "yes", you will need to sign the form.

Consent Form Signature Page

I have reviewed all of the information in this consent form related to the study called:

Centering Women and Newborns in Health Human Resources Planning: A needs-based approach to primary maternity health care in Nova Scotia

I have been given the opportunity to discuss this study. All of my questions have been answered to my satisfaction.

This signature on this consent form means that I agree to take part in this study. I understand that I am free to withdraw at any time.

_____	_____	___ / ____ / __
Signature of Participant	Name (Printed)	Year Month Day*
_____	_____	___ / ____ / __
Witness to Participant's Signature	Name (Printed)	Year Month Day*
_____	_____	___ / ____ / __
Signature of Investigator	Name (Printed)	Year Month Day*
_____	_____	___ / ____ / __
Signature of Person Conducting Consent Discussion	Name (Printed)	Year Month Day*

If the consent discussion has been conducted in a language other than English, please indicate:

_____   Language

_____	_____	____ / _____ / ___
Signature of Translator	Name (Printed)	Year Month Day*

*Note: Please fill in the dates personally

I Will Be Given a Signed Copy of This Consent Form

Thank you for your time and patience!

APPENDIX J: CONSENT FORM FOR INTERVIEWS OR FOCUS GROUPS WITH HEALTH CARE LEADERS

STUDY TITLE: Centering Women and Newborns in Health Human Resources Planning: A needs-based approach to primary maternity health care in Nova Scotia

**PRINCIPAL
OR QUALIFIED   Annette Elliott Rose
INVESTIGATOR**

Phd Candidate, School of Nursing
5869 University Avenue
Dalhousie University
P.O. Box 15000
Halifax, N.S. B3H 4R2

DOCTORAL SUPERVISOR: Dr. Gail Tomblin Murphy

SUPERVISING INVESTIGATOR: Ms. Michelle LeDrew (IWK); Ms. Mary Ellen Gurnham (CDHA)

**ASSOCIATE
INVESTIGATORS:** Dr. Megan Aston
                          Dr. John Gilbert
                          Dr. David Gass

STUDY FUNDER: Nova Scotia Health Research Foundation Scotia Scholarship

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about it for a while. Mark anything you don't understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- Discuss the study with you
- Answer your questions
- Keep confidential any information which could identify you personally
- Be available during the study to deal with problems and answer questions

We do not know if taking part in this study will help you. You may feel better. On the other hand it might not help you at all. It might even make you feel worse. We cannot always predict these things. We will always give you the best possible care no matter what happens.

If you decide not to take part or if you leave the study early, your employment will not be affected.

Information about the study

Canada has a shortage of health care professionals in all settings, including for the care of pregnant women, new mothers and newborns. In order to plan for enough people to care for pregnant women and newborns, we need to know the health needs of women, new mothers and newborns.

The purpose of this study is to identify the needs of pregnant women, new mothers and newborns in Nova Scotia and to identify any gaps in care (in other words, needs that are not being met).

The main question the study is designed to answer is:
What are the primary maternity health care needs of women and newborns in Nova Scotia?

To make sure we know what is important to pregnant women, new mothers, their newborns and their families, we need to have conversations with women, with health care providers and with health leaders/decision-makers. Having conversations is part of this research.

You have been asked to join this study because you are/have been involved in the leadership, decision-making and/or planning for the care of women in pregnancy, new mothers and/or newborns within the last two years.

Participation in this study will involve one focus group or interview lasting approximately 60-90 minutes. There are no other study activities that will require your time.

This study is being done only in Nova Scotia. Focus groups and interviews for this study are being done only in Halifax and Hants counties. It is expected that approximately 40-50 women as well as 40-50 care providers and 10 health leaders and decision makers will participate in this study. Additional information for this study will also come from a national survey, the Canadian Community Health Survey and a local database, the Nova Scotia Atlee Perinatal Database.

There are four main parts to this study:

1) Information from the database and survey described above

2) Focus groups with women who have had a baby in the last year
3) Interviews or focus groups with health professionals who care for pregnant women, new mothers and newborns
4) Interview with health leaders and decision makers who are involved in planning for the care of pregnant women, new mothers and newborns

Information from the database and survey will be used to determine health needs of pregnant women, new mothers and newborns in Nova Scotia. However, the information from the database and surveys may not give all the information about the health needs of pregnant women, new mothers and newborns. Therefore, it is best to ask women and to ask care providers and decision makers about the health needs of women, new mothers and newborns. Once we've gathered this information then we can plan the best ways to provide care to meet those needs. Time commitment for this study is a one-time focus group or interview lasting 60 -90 minutes.

What Will Happen If I Take Part In This Study?

The study involves one focus group or interview lasting 60-90 minutes. There are no other activities involved in this study. Participants are invited to participate in the study if they are/have been involved in the leadership, decision-making and/or planning for the care of women in pregnancy, new mothers and/or newborns within the last two years. Email and fax invitations to participate in this study have been sent out to a variety of health care leaders/decision-makers as we want to be sure we have included multiple perspectives from a variety of different types of providers involved in the care of pregnant women, new mothers and newborns.

Are There Risks To The Study?

There are risks with this, or any study. To give you the most complete information available, we have listed some *possible* risks. We want to make sure that if you decide to try the study, you have had a chance to think about the risks carefully. Please be aware that there may be risks that we don't yet know about.

- There are no anticipated participant physical risks associated with this study.
- Possible emotional or psychological risks may be associated with health care leaders/decision-makers recalling negative health care encounters and/or realizing that women's and newborns' health care needs were not met.
- There may also be questions asked during the focus group or interview that make you feel uncomfortable. You will not be <u>required</u> to answer any questions during the focus group or interview that make you feel uncomfortable. However, if there is something you want to share but not in the group setting, arrangements will be made for you to meet with the researcher at another time.
- The privacy of participants in focus groups cannot be guaranteed.
- If you experience distress during the focus group or interview, please let the researcher know right away. The researcher will talk with you about your feelings and offer you a follow-up appointment with a health care professional if you want to talk more about your feelings.

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- As a doctoral student, the researcher also has a supervisor who oversees the research. The researcher may discuss any concerns about participant distress with the supervisor to make sure all was done to address participants' feelings and concerns.

The possible benefits of this study include:

- increased awareness of women's and newborns health needs
- an awareness of current practice challenges and successes that meet women's and newborns health needs
- potential changes to how care is delivered to meet the needs of women and newborns at the levels of practice, policy and planning.

What Happens at the End of the Study?

Study findings will be shared with participants via a negotiated approach (meetings, workshops, and conversations, written findings) to enhance consciousness regarding needs-based health human resources planning in primary maternity care. Participation in the strategies to share study findings will be voluntary; open to all participants in the study and will not be a required component of participation in the study.

What Are My Responsibilities?

As a study participant, we are asking you to:

- Participate in a one-time focus group, 60-90 minutes in length with other health leaders --OR- a one-time, one-on-one interview, 60-90 minutes in length
- Follow the directions of the Principal Investigator

Can I Be Taken Out Of The Study Without My Consent?

Yes. You may be taken out of the study at any time, if:

➤ There is new information that shows that being in this study is not in your best interests.
➤ The IWK Research Ethics Board or the Principal Investigator decides to stop the study.
➤ You will be told about the reasons why you might need to be taken out of the study.

What about New Information?

It is possible (but unlikely) that new information may become available while you are in the study that might affect your health, welfare, or willingness to stay in the study. If this happens, you will be informed in a timely manner and will be asked whether you wish to continue taking part in the study or not.

Will It Cost Me Anything?

There are no costs to participants.

<u>Research Related Injury</u>

If you become ill or injured as a direct result of participating in this study, necessary medical treatment will be available at no additional cost to you. Your signature on this form only indicates that you have understood to your satisfaction the information regarding your participation in the study and agree to participate as a subject. In no way does this waive your legal rights nor release the Principal Investigator, the research staff, the study sponsor or involved institutions from their legal and professional responsibilities.

What about My Right to Privacy?

Protecting your privacy is an important part of this study. A copy of this consent will be provided to you.

When you sign this consent form you give us permission to:

- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

The research team will collect and use only the information they need to complete the Study. This information will only be used for the purposes of this study.

This information will include:
- Type of leadership role
- Years of experience as a health leader
- Gender
- Employment status
- Questions related to your experiences and insights about the health needs of women and newborns

<u>Access to records</u>

The study principal investigator and members of the research team will see study records that identify you by name.

Other people may need to look at the study records that identify you by name. These might include:
- The IWK Research Ethics Board
- a research assistant who may assist with note taking during focus groups
- the transcriptionist who listens to the audio tapes from the focus groups and interviews and transcribes the information into type-written notes

Your name and contact information will be kept secure by the research team at Dalhousie

University. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study. Information collected for this study will kept as long as required by law. This could be 5 years or more.

If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. All information will be kept confidential and shared only with appropriate people involved with the study (i.e.: the principal investigator, the transcriptionist and the thesis supervisor and committee members). All information will be stored in a locked and secure cabinet. Study data entered on the laptop computer will be anonymized and both the word documents and the laptop computer will be password protected. The computer will be stored in a locked cabinet when not in use. For the qualitative component, study results will be presented as broad themes and when participant direct quotes are used, pseudonyms (e.g. fake names) will be used. Pseudonyms will also be used when participants are referring to others.

You may ask the study principal investigator to see the information that has been collected about you.

You may also be contacted personally by Research Auditors for quality assurance purposes.

WHAT IF I WANT TO QUIT THE STUDY?

If you chose to participate and later change your mind, you can say no and stop the research at any time. If you wish to withdraw your consent please inform the Principal Investigator. All data collected up to the date you withdraw your consent will remain in the study records, to be included in study related analyses. *A decision to stop being in the study will not affect your employment.*

Declaration of Financial Interest

The funder is paying the Principal Investigator and/or the Principal Investigator's institution to conduct this study. The amount of this payment is sufficient to cover the costs of conducting the study. The Principal Investigator has no financial interests in conducting this research study.

What about Questions or Problems?

For further information about the study contact Ms. Annette Elliott Rose, Principal Investigator and Phd Candidate. Ms. Elliott Rose's work telephone number is (902) 494-4333. If you can't reach the Principal Investigator, please refer to the attached Research Team Contact Page for a full list of the people you can contact for further information about the study.

The Principal Investigator is Ms. Annette Elliott Rose

Telephone: (902) 494-4333

What Are My Rights?

After you have signed this consent form you will be given a copy. If you have any questions about your rights as a research participant, contact IWK Research Services at (902) 470-7548. In the next part you will be asked if you agree (consent) to join this study. If the answer is "yes", you will need to sign the form.

Consent Form Signature Page

I have reviewed all of the information in this consent form related to the study called:

Centering Women and Newborns in Health Human Resources Planning: A needs-based approach to primary maternity health care in Nova Scotia

I have been given the opportunity to discuss this study. All of my questions have been answered to my satisfaction.

This signature on this consent form means that I agree to take part in this study. I understand that I am free to withdraw at any time.

_____ _____ ___ / ____ / __
Signature of Participant Name (Printed) Year Month Day*

_____ _____ ___ / ____ / __
Witness to Participant's Name (Printed) Year Month Day*
Signature

_____ _____ ___ / ____ / __
Signature of Investigator Name (Printed) Year Month Day*

_____ _____ ___ / ____ / __
Signature of Person Name (Printed) Year Month Day*
Conducting Consent Discussion

If the consent discussion has been conducted in a language other than English, please indicate:

_____ Language

_____ _____ ____ / _____ / ___
Signature of Translator Name (Printed) Year Month Day*

Note: Please fill in the dates personally

I Will Be Given a Signed Copy of This Consent Form

Thank you for your time and patience!

APPENDIX K: INTER-RATER RELIABILITY EXERCISE

A hybrid approach (deductive and inductive) to coding the data was used in the qualitative analysis (Fereday & Muir-Cochrane, 2006). First, deductive coding was used with 'a priori' codes and a codebook with clear definitions based upon the research purpose, the research questions, relevant literature and the theoretical and conceptual frameworks (Crabtree & Miller, 1999).   Secondly, three randomly selected interviews or focus groups (one from each of the different participant groups---providers, leaders and women) were coded and additional inductive codes were added (emergent codes) to enhance the analysis. Once all codes ('a priori' and emergent) were created, one of the interviews was randomly selected and a content analysis was completed by the principal investigator (PI) and two additional thesis committee members. The intent of the content analysis was to provide a systematic, replicable approach for categorizing the qualitative data based on a coding approach (Stemler, 2001). To check the transparency and reliable replication of the content analysis, several researchers code the same text data (Gibbert et al. 2008; Krippendorff, 2004). There is no agreement in the literature on the amount of data that should be analyzed for inter-coder reliability. From a resource perspective it is not feasible to have all data coded by several researchers. Hagelin (1999) suggests ten percent while Miles & Huberman (1984) consider five to ten pages of field notes to be sufficient. Campbell et al. (2013) started with one interview transcript and added up to ten percent of the overall sample as revisions to the codes were made to ensure adequate reliability. For the purpose of this study, the same interview was coded by the PI and two additional research team members. There was no need to add additional interviews. One additional emergent code was added based on consensus between the three coders. The code was policy. Once coding was completed, all the qualitative data was themed by the PI using an interpretive thematic approach outlined by Braun and Clarke (2006). The intent of the coding process was to recognize an important 'moment' in the data and to encode it prior to the process of interpretation (Boyatzis, 1998). The codes organized the data and then themes were identified and developed from them.

The inter-coder reliability exercise focused on steps one and two above of Braun and Clarke's (2006) approach to thematic analysis. In collaboration with thesis committee members and based upon relevant literature and the theoretical and conceptual

frameworks for the study as well as the study purpose and questions, 'a priori' codes were created to inform the coding approach. Emergent codes were added to the codebook from a random sampling of transcripts that were coded by the principal investigator. Once the coding exercise was completed, one new code, 'policy', was added to the codebook based on the discussion. The codebook is provided in Appendix L. These codes were used for the inter-coder reliability exercise with the PI and two thesis committee members. All three research team members coded the same transcript with a resultant, overall Kappa coefficient of 0.8238 based upon agreed analysis of codes relevant to and prominent in the transcript used. The inter-coder agreement ranged from 88.76-99.61% for specific coded sections of text.

APPENDIX L: CODEBOOK FOR QUALITATIVE ANALYSIS

'A Priori' Codes: developed based on the theoretical and conceptual frameworks, the literature review, the overall purpose of the research and the research questions.			
Primary Codes	**Definitions**	**Secondary Codes**	**Definitions**
System Issues Related Research Questions: Do women, care providers and/or health leaders and decision-makers identify gaps in services in the current models of primary maternity care? If gaps are identified, what service delivery approaches can be used to address the gaps in service?	*System Design* relates to the design of health care services (e.g. delivery models). Planning and design of services is usually determined in partnership between policy and decision makers and based upon current government commitments to meet health needs (Tomblin Murphy, 2007)	**Financial/ Economic** **Access** **Policy** **Interprofessional Collaboration (IPC)**	*Financial Resources* refers to the total amount of the Gross Domestic Product allocated to health. Resource allocation decisions take into account the levels and distribution of population needs and how HHR (including human and non-human resources) can meet those needs amidst competing system priorities (WHO, 2006; O'Brien-Pallas, 2002). McIntyre, Thiede & Birch (2009) define access as a multi-dimensional concept based on three dimensions: **availability** (or physical access), **affordability** (or financial access), and **acceptability** (or cultural access). Eg: the availability of care providers, transportation to services, geography, options for care delivery, culturally safe. Courses of action (and inaction) that affect the set of institutions, organizations, services and funding arrangements of the health system (Buse et al., 2005, p.5.). Orchard, Curran and Kabene (2005) define IPC as "a partnership between a team of health providers and a client in a participatory, collaborative and coordinated approach to shared decision-making around health and social issues" (p. 24).

Identified Health Needs	Birch and Eyles (1991) define need as "the ability to benefit from health care as implied by reducing the risks of deterioration in health status (or health-related quality of life) or improving the probability of improvements to health status (or health-related quality of life)" (p. 10).	Vulnerable/ Marginalized Populations	Hay et al. (2006) state that "vulnerable populations generally face one or more of the following: low employment or unemployment, lower level of education, older age, social dysfunction, homelessness or inadequate, overcrowded housing, mental health issues, long-term diseases, language and cultural barriers, transportation barriers, no health card, and/or substance use."
Related Research Questions: What are the primary maternity care needs of women and newborns in Nova Scotia? Are there differences in the identified primary maternity care needs between women, care providers, leaders and decision-makers and those needs identified using the needs-based HHR frameworks?		Unmet needs and gaps in care	San Martin et al. (2001) define unmet health care needs as "the difference between health care services deemed necessary to deal with a particular health problem and the actual services received." They may arise from system issues (e.g. access [see definition above]) or personal circumstances (e.g. SdoH below).
		Broad definition of health	The classic definition of health from the World Health Organization (1978) is that "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (p. 100).
	In keeping with a broader definition of health, health needs are also influenced by social, cultural, political, contextual, geographical, environmental and financial factors as	Social determinants of health (SDoH)	Raphael (2009) outlines the SDoH as: Aboriginal status, gender, disability, housing, early life income and income distribution, education, race, employment and working conditions, social exclusion, food insecurity, social safety net, health services, unemployment and job security. WHO (2011) defines SDoH as "the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the

	well as individual biological constitution and responses (Tomblin Murphy, 2007)		distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities - the unfair and avoidable differences in health status seen within and between countries."
		Changing maternal demographics and lifestyle factors	**Demographics** are defined in Merriam-Webster (2014) as "the qualities (such as age, sex, and income) of a specific group of people [or] a group of people that has a particular set of qualities." E.g.: age, race/ethnicity, education, obesity Lifestyle factors include experiences that have the potential to be modifiable (nutrition, smoking, substance use, getting enough sleep and/or exercise).
		Women's Experiences and Satisfaction with Primary Maternity Health Care	**Patient's satisfaction** can be based on eight domains of responsiveness: dignity, autonomy, confidentiality, clear communication, prompt attention, access to social support networks, quality basic amenities and choice of health care provider (Darby, Valentine, Murray and de Silva, 2000). Primary Maternity Health Care is defined as Primary Maternity Health Care is part of comprehensive primary care for and within a community. It is based on the philosophy that pregnancy and childbirth are natural processes that require a focus on health and should be individualized. Within the context of primary

			healthcare, it is an important way of working toward developing healthy communities. The continuum of primary maternity care includes pre- and post-conception, pre-natal and intra- and post-partum phases and includes such services as pre- and post-conception counseling (contraception, healthy lifestyle, risk reduction), prenatal education and care (birth planning and screening), supportive and skilled care during labour and birth and supportive and skilled care during the transition to self-care, infant care and family integration (Nova Scotia Advisory Committee on Primary Health Care Renewal, 2003).
Emergent codes (from coding three random transcripts: one from a provider, one from a health leader and one from a focus group with women).			
System	As above	**Paradigm Shift**	Philosophical and then operational shift from an illness-focused to a patient-centered care and broader health focus.
		Patient-Centered Care	"The patient must be at the centre of health care. Patient-centred care is seamless access to the continuum of care in a timely manner, based on need and not the ability to pay, that takes into consideration the individual needs and preferences of the patient and his/her family, and treats the patient with respect and dignity. Improving the patient experience and the health of Canadians must be at the heart of any reforms." (Joint position statement, CNA & CMA, 2011)

Provider Issues	**Focused specifically on the participant groups of interest for this study: physicians (included family physicians, obstetricians/gynecologists and maternal-fetal medicine specialists), nurses (in–hospital and community) and midwives**	**Shortages**	Identified gap in the number or types of health care providers required to provide care for pregnant women, new mothers and newborns.
Individual Care Encounters	**Any data related to the care received from perinatal health care providers (as described above)**	**Cultural Safety**	**Cultural safety**: refers to what is felt or experienced by a patient when a health care provider communicates with the patient in a respectful, inclusive way, empowers the patient in decision-making and builds a health care relationship where the patient and provider work together as a team to ensure maximum effectiveness of care. Culturally safe encounters require that health care providers treat patient s with the understanding that not all individuals in a group act the same way or have the same beliefs (NAHO, 2007).
		Cultural Competence	**Cultural Competence** is a set of "congruent behaviors, attitudes, and policies that come together in a system, agency, or among professionals that enables the system or professionals to work effectively in cross–cultural situations" (Nova

| | | Relational Care | Scotia Department of Health, 2005).

"The **relational model** proposes that the best environment for emotional growth and change is within the context of one or more mutual, empathic, authentic relationships. Such relationships allow individuals to better understand themselves and others, lead to the desire for more connection, and create a feeling of excitement and zest that stimulates people to action." (Markoff et al., 2005) |