POPULATION HEALTH AND PUBLIC HEALTH

ADOPTION OF A POPULATION HEALTH APPROACH IN SEXUAL HEALTH PROGRAMS AND SERVICES WITHIN PUBLIC HEALTH IN ONTARIO: A MULTI-PHASE MIXED METHODS STUDY.

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TITLE: Adoption of a Population Health Approach in Sexual Health Programs and Services within Public Health in Ontario: A Multi-phase Mixed Methods Study.

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LAY ABSTRACT

Traditionally, sexual health programs and services provided by Ontario public health units have focused on providing services for individuals, such as clinic services. More recently, there has been a shift in public health to apply a population health approach, which focuses attention on addressing the broader social and economic influences on health. This is viewed as important to improving the health of communities and disadvantaged groups within those communities. It is not known to what extent this shift in the approach to sexual health services or programs is being implemented within Ontario public health units. Therefore, it is important to understand how public health units have moved towards a broader approach in sexual health and what challenges they have faced. This thesis examines how much sexual health programs and services have implemented a population health approach within sexual health programs and services in public health units. It also explores what helped or hindered this change. Some key population health activities (e.g., using evidence to plan programs, offering clinic services) have been implemented but not all (e.g., working with community partners, participating in primary research). An example of a barrier to implementation is having a lack of resources (human and financial). New knowledge from this study can support public health organizations to apply a broader population health approach in sexual health programs and services.

ABSTRACT

Since 2018, the Provincial Government of Ontario has begun transformation within the public health sector, which emphasizes the increased application of a population health approach. The goal of this transformation is to maximize the contribution of public health in improving the health of Ontarians by moving from a reactive to a proactive model that is focused on prevention. To support this transformation the standards that guide the programs and services provided through public health units underwent modernization in 2018. The emphasis of the modernized standards is about expanding the scope and reach of public health, by supporting the role of population health in the development and delivery of programs and services. This thesis used quantitative data to examine the extent that a population health approach was implemented in sexual health programs and services in public health units across Ontario. Qualitative data was gathered to explore public health managers' and supervisors' perceptions of barriers and facilitators that influenced the implementation of this approach. A mixed-methods study was used to determine if the qualitative findings helped our understanding of the quantitative results. This multi-phase mixed methods study involved four sequential phases. Phase 1 and 2 involved instrument development which included a literature review, input from experts, and testing; in phase 3 instrument administration was conducted; and phase 4 involved interviews with sexual health managers and supervisors. A qualitative descriptive approach was used as part of phases 1, 2, and in phase 4 for data collection and analysis using focus groups and semi-structured interviews with sexual health managers and supervisors delivering sexual

health programs and services. The instrument was developed based on Health Canada's Population Health Key Elements Template with multiple activities listed under each element and was administered in phase 3. Descriptive statistics were used to analyze this data. The Consolidated Framework for Implementation Research (CFIR) guided the development of the interviews for phase 4 and the qualitative analysis. Quantitative data showed that some population health elements were implemented more than others. For example, *Address Determinants of Health and their Interactions* was implemented by most health units while *Employ Mechanisms for Public Involvement* was implemented by a few. Qualitative data revealed that most factors influencing the implementation of a population health approach fit within CFIR's domains of the *inner* and *outer setting*. For example *Address Determinants of Health and Their Interactions* and *Focus on the Health of Populations* were highly implemented by health units, due to factors such as organizational culture, and access to data. On the other hand, the elements *Collaborate Across Sectors and Levels* and *Employ Mechanism for Public Involvement* were less often implemented which were influenced by resources (e.g., human and financial) that were available to the health unit. This study fills an existing gap in the research and offers evidence of how to implement a population health approach within sexual health programs and services in public health.

Keywords

Public health; Sexual health; Population health; Instrument development; Instrument validation; Mixed methods

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LIST OF ABBREVIATIONS

AMOH - Associate Medical Officer of Health

CASP - Critical Appraisal Skills Programme

CFIR - Consolidated Framework for Implementation Research

CVI - Content Validity Index

HPPA - Health Protection and Promotion Act

LHIN - Local Health Integrated Network

MM – Mixed Methods

MOH - Medical Officer of Health

MOHLTC - Ministry of Health and Long-Term Care

OPHS - Ontario Public Health Standards

PHAC - Public Health Agency of Canada

PHN - Public Health Nurse

QD - Qualitative Descriptive

SDoH - Social Determinants of Health

SRH - Sexual and Reproductive Health

STBBI - Sexually Transmitted and Blood-Borne Infection

WHO - World Health Organization

DECLARATION OF ACADEMIC ACHIEVEMENT

This sandwich thesis consists of four articles submitted to peer-reviewed journals. Linda Frost is the primary author of all publications. She held the primary responsibility for the following: generation of research questions, research design, study implementation, data analysis, interpretation of results, writing of manuscripts, and the incorporation of feedback from her thesis committee co-authors and journal reviewers into the manuscript revisions. Dr. Ruta Valaitis, Dr. Michelle Butt, Dr. Susan Jack, and Dr. Noori Akhtar-Danesh are the co-authors of the manuscripts included in this sandwich thesis. All authors contributed to the study design, interpretation of findings, revising of manuscripts, and approval of the final manuscripts for publication.

CHAPTER ONE

Introduction

A public health sector that is responsive to Ontario's evolving health needs is required to ensure that the overall well-being of populations serviced by public health is improved. Critical to the success of a modernized public health system is the emphasis on population health. Population health has been an integral part of public health but incorporating a population health approach across programs within public health units has varied depending on the program (Cabaji, Musto, & Ghali, 2019; Lucyk & Mclaren, 2017; McLaren, 2019; Neudorf, 2012). In 2018, the new Ontario Public Health Standards (OPHS) were released with the intent to modernize the delivery of public health programs and services in Ontario, which included standards that emphasized the adoption and implementation of population health approaches. At a time when public health has seen a loss of its infrastructure, the rising use and cost of acute and long-term health care services have often overshadowed the health promotion and disease prevention activities led by public health. The modernization of the standards provides an opportunity to re-focus attention on approaches to address the prevention and health promotion efforts of public health (Cabaji et. al.; Hanncock & McLaren, 2019). One of the most significant requirements in these modernized standards is the increased focus on population-level care [Ministry of Health and Long-Term Care (MOHLTC), 2018]. This broader approach in public health recognizes the importance of intersectoral partnerships at the local level and among different levels of government, and the use of evidence for policy change that can

reduce inequities and influence health, to name a few (Butler-Jones, 1999; Hanncock & McLaren).

The public health community could benefit from building on existing knowledge and expertise to develop a more sophisticated understanding of how a population health approach can be implemented within sexual health programming in Ontario public health units. The successful implementation of a population health approach in sexual health programs and services demands a change in day-to-day operations within health units, requires realignment in how public health stakeholders think about and conceptualize public health, and requires an investment in the development of new skills and competencies in the existing public health workforce (Thompson, 2016). Documenting the shift in how sexual health programs and services are delivered, along with identifying associated barriers and facilitators influencing this process, is important to understand the activities required to implement a population health approach. Historically, the emphasis has been on providing clinical services for the testing and treatment of sexually transmitted and blood-borne infections (STBBIs) in sexual health programs and services in Ontario public health units (Baum and Fisher, 2014; Brassolotto et al., 2014; Lucyk and McLaren, 2017; Neudorf, 2012). This focus has left few resources to operationalize a population health approach in sexual health. In addition, the legislative framework that mandates public health to manage STBBIs is not aligned with a population health approach, because it focuses on the management of people with STBBIs rather than on prevention (Brassolotto et al.; Lucyk and McLaren). Rising costs associated with the treatment of STBBIs and subsequent morbidity that can occur call for a new approach [Public Health

Agency of Canada (PHAC), 2013]. Translating population health frameworks and evidence into actionable activities that public health professionals can implement to effect change and influence the health of the populations served by public health units is crucial. However, how population health can be translated into consistent action, especially in sexual health, is not well understood (Butler-Jones, 1999; Ivankovitch, Fenton, & Douglas, 2013). In addition, it is important to understand implementation barriers and facilitators to a population health approach in sexual health programs and services as these factors can help determine its successful application. Therefore, the purpose of this study was to measure the extent that a population health approach was implemented in sexual health programs and services within Ontario's public health units and to examine the barriers and facilitators that influenced the implementation of a population health approach from the perspective of sexual health managers and supervisors. Following this, additional analysis and integration were conducted to determine if the qualitative findings from the key informant interviews with sexual health managers and supervisors helped to deepen our understanding and interpretation of the quantitative results.

Overall Research Process

This four-phase sequential MM design (qual→qual→quan → QUAL) focused on developing a questionnaire based on the literature and focus groups with public health professionals (phase 1), along with validation (phase 2), administration of the questionnaire (phase 3), and follow-up interviews with sexual managers and supervisors (phase 4). The results from this study contribute 1) a new validated questionnaire to

measure the extent that population health actions have been taken by health units, and 2) empirical data on what population health elements have been highly implemented or have limited implementation within public health sexual health programs and services in Ontario, Canada. This can inform public health broadly about where investments need to be made or areas that can be further strengthened. Furthermore, this study was timely in the immediate aftermath of the modernized OPHS because it can offer a valuable look at the extent of implementation of population health approaches in sexual health and provide an opportunity for future research in measuring any change over time in Ontario's public health system. Although the study was conducted before the COVID-19 pandemic, it has highlighted the need for population-level interventions to achieve overall well-being in the public (Evans & Bufka, 2020; Sun, Lin, & Operato, 2020). Following the pandemic, the results of this study can offer guidance to public health, as they look towards re-focusing time and resources to the development of strategic plans or operations to implement or enhance population health activities within their programs and services. This information can support public health units in their programs if a future pandemic occurs by offering comprehensive approaches that can address the needs of the total population and at-risk subgroups (Evans & Bufka; Sun et al.).

Research Questions

For this four-phase study, questions were asked for the quantitative and qualitative strands (e.g., qual, qual, quan, QUAL), as well as an overarching mixed methods research question (Creswell & Plano Clark, 2011). The research questions that were answered were:

1. To what extent have the key elements of a population health approach been incorporated into sexual health programming in Ontario public health units? [Phases 1 (qual) and 2 (qual) to support instrument development for implementation in Phase 3 (quan)]
2. How do managers, supervisors, or staff working in Ontario public health units describe the factors that they perceive influence the implementation of the elements of a population health approach within sexual health programs and services? [Phase 4 (QUAL)]

The mixed methods research question that was addressed was:

3. In what ways do qualitative interviews with managers, supervisors or staff contribute to the understanding of what has been integrated from a population health approach into sexual health within Ontario public health units?

Definitions

There are various definitions of *population health*, with no single definition being widely accepted (Kindig & Stoddart, 2003). Models of population health that exist have distinct variations in their fundamental principles, which influence how population health is defined (Kindig & Stoddart). Given this, the Public Health Agency of Canada's definition of population health was chosen for this thesis due to its relevance to Canada and roots in public health, which are well aligned with this study. Population health is an approach to health that aims to improve the health of the entire population and reduce health inequities among population groups. To reach these objectives, population health

looks at and acts upon the broad range of factors and conditions that have a strong influence on our health (PHAC, 2013). A *population health approach* is defined by the Public Health Agency of Canada (Health Canada, 2001), as:

> "An approach that addresses the entire range of individual and collective factors that determine health. Population health strategies are designed to affect whole groups or populations of people. The overarching goals of a population health approach are to maintain and improve the health status of the entire population and to reduce inequities in health status between population groups" (p. 2).

For this thesis, *public health* is defined by PHAC (2010) as:

> "An organized activity of society to promote, protect, improve, and when necessary, restore the health of individuals, specified groups, or the entire population. It is a combination of sciences, skills, and values that function through collective societal activities and involve programs, services, and institutions aimed at protecting and improving the health of all people. The term 'public health' can describe a concept, a social institution, a set of scientific and professional disciplines and technologies, and a form of practice. It is a way of thinking, a set of disciplines, an institution of society, and a manner of practice. It has an increasing number and variety of specialized domains and demands of its practitioners an increasing array of skills and expertise" (p. 6).

Conceptual Frameworks

Population health is a complex concept that can be challenging to operationalize. The *Population Health Key Elements Template* developed by Health Canada (2001) provides a guide for organizations like public health to implement a population health approach. The template was generated through an understanding of the components of population health and the evolution of our thinking about health (Health Canada, 2001). The template identifies eight interacting key elements and associated activities when looking at implementing a population health approach. This template provided the structure for the creation of the questionnaire that was developed and administered as part

of this research to measure the extent that a population health approach was implemented. As well, when looking at implementing population health interventions to achieve better health outcomes, understanding the barriers and facilitators that influence implementing those interventions is important. For that reason, the *Consolidated Framework for Implementation Research* (CFIR) (Damschroder et al., 2009) was chosen to inform the QUAL strand of this study. CFIR was used in the development of the interview guide and in “sorting and organizing” data in the qualitative analysis (Phase 4). Both frameworks were used in the creation of the joint display for the mixed methods analysis and interpretation.

Study Context

This study was conducted in Ontario, Canada. In Ontario, 34 public health units offer a combination of *sexual health services* that are aimed at providing direct care for testing and treatment of STBBIs and birth control and *sexual health programs* that focus on health promotion campaigns and collaborating with external partners. These programs can differ between health units as the resources and capacity available differ based on the size and geography of the health unit. In sexual health programs and services, public health nurses (PHNs) make up a large proportion of the workforce, with some health units utilizing nurse practitioners and/or physicians to provide clinic services. In addition, the governance structure of public health in Ontario is under the MOHLTC, which is responsible for the public health standards that guide the programs and services offered by public health (MOHLTC, 2018; Ministry of Health, 2019). As of 2019, most mandated

public health programs have provincial cost-sharing up to 70% covered by the province and 30% by the municipality such as infectious diseases, with some programs having 100% provincial funding such as Smoke-Free Ontario (Lyons, 2016). Boards of health have the responsibility for delivering local public health programs and services within its geographic borders with a Medical Officer of Health (MOH) that is accountable to the board of health for the delivery of programs and services within the health unit (Ministry of Health; Lyons). As well, to improve healthcare in Ontario, the provincial government announced the establishment of Ontario Health to connect health care providers with patients and community services (Ministry of Health). The Ontario Health Team was rolled out at the time of data collection for this study.

Literature Review

Existing knowledge and gaps in understanding a population health approach within public health and sexual health programs and services are explored in this literature review. This review covers three primary content areas that are presented in four parts: 1) the history of population health in public health within Canada and internationally, 2) barriers and facilitators to implementing population health in public health, 3) population health and sexual health in Canada and internationally, and 4) human resources in public health and sexual health. Comparisons between the use of a population health approach in public health and sexual health within Canada and other westernized countries (e.g., Australia and the UK) that have a similar public health structure to Canada are made. However, the main discussion focuses on the Canadian context.

Part 1 of the literature review examines the history of population health within Canada's healthcare system and how a population health approach was incorporated into public health. Population health approaches within public health systems of service delivery are examined from an international perspective, looking specifically at the UK, Australia, and New Zealand. These three countries were chosen because they were cited in the literature as being early adopters of a population health approach in public health policy (Health Canada, 2001; Raphael, 2008). Grey literature was included that focused on policies (e.g., government documents, reports) related to the history of population health within Canada and internationally.

Part 2 critically reviews the literature, identifying barriers and facilitators to implementing a population health approach within public health. Papers published in the past 12 years were examined given the minimal focus on population health before the release of the 2008 public health standards (MOHLTC, 2008). Papers were included if they discussed any one of the eight key elements of a population health approach (Health Canada, 2001) and associated implementation barriers and facilitators for that element. These elements include: *Focus on the Health of Populations, Address the Determinants of Health, Base Decisions on Evidence, Increase Upstream Investments, Apply Multiple Strategies, Collaborate across Sectors and Levels, Employ Mechanisms for Public Involvement, and Demonstrate Accountability for Health Outcomes* (Health Canada, 2001).

Part 3 explores the evolution of sexual health within public health in Canada and countries that have implemented a national sexual health policy. Papers published in the

past 10 years that describe how sexual health programs can implement the key elements of a population health approach (Health Canada, 2001) are discussed. Papers were included if they: 1) discussed population health within sexual health programs, OR 2) discussed sexual health within population health AND addressed at least one element of the population health key elements by describing or explaining how the element is or should be used in sexual health programming, OR 3) discussed sexual health policy internationally concerning population health. Part 4 focuses on the role of health professionals such as PHNs, nurse practitioners, and epidemiologists within sexual health in public health.

Part 1: History of Population Health in Canada and Internationally

Four key documents reveal the progression of population health within Canada: 1) Lalonde Report (1974); 2) Epp Report (1986); 3) Ottawa Charter (1986); and 4) Population Health Key Elements (2001). These documents provide an understanding of how population health developed and influenced healthcare. Information contained in these reports provided Canada and beyond with a new perspective on addressing the health of the entire population. They were the start of Canada's historical journey from medically-focused healthcare to a population health approach, which was essential in shaping the role of public health.

The Lalonde Report (1974) was revolutionary in acknowledging that the well-being of individuals is based on more than having access to healthcare. This landmark document first introduced population health by recognizing that factors outside of human

biology, like environment and lifestyle, can influence the health of populations (Thompson, 2016). This belief was the beginning of public health interventions that emphasized individual-level behaviour change such as condom use and smoking (Health and Welfare Canada, 1974; Robertson, 1998). Despite the benefits of this approach in raising the health status of Canadians, it was criticized for failing to acknowledge socioeconomic barriers as a determinant in healthy lifestyle choices (Frohlich & Potvin, 2008; Robertson, 1998).

The Epp Report (1986) and the Ottawa Charter (1986) were influenced by the notion that socioeconomic barriers are influential in shaping lifestyle choices. These documents outlined health promotion strategies that focused on socioeconomic factors and reducing inequities. The Epp Report (1986) and the Ottawa Charter (1986) created a vision of improving the health of Canadians by focusing on community-level strategies. As a result of these documents, public health saw a radical change in their programming that moved from disease prevention to capacity building (Kickbusch, 2002; Potvin & Jones, 2011).

In 2001, as noted earlier, Health Canada introduced the *Population Health Template,* which renewed the approach started by the *Epp Report* (1986) and the *Ottawa Charter* (1986). In this template, Health Canada identified population health as a key approach for policy and program development (Health Canada, 2001).

These reports were significant in uniting a population health approach to achieve better health for Canadians (Thompson, 2016). Health promotion became the focus of public health, providing opportunities for individuals to increase control over their health

(Kickbusch, 2002). However, the implementation of a population health approach in public health fell short of what was expected (Raphael, Bryant & Curry-Stevens, 2008). This approach required ongoing funding and commitment by all levels of government but competing priorities in public health caused population health to take a back seat (Thompson, 2016). Canada was influential in establishing a population health approach in healthcare by contributing four key documents that revolutionized health in the nation. It has been argued that despite efforts to establish population health as an important approach for improving the health of Canadians, public health practice remained mostly focused on behavioural strategies (e.g., promoting condom use) rather than addressing the broader social determinants of health (Raphael, 2003). Research to further understand the barriers and facilitators to incorporate a population health approach in public health remains a critical gap.

Outside of Canada, the UK developed a population health approach which was influenced by three key documents: 1) *Whitehall I* (1978), which introduced the notion that lower pay was associated with higher mortality; 2) *Sick Individuals and Sick Populations* (1985), which presented the concept of prevention; and 3) *Whitehall II* (1991), which brought health inequality to the forefront of population-level research (Lucyk & McLaren, 2017). These documents led the way for the *Marmot Report* (2010), which set out a framework of six policy objectives with two goals: to create a society that maximizes individual and community potential and to ensure social justice, with the notion that health and sustainability are at the heart of all policies (Marmot, 2010). The success of the UK in attaining a population health approach is directly related to government-endorsed policies

that address these health issues (Raphael et al., 2008). In comparison to policy activity in the UK, Canada has seen little public policy to address population health (Raphael, Curry-Stevens & Bryant, 2008). There have been changes in the UK that led to divestment in public health, inhibiting the ability of public health to function and influence outcomes (Brayne & Hickman, 2020). The fragmentation that has existed between public health and other healthcare services has influenced the coordination of services for sexual health and affected access to contraception, managing STBBIs, and offering services for people with HIV or at risk of HIV in the UK (Brayne & Hickman). What has also become clear is the need for stronger leadership roles for public health and public health expertise among those leaders. This will assist with creating a more coordinated approach at multiple levels, which is required to ensure action on population health (Buck, Baylis, Dougall, & Robertson, 2018).

In Ireland in 2013, the Department of Health released a national framework, *Healthy Ireland,* to improve the health and wellbeing of residents. The framework uses a population health approach to improve collaboration across sectors and to implement evidence-based policies at government, sectoral, community, and local levels (Department of Health, 2013). In Australia and New Zealand, there has been more focus on population health in comparison to Canada (Raphael et al., 2008). A key priority area for Australia's Population Health Division in 2000-2001 was the effective integration of a population health approach within Australia's health system (New South Wales Government, 2000). The focus was to improve public health efforts to reduce disparities in health status between social groups and to influence the underlying social, economic, physical, and

biological determinants of health (NSW Government, 2000). Public health is critical to the contribution of population-level health through assessment of health needs, policy formulation, and assurance of the availability of services (Mah, 2019). To determine needs at the population level, an integrated approach is vital to understanding the overall picture of issues across sectors (Mah). Fragmentation of health services, including public health, can lead to duplication of work and diversion from the core function of an organization.

Part 2: Barriers and Supports to Implementing a Population Health Approach in Public Health

The application of a population health approach requires a realignment of programs and services in public health, such as sexual health, to achieve changes outlined in the standards (MOHLTC, 2018). However, this level of change is influenced by barriers and facilitators that can impact implementation. The results of the literature review of barriers and facilitators impacting the implementation of a population health approach aligned with four key elements of a population health approach including *Addressing the Determinants of Health, Collaboration across Sectors, Employ Mechanisms for Public Involvement, and Base Decisions in Evidence*. Literature related to these elements will be presented under their respective sub-headings. No literature was identified that related to the barriers and facilitators in implementing four elements including - *Focus on the Health of Populations, Increase Upstream Interventions, Apply Multiple Strategies and Interventions, and Demonstrate Accountability for Health Outcomes* - and are thus not included. All studies were appraised using the Critical Appraisal Skills Programme (CASP) tools (See

Appendix A) to assess research rigor. All included papers were qualitative studies except for one systematic review. Three of the qualitative studies were Canadian, one was conducted in Europe, and the systematic review explored international literature. None of the papers explored sexual health specifically, indicating an important research gap.

Addressing the Determinants of Health and their Interaction

This element of a population health approach is refocusing the activities of public health programs and services from “lifestyle choices” to addressing underlying causes (e.g., social, economic, and political) that create inequalities (Brassolotto, Raphael & Baldeo, 2014). Public health has a role in applying strategies to address the social determinants of health (SDoH) to assist with the underlying causes of ill health within the communities they serve (Brassolotto et al., 2014).

Barassolotto and colleagues (2014) conducted a study using qualitative interviews with Medical Officers of Health (MOH), Associate Medical Officers of Health (AMOH), and lead staff who directly address Social Determinants of Health (SDoH). The study was conducted in nine public health units in Ontario to understand supports and barriers that affected the degree of implementation of SDoH within each health unit. Barriers were classified into factors that relate to 1) knowledge and understanding of SdoH, and 2) factors that stem from the organizational structure of health units. Concerning knowledge and understanding of SDoH, lack of clarity around the reach, application, and legitimacy of this broader approach was an implementation barrier for health units. As well, addressing SDoH is a long-term investment that does not produce immediate results compared to historical behavioural and lifestyle approaches, which are familiar to public

health. The philosophy of leaders regarding the benefits of SDoH and the funding and staffing challenges to maintain the momentum necessary to address SDoH were organizational influences. Others included the bureaucratic nature of public health with their tight procedures and policies; slowness in decision making; and being up-focused (e.g., accountable to the board of health; Brassolotto et al., 2014).

Supports identified in the study that assist with implementing SDoH within health units are: 1) ensuring effective communication to provide clarity on what should be done by public health to address SDoH; 2) having individuals within public health providing leadership and direction in addressing SDoH; and 3) a supportive political environment within each community serviced by public health units (Brassolotto et al., 2014). Critical appraisal of this study indicates it was well conducted with a clear statement of the aim of the research. It used an appropriate study design and rigorous data analysis. A limitation was that it explored views from health unit leadership and neglected to obtain insights from front-line staff. Results apply to the current study because Brassolotto and colleagues (2014) studied public health units in Ontario and looked at implementing approaches to address SDoH, which is a population health key element.

Collaborate Across Sectors and Levels Collaboration.

Among health care providers, government, and other sectors that influence health is an important element in a population health approach. Collaboration ensures a coordinated effort in the development and implementation of programs and services within public health. Sibbald and colleagues (2012) conducted a qualitative study using semi-

structured interviews with staff in Ontario public health units. Most staff were PHNs, with some health promoters, and public health nutritionists/dietitians. This study identified collaboration partners involved in program planning as well as facilitators and barriers that affected their collaboration. Three types of partnerships were found: 1) partnerships internal to the public health unit (internal to the health unit); 2) partnerships internal to public health (outside the health unit with public health professionals from other health units); and 3) external partnerships (external to both the unit and the public health system). Being in close geographic proximity to stakeholders and having a previous relationship with stakeholders are supportive factors in forming partnerships. Smaller health units fostered cohesion among public health staff that assisted with establishing ties with partners. Barriers included the time to develop partnering relationships, conflicting ideas that can occur between the partners, and staff turnover in partnering organizations resulting in the loss of knowledge about the purpose of the partnership (Sibbald et al., 2012). The study by Sibbald et al. (2012) was well conducted, had a clear research aim, and applied an appropriate study design and rigorous data analysis. Results inform the current study since the research involved public health units in Ontario. However, it is not clear which programs the interviewees came from, so the applicability to sexual health programming is not known.

Employ Mechanisms for Public Involvement.

Public involvement is a vital element of a population health approach that ensures that health care being delivered meets the needs of those intended. There is convincing

support for public participation in the assessment, planning, implementation, and evaluation of health care programs and services (Aston, Meager-Stewart, Edwards & Young, 2009). However, creating an environment of public participation that is successful, poses challenges. Aston and colleagues (2009) conducted a qualitative study that involved interviewing PHNs in eastern Canada to understand how to achieve public participation. This study looked at barriers and supports to achieving public participation. Four main barriers were identified that influenced PHNs' ability to engage in public participation. They were: 1) insufficient funding for health promotion and prevention programs; 2) lack of understanding from politicians, managers, and citizens about PHN's role in facilitating public involvement; 3) increased workload demands that conflicts with being able to carry out mandated public health programs; and 4) not having a presence at provincial planning tables. Understanding from public health leaders about the importance of public participation created a supportive environment for PHNs to engage in this element (Aston et al., 2014). This study had a clear statement of its research aims. It used an appropriate study design and rigorous data analysis. The study involved PHNs working in Nova Scotia, thus the transferability of results to the current study is somewhat limited. Specifically, the program areas explored did not include sexual health and public health in this province is governed by a Regional Health Authority, which differs from Ontario wherein public health reports directly to the province.

Base Decisions in Evidence.

The use of evidence at all stages of policy development is important in a population health approach. Public health needs to invest in research and disseminate findings to assist with policy uptake. Van de Goor and colleagues (2017) conducted a qualitative study that utilized semi-structured interviews with policymakers (national, regional, or local), researchers, public sector officers, or other influential stakeholders from six European countries. Three common facilitators and barriers to evidence-based practice in public health policy across countries were found that were organized under three domains:

1) Organizations, systems, and infrastructure, which showed that facilitating factors for organizations to use evidence-based practice was support of the administration, positive attitudes from managers, and training of staff in the use of evidence in policy-making (Van de Goor et al., 2017). Barriers included a lack of simultaneity between research and policy-making, insufficient resources, financial constraints, and the existence of research evidence that does not apply to policies being created.

2) Access and availability of relevant evidence revealed that tools and methodologies that allow for applicable evidence were viewed as a facilitating factor. Not having access to relevant evidence on local problems or policy context, affects stakeholders' ability to make decisions.

3) Networking and collaboration between researchers and policy-makers indicated that collaboration between researchers and policy-makers, face-to-face interactions between researchers and policy-makers, links between academia and policy-making organizations, and the interests and values of stakeholders were considered

facilitators and barriers to the use of evidence in policy-making (Van de Goor et al.).

The research aim of Van de Goor et al.'s (2017) study was well-defined, had an appropriate study design, and rigorous data analysis. It examined the use of evidence in developing health policies, which is relevant to this study. A limitation was that it only included the views of policymakers in public health. As well, the transferability of results is somewhat limited for the current study given a lack of focus on sexual health programs and the European context which may have different public health structures.

A systematic review by Oliver and colleagues (2014) also addressed facilitators and barriers to using evidence in the state, national, and regional policy that was not specific to public health. They categorized facilitators and barriers into five themes including 1) organizations and resources; 2) contact and collaboration; 3) research and researcher; 4) policymaker characteristics; and 5) policy characteristics. For organizations and resources, insufficient access to research, lack of managerial support, poor dissemination of research, and cost were barriers to the use of evidence; while availability and access to research and managerial support were facilitators. For the theme -contact, and collaboration- a relationship between researchers and policymakers was a strong facilitator for using evidence, with lack of opportunity to use research evidence being considered a barrier. Access to research that is relevant and reliable, along with researchers that have a solid grasp of the policy process, supported research uptake. However, differing priorities between researchers and policymakers were a barrier. Awareness of research and the research skills of policymakers were considered facilitators to utilizing

research. However, a lack of awareness of research and research skills of policymakers were found to be barriers. Competing pressures (e.g., economic and political) hindered the development of evidence-based policy (Oliver et al., 2014). This systematic review had a focused research question, included appropriate studies that addressed the research question, and had a clear presentation of results. However, a large proportion of the studies were from low- and middle-income countries limiting the transferability of results to the current study.

In summary, no papers discussed all eight population health key elements concerning public health. The literature addressed four population health elements including *Address the Determinants of Health and Their Interactions, Base Decisions on Evidence, Collaborate across Sectors and Levels,* and *Employ Mechanisms for Public Involvement.* Overall, the studies were well-designed but were somewhat limited in terms of transferability to the public health sector in Canada.

Part 3: Population Health and Sexual Health in Canada and Internationally

This third section of the literature review addresses how the eight population health elements (Health Canada, 2001) are incorporated in sexual health programming. Literature that addressed population health in sexual health programming was extremely limited. Giami (2002) provides a historical evolution of sexual health within public health in Canada. He identified that including sexual health within public health broadened its scope from individual clinical care to a population health approach that emphasized education, epidemiology, and prevention. This new way of thinking fits the conceptual framework of

health promotion that was developed in the *Ottawa Charter* (1986). Despite the influence that Canada had in leading a population health approach, it was static in applying it to a national sexual health strategy. Currently, Nunavut is the only territory in Canada that has a sexual health framework, indicating that there is work that can be done to improve sexual health care across other parts of Canada (Department of Health and Social Services, 2012).

Changing the direction of sexual health programming to apply a population health approach is evident outside of Canada. In 1995, WHO/Europe developed a project that focused on sexual and reproductive health (SRH) (World Health Organization [WHO], 2001). This project aimed to reduce variation in the sexual and reproductive health status of residents in Western, Central, and Eastern Europe (WHO, 2001). Fifty-three European states, along with 20 other countries, utilized the WHO European regional strategy on SRH to guide, develop, and sustain their own national sexual health strategy; this included Ireland and the UK (WHO, 2016). Australia and New Zealand also have national sexual health strategies (New South Wales, 2013; New Zealand Sexual Health Society, 2011). These strategies aim to improve the sexual health of residents in those countries by 1) addressing wider determinants of health to reduce inequalities, 2) building an honest and open culture about relationships and sex, and 3) recognizing that sexual ill-health affects society (New South Wales, 2013; New Zealand Sexual Health Society, 2011).

This review highlights the gap in the literature that examines a population health approach to sexual health programming within public health. Fragmentation of sexual health programming is evident, especially for sexual and gender minority individuals, which leads to inconsistent and inadequate prevention strategies (Halkitis & Krause,

2020). A closer look at the literature is needed to see how population health strategies can be applied to sexual health and operationalized in practice.

Population Key Elements in Sexual Health.

The *Population Health Template* (Health Canada, 2001) provides a comprehensive guide for implementing a population health approach. How this can be used in sexual health needs to be better understood. The literature was examined to find papers that explain how the key elements can be operationalized in sexual health programming. Findings will be presented organized under the eight key elements of a population health approach.

Focus on the health of the population. Three papers; including a commentary (Swartzendruber & Zenilman, 2010), a report (Ivankovich, Fenton, & Douglas, 2013), and a policy paper (WHO, 2010), addressed this element. These papers highlight the importance of considering social norms, such as stigma, to determine whether people access sexual health services (Swartzendruber & Zenilman; WHO). Swatrzendruber and Zenilman (2010) argue that reducing stigma can lower STI rates and social norms that are positive towards sexuality can promote healthy behaviours. Investing in sexual health by providing essential information to young people can improve sexual health in the long term (Ivankovich et al.; WHO).

Address the determinants of health. Four papers; including one commentary (Swatrzendruber & Zenilman, 2010), a report (Ivankovich et al., 2013), a summary (Dean, Williams, & Fenton, 2013), and a policy paper (WHO, 2010) addressed this element.

These papers emphasized that sexual health services need to offer equal access to people of all ages, gender, and marital status; and that sexual health services should be confidential, free from discrimination, provide access to sexual health information, and offer free to low-cost birth control and condoms (Swartzendruber & Zenilman; WHO). Ivankovich, Fenton, and Douglas (2013) and Dean, Williams, and Fenton (2013) recommend that sexual health services direct efforts towards individuals, communities, or societal factors that influence sexual health outcomes. For example, they suggest focusing on drug and alcohol marketing, education, and employment, which can reduce STIs. These interventions require capacity building, leadership, strategic partnerships, and communication to be successful (Dean et al.).

Base decisions on evidence. Three papers, including a report (Ivankovich et al., 2013), a summary (Douglas & Fenton, 2013), and a policy paper (WHO, 2010), focused on this element. They called attention to the fact that disease-focused programs provide limited success and a more holistic approach to sexual health is required to positively affect public health problems related to sexual behaviour (Douglas & Fenton; Ivankovich et al.). Douglas and Fenton (2013) mention that healthy adolescent and young adult relationships are crucial in preventing STIs and unintended pregnancy. Additionally, using research to address gaps, and ensuring that stakeholders at all levels support evidence-based policies related to sexual health are crucial in applying approaches that are supported by evidence (Douglas & Fenton; Ivankovich et al.).

Increase upstream investments. Four papers, including a report (Ivankovich et al., 2013), a policy paper (WHO, 2010), a commentary (Swartzendruber & Zenilman, 2010),

and a summary (Douglas & Fenton, 2013), discuss this element. These papers identified the importance of using laws and policies to support factors that maintain a sexually healthy society (Ivankovich et al.; WHO). Examples of this provided by Ivankovich et al. (2013) and WHO (2010) included legal protection against discrimination and stigma for populations such as the transgender community. A national campaign that recognizes the importance of sexual health in the overall well-being of individuals, families, and communities, along with the promotion of accurate sexual health information, will promote responsible sexual behaviour (Ivankovich et al.; Swartzendruber & Zenilman). For example, Douglas & Fenton (2013) emphasize that the promotion of sexual health complements traditional disease control and prevention.

Apply multiple strategies. Four papers; two summaries (Dean et al., 2013; Douglas & Fenton, 2013), a report (Ivankovich et al., 2013), and a policy paper (WHO, 2010), identified the necessity to apply multiple strategies. These papers emphasized the need to have integrated sexual health services that are available to the public, prioritize health equity, reflect population needs, and are provided by trained health professionals (Dean et al.; Ivankovich et al.; Swartzendruber & Zenilman, 2010; WHO). The WHO (2010) provides a list of seven services that should be included in sexual health care. Some of these services extend beyond what might be provided in standard sexual health care (e.g., STI testing, treatment, and education). WHO (2010) identifies sexuality counseling, diagnosis and referral for sexual dysfunction, and identification and referral for victims of sexual violence as components of sexual health services.

Collaborate across sectors and levels. Four papers; including a summary (Douglas & Fenton, 2013), a report (Ivankovich et al., 2013), a commentary (Swartzendruber & Fenton, 2010), and a policy paper (WHO, 2010) address this key element. These papers highlight that sexual health services should be delivered in partnership with different sectors (Dean et al., 2013; Ivankovich et al.; Swartzendruber & Zenilman, 2010; WHO, 2010). Ivankovich et al. (2013) suggest partnerships should include academia and business to provide a broader focus. Education and training for clinicians and non-clinicians on sexual health across the lifespan are necessary to reduce the stigma that surrounds STIs and improve the health outcomes of the population (Dean et al.; Ivankovich et al.; Swartzendruber & Zenilman; WHO).

Employ mechanism for public involvement. Three papers; including a commentary (Swartzendruber & Zenilman, 2010), report (Ivankovich et al., 2013), and policy paper (WHO, 2010) discussed this element. These papers indicated that knowledge of having an open discussion on sexual health with the public assists in reducing stigma and creates a more positive public orientation towards sexual health (Ivankovich et al.; Swartzendruber & Zenilman; WHO).

Demonstrate accountability for health outcomes. A summary (Douglas & Fenton, 2013) discussed demonstrating accountability for health outcomes. These authors discuss moving beyond collecting risky behaviours and adverse outcomes in sexual health. They suggest measuring sexual relationships, sexual experiences, discrimination, and well-being concerning sexuality (Douglas & Fenton).

Summary. Given these eight elements, new skills and knowledge are needed to implement a population health approach in sexual health. Exploration of the current role of health professionals in sexual health will be discussed next.

Part 4: Health Professionals in Sexual Health Programs in Public Health

With a shift to a population health approach, health professionals in sexual health likely will need different capabilities. As the new standards are incorporated, understanding the role of health professionals is needed, as new skills and knowledge may be required to address population health and to inform expanded roles for health professionals. Professional development and training may be needed to equip staff in the post-change environment to address a population health approach in sexual health programming. As well, expanding the roles of health professionals in sexual health might be needed to allow them to apply this broader approach. The groups within sexual health that will likely be affected by this change are 1) sexual health managers, 2) public health nurses, 3) nurse practitioners, and 4) epidemiologists.

In looking at integrating population health key elements (Health Canada, 2001), sexual health managers are in a unique position to facilitate this transformation, as they are the link between executives and frontline staff. The leadership skills of sexual health managers offer a pivotal element in prioritizing and implementing the goals of the organization (Anthony et al., 2005). Core competencies for managers in public health units include planning; implementing and evaluating policies and programs; making recommendations for policy and program development; and using biostatistics and

epidemiology (Ontario Public Health Association, 2009). Sexual health managers are vital in the integration of the new standards. They will bring suggestions to the executive team from the front line, provide PHNs with insight into the changes that will happen, and be charged with the responsibility of applying the proposed changes.

The largest groups of health professionals working in sexual health are PHNs, with sexual health clinics as the main practice area (Danaher et al., 2012). PHNs are registered nurses with a baccalaureate degree in nursing who work with nurse practitioners and epidemiologists to deliver public health services (Danaher et al.). Nursing practice for PHNs is guided by core competencies that set out requirements to function in the role. PHNs must synthesize knowledge from public health and nursing science and use evidence to guide decisions on program development [Community Health Nurses (CNS) of Canada, 2009]. Partnership and collaboration are also part of PHN's core competencies. Partnering with individuals within public health and community agencies to improve the health of the public is part of the role (Community Health Nurses of Canada). PHNs are responsible for initiating strategies that address determinants of health and are accountable to the individuals and community they serve (Community Health Nurses of Canada). PHNs need to effectively communicate with individuals, families, groups, communities, and colleagues (Community Health Nurses of Canada). Finally, they need to be leaders within their programs, to build capacity, improve performance, and enhance the quality of their work environment (Community Health Nurses of Canada).

The emergence of the nurse practitioner role in Ontario public health units was an innovative initiative to improve service delivery for public health clients. In 2010, 29 nurse

practitioners were working in 19 public health units in Ontario (de Guzman, Ciliska, & DiCenso, 2010). Of these, 71.4% were practicing in sexual health, where their role was focused on providing clinic services (de Guzman et al.). de Guzman and colleagues (2010) found that 69.4% of the time per day was focused on the provision of clinical care with only 7% spent on education, and the remainder spent on administration (e.g., clerical). The role of the nurse practitioner promotes the use of evidence-based practice and research while assisting PHNs to critically review research and apply it to practice (Middlesex-London Health Unit, 2005). The role of PHNs and nurse practitioners in sexual health service delivery is concentrated in direct clinical care, through sexual health clinics. The movement away from sexual health clinics to population health will see more of a role for PHNs and nurse practitioners in health promotion.

Epidemiology is the scientific underpinning of public health and describes health and disease in populations. This information is essential for formulating effective public health initiatives used to prevent disease within a community (Savitz, Poole & Miller, 1999). Epidemiological analysis determines patterns of disease within communities to assist programs like sexual health to plan programming (Savitz et al.). As such, the role of the public health epidemiologist will also change, with a greater need for data to be collected, collated, and analyzed (MOHLTC, 2018).

Conclusion

Canada has made a significant contribution in the development of a population health approach in public health through the establishment of key documents like the *Epp*

Report (1986), *Ottawa Charter* (1986), and *Population Health Key Elements* (Health Canada, 2001). However, since the release of the *Population Health Key Elements* template in 2001, limited research in Canada has been conducted to explore how a population health approach can be best applied in public health. Research into barriers and facilitators that affect the integration of population health key elements in public health practice was identified but was not comprehensive. Only four of the eight key elements were explored including *Addressing the Determinants of Health, Collaboration Across Sectors, Employ Mechanisms for Public Evolvement,* and *Base Decisions in Evidence.* Common barriers that influenced the implementation of these elements included a lack of knowledge, understanding, and support of population health by public health leaders, and the political environment. Insufficient resources/funding and increased workload were less common barriers that contributed to implementation. Having leaders, both internal and external to public health units, who had knowledge of broader determinants and were supportive of research; collaborative partnerships; and public involvement facilitated the implementation of a population health approach. There is limited research concerning population health in the context of sexual health in public health practice, and even less that provides a Canadian perspective. Much of the literature was reports, commentaries, or policy papers, with only a few studies. This identifies a gap in empirically-based research on the integration of a population health approach in sexual health within the public health sector. This thesis aimed to address these knowledge gaps.

Personal Statement of Disciplinary Orientation and Assumptions

What inspired me to choose this topic for my thesis was the proposed changes to sexual health brought on by the modernized Ontario public health standards (MOHLTC, 2018). When the modernized standards were released, there were significant changes to the language compared to the earlier standards, which altered the focus of sexual health. There was less emphasis on public health providing sexual health clinic services within their community and greater emphasis on population health approaches such as community development and partnerships. As a nurse practitioner working in sexual health within an Ontario public health unit, I am aware of the time and resources currently spent on individual care. My perception is that the time spent testing and treating STBBIs by nurse practitioners and PHNs takes away from focusing on wider determinants and is not effective for improving the health of populations or reducing the rising rates of STBBIs. This shift in attention would mean big changes for not only my health unit but other health units across Ontario. This presented a unique opportunity to examine how this policy change could be best implemented and the challenges that need to be mitigated and the support needed for a smooth transition. With this study, my goal was to understand the extent that a population health approach had been implemented in sexual health programs and services in the province, and the barriers and facilitators that affected implementing this approach. The use of MM research was chosen to address this goal because it offered the ability to quantitatively measure how a population health approach was implemented through the development of a questionnaire and to then use qualitative methods to understand the experiences of health units with in-depth interviews.

Importance

This thesis contains the first study of its kind that describes the development, testing, implementation, and results of an instrument to measure the extent that a population health approach was applied to sexual health programs and services in public health in a Canadian province. Also, it examined the experiences of sexual health managers and supervisors of health units in Ontario, Canada when implementing a population health approach. The overarching objective of this work was to understand how the activities associated with a population health approach were implemented and the barriers or facilitators associated with implementation. This thesis provides relevant recommendations for public health practitioners, managers, policymakers, educators, and researchers, about strategies to enhance the impact that public health can have at the population level in sexual health programming. Using a MM design provided a comprehensive view of the factors that influenced a health unit's ability to implement population-level activities through participants' points of view. Having the viewpoint of those working in sexual health leads to better-informed policy and programming for public health.

Summary of the Thesis Chapters

Thesis chapters' two to five include four submitted manuscripts that report on this four-phase sequential mixed methods study. The papers are linked through their focus on the implementation of a population health approach in sexual health programs and services within public health. In the final chapter (Chapter Six), there is an integration of high-level findings, discussion of study implications, and provision of recommendations for practice,

education, policy, and future research. A brief overview of each submitted manuscript (Chapters two to four) follows.

Chapter Two: The Extent, Barriers, and Facilitators of Implementing a Population Health Approach in Sexual Health Programs and Services in Ontario Public Health Units: A Mixed Methods Protocol. Submitted for peer review

Manuscript one (Chapter Two) provides the rationale for using mixed methods research and describes the protocol for conducting this multi-phase mixed methods study. It outlines the detailed methods used including the sampling criteria and participant criteria for the different phases. Next, an overview of data collection and the analysis methods used to generate the findings of this study are discussed. Finally, activities to ensure the study's trustworthiness, rigour, and ethical considerations are highlighted.

Chapter Three: Development and Administration of an Instrument to Measure Implementation of a Population Health Approach in Sexual Health Programs and Services within Public Health. Submitted for peer review

The second manuscript (Chapter Three), describes the development and administration of the instrument that measured the extent that the eight key elements of a population health approach, as outlined in the Key Elements Template (Health Canada, 2001), were implemented in sexual health programs within public health units in Ontario. The perspectives of two unique data sources (literature and experts) went into creating the survey that aimed to provide a comprehensive picture of what specific activities that were associated with the key elements were implemented within public health units in Ontario.

Chapter Four: Influences on the Uptake of a Population Health Approach to Sexual Health Programs in Ontario Public Health Units: A Qualitative Descriptive Study. Submitted for peer review

In this chapter, a manuscript reports on the results from a qualitative descriptive study (Phase 4 QUAL). It provides a robust exploration of the factors that sexual health managers/supervisors perceived influenced the implementation of a population health approach within their sexual health programs and services. Interviews were conducted with 12 managers/supervisors from 10 public health units. CFIR (Damschroder et al., 2009) was used to guide data collection and analysis. Results from this analysis provide important barriers and facilitators within CFIR's domains of the inner and outer setting that have or could influence the implementation of population-level activities by health units.

Chapter Five: A Multiphase Mixed Methods Study on the Integration of a Population health Approach in Sexual Health Programs and Services in Ontario Public Health Units. Submitted for peer review

This chapter includes a fourth and final manuscript. It integrates findings from manuscripts two and three using mixed methods to reveal how the qualitative findings explained, or did not explain the quantitative results and added to the understanding of the factors that influenced the implementation of a population health approach. Recommendations on where investments need to be made and lessons on what areas are working well to support a population health approach are presented.

Chapter Six: Summary and Contributions

This chapter focuses on summarizing the contributions of this thesis on the implementation of a population health approach in sexual health programming in public health practice, as well as the contribution to mixed methods research. In addition, there is a discussion of the implications of the findings from this thesis on public health practice, education, and policy in Ontario, and future research.

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Supplemental File 1: Critical Appraisal of Literature

The CASP systematic review and qualitative checklist was applied to all studies included in the literature review.
CASP Systematic Review Checklist. Retrieved from. https://casp-uk.net/wp-content/uploads/2018/01/CASP-Systematic-Review-Checklist.pdf
CASP Qualitative Research Checklist. Retrieved from. https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist.pdf

Author: Oliver et al. (2014)

Screening Question	Yes	No	Comment
Did the review address a clearly focused question?	✓		
Did the authors look for the right type of papers?	✓		
Do you think all the important, relevant studies were included?	✓		
Did the review's authors do enough to assess the quality of the included studies?	✓		
If the results of the review have been combined, was it reasonable to do so?	✓		
What are the overall results of the review?			Barriers and facilitators of the use of evidence by policymakers. The results are written according to the main barriers and facilitators found in the review and the number of studies that fell under these main barriers and facilitators.
How precise are the results?			Looking at public health interventions. No confidence interval reported.
Can the results be applied to the local population?		✓	Large proportions (23%) of the studies included were from low- and middle-income countries.

Were all important outcomes considered?	✓		
Are the benefits worth the harms and costs?	✓		

Author: Aston and Meagher-Stewart (2009)

Screening Question	Yes	No	Comment
Was there a clear statement of the aims of the research?	✓		
Is a qualitative methodology appropriate?	✓		
Was the research design appropriate to address the aims of the research?	✓		The study did not discuss how they decided on the method, but the method was appropriate.
Was the recruitment strategy appropriate to the aims of the research?	✓		
Was the data collected in a way that addressed the research issue?	✓		
Has the relationship between researcher and participants been adequately considered?		✓	The researchers did not examine their own role, potential bias and influence during data collection.
Have ethical issues been taken into consideration?		✓	There were no details on how the research was explained to participants but did mention that ethical approval was obtained.
Was the data analysis sufficiently rigorous?	✓		
Is there a clear statement of findings?	✓		
How valuable is the research?			The study is valuable, as it was conducted in a Canadian public health unit.

Author: Brassolotto et al. (2014)

Screening Question	Yes	No	Comment
Was there a clear statement of the aims of the research?	✓		
Is a qualitative methodology appropriate?	✓		
Was the research design appropriate to address the aims of the research?	✓		The study did not discuss how they decided on the method, but the method was appropriate.
Was the recruitment strategy appropriate to the aims of the research?	✓		
Was the data collected in a way that addressed the research issue?	✓		
Has the relationship between researcher and participants been adequately considered?		✓	The researchers did not examine their own role, potential bias and influence during data collection.
Have ethical issues been taken into consideration?		✓	There were no details on how the research was explained to participants and no mention that ethical approval was obtained.
Was the data analysis sufficiently rigorous?	✓		
Is there a clear statement of findings?	✓		
How valuable is the research?			The study is valuable, because it was conducted in an Ontario public health unit.

Author: Van de Goor et al. (2017)

Screening Question	Yes	No	Comment
Was there a clear statement of the aims of the research?	✓		
Is a qualitative methodology appropriate?	✓		
Was the research design appropriate to address the aims of the research?	✓		The study did not discuss how they decided on the method, but the method was appropriate.
Was the recruitment strategy appropriate to the aims of the research?	✓		
Was the data collected in a way that addressed the research issue?	✓		
Has the relationship between researcher and participants been adequately considered?		✓	The researchers did not examine their own role, potential bias and influence during data collection.
Have ethical issues been taken into consideration?		✓	There were no details on how the research was explained to participants but did mention that ethical approval was obtained.
Was the data analysis sufficiently rigorous?	✓		
Is there a clear statement of findings?	✓		
How valuable is the research?			The study is valuable, as it explored barriers and facilitators in the use of research in the policy-making process.

Author: Sibbald et al. (2012)

Screening Question	Yes	No	Comment
Was there a clear statement of the aims of the research?	✓		
Is a qualitative methodology appropriate?	✓		
Was the research design appropriate to address the aims of the research?	✓		
Was the recruitment strategy appropriate to the aims of the research?	✓		
Was the data collected in a way that addressed the research issue?	✓		
Has the relationship between researcher and participants been adequately considered?		✓	The researchers did not examine their own role, potential bias and influence during data collection.
Have ethical issues been taken into consideration?	✓		
Was the data analysis sufficiently rigorous?	✓		
Is there a clear statement of findings?	✓		
How valuable is the research?			The study is valuable, as it explored barriers and facilitators in collaboration.

CHAPTER TWO

The Extent, Barriers, and Facilitators of Implementing a Population Health Approach in Sexual Health Programs and Services in Ontario Public Health Units: A Mixed Methods Protocol

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This manuscript was submitted.

Abstract

Background: The new Ontario Public Health Standards were released in 2018 with the intent to modernize the delivery of public health services in Ontario, Canada. One of the most significant requirements in these standards is the focus on population health approach.

Objectives: The purpose of this paper is to discuss: 1) how to use mixed methods (MM) research to design/test surveys, and 2) how, when, and why a researcher might design a complex, multiphase MM study. This will be achieved by providing details on a sequential multi-phased MM research protocol.

Methods: In Phase 1, a survey will be developed with items generated from a comprehensive literature review and a descriptive qualitative study that will include focus groups (n = 2) with experts (n = 5). The items will be organized into eight key elements of a population health approach. In Phase 2, the validity of this instrument will be tested. In Phase 3, a cross-sectional online survey will be conducted to measure the extent to which these elements are incorporated in public health work by sexual health managers from Ontario health units (N = 34). In Phase 4, a descriptive qualitative study will be conducted that includes in-depth interviews with managers, supervisors, or staff (n = 15-20), to identify and explain barriers and facilitators that influence the implementation of a population health approach in their sexual health programs and services.

Conclusions: This study will provide guidance on designing a multiphase MM study, as well as advancing methods around using MM designs/approaches for instrument development and testing.

Keywords: Mixed methods, Multi-phase design, Population health, Sexual health, Public health

Background

There is growing global acknowledgment among public health decision-makers that promoting the optimum health of people requires a focus on the determinants of health to improve community conditions (Thompson, 2016). This focus can be supported by using a population health approach. However, the successful implementation of a population health approach in public health programs and services requires a fundamental realignment in how public health stakeholders think about and conceptualize public health, as well as an investment in supporting the development of new skills and competencies in the public health workforce (Thompson). This protocol presents a multi-phased mixed methods (MM) study that involves the design, testing, and implementation of a survey, followed by a fundamental qualitative descriptive study to gain a deeper understanding of survey results. This paper aims to support researchers contemplating the application of a multi-phased MM design using an exemplar.

As of May 2019 in Ontario, Canada, 34 health units are responsible for delivering public health programs and services to populations within their geographic borders. Given the diversity of communities and geographies across this large province, each health unit, governed by a local Board of Health, tailors services to meet identified local community needs (Lyons, 2016; Ministry of Health and Long-Term Care [MOHLTC], 2018). There is a cost-sharing relationship between the MOHLTC and local communities. Health units are led by a Medical Officer of Health (MOH), a physician specialized in public health who is responsible for day-to-day management, administrative tasks, and reporting to the Board of Health (Lyons). There are Associate Medical Officers of Health (AMOH), senior and

middle management, and a diverse professional frontline staff, such as public health nurses, supporting the delivery requirements for each program.

The Ontario Public Health Standards (OPHS; MOHLTC, 2018) provide direction to Boards of Health on how to operationalize programming, allowing health units to identify priorities to meet local population needs. Historically, Ontario public health units have provided a broad range of population-based (e.g., health promotion) and individually-focused activities (e.g., clinic services) to improve the health of their communities in collaboration with community partners (MOHLTC). In 2018, the OPHS underwent modernization, and subsequently, the new standards emphasize the role of population-based interventions in the delivery of programs and services (MOHLTC). This shift will ultimately require changes in day-to-day operations within Ontario's public health units. Furthermore, in 2019, two Ontario government announcements propose significant changes to the provinces' healthcare structure. First, Bill 74: *The People's Health Care Act*, *2019* (Watts, Newell, Putyra, 2019) recommends an innovative health care model, introducing a new agency, Ontario Health, to establish local teams that connect health care providers and services for clients (Watts et. al.). Ontario Health will incorporate four MOHLTC health agencies (e.g., the Local Health Integrated Networks, Cancer Care Ontario) into one (Watts et. al.). The objective is to ensure coordinated and effective health service delivery for Ontario residents.

Second, was a reduction of public health units from 34 to 10, as a cost-saving measure (Izenberg, 2019). This reduction combined with an annual funding reduction of about $200 million (CAD) will be offset by a new cost-sharing structure in which the

MOHLTC: municipalities ratio will shift from 75:25 to 70:30 starting on April 1, 2020 (Izenberg). The complexity of this reorganization will vary with mandatory programs, such as communicable disease, seeing fewer changes. The impact may be greatest in non-mandatory program areas that provide direct client services, such as sexual health. Based on the new standards, sexual health will need to rethink their care delivery model, moving away from providing sexual health services, one-on-one clinic services that offer testing and treatment for STIs, to emphasizing sexual health programs including health promotion strategies to address prevention of STIs (MOHLTC, 2018).

However, the demands of managing rising rates of STIs in Ontario have left insufficient time to operationalize health promotion using a population health approach (Baum and Fisher, 2014; Brassolotto et al., 2014; Lucyk and McLaren, 2017; Neudorf, 2012). Rising costs, associated with STI treatments and subsequent morbidity that can occur, calls for a new approach (Public Health Agency of Canada (PHAC), 2013). Sexual health programs and services have the opportunity to address population health goals of improving the overall sexual well-being of populations by reducing disparities within population subgroups and reducing STIs incidence. Despite this, how a population health approach can be operationalized in sexual health is not well understood. Understanding the barriers and facilitators to implementing this approach within sexual health programs and services is crucial for its successful application.

Literature shows that Canada has significantly contributed to the development of a population health approach for public health through the establishment of key documents such as the *Epp Report* (1986), *the Ottawa Charter* (1986), and *Population Health Key*

Elements (Health Canada, 2001). However, since the release of the *Population Health Key Elements* template in 2001, limited research has been conducted to explore the implementation of a population health approach in public health. Research into barriers and facilitators that affect the integration of population health key elements in public health practice is not comprehensive. Existing literature concerning population health in the context of public health and sexual health mainly consists of reports, commentaries, and policy papers (Dean, Williams, & Fenton, 2013; Douglas & Fenton, 2013; Ivankovich, Fenton, & Douglas, 2013; Swartzendruber, & Zenilman, 2010; WHO, 2010). This points to a gap in empirically-based research. Thus, the proposed research study aims to investigate the extent to which a population health approach has been implemented in sexual health programs and services within Ontario public health units, and the barriers and facilitators that contribute to the successful integration of a population health approach from front line staffs' and senior and middle managers' viewpoints.

Mixed Methods

As a research methodology, MM research in health services is in a period of rapid development; this research approach requires a research team comprised of individuals with different expertise in different methods (Molina-Azorin, 2016). MM studies are designed to investigate complex phenomena. A multiphase MM study goes beyond the basic design and contains a series of phases (three or more) that can be sequential or concurrent (Creswell & Plano Clark, 2011). It has multiple components that are explicitly linked or mixed to address an overall study objective. Multiphase MM studies are used

when research questions cannot be answered in one way, and different phases are needed to answer these questions (Creswell & Plano Clark).

A multiphase design is complex to plan and conduct, requiring greater financial resources; expertise; and time; than other mixed-method designs (Creswell & Plano Clark, 2011). However, despite the complexity of the multiphase design, it offers researchers the flexibility to answer interconnected questions and is useful for developing and testing instruments or for conducting program evaluations (Creswell & Plano Clark). This protocol offers guidance for researchers who are interested in conducting a multiphase MM research study; provides information on how a multiphase MM study is developed; and outlines challenges of using this design. This guidance is based on and drawn from an original study protocol examining the extent that a population health approach has been implemented in public health units in Ontario, Canada, and the barriers and enablers to implementation.

Theoretical Framework

One of the first decisions an applied health researcher must grapple with is if and how to use a theoretical framework to guide a study. In MM studies, theoretical frameworks can provide a structure for integrating observations and findings from one phase of inquiry into another, specifically in sequential designs (Evans, Coon, & Ume, 2011). They can also offer the MM researcher a set of constructs that can guide coding and assist in the development of themes. Frameworks also provide a map for combining and summarizing findings to answer ‘why’ results occurred, leading to a more in-depth analysis (Evans et al.). In this study, the *Population Health Template* (Health Canada,

2001) was chosen as one of two organizing frameworks, because it is Canadian and provides a starting point for understanding the components required for a population health approach. Eight key elements of this framework (see Table 1) will guide the development of survey items by forming the structure of items generated through a literature review and focus groups. This framework will be applied in the first three phases of this four-phase study to understand the extent that sexual health programs and services incorporated population health key elements.

Table 1. Population Health Key Elements.

Key Element	Activities
1. Focus on the Health of Populations	• Determine indicators for measuring health status • Measure and analyze population health status and health status inequities to identify health issues • Assess contextual conditions, characteristics and trends
2. Address the Determinants of Health and Their Interactions	• Determine indicators for measuring the determinants of health • Measure and analyze the determinants of health, and their interactions, to link health issues to their determinants
3. Base Decisions on Evidence	• Use best evidence available at all stages of policy and program development • Explain criteria for including or excluding evidence • Draw on a variety of data • Generate data through mixed research methods • Identify and assess effective interventions • Disseminate research findings and facilitate policy uptake
4. Increase Upstream Investments	• Apply criteria to select priorities for investment • Balance short and long term investments

Key Element	Activities
	• Influence investments in other sectors
5.Apply Multiple Strategies	• Identify the scope of action for interventions • Take action on the determinants of health and their interactions • Implement strategies to reduce inequities in health status between population groups • Apply a comprehensive mix of interventions and strategies • Apply interventions that address health issues in an integrated way • Apply methods to improve health over the life span • Act in multiple settings • Establish a coordinating mechanism to guide interventions
6.Collaborate Across Sectors and Levels	• Engage partners early on to establish shared values and alignment of purpose • Establish concrete objectives and focus on visible results • Identify and support a champion • Invest in the alliance-building process • Generate political support and build on positive factors in the policy environment • Share leadership, accountability, and rewards among partners
7. Employ Mechanisms for Public Involvement	• Capture the public's interest • Contribute to health literacy • Apply public involvement strategies that link to the overarching purpose
8. Demonstrate Accountability for Health Outcomes	• Construct a results-based accountability framework • Ascertain baseline measures and set targets for health improvement • Institutionalize effective evaluation systems • Promote the use of health impact assessment tools • Publicly report results

Research Questions

In a multi-phase MM design, multiple research questions guide design choices and address the overall study objectives. Typically, a MM study will include overarching research questions to guide each of the quantitative and qualitative components. For this study, questions were asked for the quantitative and qualitative strands, as well as an overarching mixed methods research question (Creswell & Plano Clark, 2011). Phases 1 and 2 were related to instrument development to address research question 1. The overarching research questions are:

1. To what extent have the key elements of a population health approach been incorporated into sexual health programming in Ontario public health units? [Phases 1 (qual) and 2 (qual) to support instrument development for implementation in Phase 3 (quan)]
2. How do managers, supervisors, or staff working in Ontario public health units describe the factors that they perceive influence the implementation of the elements of a population health approach within sexual health programs and services? [Phase 4 (QUAL)]

The mixed methods research question is:

2. In what ways do qualitative interviews with managers, supervisors or staff serve to contribute to the understanding of what has been integrated from a population health approach into sexual health within Ontario public health units?

Methods

For this study protocol, a multiphase MM design was selected that involves the sequential use of qualitative and quantitative approaches for data collection and analysis to address the research questions. A four-phase sequential MM design (qual, qual, quan, QUAL) was chosen, because both quantitative and qualitative methods are needed to address the research questions. The priority will be given to phase 4 (QUAL), because it explains factors that have and may (as a result of provincial health unit restructuring) influence the implementation of a population health approach in sexual health. This research study involves (a) a diverse research team with qualitative and quantitative expertise, (b) data collection from various sources, (c) activities to engage participants in a dynamic and iterative research process, and (d) four research components that correspond to the study's objective. Figure 1 provides a visual display of the phases, activities, and participants that will be involved.

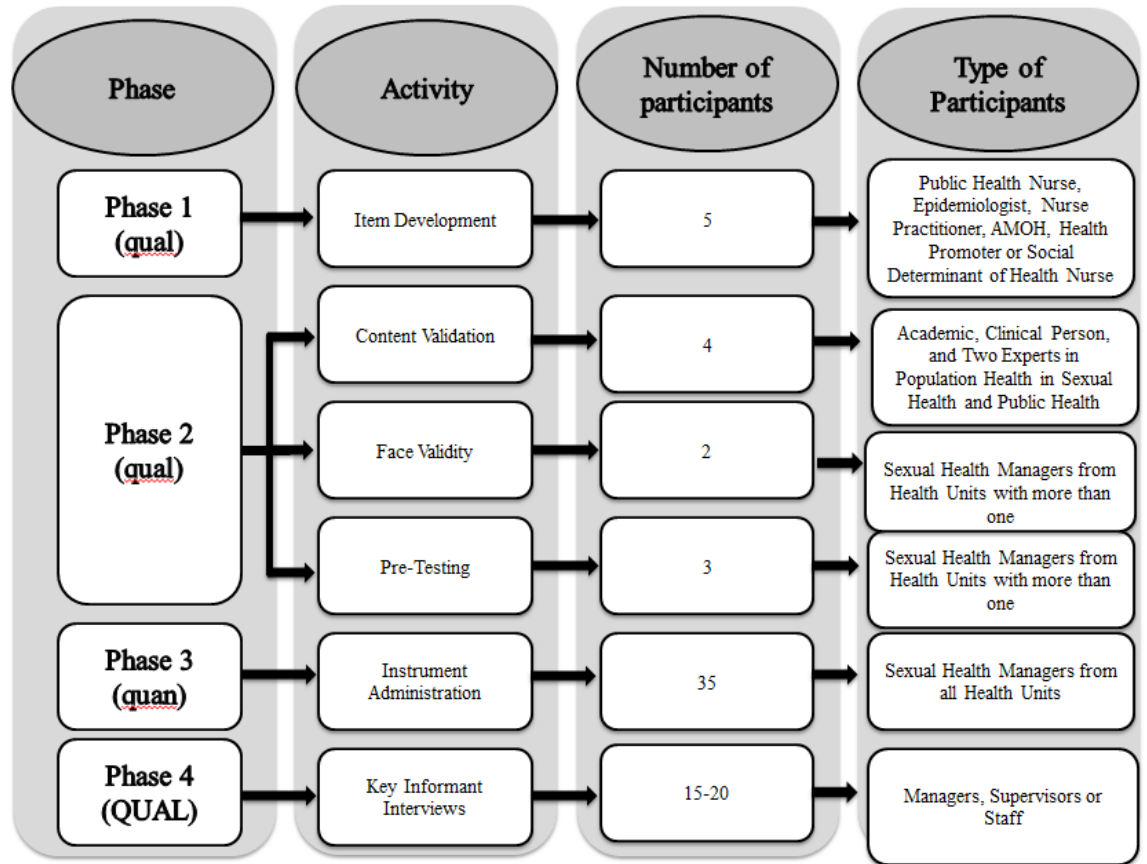

Figure 1. Study phases and participants

Phase 1 - Item Generation

The goal of phase 1 is to develop preliminary measurement scales with items informed by two primary data sources: 1) a comprehensive literature review on sexual health and population health, and 2) a descriptive qualitative study to identify experts' perceptions of activities required to implement a population health approach in sexual health. Using these two data sources allows for triangulation of results, which adds strength to the study.

Literature Review

The literature review will involve conducting a comprehensive search of 12 databases to locate relevant papers within the past 10 years (2007-2017) that a) focus on population health within sexual health programs OR b) discuss sexual health within population health AND address at least one key element of the population health approach (Health Canada, 2001) by describing or explaining how the element is or should be used in sexual health programming OR c) discuss sexual health policy internationally concerning population health. The Population Health Template (Health Canada, 2001) will assist with determining the initial coding scheme and will support directed content analysis (Hsieh & Shannon, 2005). Table 2 will be used for data extraction. Each article from the literature that meets the inclusion criteria will be examined. Activities from the literature that reflect a population health approach will be coded under the appropriate key element of a population health approach (Table 1; Health Canada, 2001). Survey items will then be created from these codes to reflect activities that apply to sexual health services, sexual health programs, or both.

Table 2. Data Extraction Table.

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final State-ment
		To what extent does your health unit perform this activity:	To what extent does your health unit perform this activity:			
A. Focus on the Health of Population		Question created from literature data	Question created from literature data			
B. Address the Determinants of Health and their Interactions		↓	↓			
C. Base Decisions in Evidence		↓	↓			
D. Increase Upstream Investment		↓	↓			
E. Apply Multiple Strategies		↓	↓			
F. Collaborate Across Sectors and Levels		↓	↓			
G. Employ Mechanisms for Public Involvement		↓	↓			

Descriptive Qualitative Study

One main element of qualitative description (QD) is learning from participants (Bradshaw, Atkinson & Doody, 2017; Kim, Sefcik & Bradway, 2017; Sandelwoski, 2000). This fits with the purpose of this MM design, which is to understand what sexual health professionals perceive are activities that reflect a population health approach within sexual health. This will be used to inform the development of survey items. QD employs purposeful sampling, allowing for participant selection that can provide rich information on the phenomena (Bradshaw et al.; Kim, Sefcik & Bradway; Sandelwoski). QD data collection strategies can involve a range of methods that utilize focus groups or interviews and minimal to semi-structured interview guides (Bradshaw, Atkinson & Doody, 2017; Kim, Sefcik & Bradway; Sandelwoski). Finally, content analysis is often the primary analysis approach in QD and allows for the use of a framework in analysis (Bradshaw et al.; Kim, Sefcik & Bradway; Sandelwoski).

Recruitment

All study participants will provide written and verbal consent before the interview and will be informed that their participation in the study is voluntary. Public health nurses will not receive compensation for their participation in the study and will complete the interview during assigned work hours.

Sampling

A purposeful sample of public health professionals (see figure 1) with extensive knowledge of population health will be invited to participate. For scale construction based on expert opinion, five participants (see figure 1) that contribute to sexual health programming in public health will be invited to participate in one of two focus groups.

Data Collection

Data will be collected from semi-structured focus groups to develop items for the online survey to be implemented in phase 3 (e.g., "To what extent does your health unit provide sexual health education to professionals [i.e., health care or educators] in your community to reduce stigma related to STIs?"). The *Population Health Template* (Health Canada, 2001), will guide the interview questions, prompting participants to provide sexual health-specific examples of how the eight key elements can be applied in public health (Hsieh & Shannon, 2005).

Data Analysis

Responses from experts in the focus group will be coded immediately into the population health key elements (Health Canada, 2001). Audio recordings will be reviewed and ideas coded into relevant population health key element/s (Health Canada). Additional items raised by experts and not identified in the literature will be created. Codes that do not fit elements of the framework will be considered to determine if they represent a new element (Hsieh & Shannon, 2005). All coding activities described above will be performed independently by the primary author with member checking from team members.

Disagreement will be resolved by consensus through discussions. This will help to increase rigor and assure the quality of the analysis to affirm the placement of the item under the most appropriate element and allow revisions to the wording of items.

Using table 2, the final items will be used to create the online survey. Items will be listed under the eight key elements and differentiate activities in sexual health programs and sexual health services. It is anticipated that some items may be relevant for both sexual health programs and sexual health services, while some will fit with only one of these practice areas. For items that apply to both sexual health programs and services (e.g., provide advice on vaccine-preventable infections), a single item will be created with a dual rating scale to measure the extent that the health unit implements the activity. Items that are relevant to only one practice area will be placed under the appropriate element as a separate item with a single rating scale. All items will be measured on a 5-point Likert (e.g., *1*= never, *5* = always) rating to determine the extent that a population health approach has been implemented. Activities raised in focus groups that confirms items from the literature will be noted to support triangulation of results.

Rigor

Rigor in this qualitative phase is ensured using several strategies. One team member will code the data, and a team member will confirm the analysis. Peer debriefing will be used to verify data analysis between members of the study team.

Phase 2 - Instrument Testing

Validity testing of the instrument developed in phase 1 will involve: 1) content validity, 2) face validity, and 3) pre-testing. Principles guiding instrument testing will be followed but given that the sample size for phase 3 is low (N=34), there are limitations in determining the reliability of the instrument. Given that this is an organizational survey, performing test-retest reliability would be challenging. Sexual health managers would have to consult with individuals on two occasions, which would not be feasible given informants' busy workloads. In addition, there would be a burden placed on a small pool of participants who would be asked to respond to multiple requests. Additionally, internal consistency cannot be used, because sexual health programs and services may only conduct one activity under each element, and might not conduct every activity listed in the whole scale.

Content Validation

Content validation will be assessed using Lynn's (1986) two-stage process for a cognitive measure. There are various components to the first stage of Lynn's content validity, such as identification of full content domain, item generation, and assimilation of items into a usable form. These steps will be incorporated into phase 1, with item generation and instrument development. The components of the second stage will involve experts determining that items developed are content valid and that the entire instrument is content valid (Lynn). Expert sampling will be used for the second stage to identify four individuals known to the primary author who has expertise in population health and sexual

health, to evaluate if the items generated are measuring a population health approach in sexual health. They will be invited through e-mail. Experts will rate each item using a 4-point scale (*1 = not representative*, *4 = representative)*. Items must receive a rating of *3* (*representative but needs minor alterations*) or *4* (*representative*) to be considered valid (Grant and Davis, 1997; Lynn, 1986). All experts must agree on the content validity of an item for its inclusion (Lynn). Items not achieving a rating of 3 will be revised and presented back to the experts to determine if a higher rating can be achieved.

Face Validity

Convenience sampling will be employed to identify managers from health units with two managers or a manager and supervisor. Rating the instrument will be based on a 5-point scale, ranging from 1=*extremely suitable* to *5=irrelevant* (Streiner et al., 2014). Mean and standard deviation (SD) will be calculated from the respondent's scores.

Pre-Testing

Sexual health managers from health units with two or more managers or a manager and a supervisor will be asked to complete the survey using an on line survey link. Feedback provided by participants will be used to refine the items before administration. Data obtained in this process will be excluded from the final results.

Phase 3 - Instrument Administration

The validated and pre-tested instrument will be administered to each health unit in Ontario. The survey will be completed by one health unit representative utilizing input from relevant staff. Instructions will direct the manager or supervisor to gather input from

relevant staff through a consultative process. Consensus on how the survey item is rated will need to be achieved among staff consulted in the process.

Recruitment

Recruitment will be by direct referral from sexual health managers at their Ontario sexual health managers meeting. Participants will be eligible for inclusion if they are a sexual health manager in a sexual health program in Ontario. Exclusion criteria for this phase will be staff that are dedicated solely to STI case management and are not involved in other components of sexual health programming.

Sampling

The study will include all 34 health units in Ontario. This is an organizational survey, so sexual health managers or supervisors will be nominated as the key informant from each health unit to complete the survey in consultation with other relevant staff.

Data Collection

Data will be collected using a cross-sectional, self-administered, web-based survey to identify the extent to which sexual health programs and services in public health have implemented the elements of a population health approach.

Data Analysis

Frequency will be used as the measure for categorical data (Daniel and Cross, 2013; Isotalo, n.d.). The 5-point Likert scale used will be treated as a continuous variable and mean and SD will be used for this measure (Daniel and Cross; Isotalo.; XLSTAT,

2017). A two-way frequency table will display the extent that each of the eight key elements and their associated activities were implemented. Analyses will be performed to describe the degree that health units have implemented each of the key elements of a population health approach and the type of population (e.g., rural, urban. mixed) that it serves. The statistical analyses will be performed using SPSS.

Phase 4 - Qualitative Description

In the fourth phase of the MM study, QD design will be utilized (Sandelowski, 2000). The goal is to use key informant interviews to explain the results from phase three, to understand how individual, organizational, and system-level factors influence the implementation of a population health approach in sexual health programs and services offered by Ontario health units. QD was chosen because it allows for the collection of rich information and experiences on a topic about which little is known (Bradshaw, Atkins & Doody, 2017; Petrosoniak & Varpio, 2013; Sandelowski).

Organizing Framework

In QD, theory can be employed when designing a study. The *Consolidated Framework for Implementation Research* (CFIR) was chosen as the organizing framework because it explores external political, economic, and social contexts that influence the work that public health does (Damschroder et al., 2009; Valaitis et al., 2016). As well, it looks at the internal structural, political, and cultural contexts which can influence the successful implementation of an intervention (Damschroder et al.; Valaitis et al.,). CFIR also classifies 39 implementation constructs across five domains that are influential

moderators or mediators of implementation outcomes (Bauer et al., 2015; Damschroder et al.). CFIR constructs will guide the development of interview questions and analysis for phase 4 to explain barriers and facilitators to implementing a population health approach.

Sampling

Purposeful sampling of participants from management (e.g., managers, supervisors) will offer a range of insights about the CFIR domains that influence the extent that a population health approach is implemented. If managers and supervisors are unable to participate, invitations will be extended to public health staff who are responsible for the implementation, delivery, and evaluation of population health initiatives within sexual health programming. From these two data sources, a range of 15 to 20 participants will be recruited. To recruit health units an e-mail will be sent by the primary author to the nominated sexual health manager or supervisor that completed the survey in phase 3 to invite them to participate in an interview. Those who decide not to participate will be approached and asked to forward an e-mail invitation to a staff member to participate in an interview. Consent will be implied based on participation in interviews.

Data Collection

In QD, data collection involves the use of information that will aid in understanding and explaining the phenomenon (Bradshaw, Atkinson & Doody, 2017). Interviews allow for the exploration of participants' perspectives that can provide depth and rigor, which facilitates the emergence of new concepts/issues (Bradshaw et. al., 2017). Semi-structured interviews will be conducted with managers, supervisors, or staff involved

in the organization and delivery of sexual health. We expect that a heterogeneous sample including managers, supervisors, or staff will create as complete a picture as possible, consisting of many diverse perspectives, experiences, and opinions. Interviews will be 45-60 minutes in length, conducted in person, by phone, or through a secure online platform. They will be audio-recorded and transcribed verbatim for analysis.

An interview guide will be used to help direct the conversation to answer the research questions. The purpose is to understand the experience of implementing a population health approach, as well as perceptions of anticipated challenges and enablers in doing so in the proposed new public health structure. The interview guide used for all participants is based on the CFIR domains and will include one overarching question that explores each of the five CFIR domains (Damschroder et al., 2009); with a set of prompts for each.

Data Analysis

NVivo 12 (QRS international, 2018) will be used to create the database to support analysis. Interview data will be analyzed through directed content analysis, using an inductive followed by a deductive approach to organize codes under the CFIR framework (Damschroder et al., 2009; Elo & Kyngäs, 2007; Hsieh & Shannon, 2014). A codebook will be used for deductive and inductive approaches. For inductive data analysis, open coding will occur by reading through the transcribed interview data to understand the content. Following this, deductive data analysis will occur by coding into the CFIR domains. To validate codes, the primary author will meet with the research team to discuss

the initial coding structure and conduct follow-up meetings to review and revise the coding structure as needed. This will also act as a peer debriefing strategy.

Trustworthiness

Guba's (1981) guide to establishing trustworthiness in qualitative research will be used. Criteria outlined by Guba to establish trustworthiness in a qualitative study include a) credibility; b) transferability; c) dependability; and d) confirmability. Credibility will be determined through a debriefing with the research team and triangulation. Transferability will involve the development of a thick description of the context of the study (e.g., how public health in Ontario is organized). This will provide readers with the ability to determine the extent to which the findings from this study apply to their setting (Guba). Dependability will be met through record keeping of the study process and NVivo (QRS international, 2018) to track coding and maintain memos. For confirmability, the primary author will keep a reflexive journal on how her preconceptions, beliefs, values, and assumptions that may have come into play during the research process (Guba). It will also record decisions made throughout the research process and justification for them.

Integration of Results

A key characteristic of MM research is the intentional integration of quantitative and qualitative strands during the research process. The integration of the two strands can occur at four different points, such as during data analysis or data collection, depending on the design of the study (Creswell & Plano Clark, 2011). The purpose of integration is to further explain or use results from one strand to assist with data collection in another (Creswell & Plano Clark).

For this study, mixing of data sets will occur during data collection (in phases 1, 2, and 3), and during analysis and interpretation. Data collected from phase 1 will be used to develop items for the survey that will be validated in phase 2 and administered in phase 3. In data analysis, phase 3 quantitative data and phase 4 qualitative data will be integrated. This strategy will bring together quantitative and qualitative results in a side-by-side comparison (Creswell & Plano Clark, 2011). The quantitative results will be presented first, followed by qualitative findings in the form of quotes (Creswell & Plano Clark). Finally, mixing will happen during the interpretation of results. Phase 3 and 4 results will be synthesized in the discussion to explain what was learned from combining these data sets.

Ethical Considerations

Informed consent will be obtained from participants at each phase to ensure that individuals are choosing to participate of their own free will and have been fully informed of study procedures and potential risks. Confidentiality and anonymity of health units and participants will be protected. Names will not be used in reporting results. Personal interests that may affect the research will be disclosed.

Discussion

No Canadian studies have investigated the implementation of a population health approach in sexual health programming in public health units. Using this multiphase MM study, it is anticipated that a firsthand exploration of the extent that a population health approach is implemented in sexual health programming, along with the barriers and facilitators that affect implementation, would inform practice, research, and policy

development. Findings and their implications will be disseminated to relevant organizations and provincial policymakers to inform practice and policy. In this study, an anticipated challenge will be the recruitment of experts. The pool of candidates with sexual health expertise is small and given recent provincial funding cuts to public health, potential participants might be busy and unwilling to participate. This challenge could impact the study timeline. However, the primary author's public health connections (e.g., ID teleconference) may facilitate recruitment. A study limitation is that the survey instrument cannot be validated through reliability and construct validity because of the small pool of participants to pull from. However, the face and content validity, along with pre-testing will be completed.

Conclusion

This study protocol describes the design of a multiphase MM study involving the development, testing, and implementation of a survey and follow-up key informant interviews. This protocol will add to the literature on how such a design can be used in health services and policy research. It will measure the extent of implementation of population health interventions in a public health program driven by a provincial policy, and identify the barriers and facilitators influencing their implementation in practice.

Conflict of Interest Statement

The authors whose names are listed on this manuscript certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony

or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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CHAPTER THREE

Development and Administration of an Instrument to Measure the Implementation of a Population Health Approach in Sexual Health Programs and Services within Public Health

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Abstract

Objectives: The objectives of this paper are to a) describe the development and validation of an instrument to measure the extent that a population health approach has been applied in sexual health programs by public health, and b) report the results of a cross-sectional survey of public health units using the instrument, following the introduction of Ontario's new provincial public health standards.

Methods: Instrument development included three phases: 1) a review of published literature and expert input (n = 6) to develop items; 2) validation of items by subject experts (n = 5), and pre-testing with the target audience (n = 3); and 3) administration of an online survey to sexual health managers from 34 public health units between September and October 2019 to measure the degree of implementation of a population health approach as directed by modernized public health standards.

Results: Overall, the population health elements *Focus on the Health of Populations* and *Address the Determinants of Health and their Interactions* were implemented more frequently compared to *Collaborate Across Sectors and Levels* and *Employ Mechanisms for Public Involvement,* which were infrequently implemented.

Conclusion: This paper will be of value to researchers building similar surveys, and to public health unit managers and policy-makers by informing them about where to target sexual health specific population health-strategies.

Keywords**:** Item development, Public health, Sexual health, Population health, Mixed methods

Introduction

As of 2019, Ontario had 34 public health units, serving a range of population groups and geography (e.g., urban and rural). Public health staff deliver programs and services within the unit's geographic borders in accordance with the Ontario Public Health Standards (OPHS) and under the governance of a Board of Health, with cost-sharing between local municipalities and the Ontario Ministry of Health and Long-Term Care (MOHLTC; Lyons, 2016; MOHLTC, 2018b). The main goal of public health is to develop and implement programs that are focused on the health of the whole population, through an increased emphasis on health promotion and illness prevention (McLaren, 2019; Neudorf, 2012). Public health in Ontario has attempted to implement this goal by adapting existing programs to focus more on population health through the modernization of the OPHS. Modernization occurred in 2018 and brought a shift in focus from individual services to a population-based approach (MOHLTC, 2018b).

The impact of this change in approach will be greatest in sexual health, which includes a combination of sexual health services (e.g., clinic testing and treatment for sexually transmitted and blood-borne infections [STBBIs]) and sexual health programs (e.g., educational campaigns), as the movement away from clinic services will likely occur with modernization. When focusing on population health initiatives compared to one-on-one clinic services, improved health outcomes become apparent (Douglas & Fenton, 2013; Garrett, Hwang & Wrobel, 2018; Kingdig, 2015; McLaren, 2019). Focusing on population health is encouraging to improve the sexual health of populations; this approach is different from providing clinic services. Experiences of individuals involved in

implementing these changes can be useful in understanding how population health activities have been implemented and provides insight into activities that have higher or lower implementation. To date, there is limited Canadian data on activities required to implement a population health approach in sexual health within public health. No comprehensive way to measure the extent of implementation of a population health approach was found in the literature, which is a gap that we have sought to address.

In this changing landscape, public health can contribute to the health of their communities by strengthening the implementation of a population health approach. However, with this shift in focus, little is known about the extent to which sexual health programs and services delivered by Ontario public health units have implemented a population health approach. The objective of this paper is to describe the development, validation, and administration of an instrument, and provide results of the survey that measured the extent to which a population health approach was implemented in sexual health programs and services in public health. Addressing the objective has significant value for public health professionals and policy-makers. It allows them to quantify the extent that population-level activities are being implemented in sexual health and indicates where investments should be made based on what activities have been and could be, incorporated into sexual health programming to ensure a concentrated focus on population health.

Within this paper, *sexual health programs* are defined as: health promotion strategies to address the prevention of STBBIs, unplanned pregnancy, emphasis on the importance of sexual health to the overall well-being of individuals, and looking at wider

determinants of health. As well, *sexual health services* are defined as one-on-one clinic services that offer testing and treatment for STIBBIs, advice, and information on sexual health, birth control, and vaccination.

Methods

This study involved three sequential phases of inquiry. Phase one was the development of instrument items that reflect a population health approach in sexual health. Phase 2 consisted of face and content validity of items, along with pre-testing**.** In phase 3, an organizational cross-sectional survey was administered to 34 Ontario public health units. Ethics approval was obtained from Hamilton Integrated Research Ethics Board (HiREB # 5692). Informed consent was obtained from all individual participants included in the study.

Although no instruments were found in the literature that measure the degree of implementation of a population health approach, a variety of population health frameworks were identified. Most were not comprehensive and focused on social determinants of health (SDoH) and health outcomes (Kindig, Asada, & Booske, 2008; MacDonald, Newborn-Cook, Allen, & Reutter, 2013) and others focused on SDoH in combination with health outcomes and policy (Centre for Urban Population Health, 2013). Two frameworks did offer a list of population-level activities. The NHS (National Health Service) Provider (2016) population health framework set out five activities for a population health approach but did not offer an extensive list of population-level activities; it was centered on NHS organizations and health care providers and did not target public health or sexual health. Lastly, a framework by the Institute for Healthcare Improvement (2013) identified four

portfolios that focused on things like partnering with those with lived experience and addressing equity. Although the framework was focused on healthcare, it did not address public health or sexual health.

Another framework, *The Population Health Template* (Health Canada, 2001), included activities that address eight key elements of a population health approach. This template focuses on public health and is relevant to the Canadian public health system. However, activities identified in this template are broad concepts not specific to sexual health. Despite this limitation, The Population Health Template (Health Canada, 2001, https://www.phac-aspc.gc.ca/ph-sp/pdf/overview_handout_black-eng.pdf) was chosen as the organizing framework for this study, because it offered the most comprehensive list of elements needed for a population health approach while acknowledging that the elements identified were not an exhaustive list. As well, it provided the most detail, offering definitions of the elements and activities required for mobilization, with an explanation of what those activities mean.

Phase 1 - Item Development

To inform the content of the instrument, a deductive and inductive approach using two primary sources: 1) a literature review that provided sexual health related examples of population health related activities, and 2) semi-structured focus groups with experts in population health and/or sexual health (Morgado, Meireles, Neves, Amaral, & Ferreira, 2017; Streiner, Norman, & Cairney, 2014).

Literature Review

Literature review involved conducting a comprehensive search of 12 databases (e.g., OVID, PubMed, Web of Science, CINAHL, Health Evidence) to locate relevant papers within the past 10 years (2007-2017) that: a) focused on population health within sexual health programs OR b) discussed barriers and facilitators to population health AND addressed at least one key element of the population health approach (Health Canada, 2001) by describing or explaining how the element is or should be used in sexual health, OR c) discussed sexual health policy internationally concerning population health. A few keywords used for the literature review included: "upstream investments and barriers and supports and public health", "health equity and barriers and supports and public health", and "social determinants of health and barriers and supports and public health". Identified articles that met the inclusion criteria were reviewed by the first author and RV, to identify activities that reflected a population health approach. Activities were organized into one of the eight key elements of a population health approach, based on the element's definition (see supplementary file 1). Following this, items were created to reflect the activities found in the literature and were adapted to address sexual health services, sexual health programs, or both, where applicable (supplementary file 1). For example, the literature identified that "Social and cultural factors are very significant in determining people's access to sexual and reproductive health services and information. Any intervention to improve the sexual health of a population must therefore be understood and accepted by the community" (World Health Organization, 2010). This was reworded for the survey as "To what extent do sexual health programs in your health unit consider the values (e.g.,

social, political, religious beliefs) of the community it serves?" to reflect a sexual health program activity. Placement of items generated under relevant population health elements in the template, as well as the wording and structuring of the items, was done through consensus by the research team, who have qualitative and quantitative expertise.

Focus Groups

To obtain feedback from content experts on sexual health activities in the key elements, a purposeful sample of public health professionals with knowledge of population health and/or sexual health were invited to participate in one of two focus groups. For scale construction based on expert opinion, six individuals from different professional groups (see figure 1) who contribute to sexual health programming in public health were invited to participate. Recruitment occurred using snowball sampling. An e-mail was sent to connections that the first author had in five Ontario health units. These contacts were asked to identify experts in their or other health units who may be willing to participate in the focus groups.

The purpose of the semi-structured focus groups was to generate items that would be used to develop an online survey for phase 3. The focus group interview guide can be found in supplementary file 2. Online focus groups made use of a synchronous secure Web conference technology. Focus groups were recorded and notes were made during the session. The discussion was concentrated on having experts provide examples of a population health approach in sexual health that addressed each of the eight key elements of the *Population Health Template* (Health Canada, 2001). These examples were items they believed exemplified that element. For instance, one question asked: "Tell me how

sexual health programs would focus on the health of a population?" A prompt was provided with an example if needed. Following the main discussion, participants were allowed to express their final reflections, clarify points that needed more explanation, and synthesize main points.

Following the focus groups, the data collected was transcribed and analyzed manually using directed content analysis with a deductive approach. A deductive approach was used, employing a framework – the *Population Health Template* (Health Canada, 2001; Hsieh & Shannon, 2005). This framework's elements were also used to determine the initial coding scheme, with responses from experts being coded into the eight population health key elements (Health Canada, 2001). Participant responses that did not reflect a population health activity (e.g., barriers to implementing population health) were reported in a table. Data that did not fit under the template were identified and considered to determine if it represented a new category or a subcategory of an existing code (Hsieh & Shannon, 2005). All activities from the focus groups were classified into key elements (see supplemental file 2). Combined items generated by the first author, literature, and focus groups were reviewed by co-authors to obtain consensus on the placement of activities under the key elements. As well, items were phrased to avoid vagueness, double-barrelled questions, and double negatives (Streiner et al., 2014).

Phase 2-Instrument Validation

Content validity

Content validity was assessed through the clarity, comprehensiveness, and redundancy of items. Content validity of the new instrument was determined using the approach described by Lynn (1986). This approach had two stages: in which stage I (development) resulted in the generation of the instrument's items and stage II evaluated the performance of the instrument's items (judgment and quantification) (Lynn, 1986). Content validity was undertaken by four experts. An evaluation form was created containing 144 items generated from Phase 1 and was e-mailed to the experts to determine whether items were appropriate and relevant to the study purpose.

Each expert rated the relevance of each item on a 4-point Likert scale (from *1 = item is not representative of a population health approach in sexual health,* to *4 = item is representative of a population health approach in sexual health*). In addition, experts evaluated whether items covered all important aspects, if there were missing components, and provided comments on every item. A content validity index was calculated at the item level (I-CVI) and scale level (S-CVI). I-CVI was calculated as the number of experts providing a score of 3 or 4 divided by the total number of experts (Lynn, 1986). With 4 experts, the I-CVI needed to be 1.00 for each item. Any item that did not meet this requirement was dropped if it was felt that the content was covered in another item or revised to offer greater clarity. If the item was revised, it was sent back to the expert to see if changes made resulted in a higher rating. The S-CVI is the proportion of items on the

instrument that achieved a rating of 3 or 4 by all experts (Polit & Beck, 2006). An S-CVI of 0.8 is considered acceptable for a new instrument (Polit & Beck).

Face Validity

Convenience sampling was employed to identify managers to participate in face validity. To determine the face validity of the items, an evaluation form was created with 144 items and sent to two sexual health managers via e-mail. The purpose of the face validity was to assess how suitable items were for a population health approach in sexual health. The quantitative assessment of face validity was achieved on a five-point Likert scale (*1*= item is *extremely suitable* for a population health approach in sexual health, *5*= item is *irrelevant* for a population health approach in sexual health; Streiner et al., 2014). Experts rated each item on this scale and were able to provide comments for each item, in addition to overall comments.

Pre-testing

Pre-testing was conducted by three sexual health managers using convenience sampling. Pre-testing ensured that items in the instrument were comprehensible to the target population; were unambiguous; asked a single question; had logical flow; and that the computer-assisted survey system was user-friendly (Streiner et al., 2014). Invited participants received a link to the online survey and a list of questions to consider when reviewing the survey. Results from pre-testing were not included in the final survey results.

Phase 3 - Instrument Administration

The validated instrument was administered to managers in 34 health units across Ontario. One respondent per health unit was asked to complete the survey on behalf of the organization, with input from other relevant staff or managers. The final validated items were populated into an online survey using LimeSurvey (see supplemental file 3). Items were listed under headings representing Health Canada's (2001) eight key population health elements as appropriate. The survey included questions at the start that addressed demographic characteristics of the health unit. An open-ended section at the end of the questionnaire asked for general feedback and disciplines that were consulted while completing the survey. Managers were the nominated representative because they were in a unique position to bring suggestions to the executive team from the front-line and are charged with the responsibility of applying changes proposed by the modernized standards.

Statistical Analysis

Categorical variables were used to capture the name of the health unit and the type of population served (e.g., rural or urban). The 5-point Likert scale used to measure the degree that each of the eight key elements is implemented was considered a continuous variable. Descriptive statistics for this measure included mean and standard deviation (Daniel and Cross, 2013; XLSTAT, 2017).

Results

Phase 1 - Item Generation

Participants had three or more years of experience working in sexual health and/or public health. A list of 96 activities was generated from the literature review (see supplemental file 2) and spread across the eight key elements. There were thirty new activities identified from focus groups: with18 activities from these two sources split into two questions, one for sexual health programs and one for sexual health services (see supplemental file 2). The items from the literature review, focus groups, and split activities generated a total of 144 items that were used for face validity and content validation. The focus groups responses also confirmed 25 existing activities that were identified in the literature, 34 confirmed existing activities in the literature and also provided an example, 30 provided examples that could be used for an existing activity, and 2 confirmed an idea from another focus group (see Table 1). Through this consensus process, there were two examples of activities that we thought would align better with another item, so these examples were moved from one item to another. For example, under *Address the Determinants of Health and Their Interactions,* 'travel vouchers' was moved from the item on *accessibility* to the item on *affordability.*

Table 1. Activities Generated by Focus Groups

Focus Group	**Total # of activities generated**	**N**	**CLit**	**CF**	**CLitE**	**E**
# 1	64	18	13	0	15	18
# 2	58	12	12	2	20	12
Total	**122**	**30**	**25**	**2**	**34**	**30**

Legend:

N = new in relation to the existing literature

CF = confirmed an idea from another focus group

CLit = confirmed an idea from the literature

CLitE = confirmed an idea from the literature and provided an example to expand or clarify

E = provided an example to expand or clarify an idea

Phase 2 - Validation

Experts who participated included: a manager of research/policy/planning at an Ontario health unit, a manager of sexual health at an Ontario health unit, an individual involved in policy/practice at a Canadian nursing regulatory body associated with an Ontario university, and a consultant with experience in policy/public health/community nursing.

Content Validity Index

The proportion of items (S-CVI) on the entire instrument that experts rated as content valid was 0.95, which indicates good content validity (Polit & Beck, 2006). One hundred and twenty-three items received an I-CVI of 1.00 and 15 items received a rating of 0.75 (1 out of 4 experts rated the item as a 2). Of the items that received a 0.75, 4 were deleted and 11 were revised. Revised items were presented back to each expert who was asked to re-rate them. All experts rated revised items as content valid (3 or 4). In addition, some items that received a rating of 1.00 were revised (e.g., changing a word) or deleted

(content covered in another item) based on feedback from experts. A total of 49 items were revised based on expert feedback and 9 were deleted. As well, 7 items were revised based on feedback from co-authors after reviewing the literature, and 13 were deleted. Deletions were made where there was duplication of ideas in items under other elements. For example, the item from element D, "To what extent do sexual health programs/sexual health services in your health unit ensure they are acceptable to the population (e.g., no discrimination)?" was deleted because it was captured in another item within a different element: "To what extent do sexual health programs/services in your health unit target priority populations?" This does create bias as these decisions were not based on feedback from the experts but rather the experience and knowledge of the authors. However, the combined expertise of the authors provided the ability to determine when an item might be asking the same thing.

Finally, 7 items were not revised based on expert feedback. When we reviewed the feedback, some changes that were proposed by experts were believed to affect item clarity. For example, despite expert opinion, we chose not to remove the word 'priority' from the following item: "To what extent do sexual health services in your health unit work with priority populations." We believed that it was needed to understand the type of population that health units would need to engage with. In another example, the term - social media marketing - appeared to not be understood by the expert but was believed to be the correct term. Revisions were minor, such as providing a different example or changing one word in an item as noted above. A total of 118 items were retained for the final instrument.

Face validity

The mean face validity score was 1.7 out of 5 (*1*= item is *extremely suitable* for a population health approach in sexual health; *5*= item is *irrelevant)* with a standard deviation of 0.28. This score indicated that items were suitable for a population health approach in sexual health. As well, there were comments and suggestions for changes to some items, which were incorporated into the revision of items. There were three general comments by the experts: 1) questions were great, 2) there were a lot of items, and 3) separate terms for sexual health programs and sexual health services were confusing. To address the comments, items were eliminated where possible, to reduce the total number. Unfortunately, most health units do not separate the work that they do into 'sexual health programs' and 'sexual health services.' As a result, managers found it confusing to see these as two separate components as they view them collectively. There were definitions of 'sexual health programs' and 'sexual health services' at the outset of the evaluation form to assist with clarity. However, given that: a) these two components made up the broad topic of sexual health programming, and b) we were interested in the extent that a population health approach was being implemented in both components, the two terms were kept.

Pre-testing

Although there were 118 items in the previous phase, the online survey for pre-testing consisted of 73 items. This was because items were grouped together if they applied to both sexual health services and sexual health programs, which reduced the total

number of items. Items that reflected sexual health programs and sexual health services were constructed as one item with a dual rating scale for each component (e.g., to what extent does your health unit work with priority populations?). Items that were relevant to only one of these areas were added as a single item (e.g., to what extent do sexual health services in your health unit ensure they are accessible?) with a single rating scale. Supplemental file 3 provides examples to illustrate this setup. Overall, managers who completed pre-testing felt that survey instructions were clear, items were comprehensible, and only asked one question (e.g., were not double-barrelled), the survey had a logical flow, and they had no technical issues completing the online survey. One question was identified as ambiguous by one respondent which was reworded in the final version. There were also three items that respondents felt asked the same concept under the element *Address the Determinants of Health*, and two similar items under the element *Base Decisions in Evidence*. As a result, these items were reviewed by the primary author and one co-author and the decision was made to delete the duplicate items. Four items were deleted, leaving 69 items for the final survey.

Phase 3 - Instrument Administration

A total of 15 health units (41.6% response rate) completed the survey. Of those health units, 2 served a rural population, 1 served an urban population, and 12 served a mixed rural/urban population. Managers that completed the survey consulted with an epidemiologist (n=3), public health nurse (n=2), director (n=1), previous manager/supervisor (n=2), no one (n=5), or did not answer (n=2). A summary of the mean (SD) for each question asked in the survey and the overall mean (SD) for each element can

be found in Table 2. However, breadth of knowledge about sexual health programs and services affords managers the ability to answer items on the survey without consultation.

Table 2. Mean and SD for Each Survey Question

Items	**Sexual Health Programs**			**Sexual Health Services**		
Key Element A Focus on the Health of Populations	N	Mean	SD	N	Mean	SD
Consider the social and cultural factors in the community (e.g., social norms/attitudes).	15	4.00	1.069	15	4.33	.617
Address social stigma (disapproval of or discrimination against a person) in relation to sexually transmitted infections?	15	3.60	1.12	15	3.73	1.10
Collaborate with priority populations (e.g., LGBTQ2S, youth, post-secondary students, sex trade workers).	15	3.53	.915	15	3.53	.990
Provide individuals within priority populations with targeted health information to make decisions about their sexual health (e.g., condom use).	15	3.53	1.12	15	3.80	1.45
Collect information to identify priority populations.	15	3.73	1.10	15	3.83	1.10
Collect external data (e.g., OHIP billing, ER and hospital use data) to inform program planning.	15	2.73	1.49	15	2.73	1.44
Collect internal epidemiological data to inform program planning (e.g., risk factors, incidence, prevalence).	15	4.20	1.08	15	4.13	1.13
Use internal epidemiological data to inform program planning (e.g., risk factors, incidence, prevalence).	15	4.33	.816	15	4.27	.799
Use geographical data to inform program planning (e.g., look at the	15	3.13	1.55	15	2.93	1.62

incidence of chlamydia by postal code).						
Provide advice for vaccine-preventable infections (e.g., Hepatitis A, Hepatitis B, HPV) for those identified at risk.	15	4.27	1.10	15	4.73	.458
Overall mean and SD		3.71	0.66		3.81	0.54
Key Element B Address the Determinants of Health and their Interactions	N	Mean	SD	N	Mean	SD
Ensure quality in the programs offered (e.g., quality control, identify best practices, adequate staffing, gaps in current programs, conduct quality initiatives).	15	3.80	.941	15	3.80	1.01
Offer access for youth 24 years of age and under.	15	4.80	.561	15	4.80	.775
Offer access for adults over the age of 25.	15	4.60	0.74	15	4.60	0.91
Use principles of social justice to address the disadvantage of certain groups that prevent equal access to determinants of health in your community.	15	3.13	1.13	15	3.40	0.91
Use trauma and violence-informed care at the program level (e.g., understanding, recognizing, and responding to the effects of all types of trauma, such as sexual abuse, physical violence).	15	3.53	1.12	15	3.80	1.01
Provide supports to address broader social needs (e.g., referrals to address issues of poverty, lack of education, housing) for individuals engaged in high-risk sexual behaviour.	15	3.07	1.22	15	3.47	1.06
Ensure affordability (e.g., provide low cost birth control, travel vouchers).	N/A	N/A	N/A	15	4.73	0.46
Ensure accessibility (e.g., local, easy to get to, flexible hours).	N/A	N/A	N/A	15	3.73	0.59
Overall mean and SD		3.82	0.63		4.04	0.49

Key Element C **Base Decisions in Evidence**	N	Mean	SD	N	Mean	SD
Use the best available evidence/guidelines to inform decision-making in practice and/or program development.	15	4.40	0.63	15	4.27	0.70
Get involved in primary research.	15	2.33	1.11	15	2.33	1.18
Engage in evaluation to inform program planning.	15	3.40	0.91	15	3.80	0.68
Overall mean and SD		3.38	0.69		3.47	0.53
Key Element D Increase Upstream Investments	N	Mean	SD	N	Mean	SD
Utilize social media marketing (e.g., Twitter, Facebook, dating apps) to educate the public.	15	3.47	1.19	15	3.60	1.18
Provide sexual health messages to community stakeholders (e.g., qualities of a healthy relationship, what is healthy sexuality).	15	3.13	0.99	15	3.13	1.06
Provide data or information to national organizations (e.g., Public Health Agency of Canada) to assist with sexual health policy development.	15	2.53	1.69	15	2.47	1.69
Provide data or information to provincial organizations (e.g., Ministry of Health and Long-Term Care, Public Health Agency of Ontario) to assist with sexual health policy development.	15	3.07	1.39	15	3.13	1.36
Provide information to primary health care providers on healthy sexuality and sexual health (e.g., sexually transmitted testing in priority populations, first-line sexually transmitted treatment).	15	3.87	0.83	14	3.36	1.01
Provide education to primary health care providers on healthy sexuality and sexual health (e.g., sexually transmitted testing in	14	3.36	1.01	15	3.60	0.91

priority populations, first-line sexually transmitted treatment).						
Provide information to the public (e.g., youth) on healthy sexuality and sexual health (e.g., sexually transmitted infection risk factors).	15	3.73	0.79	15	3.67	0.98
Advocate for sexual health in schools.	15	3.73	1.16	15	3.33	1.49
Provide standard sexual health messages (e.g., populations at risk and trends for sexually transmitted infections) to other programs in the health unit to ensure consistency.	15	3.40	1.06	N/A	N/A	N/A
Engage in healthy public policy to create supportive environments that enable people to lead healthy sexual lives.	15	2.60	1.29	N/A	N/A	N/A
Overall mean and SD		3.26	0.79		3.35	0.82
Key Element E Apply Multiple Strategies	N	Mean	SD	N	Mean	SD
Work with primary health care providers in your community to assess overlaps and gaps in sexual health.	15	2.87	0.99	15	3.27	0.96
Provide multiple components in interventions (e.g., primary, secondary, and/or tertiary interventions).	15	2.93	1.03	15	3.53	0.91
Engage in community development activities (e.g., work with local community members, youth) to assist with improving sexual health programs for the community.	15	3.13	1.13	15	2.93	1.03
Have a written strategy (e.g., service plan, operational plan, logic model) that addresses sexual health issues within your community.	15	4.00	1.13	15	3.87	1.19

Apply a sexual health framework to inform planning (e.g., The Health Impact Pyramid).	15	3.20	1.42	15	3.07	1.44
To what extent does Sexual Health Programming in your health unit provide multiple components in interventions (e.g., primary, secondary, and/or tertiary interventions).	N/A	N/A	N/A	15	3.27	1.16
To what extent do Sexual Health Services in your health unit offer multiple services (e.g., sexually transmitted infection testing and naloxone).	N/A	N/A	N/A	15	4.67	0.62
To what extent do Sexual Health Services in your health unit offer sexually transmitted infection screening and/or treatment.	N/A	N/A	N/A	15	4.73	0.59
To what extent do Sexual Health Services in your health unit refer victims of violence (e.g., sexual and domestic).	N/A	N/A	N/A	15	4.13	1.06
To what extent do Sexual Health Services in your health unit offer contraceptive counselling and prescription.	N/A	N/A	N/A	15	4.60	0.63
To what extent do Sexual Health Services in your health unit offer pregnancy options counselling and/or post-abortion care.	N/A	N/A	N/A	15	4.67	0.62
To what extent do Sexual Health Services in your health unit offer counselling for sexual health concerns.	N/A	N/A	N/A	15	4.20	1.14
To what extent do Sexual Health Services in your health unit offer referral for sexual dysfunction.	N/A	N/A	N/A	15	2.47	1.46
Overall mean and SD		3.23	0.79		3.84	0.52
Key Element F Collaborate Across Sectors and Levels	N	Mean	SD	N	Mean	SD

Engage in intersectoral partnerships (e.g., with education, police, housing, pharmacies, social services, and/or faith sectors), to address health promotion and prevention (e.g., primary, secondary, and/or tertiary).	15	3.13	0.74	15	2.87	0.83
Work with other local municipal government services (e.g., housing, police, paramedics) to address issues related to sexual health in your community.	15	2.80	0.86	15	2.60	0.91
Work with the provincial government (e.g., Ministry of Health and Long-Term Care) to address issues related to sexual health.	15	2,87	1.19	15	2.87	0.99
Work with the provincial government to provide updates on sexual health issues in your community.	15	2.87	0.99	15	2.87	0.99
Work with the federal government to address issues related to sexual health.	15	2.00	1.07	15	2.00	1.07
Engage in capacity building (e.g., naloxone training, harm reduction) across sectors (e.g., health, non-profit) to assist professionals in developing the skills required to provide sexual health care.	15	4.13	0.91	15	4.07	1.03
Work with community stakeholders (e.g., teachers, community leaders) to assist them with identifying their own attitudes, beliefs, and values related to sexual health.	15	2.87	0.91	15	2.73	1.03
Overall mean and SD		2.97	0.78		2.86	0.77
Key Element G **Employ Mechanisms for Public Involvement**	N	Mean	SD	N	Mean	SD

Involve local community partners (e.g., advisory groups, youth committees) in planning.	15	2.87	1.30	15	2.73	1.33
Involve provincial partners (e.g., Ontario HIV epidemiology and surveillance initiative) in planning.	15	2.53	1.12	15	2.47	1.12
Involve clients in planning (e.g., gathering feedback, co-design).	15	2.40	1.12	15	2.33	1.11
Develop sex-positive messaging (e.g., sex is healthy) in collaboration with the general public.	15	2.80	1.32	15	2.53	1.46
Overall mean and SD		2.65	1.07		2.52	1.03
Key Element H Demonstrate Accountability for Health Outcomes	N	Mean	SD	N	Mean	SD
Collect information on the incidence of sexually transmitted infection in your community (e.g., sexual transmitted and blood-borne infections).	15	5.00	0.00	15	5.00	0.00
Collect data on the risk factors for sexually transmitted infections in your community (e.g., no condom use, multiple partners).	15	4.67	0.49	15	4.67	0.49
Collect information from your community on healthy sexual relationships (e.g., mutual respect, support, trust).	15	2.20	1.15	15	2.27	1.39
Collect information from your community on sexual experience (e.g., consensual, respectful, equity in relationships).	15	2.07	1.10	15	2.27	1.33
Collect information from your community related to sexual health discrimination (e.g., stigma against minorities, older adults, LGBTQ2S).	15	2.47	1.19	15	2.47	1.40
Collect information from your community on incidence of sexual violence (e.g., sexual assault,	15	2.47	1.25	15	2.60	1.45

sexual abuse, intimate partner violence).						
Use sexual health data that is collected to compare to other jurisdictions.	15	3.73	1.39	15	3.73	1.39
Use specific targets (e.g., reduce chlamydia by 5%) to determine the success of interventions?	15	2.80	1.08	15	2.93	1.16
Make epidemiological data available on your website (e.g., sexually transmitted infection incidence).	15	3.80	1.57	15	3.67	1.23
Use data on outcomes associated with an unintended pregnancy for planning (e.g., abortion rates, teen pregnancy rates).	15	3.67	1.23	15	3.73	1.28
Examine Hospital Emergency Room visit data (e.g., individuals with an STI).	15	2.33	1.29	15	2.13	1.25
Use epidemiological products to provide a profile of your community (e.g., village of 100).	15	3.60	1.50	15	3.53	1.59
Report incidence of sexually transmitted infections of your community to health care providers.	15	3.93	1.03	15	3.93	1.03
Collect socio-demographic information on individuals with sexually transmitted infections.	15	3.47	1.50	15	3.47	1.55
Overall mean and SD		3.30	0.66		3.32	0.71

For the survey items, the following are the mean (SD) for each element based on the implementation of activities for 1) sexual health programs and 2) sexual health services, where, *1* = never and *5* = always, respectively. There were two elements that had the greatest amount of implementation by health units, *Addressing determinants of health and their interactions (M = 3.82, SD = 0.63 and M = 4.04 SD = 0.49)* and *Focus on the health of populations (M = 3.71, SD = 0.66 and M = 3.80 SD = 0.54)*, while two elements

Employ mechanism for public involvement (M = 2.65, SD = 1.07 and M = 2.52 SD = 1.03) and *Collaborate across sectors and levels (M = 2.97, SD = 0.78 and M = 2.86 SD = 0.77)* showed the least amount of implementation by health units. In addition, the remaining four elements were implemented fairly consistently, but there were activities within those elements that were implemented to a greater extent than others. For the element *Base decisions in evidence (M = 3.38, SD = 0.69 and M = 3.47 SD = 0.53)*, the use of evidence/guidelines to inform practice had a high degree of implementation, while the activity of being involved in primary research was less likely to be implemented by health units. For the element *Increase upstream investments (M = 3.26, SD = 0.79 and M = 3.35 SD = 0.82)*, providing information to the public/primary health care providers on sexual health was more likely put into practice than engaging in healthy public policy within health units. The element, *Apply multiple strategies (M = 3.23, SD = 0.79 and M = 3.84 SD = 0.52)* showed that within health units, the activity of offering sexual health clinic services was more likely to be employed than engaging in community development activities to improve sexual health programs in the community. Finally, in *Demonstrate accountability for health (M = 3.30, SD = 0.66 and M = 3.32 SD = 0.71),* health units were more likely to carry out the activity of collecting incidence and risk factors for STBBIs than collecting information on healthy sexual relationships or sexual health discrimination.

Discussion

Successful application of population health within sexual health programs and services requires an understanding of the activities needed to achieve this type of

approach. We developed a direct measure of the extent that activities associated with a population health approach have been implemented in a) sexual health programs and b) sexual health services in 34 health units in Ontario, Canada. To our knowledge, this is the first valid direct measure of a population health approach in sexual health, which contributes to the field of population health by introducing a new understanding of what is required to make population-level changes in sexual health. As well, multiple phases of instrument development helped to build rigor by using multiple data sources including published literature and expert opinion from various groups including managers, staff, and researchers. Face and content validity added additional rigor and experts assessing items for content validity perceived the majority of the questions as relevant. There were not a high number of individuals consulted to complete the survey. This is likely because managers of sexual health programming are well-positioned to be aware of activities being conducted within their sexual health programs and services; therefore, consultation was not required with every health unit.

It is apparent from the results that the capacity of health units to implement elements and activities associated with a population health approach varied, with some elements and activities being more challenging for health units to implement than others. For example, *collaborate across sectors and levels* and *employ mechanisms for public involvement* were the least implemented elements among health units. Literature indicates that factors such as funding, staffing levels, differing goals, and organizational commitment can influence the ability of agencies like public health to collaborate with community organizations and engage the public in service planning (Estacio, Oliver,

Downing, Kurth, & Protheroe, 2017; Littelcott, Fox, Stathi, & Thomson, 2017; Williamson, 2014). In contrast, *address determinants of health and their interactions* and *focus on the health of populations* were the most highly implemented elements. In public health, concepts like SDoH are better understood and applied to programming, especially identifying and serving priority populations (Brassolotto, Raphael, & Baldeo, 2013; Cohen et al., 2013). SDoH have been part of the OPHS since 1997, and it could be this corporate vision of focusing on broader determinants of health that makes public health more comfortable with applying this approach (Cohen et al.; Ministry of Health and Long-term Care, 1997).

However, the actual reasons behind the difference in implementation is unknown, identifying a knowledge gap and what would be a valuable next area for study to fully understand how changes can be made within public health to support the implementation of these elements and activities. With an abundance of research showing the need for population-level action to improve health equity and the overall health of populations (McLaren, 2019; Neudorf, 2012), why is the translation of this into practice so challenging for sexual health? Knowledge of barriers and facilitators faced by health units in translating these activities into practice would provide lessons on where public health needs to make investments.

Limitations

The aim of developing this survey was not to use it as a research measure but to gather cross-sectional data to inform the next phase of research, which is examining factors that influenced the implementation of the population health key elements. Given

this, we know there were limitations, specifically around determining the reliability of the instrument, which could be addressed in the future with a larger sample size. Given that this is an organizational survey, performing test-retest reliability would have been challenging, as sexual health managers would have to consult with individuals on two occasions, which would not be feasible given informants' busy workloads. In addition, a small pool of participants (n=34) can be drawn from, which makes it burdensome, because the same people would be asked to participate on multiple occasions. Additionally, internal consistency cannot be determined because sexual health programs and services may only conduct one activity under each element and might not conduct every activity listed in the whole scale.

A response rate of 60% was not achieved. The final response rate of 43% makes it challenging to provide an accurate picture of the extent that a population health approach has been implemented in sexual health programs and services across Ontario. The timing of the survey probably contributed to the low response rate. The survey was implemented during a time of uncertainty within public health when the Ontario government proposed a reduction in the number of health units from 34 to 10 (Izenberg, 2019). With pending amalgamation, health units may not have been eager to participate in a survey, as they may have been preparing for restructuring. Despite the response rate, results contribute new knowledge to fill an important research gap, and the tool can be useful to assess population-level changes made within public health in future studies.

Conclusions

This paper explains the development, validation, and administration of an instrument for measuring the extent that activities associated with a population health approach in sexual health were implemented. This new questionnaire has the potential advantage of providing a starting point for understanding sexual health specific activities towards implementing a population health approach in public health and can be built upon in future research, addressing identified limitations to create a validated instrument in Canadian and similar contexts. Research on factors that determine why certain elements and activities are implemented to a greater extent than others would offer valuable insight in determining what resources public health needs to fully integrate a population health approach.

Compliance with Ethical Standards

Funding: This study received no funding

Conflict of Interest: The authors declare that they have no conflict of interest

Research involving Human Participants and/or Animals: Ethics approval was obtained from: Hamilton Integrated Research Ethics Board (HiREB #5692) for this study

Informed consent: Was obtained by all study participants for all phases.

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Supplementary File 1

Title: Questions from literature and focus groups

Description: Supplementary file 1 is the table that shows the survey questions generated by the l **Sexual Health Programs are defined as:** health promotion strategies to address prevention of STIs, unplanned pregnancy, emphasis of the importance of sexual health to the overall well-being of individuals, and looking at the wider determinants of health

Sexual Health Services are defined as: one-on-one clinic services that offer testing and treatment for STIs, advice and information on sexual health, birth control, vaccination and referral to specialists where appropriate.

Sexual Health Programming is defined as: health promotion strategies and one-on-one clinic services

The stem question is: To what extent does your health unit…

The questions will be rated on a 5-point scale: 1=never, 5=always

Legend

N= statements that were new in relation to the existing literature

CF= statements that were added that confirmed an idea from another focus group

CLit= statements that were added that confirmed an idea from the literature

CLitE= statements that confirmed an idea from the literature and provided an example to expand or clarify

E= statements that provided an example to expand or clarify an idea

For example, the label "A3 CLitE = Denotes the survey item number (A3), and indicates that the source -the literature- confirmed an idea from the literature and provided an example to expand or clarify the item."

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
A. Focus on the Health of Population "A population health approach focuses on improving the health status of the population. Action is directed at the health of an entire population, or sub-population, rather than individuals. Focusing on the health of populations also necessitates the reduction in inequalities in health status between population groups. An underlying assumption of a population health approach is that reductions in health inequities require	1. Social and cultural factors are very significant in determining people's access to sexual and reproductive health services and information. The role that family, community and society play in shaping a person's sexual life should not be underestimated. Any intervention to improve the sexual health of a population must therefore be understood and accepted by the community. Programs and interventions that contradict traditional teachings and do not attempt to achieve some level of acceptance or consensus among power holders in the community are likely to fail (WHO, 2010).	1. To what extent do sexual health programs in your health unit consider the values (e.g., social, political, religious beliefs) of the community it serves?	1. To what extent do sexual health services in your health unit consider the values (e.g., social, political, religious beliefs) of the community that your health unit serves?			1. To what extent does your health unit consider the values (e.g., social, political, religious beliefs) of the community?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
reductions in material and social inequities. The outcomes or benefits of a population health approach, therefore, extend beyond improved population health outcomes to include a sustainable and integrated health system, increased national growth and productivity, and strengthened social cohesion and citizen engagement" (Public Health Agency of Canada (PHAC), 2013, Focus on the Health of Population section).	2. Suggest that stigma creates secrecy and shame that prevents individuals from accessing sexual health services. Reducing stigma lowers STI rates. Social norms that promote healthy behaviours (Swartzendruber & Zenilman, 2010).	2. To what extent do sexual health programs in your health unit address social stigma (e.g., discrimination, disapproval) in relation to sexually transmitted infections?	2. To what extent do sexual health services in your health unit address social stigma (e.g., discrimination, disapproval) in relation to sexually transmitted infections?			2. To what extent does your health unit address social stigma (e.g., discrimination, disapproval) in relation to sexually transmitted infections?
	3. Investments in sexual and reproductive health services have been shown to provide economic and social benefits at the individual, family, and societal levels. High rates of adverse outcomes in adolescents, racial minorities, LGBTQ, and people with disabilities (Ivankovich et al., 2013).	3. To what extent do sexual health programs in your health unit target priority populations (e.g., LGBTQ, youth)?	3. To what extent do sexual health services in your health unit target priority populations (e.g., LGBTQ, youth)?	3. Focus on high risk priority populations (e.g., college students) A3 CLitE. Offer men's clinic A3 E	3. Focus on priority populations A3 CLit. Client survey targeted to MSM A3 CLitE	3. To what extent does your health unit target priority populations (e.g., LGBTQ, youth, post-secondary students)?
	4. That young people have the information they need to make healthy decisions about their sexual lives is one of the most effective	4. To what extent do sexual health programs in your health unit provide identified priority populations with	4. To what extent do sexual health services in your health unit provide identified priority populations with	4. Target priority populations for health promotion. "One size health promotion doesn't fit all" A4 CLit	4. Target messaging to priority populations, not general messages A4 CLit	4. To what extent does your health unit provide priority populations with targeted health information to make

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	ways of improving sexual health in the long term (WHO, 2010).	information to make healthy decisions about their sexual health?	information to make healthy decisions about their sexual health in your sexual health services?			healthy decisions about their sexual health?
				5. Pull data from EMR to identify vulnerable populations A5 N 7. Need epidemiological information (e.g., incidence and prevalence of STIs, clusters of STIs) in order to guide programs and services and identify inequities A7 N	6. Use ICES to pull OHIP data to see physicians who test for GC/CT and the number of negative tests A6 N	5. To what extent does your health unit use information (e.g., electronic medical records) to identify vulnerable populations? 6. To what extent does your health unit use external data (e.g., OHIP billing) to inform program planning? 7. To what extent does your health unit collect/use epidemiological data (e.g., risk factors, incidence, prevalence) to inform program planning?

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		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
					8. Using postal code information to determine where there are higher cases of STIs to focus health promotion interventions A8 N 9. Looking at sexually transmitted enteric infections. Making links, advice and support for clients. Offer Hep A vaccination A9 N	8. To what extent does your health unit use geographical data (e.g., look at incidence of chlamydia by postal code) to inform program planning? 9. To what extent does your health unit provide advice for vaccine preventable infections (e.g., Hepatitis A) for those identified at risk?
B. Address the Determinants of Health and their Interactions "A population health approach takes action based on analyses and understandings of the entire range of the determinants of	1. Recommend that adolescents should have easy access to contraceptives and condoms at low or no cost through federally funded programs (Swartzendruber & Zenilman, 2010).	1a. To what extent do sexual health programs in your health unit ensure availability (e.g., enough personnel, up-to-date knowledge) of staff? 1b.To what extent do sexual health programs in your health unit ensure	1a. To what extent do sexual health services in your health unit ensure availability (e.g., enough personnel, up-to-date knowledge) of staff? 1b.To what extent do sexual health services in your health unit ensure	1a. Sexual health clinic services are available for all the general population B1a CLit 1b. Health equity nurses help to train staff to understand how to use tools like HEIA B1b CLitE		1a. To what extent does your health unit ensure availability of quality programs/ services to the population (e.g., enough personnel, knowledgeable staff?) 1b. To what extent does your health unit ensure programs/ services are acceptable to the

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
health. A population health approach recognizes the complex interplay between the determinants of health. It uses a variety of strategies and settings to act on the health determinants in partnership with sectors outside the traditional health system or sector" (PHAC, 2013, Address the Determinants of Health and their Interactions section).		acceptability (e.g., no discrimination)?	acceptability (e.g., no discrimination)? 1c. To what extent do sexual health services in your health unit ensure affordability (e.g., provide low lost birth control)? 1d. To what extent do sexual health services in your health unit ensure accessibility (e.g., local, easy to get to)?	1c. Look at how youth will access their birth control from the pharmacy if they live in rural area B1c CLit 1d. Offer transportation vouchers and incentives to get clients to the clinic B1d CLitE		population (e.g., no discrimination)? 1c. To what extent does your health unit ensure affordability of services (e.g., provide low lost birth control)? 1d. To what extent does your health unit ensure services are accessible (e.g., local, easy to get to, travel vouchers)?
	2. Recommend access to services that include diagnosis and management of STIs, accurate risk reduction information, contraception, and safe abortion (Swartzendruber & Zenilman, 2010).	2. To what extent does your health unit provide embedded sexual health programs in the community to reach priority populations?	2. To what extent does your health unit provide embedded sexual health services in the community to reach priority populations?	2. Outreach nurses offer services in the community (e.g., sex trade). They go where the clients are B2a CLitE	2. Outreach testing is being done in youth shelters and adults in a day drop-in center B2a CLitE. Provide STI testing in public high schools B2a CLitE	2. To what extent does your health unit provide sexual health services in the community to reach priority populations (e.g., testing in schools and/or shelters)?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	3. Interventions to maintain and ensure sexual health must be offered to women and men of all ages, regardless of their marital status (WHO, 2010). 4. Services should be made as accessible as possible to young people and adults, and should be confidential, private, and non-discriminating (WHO, 2010). 5. Ensuring the right of people living with STIs or HIV to have access to information and	3. To what extent do sexual health programs in your health unit offer equitable access for youth (15-24 years of age)? 4a. To what extent do sexual health programs in your health unit offer equitable access for adults (25-64 years of age)? 4b. To what extent do sexual health programs in your health unit offer equitable access for older adults (65+)? 5. To what extent do sexual health programs in your health unit use	3. To what extent do sexual health services in your health unit offer equitable access for youth (15-24 years of age)? 4a. To what extent do sexual health services in your health unit offer equitable access for adults (25-64 years of age)? 4b. To what extent do sexual health services in your health unit offer equitable access for older adults (65+)? 5. To what extent do sexual health services in your health unit use	5. Reducing stigma around STI testing B5 CLitE	5. Use Health Equity Impact Assessment tool (HEIA) to identify	3. To what extent does your health unit offer equitable access for youth (under 24 years of age)? 4a. To what extent does your health unit offer equitable access for adults (25-64 years of age)? 4b. To what extent does your health unit offer equitable access for older adults (65+)? 5. To what extent does your health unit use principles of social justice to address health

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	services without discrimination (WHO, 2010).	principles of social justice (e.g., addresses health inequity, supportive environments)?	principles of social justice (e.g., addresses health inequity, supportive environments)?		individuals affected by SDOH and develop interventions to increase access to sexual health services for those subpopulations B5 CLitE	inequity in your community (e.g., address discrimination based on sexual orientation, address social inequality)?
	6. The context in which behaviour change is expected to take place is especially important. (i.e. a woman or girl who is poor may know about the dangers of HIV and other STIsbut engaging in transactional or commercial sex may be the only way for her to earn money) (WHO, 2010). Recommend focusing on the complex factors at the individual, relational, community, and societal levels that influence individual and community sexual health outcomes (Ivankovich et al., 2013). Studies show	6. To what extent do sexual health programs in your health unit promote trauma-informed practice (e.g., understanding, recognizing, and responding to the effects of all types of trauma, such as sexual abuse, physical violence)?	6. To what extent do sexual health services in your health unit use trauma-informed practice (e.g., understanding, recognizing, and responding to the effects of all types of trauma, such as sexual abuse, physical violence)?	6. Screen clients for history of trauma and make referrals based on the assessment B 6a/b CLit		6a. To what extent does your health unit use trauma and violence-informed care at the organizational level (e.g., understanding, recognizing, and responding to the effects of all types of trauma, such as sexual abuse, physical violence)? 6b. To what extent does your health unit use trauma and violence-informed care at the program level (e.g., understanding, recognizing, and responding to the effects of all types of

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	that sexual abuse early in life can lead to increased ill-health in adulthood. This is partly because of increased sexual risk-taking, such as having early first sex, multiple partners, and participating in sex work of various kinds WHO, 2010).					trauma, such as sexual abuse, physical violence)?
	7. Focusing on education, employment, drug and alcohol marketing, male incarceration, and social capital will have an impact on STIs (Dean et al., 2013). Underlying patterns of social exclusion and inequality, in particular poverty, gender inequality and unequal access to education and healthcare, must also be addressed through simultaneous, multi layered interventions that address both risk and vulnerability within the context of	7. To what extent do sexual health programs in your health unit address sexual risk behaviour for people affected by determinants of health (e.g., poverty, lack of education, and gender inequality)?	7. To what extent do sexual health services in your health unit address sexual risk behaviour for people affected by determinants of health (e.g., poverty, lack of education, and gender inequality)?	7. Screen clients for risk of poverty, housing, and income and make referrals based on the assessment B7 CLit Addictions and mental health plays a role in sexual health behaviours. They all impact each other. Not seeing clients for only sexual health issues. B7 CLitE	7. Link street involved, substance users, or low income individuals to tax return filing services to ensure they are receiving funds they are entitled to B7 E Developed a questionnaire for clinic clients to determine those individuals affected by SDOH B7 E	7. To what extent does your health unit provide supports to address needs beyond sexual health (e.g., referrals to address issues of poverty, lack of education, housing) for individuals engaged in high risk sexual behaviour?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	sexual behaviour (WHO, 2010).					
C. Base Decisions in Evidence "A population health approach uses "evidence-based decision making." Quantitative and qualitative evidence on the determinants of health is used to identify priorities and strategies to improve health. An important part of the population health approach is the development of new sources of evidence on the determinants of health, their interrelationship, and the effectiveness of interventions to improve health and the factors known to influence it" (PHAC, 2013,	1. Research is recommended to develop and assess new prevention approaches that address gaps (Ivankovich et al., 2013).	1a. To what extent do sexual health programs in your health unit engage in evaluations to inform improvements?	1a. To what extent do sexual health services in your health unit engage in evaluations to inform improvements?	1a. Looking at data (e.g., teen pregnancy, STIs) to target decisions C1a CLitE Determining how best to share guidelines with community partners and clinicians to ensure they are using evidence in the decisions they make C1a CLitE Evidence-informed public health C1a CLit Use evidence from PHO and PHAC are used to obtain what the best practice is C1a CLitE	1a. Data on STIs in target groups to help develop health promotion resources C1a CLitE 1c. Collaborate with PHAC on	1a. To what extent does your health unit engage in evidence-informed decision making by reviewing best available research to inform decisions related to program/service implementation? 1b. To what extent does your health unit participate in a continuous quality improvement program? 1c. To what extent is your health unit

Element with Definition	**Findings From the Literature**	**In Sexual Health Programs**	**In Sexual Health Services**	**Findings From Focus Group #1**	**Findings From Focus Group #2**	**Final Statement**
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
Base Decisions in Evidence section).					research projects C1c CLitE	involved in conducting research?
		1d. To what extent do sexual health programs in your health unit engage in research to inform improvements?	1d. To what extent do sexual health services in your health unit engage in research to inform improvements?		1d. Review literature and best practice guidelines C1d E Using EIDM to reduce STIs C1d CLitE Planning tool that incorporates a situational assessment and literature review C1d E Applicability and transferability tool to determine how to apply interventions internally and externally. Apply to public health context C1d E	1d. To what extent does your health unit engage in research to inform improvements (e.g., literature review, research projects to reduce sexually transmitted infections)?
				1e. Focus on evaluation, to make sure that the right populations are	1e. For program planning, decisions are	1e. To what extent does your health unit engage in program

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
				being targeted C1e CLit	based on evidence C1e Clit Evaluation and monitoring of interventions C1e CLit	evaluation to inform program planning?
D. Increase Upstream Investment “Efforts and investments in a population health approach are directed at root causes to increase potential benefits for health outcomes. The identification and definition of health issues and the investment decisions within a population health approach are guided by parameters based on evidence about what makes and keeps people healthy. A	1. Recommend a national campaign to promote sexual health and publicize prevention (Swartzendruber & Zenilman, 2010).	1. To what extent do sexual health programs in your health unit utilize social marketing campaigns to educate the public?	1. To what extent do sexual health services in your health unit utilize social marketing campaigns to educate the public?	1.Use social media education and paid social media advertising D1CLit Nurses use twitter and Facebook D1 E	1. Using social media, dating apps, texting, and Twitter D1 CLitE	1. To what extent does your health unit utilize social media marketing (e.g., Twitter, Facebook, dating apps) to educate the public?
	2. Health promotion approach that recognizes sexual health as an important aspect of the overall health and well-being of individuals, families, and communities (Ivankovich et al., 2013).	2. To what extent do sexual health programs in your health unit embed sexual health messaging in all programs where relevant?			2a. Key message work across programs in the health unit. 2b. Developing sexual health key messages-Youth specific. Working to provide these messages to internal and external	2a. To what extent does your health unit provide sexual health messaging within internal programs, where relevant (e.g., school health)? 2b. To what extent does your health unit provide sexual health messaging to community stakeholders where relevant?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	To what extent does your health unit perform this activity:			
population health approach directs investments to those areas that have the greatest potential to influence population health status positively. A population health approach is grounded in the notion that the earlier in the causal stream action is taken, the greater the potential for population health gains" (PHAC, 2013, Increase Upstream Investment section).					stakeholders D2b CLit	
	3. Develop policies that support greater access to sexual and reproductive health services and safe, supportive environments (e.g. free of discrimination) that impact sexual behaviour (Douglas & Fenton, 2013). Countries may use laws, policies and other regulatory mechanisms to guarantee the promotion, protection and provision of sexual health information and services (WHO, 2010). 4. Stakeholders at national, regional and local levels can identify and support evidence-based policies related to sexual health (e.g. access to services and	3. To what extent do sexual health programs in your health unit engage in healthy public policy within your organization? 4. To what extent do sexual health programs in your health unit provide evidence to provincial and/or national	3. To what extent do sexual health services in your health unit engage in healthy public policy within your organization? 4. To what extent do sexual health services in your health unit provide evidence to provincial and/or national	3. Policy work D3 CLit	4. Mandatory reporting to the MOHLTC D4 CLit	3. To what extent does your health unit engage in healthy public policy in relation to sexual health within your organization? 4. To what extent does your health unit provide evidence to provincial and/or national organizations (e.g., Ministry of Health and Long-Term Care, Public

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	education) (Ivankovich et al., 2013). Legal protection against discrimination and stigma related to sexuality and sexual health status is fundamental to the creation and maintenance of a sexually healthy society (WHO, 2010).	organizations (i.e. MOHLTC, Public Health Agency of Canada or community stakeholders) to assist with policy development?	organizations (i.e. MOHLTC, Public Health Agency of Canada or community stakeholders) to assist with policy development?			Health Agency of Canada) to assist with sexual health policy development?
	5. Messages should provide accurate information, reduce stigma, encourage use of health services, and promote responsible sexual behaviour (Swartzendruber & Zenilman, 2010). Recommend providing accurate and comprehensive information to adolescents to prepare them for responsible decision making (Swartzendruber & Zenilman, 2010).The best way to ensure that young people learn and adopt safe and healthy	5. To what extent do sexual health programs in your health unit educate youth to improve decision making using communication skills, negotiation skills, or condom use skills?	5. To what extent do sexual health services to in your health unit educate youth to improve decision making using communication skills, negotiation skills, or condom use skills?	5. Focus on the use of condoms to reduce STIs D5 CLit		5. To what extent does your health unit educate youth to improve their decision making (i.e., using communication skills, negotiation skills, or condom use skills)?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	sexual behaviour, and limit their risk and vulnerability to sexual health (such as unwanted pregnancy, unsafe abortion, STIs and HIV), is by providing appropriate education about sex and personal relationships (WHO, 2010).					
	6. Suggested that improved education and training for the general public and health care providers on human sexuality and sexual health can help address the stigma that surrounds STI and improve health outcomes (Ivankovich et al., 2013).	6a. To what extent does your health unit provide information / education to **primary health care providers** on sexual health programs (e.g., STI risk factors)? 6b. To what extent does your health unit provide information / education to the	6a. To what extent does your health unit provide information / education to **primary health care providers** on sexual health services (e.g., STI testing and treatment)? 6b. To what extent does your health unit provide information / education to the	6a. Ask HCPs why they are using 2nd line treatment for STIs and MOH provides education to these HCPs D6a E In-service for primary HCPs on sexual health services D6a E	6a. Engaging physicians in universal testing for priority populations D6a CLitE 6b. Website for young adults that has sexual health information D6b CLitE Clinic tours D6b E Infographics used	6a. To what extent does your health unit provide information / education to **primary health care providers** on healthy sexuality and sexual health (e.g., sexually transmitted testing in priority populations, first line sexually transmitted treatment)? 6b. To what extent does your health unit provide information / education to the **general public** on healthy sexuality and sexual health (e.g.,

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		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
		general public on sexual health programs (e.g., STI risk factors)?	**general public** on sexual health services (e.g., STI testing and treatment)?		to disseminate information to the public D6b CLitE	sexually transmitted infections risk factors)?
				7. Encouraging condom use is challenging and hard to measure D7 N 8. Advocate for sexual health curriculum in schools D8 N	8. Health promotion in schools D8 CF	7. To what extent does your health unit engage in an evaluation of intervention effectiveness (e.g., condom use)? 8. To what extent does your health unit advocate for sexual health curriculum in schools?
E. Apply Multiple Strategies "Contemporary research has clearly demonstrated the relationship between population health status and the multiple determinants of health. Our current state of knowledge rests on the notion	1. Recommend a framework for coordinated services and facilitate local action according to population needs (Swartzendruber & Zenilman, 2010). 2. Sexual health services can be	1. To what extent does your health unit work with primary health care providers in your community to ensure coordination of sexual health programs? 2a. To what extent does your health unit	1. To what extent does your health unit work with primary health care providers in your community to ensure coordination of sexual health services? 2a. To what extent does your health unit	1. Overlaps between agencies E1 E Assessment/scan on overlapping services. Who provide services to the target population and who are potential referral sources E1 E 2a. Stakeholder analysis to	2a. Using peer educators E2a E	1. To what extent does your health unit work with primary health care providers in your community to assess overlaps and gaps in sexual health programs and services? 2a. To what extent does your health unit provide sexual health

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		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
that the health of populations is correlated with factors that fall outside the health system or established health sector. This understanding has set the context for new approaches to health improvement that draw upon multiple strategies applied within multiple settings. It calls for innovative and interconnected strategies that give due consideration to the full spectrum of social, economic and environmental health determinants. Based on the analysis of evidence, strategies are developed that will have the	provided as part of primary health care, including reproductive health services, or as a stand-alone service, and should address the most significant sexual health problems and concerns (WHO, 2010).Strengthen infrastructure to ensure that services relevant to sexual health (i.e. clinical and other preventative services) are available to the public and that health professionals are trained to provide these services (Ivankovich et al., 2013). Recommendation that sexual health services should be incorporated into primary care and those clinicians should be trained to provide sexual health care throughout the lifespan (Swartzendruber & Zenilman, 2010).	provide comprehensive sexual health programs that are responsive to the needs of your community?	provide comprehensive sexual health services that are responsive to the needs of your community?	determine gaps/opportunities E2a E	2b. Pair testing with naloxone provision. If clients come for supplies, testing is available E2b CLitE	programs that are responsive to the needs of your community? 2b.To what extent does your health unit provide comprehensive 'one stop' services (e.g., sexually transmitted infection testing and naloxone)?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
greatest relative impact on population health risks and conditions. Strategy development includes the identification of (a) who will employ strategies, (b) to whom, (c) when, and (d) where, in order to ensure maximum contribution to desired health outcomes" (PHAC, 2013, Apply Multiple Strategies section).	3. Evidence indicates that traditional, disease-focused programs have provided many successes; they often function with limited collaboration across program lines and have not provided optimal results (Ivankovich et al., 2013).Suggest that promotion of sexual health has great potential to complement traditional disease control and prevention (Douglas & Fenton, 2013). Increasing evidence shows that a more holistic and health-focused approach can positively affect public health problems related to sexual behaviour (Douglas & Fenton, 2013).	3. To what extent does your health unit provide multiple components in interventions (e.g., inclusion of clinic services along with health promotion activities) in sexual health programming?			3. Primary, secondary, and tertiary interventions E3 V	3. To what extent does your health unit provide multiple component interventions (e.g., includes primary, secondary, and/or tertiary interventions)?
	4. Implementing key public health activities (research activities, public and professional training, and partnerships),	4. To what extent does your health unit engage in community development activities to assist	4. To what extent does your health unit engage in community development activities to assist	4. Targeting kids early before they are sexually active. Offering testing in schools E4 CLitE	4. Youth strategy- meeting with stakeholders and youth to determine what they need for their health and	4. To what extent does your health unit engage in community development activities (e.g., work with local community

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	stakeholders can support conditions that allow each person to develop the knowledge, attitudes, and skills to make healthy choices (Ivankovich et al., 2013).	with improving sexual health programs for the community(ies) you serve?	with improving sexual health services for the community(ies) you serve?		well-being E4 CLitE Work with community services to focus on those who are marginalized to focus on sexual health E4 CLitE Work with youth shelters to offer testing E4 CLitE	members, youth) to assist with improving sexual health programs for the community?
	5. Recommend a more coordinated public health approach to advance sexual health and suggest a sexual health framework that emphasizes the importance of health promotion (Ivankovich et al., 2013).	5a. To what extent do sexual health programs in your health unit have a written strategy (e.g., service plan, operational plan, logic model) that address sexual health issues within your community? 5b. To what extent do sexual health programs in your health unit apply a sexual health framework(s) to inform planning?	5a. To what extent do sexual health services in your health unit have a written strategy (e.g., service plan, operational plan, logic model) that address sexual health issues within your community? 5b. To what extent do sexual health services in your health unit apply a sexual health framework(s) to inform planning?	5a. Using logic models E5a CLit		5a. To what extent does your health unit have a written strategy (e.g., service plan, operational plan, logic model) that addresses sexual health issues within your community? 5b. To what extent does your health unit apply a sexual health framework to inform planning?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	6. Create organizational structures and health systems (via policies, research, and partnerships) that prioritize health equity is also necessary for effectively acting on the sources of health inequities (Dean et al., 2013).	6. To what extent does your health unit engage in sexual health research to address health inequities in sexual health programs?	6. To what extent does your health unit engage in sexual health research to address health inequities in sexual health services?		Explore literature on expedited partner therapy E6 CLitE	6. To what extent does your health unit engage in sexual health research to address health inequities in sexual health programs?
	7. Health systems should provide: 1. Sexual health education and prevention information for young people, single, adults, and couples, where confidentiality and privacy are assured 2.Sexuality counseling for the client's sexual health concerns or needs, and desired sexuality, reproductive or contraceptive preferences 3. Identification and referral for victims of sexual and other forms of violence.		7a. To what extent do sexual health services in your health unit identify and refer victims of violence (e.g., sexual and domestic)? 7b. To what extent do sexual health services in your health unit offer STI screening and treatment? 7c. To what extent do sexual health services in your health unit offer contraceptive			7a. To what extent do sexual health services in your health unit offer sexually transmitted infection screening and/or treatment? 7b. To what extent do sexual health services in your health unit refer victims of violence (e.g., sexual and domestic)? 7c. To what extent do sexual health services in your health unit offer contraceptive counselling and prescription?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	To what extent does your health unit perform this activity:			
	4. Voluntary counseling, testing, treatment and follow-up for STIs, including HIV. 5. Diagnosis, screening, treatment and follow-up for RTIs, reproductive cancers, and associated infertility. 6. Diagnosis and referral for sexual dysfunction. 7.Post-abortion care, including provision of contraceptive information, counseling and methods (WHO, 2010).		counselling and prescription? 7d. To what extent do sexual health services in your health unit offer options counselling and post-abortion care? 7e. To what extent do sexual health services in your health unit offer counselling for sexual health concerns? 7f. To what extent do sexual health services in your health unit offer referral for sexual dysfunction?			7d. To what extent do sexual health services in your health unit offer pregnancy options counselling and/or post-abortion care? 7e. To what extent do sexual health services in your health unit offer counselling for sexual health concerns? 7f. To what extent do sexual health services in your health unit offer referral for sexual dysfunction?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
F. Collaborate Across Sectors and Levels "A population health approach recognizes that improving health is a shared responsibility. "Intersectoral collaboration" is the joint action among health and other groups to improve health outcomes. A population health approach calls for shared responsibility and accountability for health outcomes with groups not normally associated with healthbut whose activities may have an impact on health or the factors known to influence it. Intersectoral collaboration in a population health	1. Traditional interventions (education, screening, treatment, partner notification, and immunization) may benefit from linkage to broader health and wellness-focused approach to more comprehensively and efficiently address issues related to sexual behaviours and to leverage multisectoral partners and other resources (Ivankovich et al., 2013).	1. To what extent do sexual health programs in your health unit engage in intersectoral partnerships (e.g., education, police, housing, business, faith sectors), to address prevention (e.g., primary, secondary, and/or tertiary)?	1. To what extent do sexual health services in your health unit engage in intersectoral partnerships (e.g., education, police, housing, business, faith sectors), to address prevention (e.g., primary, secondary, and/or tertiary)?	1.Partner with agencies (e.g., pharmacies, shelters, AIDS organization) F1a/b E Brainstorm with social services F1a/b E Connect with mental health van F1a/b E Partner with opioid replacement partners F1a/b E Working with Catholic school boards F1a/b E	1. Community College F1a/b E Addictions and mental health services F1a/b E Partner with planned parenthood, school boards, and physician groups F1a/b E AIDS network staff support sexual health work by promoting testing in bath houses F1a/b CLitE	1a. To what extent does your health unit engage in intersectoral partnerships (e.g., with education, police, housing, pharmacies, social services, and/or faith sectors), to address prevention (e.g., primary, secondary, and/or tertiary)? 1b. To what extent does your health unit engage in intersectoral partnerships (e.g., with education, police, housing, pharmacies, social services, and/or faith sectors) to address health promotion?
	2. Addressing social determinants of health requires coordination and cooperation of multi-level partnerships across sectors (Dean et al., 2013).	2a. To what extent does your health unit work with the local municipal government services to address issues related to sexual health programs?	2a. To what extent does your health unit work with the local municipal government services to address issues related to sexual health services?		2a. Work with local municipality to offer satellite services in the community F2a CLitE	2a. To what extent does your health unit work with the local municipal government services to address issues related to sexual health programs?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
approach includes the horizontal management of health issues. Horizontal management identifies common goals among sectoral partners. It				2b. Write reports to council on updates, roles and scope of practice of staff members F2b E		2b. To what extent does your health unit work with local municipal government to provide updates on sexual health issues in your community?
then ensures coordinated planning, development and implementation of their related policies, programs and services" (PHAC, 2013, Collaborate Across Sectors and Levels section).	3. Recommend dynamic partnerships to inform and support sexual health efforts. Include groups from a variety of sectors (e.g. business, health care, and academia) to support the overall effectiveness of a sexual health effort (Ivankovich et al., 2013).	3a. To what extent does your health unit work with the provincial government to address issues related to sexual health programs? 3c. To what extent does your health unit work with the federal government	3a. To what extent does your health unit work with the provincial government to address issues related to sexual health services? 3c. To what extent does your health unit work with the federal government	3a. Work with the primary care advisor (LHIN) F3a CLitE		3a. To what extent does your health unit work with the provincial government (e.g., Local Health Integration Network) to address issues related to sexual health programs? 3b. To what extent does your health unit work with provincial government to provide updates on sexual health issues in your community? 3c. To what extent does your health unit work with the federal government to address issues related

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
		to address issues related to sexual health programs?	to address issues related to sexual health services?			to sexual health programs?
	5. Suggested that improved education and training for the general public and health care providers on human sexuality and sexual health can help address the stigma that surrounds STI and improve health outcomes Ivankovich et al., 2013). Health-care providers should be trained to detect any problems and to provide referral when needed (WHO, 2010).	5. To what extent does your health unit engage in capacity building across sectors (e.g., health, non-profit) to assist professionals in developing the skills required to provide sexual health programs?	5. To what extent does your health unit engage in capacity building across sectors (e.g., health, non-profit) to assist professionals in developing the skills required to provide sexual health services?	5. Work with community partners for naloxone training and distribution F5 CLitE Provide education to primary HCPs on sexual health F5 CLitE	5. Outreach workers go out in the community to provide harm reduction in-service F5 CLitE Engage community physicians F5 CLit	5. To what extent does your health unit engage in capacity building (e.g., naloxone training, harm reduction) across sectors (e.g., health, non-profit) to assist professionals in developing the skills required to provide sexual health programs?
	6. Anyone involved in providing sex and relationships education – from teachers and community and religious leaders to health-care providers – should receive training and continuing education to ensure that the information and counseling they give are accurate,	6. To what extent does your health unit work with community stakeholders (e.g., teachers, community leaders) to assist them with identifying their own attitudes, beliefs, and values related to sexual health programs?	6. To what extent does your health unit work with community stakeholders (e.g., teachers, community leaders) to assist them with identifying their own attitudes, beliefs, and values related to sexual health services?			6. To what extent does your health unit work with community stakeholders (e.g., teachers, community leaders) to assist them with identifying their own attitudes, beliefs, and values related to sexual health programs?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
	evidence-based, appropriate, and free from discrimination, gender bias and stigma. Health providers have an important role, too, if they create a safe, judgment-free, confidential environment in which people feel free to share any concerns and problems related to their sexuality (WHO, 2010).					
G. Employ Mechanisms for Public Involvement “A population health approach promotes the participation of all Canadians in developing strategies to improve health. The approach ensures appropriate opportunities for Canadians to have meaningful input into the	1. Suggest that community responsibility and participation is critical to achieve a public orientation towards sexual health (Swartzendruber & Zenilman, 2010). Increase the awareness and knowledge about sexual health among the public, community organizations and other stakeholders in society (Douglas & Fenton, 2013).	1a. To what extent do sexual health programs in your health unit involve community partners in planning?	1a. To what extent do sexual health services in your health unit involve community partners in planning?	1a. Youth advisory committee G1a E Lived experience advisory group in poverty. Obtain input from them G1a E Feedback from community partners. Health department wide, not sexual health specific G1a E	1b. Partner with Ontario HIV Epidemiology and Surveillance Initiative (OHESI) G1b E	1a. To what extent does your health unit involve local community partners (e.g., advisory groups, youth committees) in planning programs/services? 1b. To what extent does your health unit involve provincial partners (e.g., Ontario HIV epidemiology and surveillance

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	To what extent does your health unit perform this activity:			
development of health priorities, strategies and the review of outcomes. A benefit of public involvement is that public confidence in decision making and information sharing is increased, as those Canadians who are most affected by a health issue contribute to possible solutions early in the planning process" (Employ Mechanisms for Public Involvement section).						initiative, Public Health Ontario) in planning programs/services?
		1c. To what extent do sexual health programs in your health unit involve users of sexual health services in planning?	1c. To what extent do sexual health services in your health unit involve users of sexual health services in planning?	1c. Survey clients to help with program planning G1c CLitE Survey customers to know what they would like done differently G1c CLitE Why are they using our service vs another service G1c E Feedback from clients who utilize the outreach services G1c E	1c. Clinic client satisfaction survey G1c E Feedback from public on culturally appropriate services G1c CLitE	1c. To what extent does your health unit involve users of sexual health programs and services in planning (e.g., client survey/ feedback)?
		1d. To what extent do sexual health programs in your health unit develop sex positive messaging (e.g., sex is healthy) targeted to the community?	1d. To what extent do sexual health services in your health unit develop sex positive messaging (e.g., sex is healthy) targeted to the community?		1d.Communication team monitors social media and newspaper to see what people are talking about in terms of public health. This information can be used to gear	1d. To what extent does your health unit develop sex positive messaging (e.g., sex is healthy) in collaboration with the general public?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
					messaging G1d CLit	
H. Demonstrate Accountability for Health Outcomes "A population health approach calls for an increased focus on health outcomes (as opposed to inputs, processes and products) and on determining the degree of change that can actually be attributed to an intervention. Changes are examined in health status, determinants of health and health status inequities between population sub-groups. Process, impact and outcome evaluation are used to assess these changes. Regular and timely reporting of results	1. Expand beyond traditional measures such as risky behaviours and adverse health outcomes, to include the areas of physical, mental, emotional, and social well-being in relation to sexuality; sexual relationships; sexual experiences; and discrimination, coercion, and violence (Douglas & Fenton, 2013).	1a. To what extent do sexual health programs in your health unit collect information on the incidence of STIs in your community? 1b. To what extent do sexual health programs in your health unit collect information on the risk factors (e.g., no condom use, multiple partners) for STIs in your community? 1c. To what extent do sexual health programs in your health unit collect information on healthy sexual relationships (e.g., mutual respect, support, trust)?	1a. To what extent do sexual health services in your health unit collect information on the incidence of STIs in your community? 1b. To what extent do sexual health services in your health unit collect information on the risk factors (e.g., no condom use, multiple partners) for STIs in your community? 1c. To what extent do sexual health services in your health unit collect information on healthy sexual relationships (e.g., mutual respect, support, trust)?	1a. is collected on the incidence of STIs H1a CLit	1a. Measure incidence of STIs in the population H1a CLit 1b. Gather exposure information for case management H1b CLit	1a. To what extent does your health unit collect information on the incidence of sexually transmitted infection in your community? 1b. To what extent does your health unit collect/use data on the risk factors (e.g., no condom use, multiple partners) for sexually transmitted infections) in your community? 1c. To what extent does your health unit collect information from your community on healthy sexual relationships (e.g., mutual respect, support, trust)?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
and sharing of information with partners and Canadians is an integral part of a population health approach" (PHAC, 2013, Demonstrate Accountability for Health Outcomes section).		1d. To what extent does your health unit collect information from your community on sexual experience (e.g., consensual, pleasurable)? 1e. To what extent does your health unit collect information from your community related to sexual health discrimination (e.g., stigma against sexual minorities)? 1f. To what extent does your health unit collect information from your community on sexual violence (e.g., sexual assault)?	1d. To what extent do sexual health services in your health unit collect information on sexual experience (e.g., consensual, pleasurable)? 1e. To what extent does your health unit collect information from your community on sexual health discrimination (e.g., stigma against sexual minorities)? 1f. To what extent do sexual health services in your health unit collect information on sexual violence (e.g., sexual assault)?			1d. To what extent does your health unit collect information from your community on sexual experience (e.g., consensual, pleasurable)? 1e. To what extent does your health unit collect information from your community related to sexual health discrimination (e.g., stigma against sexual minorities)? 1f. To what extent does your health unit collect information from your community on sexual violence (e.g., sexual assault)?

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
		1g. To what extent does your health unit use the data that is collected to compare to other jurisdictions?	1g. To what extent does your health unit use the data that is collected to compare to other jurisdictions?			1g. To what extent does your health unit use local sexual health data to compare to other jurisdictions?
				2. Use specific targets (e.g., reduce by 5%) to determine success of intervention H2 N 3. Report STI incidence on website H3 N 4. Information on women who are pregnant H4 N	2. % of clients treated with a specific treatment H2 CLit 3. Report incidence of STIs on website H3 CLit 4. Teen pregnancy rates, abortion rates, and live pregnancy rates H4 CF	2. To what extent does your health unit use specific targets (e.g., reduce chlamydia by 5%) to determine success of interventions? 3. To what extent does your health unit make epidemiological data available on your website (e.g., sexually transmitted infection incidence)? 4. To what extent does your health unit use data on outcomes associated with unintended pregnancy to plan programs and

Element with Definition	Findings From the Literature	In Sexual Health Programs	In Sexual Health Services	Findings From Focus Group #1	Findings From Focus Group #2	Final Statement
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
						services (e.g., abortion rates, teen pregnancy rates)?
				5. Data was collected on the top 10 reasons people visit the ER. Chlamydia was in the top 10 for a specific age group H5 N		5. To what extent does your health unit look at Hospital Emergency Room visit data (e.g., individuals with an STI)?
				6. Village of 100 people was created to show how the community would look if they were a village of 100 people H6 N		6. To what extent does your health unit use community sexually transmitted infection data to provide a profile of your community (e.g., village of 100)?
					7. Report incidence to physicians H7 N	7. To what extent does your health unit report incidence of sexually transmitted infections in your community to health care providers?
					8. HIV rates, HIV testing, and cascade of care information H8 N	8. To what extent does your health unit collect information on HIV (e.g., rates, number of people testing)?

Element with Definition	**Findings From the Literature**	**In Sexual Health Programs**	**In Sexual Health Services**	**Findings From Focus Group #1**	**Findings From Focus Group #2**	**Final Statement**
		To what extent does your health unit perform this activity:	**To what extent does your health unit perform this activity:**			
					9. Demographic and socio-demographic information H9 N	9. To what extent does your health unit collect socio-demographic information on individuals with sexually transmitted infections?

References

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Supplementary File 2

Title: Interview Guide

Description: Supplementary file 2 is the focus group interview guide.

Interview Guide for On-line Focus Group

Welcome to our session. Thanks for taking the time to join me to talk about a population health approach in sexual health programs within public health. My name is [name of interviewer] and I am [role/position] at [name of organization]. You were invited to this focus group because you have knowledge and expertise in population health in sexual health and public health. Given your backgrounds, I want to explore this topic with you to develop a questionnaire that will measure the extent that sexual health programs in public health units across Ontario are implementing a population health approach. If you would like to be acknowledged publicly for your involvement in this stage of the study, I will need your consent for this. Otherwise, your responses will remain anonymous.

In this focus group, there are no wrong answers but rather points of view. Please feel free to share your point of view even if it differs from what others have said. I will be recording the session because I don't want to miss any of your comments. People often say very helpful things in these discussions, and I can't write fast enough to get them all down. We will be on a first name basis during the session, and I won't use any names in my reports. You may be assured of complete confidentiality from the research team (myself and my committee members). We ask that you do not share what you hear in the group with others and as such, we cannot guarantee confidentiality.

Let's find out some more about each other. Tell me your name, profession, and the health unit you are from.

Focus Group Questions

As a reminder, the aim of this aspect of the study is to measure the extent that sexual health programs in public health units across Ontario are implementing a population health approach.

1. Tell me how sexual health programs would focus on the health of a population? What kinds of activities would this involve? (**Prompt**: For example, measuring rates STIs annually at the community level)

2. Can you give me an example(s) of how your health unit addresses determinants of health at a population level in sexual health? (**Prompt**: For example, analysing how determinants of health are related to sexual health behaviours in your community)

3. In what ways can sexual health programs base decisions on evidence? (**Prompt**: For example, using evidence for program planning)

4. How do you see using an upstream approach in sexual health? What activities would demonstrate this? (**Prompt**: For example, balancing short and long term investments)

5. What do you think are ways that sexual health programs can apply multiple strategies at the population level? (**Prompt**: For example, improving health across the lifespan)

6. What ways can sexual health programs collaborate across sectors and levels to achieve a population health approach? (**Prompt**: For example, engaging partners to establish a shared purpose)

7. How do you see sexual health programs employing mechanisms for public involvement? (**Prompt**: For example, using public involvement in developing programs)

8. In what ways can sexual health programs demonstrate accountability for health outcomes? (**Prompt**: For example, develop baseline measures and targets for health improvement)

9. Are there other ways that you can think of that we should consider?

Ending Question

10. Of all the things we discussed today, what to you is the most important?

11. Is there anything else you think is important for us to know?

Supplementary File 3

Title: Survey

Description: Supplementary file 3 is an example of how the on-line survey was set-up.

The Adoption of a Population Health Approach to Sexual Health

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Programs in Public Health Units in Ontario: A Multi-phase Mixed Methods Study

The survey is looking to explore the experiences that health units have had in implementing a population health approach in sexual health programs and sexual health services.

The survey is broken down into the eight key elements of a population health approach. A definition of these elements is provided at the beginning of the question group for your reference. There are questions under each of these elements that you will rate on a Likert scale from 1 to 5 (1= never, 2=seldom, 3= sometimes, 4= often, 5 = always). Your rating will reflect the extent that your health unit is implementing these activities. We know that there might be activities that you do not perform at your health unit. If you encounter this while completing the survey, you should rate that activity as a '1'.

One person should complete the survey on behalf of your health unit. **You should enlist help from other departments or programs (e.g., epidemiologist, health promoter) in your health unit to obtain the most accurate response for your health unit.**

The survey should take 30 minutes to complete. The results are confidential and neither you nor your health unit will be identified.

If you have any questions, please e-mail me at broussel@mcmaster.ca

The survey includes separate questions about sexual health programs and sexual health services.

Sexual Health Programs are defined as: health promotion strategies to address prevention of STIs, unplanned pregnancy, emphasis of the importance of sexual health to the overall well-being of individuals, and looking at the wider determinants of health

Sexual Health Services are defined as: one-on-one clinic services that offer testing and treatment for STIs, advice and information on sexual health, birth control, vaccination and referral to specialists where appropriate. There are 15 questions in this survey.

Demographics
Which health unit do you work at? *

Please choose **only one** of the following:

- Algoma Public Health
- Brant County Health Unit
- Chatham-Kent Public Health
- Durham Region Health Department
- Eastern Ontario Health Unit
- Elgin St. Thomas
- Grey Bruce Health Unit
- Haldimand-Norfolk Health Unit
- Haliburton, Kawartha, Pine Ridge District Health Unit
- Halton Region Health Department
- City of Hamilton Public Health Services
- Hastings Prince Edward Public Health
- Huron Perth Public Health
- Kingston, Frontenac, Lennox & Addington Public Health
- Lambton Public Health
- Leeds, Grenville and Lanark District Health Unit
- Middlesex-London Health Unit
- Niagara Region Public Health
- North Bay Parry Sound District Health Unit
- Northwestern Health Unit
- Ottawa Public Health
- Peel Public Health
- Peterborough Public Health
  Porcupine Health Unit
- Public Health Sudbury & Districts
- Renfrew County & District Health Unit
- Simcoe Muskoka District Health Unit
- Southwestern Public Health
- Thunder Bay District Health Unit
- Timiskaming Health Unit
  Toronto Public Health
- Region of Waterloo, Public Health
  Wellington-Dufferin-Guelph Public Health
  Windsor-Essex County Health Unit
  York Region Public Health

What is the type of population that your health unit serves?
Please choose **only one** of the following

- Rural
- Remote
- Mixed

A. Focus on the Health of Population

"A population health approach focuses on improving the health status of the population. Action is directed at the health of an entire population, or sub-population, rather than individuals. Focusing on the health of populations also necessitates the reduction in inequalities in health status between population groups. An underlying assumption of a population health approach is that reductions in health inequities require reductions in material and social inequities. The outcomes or benefits of a population health approach, therefore, extend beyond improved population health outcomes to include a sustainable and integrated health system, increased national growth and productivity, and strengthened social cohesion and citizen engagement" (Public Health Agency of Canada (PHAC), 2013, Focus on the Health of Population section).

To what extent does your health unit perform these activities? *
Please choose the appropriate response for each item:

	In Sexual Health Programs 1 (never) 2 3 4 5 (always)	**In Sexual Health Services 1 (never) 2 3 4 5 (always)**
1. Consider the social and cultural factors in the community (e.g., social norms/attitudes).		
2. Address social stigma (disapproval of or discrimination against a person) in relation to sexually transmitted infections?		
3. Collaborate with priority populations (e.g., LGBTQ2S, youth, post-secondary students, sex trade workers).		
4. Provide individuals within priority populations		

with targeted health information to make decisions about their sexual health (e.g., condom use).

5. Collect information to identify priority populations.

6. Collect external data (e.g., OHIP billing, ER and hospital use data) to inform program planning.

7. Collect internal epidemiological data to inform program planning (e.g., risk factors, incidence, and prevalence).

8. Use internal epidemiological data to inform program planning (e.g., risk factors, incidence, and prevalence).

9. Use geographical data to inform program planning (e.g., look at incidence of chlamydia by postal code).

10. Provide advice for vaccine preventable infections (e.g., Hepatitis A, Hepatitis B, HPV) for those identified at risk.

B. Address the Determinants of Health and their Interactions
"A population health approach takes action based on analyses and understandings of the entire range of the determinants of health. A population health approach recognizes the complex interplay between the determinants of health. It uses a variety of strategies and settings to act on the health determinants in partnership with sectors outside the traditional health system or sector" (PHAC, 2013, Address the Determinants of Health and their Interactions section."

To what extent does your health unit perform these activities?

Please choose the appropriate response for each item:

	In Sexual Health Programs **1 (never) 2 3 4 5 (always)**	**In Sexual Health Services** **1 (never) 2 3 4 5 (always)**
1. Ensure quality in the programs offered (e.g., quality control, identify best practices, adequate staffing, gaps in current programs, conduct quality initiatives).		
2. Offer access for youth 24 years of age and under.		
3. Offer access for adults over the age of 25.		
4. Use principles of social justice to address the disadvantage of certain groups that prevent equal access to determinants of health in your community.		
5. Use trauma and violence-informed care at the program level (e.g., understanding, recognizing, and		

responding to the effects of all types of trauma, such as sexual abuse, physical violence).

6. Provide supports to address broader social needs (e.g., referrals to address issues of poverty, lack of education, housing) for individuals engaged in high risk sexual behaviour.

In Sexual Health Programs
1 (never) 2 3 4 5 (always)

To what extent do Sexual Health Services in your health unit perform these activities?

1 never

5 always

Please choose the appropriate response for each item:

	1	2	3	4	5
7. Ensure affordability (e.g., provide low lost birth control, travel vouchers).					
8. Ensure accessibility (e.g., local, easy to get to, flexible)					

CHAPTER FOUR

Influences on the uptake of a population health approach to sexual health programs in Ontario public health units: A qualitative descriptive study

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Abstract

Aim: Population-level prevention initiatives are the cornerstone of public health practice. Yet despite this normative practice, sexual health programming within public health has not utilized this approach to the same extent as other public health programs. Understanding requirements to put a population-level approach into practice is needed. The objective of this study was to explore the barriers and facilitators experienced by sexual health programs and services within public health when implementing a population health approach.

Subject Design and Methods: We conducted a study using descriptive qualitative methodological principles. Data collection involved in-depth semi-structured interviews with twelve sexual health managers and/or supervisors from ten Ontario public health units. Directed content analysis was completed and guided by the Consolidated Framework for Implementation Research.

Results: Barriers and facilitators that influenced implementing a population health approach were mainly in the inner and outer setting domains of the Consolidated Framework for Implementation Research. Participants identified the presence of community partnerships, adequate staff training on population health, and access to data on population health served as facilitators. In comparison, barriers to implementation included a lack of resources (human, financial) and clinicians' value of and preferences for delivering services at the individual clinic level.

Conclusion: Some clear barriers and facilitators influenced if staff in sexual health programs and services could implement a population health approach. Results indicate where public health resources need to be enhanced to move towards a population health approach and provide insight into what worked and should be considered by public health organizations.

Keywords: Public health, Sexual health, Population health, Implementation science

Background

Addressing social determinants of health, engaging in inter-sectoral partnerships, and focusing on health promotion are strategies to improve the health of populations (Cohen et al., 2014; Health Canada, 2001). Employing a population health approach is a cornerstone of public health practice. However, within public health units that are delivering care to individuals through clinic-based services (such as sexual health clinics), what emerges is a tension between providing individual-level care and population health. This tension questions if both of these activities can be done. Despite the interest and promise of a population health approach, important challenges exist in how this approach can be translated into meaningful outcomes within sexual health, given the growing demand for one-on-one clinical services to address rising cases of sexually transmitted infections (Choudhri, Miller, Sandhu, Leon, & Aho, 2018a; Choudhari et al., 2018b; Waters, 2020). Given this demand, questions remain: does public health have the financial and human resources to accommodate this approach and how would population health be prioritized amongst these competing priorities?

In 2018, the transformation from individual-focused services to population-based interventions was initiated within Ontario's public health sector due to the modernization of the standards that govern public health (Ministry of Health and Long-Term Care [MOHLTC], 2018). Implementing a new approach can be challenging for an organization, with individual, external, and internal factors influencing how and if a new approach is implemented (Damschroder et al., 2009). Further, contexts in which new approaches are implemented are increasingly complex, involving interactions within and

outside of the organization. In 2019, a reduction from 34 to 10 public health units was proposed by the Ontario government as an attempt to decrease the costs of public health services (Izenberg, 2019). How the combination of these two factors would impact sexual health programming was not known.

In Ontario, the structure of public health is complex, with 34 separate health units that deliver health promotion and disease prevention programs to diverse communities and geographies across the province (Lyons, 2016). Each health unit is governed by a local Board of Health and led by a Medical Officer of Health (MOH). Health units provide and tailor services to meet identified local community needs (Lyons; MOHLTC, 2018). Cost-sharing occurs between the MOHLTC and health units, to ensure that programs and services mandated by the Ontario Public Health Standards (OPHS) are operationalized (Lyons). Given the centrality of population health within public health practice, it would be vital to understand how public health units across Ontario are faring when implementing a population health approach within sexual health. While an emerging body of literature in public health has supplied important insights into barriers and facilitators to implementing components of a population health approach, we believe that expanding this understanding within the specific context of sexual health is an important next step (Aston, Meager-Stewart, Edwards & Young, 2009; Brassolotto, Raphael & Baldeo, 2014; Oliver et al., 2014; Sibbald et al., 2012; & Van de Goor et al., 2017). Therefore, this paper reports findings from a qualitative descriptive study that sought to understand how managers and supervisors working in Ontario public health units perceive barriers and facilitators that influence the implementation of a population

health approach within sexual health programs and services. Deepening our understanding of these influences will provide a holistic view of the implementation of a population health approach in sexual health, and identify barriers that need to be overcome and enablers that can be strengthened in implementing population-level activities in sexual health.

Methods

Study Design

This study employed methodological principles drawn from fundamental qualitative description (QD) (Sandelowski, 2000). QD was chosen for its relevance in offering a rich description of a phenomenon, especially when little is known about a topic (Sandelowski). QD offers the opportunity to gain insight and knowledge into how participants see their world, which aligns with the purpose of this study (Sandelowski). Key informants were purposively recruited based on their leadership position within sexual health to offer insights about individual, interpersonal, organizational, and system factors that influence implementing a population health approach. Given their role in developing or implementing policy and practice change with their health units, managers and/or supervisors could provide a detailed examination of factors that influenced implementation.

Key informants were recruited through email invitations from a pool of sexual health managers and/or supervisors (n=15) who completed an online survey, as part of a larger study by Frost and colleagues (Chapter 1). This survey examined the extent that

population health activities were implemented in sexual health programs and services within public health units across Ontario. Of the 15 managers/supervisors, 10 health units agreed to participate. Semi-structured telephone or secure online interviews were conducted between October and November 2019 and were 45-65 minutes in length. Confidentiality was assured at all stages of the research. Ethics approval for the study was obtained from Hamilton Integrated Research Ethics Board (HiREB # 5692).

Organizing Framework

The *Consolidated Framework for Implementation Research* (CFIR) was used as the framework to develop the interview guide, organize data extraction and synthesize findings. The interview guide included one overarching question for each of the five CFIR domains (Damschroder et al.), with a set of prompts for each (see supplemental file 1). CFIR was chosen because it captures the complex set of factors that influence the successful implementation of new models of care (Damschroder et al., 2009; Safaeinilli, Brown-Johnson, Shaw, Mahoney, & Winget, 2020). As well, CFIR offers a comprehensive list of 39 constructs across five domains – *Intervention Characteristics; Outer Setting; Inner Setting; Characteristics of Individuals; and Process* - that allows researchers to choose constructs relevant to their study, without needing to focus on all constructs (Damschroder et al.).

Data Analysis

Interviews were digitally recorded with permission from the interviewees and transcribed verbatim. Each interview transcript was read individually and coded into the constructs in each of the five CFIR domains, as appropriate, using directed content analysis (Hsieh & Shannon, 2005). This was done by the first author using NVivo 12 (QRS international, 2018). Coding was an iterative process, with the research team reviewing the coding until a concise set of themes was created.

Findings

Our sample was comprised of 11 managers and 1 supervisor from 10 health units, with two health units having more than one individual involved in the interview. See Table 1 for participant demographics. Ten participants had 10 or more years of public health experience, nine participants had 5 years or less of experience in their current role, with two participants with 10 or more years of experience. Seven participants had a Master's degree.

Table 1. Basic Demographic Information about Key Informants.

Positions	**Supervisor n (%)**	**Manager n (%)**	
	1 (8%)	11(92 %)	
Education Level	**Bachelor**	**Masters**	
	5 (42%)	7 (58%)	
Years in Public Health	**Mean (SD)**	**Range**	**Median**
	4.5 (1.91)	34	18
Years in Current Position	**Mean (SD)**	**Range**	**Median**
	17.5 (5.55)	10	3

Themes fell under CIFR's domains – inner and outer setting – to provide a rich understanding of common barriers and facilitators that impacted implementing a population health approach. Table 2 summarizes these findings. In the following paragraphs, inner and outer setting domains will be defined and themes organized under relevant *constructs* and *sub-constructs* (italicized) within each domain will be discussed.

Table 2. Domains, Constructs and Themes.

Domain: Outer Setting	**Construct**	**Theme**
	Cosmopolitism	Working/collaborating with local and regional partners
		Networking with other sexual health programs
	External Policy & Incentives	Addressing modernized standards
		Anticipating the potential amalgamation of health units
Domain: Inner Setting	**Construct and Sub-construct**	**Theme**
	Implementation Climate	
	Sub-construct: compatibility	Valuing of clinic work over population health
	Sub-construct: learning climate	Enhancing staff's capacity to take on population health
	Readiness for Implementation	
	Sub-construct: available resources	Diminishing resources available to sexual health
	Sub-construct: access to knowledge and information	Gaining access to data to inform program changes

CFIR: Outer Setting Domain

Outer setting focuses on the economic, political, and social context within which an organization resides (Damschroder et al., 2009). These external considerations are necessary for establishing what influences a health unit in determining if a population health approach can be implemented. Two CFIR constructs that greatly influenced implementation in the outer setting included: *Cosmopolitism* and *External Policy & Incentives*. *Cosmopolitism* is reflected in a core requirement of the OPHS, which focuses on public health staff engaging partners from across multiple sectors, including community researchers and academic partners (MOHLTC, 2018). *External Policy & Incentives* is demonstrated in policies that influence the work of public health, such as the proposed amalgamation of health units to align public health in Ontario to a regional structure, similar to the rest of Canada.

Cosmopolitanism - Theme: Working and collaborating with local and regional partners.

Under the construct *Cosmopolitanism*, engagement with community partners was an activity that most participants were involved in to move towards a population health approach. The type of community partners that sexual health engaged with differed among health units and was dependent upon organizations in their community. Participants explained that given the limited availability of both staff and time, engaging with community partners was a strategy that maximized opportunities, to identify and deliver population health programs. How health units engaged with community partners

varied. Some utilized community partners to deliver sexual health services, while others worked with them on health promotion campaigns. One manager stated how they work with community partners: “We're working with the poverty task force, so really some population-based approaches. Within that context, we are looking at a priority population, and we talk about youth, we talk about those more vulnerable” (Participant 1).

The ability of community partners to facilitate change faster than their health unit was described as a facilitator by some participants. Community partners often had stronger relationships with groups that are marginalized (e.g., LGBTQ2S) and could move public health interventions forward easier with less political interference than public health. This allowed sexual health work to be done that might not be accomplished through public health channels: “Even some operational stuff that would take about six months to do, they can do in a week and a half” (Participant 7). However, participants’ accounts of these partnerships acknowledged that engaging community partners was challenging and could be a barrier. Factors like busy schedules and the belief that sexual health was not always a significant priority, affected what could be achieved from a population perspective:

> I think community engagement with any of our community partners; they all certainly have their own strategic priorities. My experience is that some are not necessarily that great at articulating those and getting us all aligned in the same direction (Participant 4).

Cosmopolitanism - Theme: Networking with other sexual health programs.

Additionally, under the construct *Cosmopolitanism*, many participants perceived that having a connection with sexual health programs in other health units was essential to stay up to date with what other health units were doing. Health units struggled with funding allocation and resources available for quality improvement and innovation, and participants searched for support from other health units to take advantage of the expertise and work done by them: "I know [a health unit] had done, what are the effective practices to decrease STI rates among youth, young adults. It was already done for us" (Participant 9).

Participants also identified that there is a linkage among health units through STI network meetings, organized by regions (e.g., Central West, Central East), and the provincial infectious disease managers meeting organized by MOHLTC. However, these venues were not always seen as helpful. There was reluctance on the part of health units to share what they were doing or there was not enough time to discuss sexual health issues or ask questions, as other infectious diseases dominated the conversation: "You don't get enough air time in discussion or even sharing collectively within that" (Participant 1).

External Policy & Incentives - Theme: Addressing the modernized standards and MOHLTC accountability.

In the construct *External Policy & Incentives*, most participants acknowledged that the modernized standards changed how their health unit viewed sexual health. Many

pointed out that the language in the new standard took away from sexual health and reduced the perceived value of it as a health unit program. The OPHS language shifted away from health units directly offering sexual health services to "ensuring" they are available in their communities. Participants' interpretations of this change was that sexual health was less of a priority, which diverted resources away from sexual health to other health unit programs, such as harm reduction and healthy living:

> [It] doesn't mean that we have to provide it if there's access. You know, when you don't have that anchor, it's difficult. Like you've taken the label of sexual health off in these standards you've put it into the lens of infectious disease (Participant1).

Participants did not describe any incentives provided to them to support implementing a population health approach with the new standards. There was no strong mandate to ensure implementation and participants did not verbalize any consequence if there was no implementation.

External Policy & Incentives - Theme: Anticipating the potential amalgamation of health units.

Discussions around potential amalgamation of health units, an *External Policy*, created a barrier for health units, by putting planning on hold. Commitment to implementing a population health approach was hard to consider for managers and supervisors when they believed that the amalgamation of health units would change the structure of their health unit. Many participants pointed out that how their health unit would be amalgamated with other health units and what parts of their program would be retained created hesitancy to move forward with making population-level changes: "I

think people are just waiting to see what's going on before they start investing in new directions and new things” (Participant 10).

Several participants raised the issue of uncertainty about how a population health approach could be achieved with amalgamation. Merging of health units with diverse geography (e.g., rural, urban) would result in different community needs, triggering the need to determine whose concerns and voices should be considered. Many spoke that servicing a larger geographical area with different needs would present as a potential barrier, especially for areas served by smaller health units, as their needs may be overshadowed by larger health units:

> We are a smaller health unit with a rural population, and we have seen examples of things that have become regionalized in the past. That region doesn’t get served, the big people do. We’re afraid that’s going to happen (Participant 5).

CFIR: Inner Setting Domain

CFIR’s inner setting is defined as the structural and cultural contexts through which the implementation process occurs (Damschroder et al., 2009). Within the inner context, *Implementation Climate* and *Readiness for Implementation* influenced the implementation of a population health approach. *Implementation Climate* reflects the organization's ability to change, along with the receptivity of involved individuals to that change (Damschroder et al.). Sub-constructs under *Implementation Climate* that greatly impacted implementing a population health approach within health units were *compatibility* and *learning climate*. *Readiness for Implementation* is an indicator of the organization’s decision to implement a population health approach (Damschroder et al.,

2009), and there were two sub-constructs, *available resources* and *access to knowledge and information,* that influenced health units. Themes relating to these sub-constructs follow.

Implementation Climate - Theme: Valuing clinic work over population health.

Within the construct of *Implementation Climate* and sub-construct of *compatibility*, participants voiced that sexual health programming is geared towards clinical services and not population health. They noted that at the program level, staff in sexual health valued one-on-one clinic services over population health: "So that's what you're dealing with here in the clinical area. It's people who like clinical work, and they like the one-on-one with the client" (Participant 5).

A few managers and supervisors identified that staff recognized the connection between current sexual health programming and the intention of moving towards a population health approach. However, buy-in was required by public health nurses (PHNs) and community stakeholders to be able to move this approach forward. Selling the work associated with population health meant that it needed to align with PHNs' passion and be connected to their interests. Given that sexual health has historically focused on providing clinical care, PHNs felt that population health was an active shift away from a model of care that they valued and wanted to retain:

> Would their passion lie there? Not at this point. There would have to be a lot of coaching to get to the place where it's reframing the overall work because again they don't want to let go of what they see is the important community need of clinical services (Participant 3).

In addition, a few participants mentioned that the present vision for sexual health from senior leaders in their health unit did not support a population health approach. Leaders within their health unit wanted sexual health to remain clinic-focused, which made shifting to a population health approach difficult. There was no buy-in to an upstream investment for sexual health from those with decision-making power. Participants were unclear of the reasoning behind this way of thinking but felt they did not have a voice to challenge this decision, so they accepted and worked within those parameters:

> When I first took on this program we were looking at a much larger population health approach and looking at health promotion but as the organization has moved forward, the direction has been that we are very, very clinical and just one-on-one (Participant 2).

Implementation Climate - Theme: Enabling staff's capacity to take on a population health approach.

In the construct *Implementation Climate* and sub-construct *learning climate*, interviewees displayed early involvement of staff by facilitating education and training on population health. The training was provided to sexual health staff to ensure they were familiar with population health as a common starting point: “We started it off with public health principles, what is population health, re-orientating everyone. It did require re-orientating everyone to the principles of population health again” (Participant 9). Providing staff training facilitated a shared understanding of what a population health approach entailed, which helped sexual health in implementing the activities associated with a population health approach.

The importance of including staff in the process right from the outset, to ensure they had a sense of ownership in the planning process, was a critical point made by participants: “I think probably the most important thing is staff engagement from the get-go. If they're not driving it then it's not going to happen. They need to be on board and they need an opportunity to provide the input” (Participant 7). Engaging staff in the process of developing a shared vision facilitated how the change was received and made it easier to operationalize the vision and assure success.

Readiness for Implementation - Theme: Diminishing resources available to sexual health.

A dearth of available resources was the reason why there was a lack of *Readiness for Implementation* of a population health approach in sexual health. Some participants viewed the lack of resources available to sexual health as illustrative of the low priority that sexual health had in their health unit: “We were better prior to some challenges where we had funding and FTE (full-time equivalent). We now have a really limited FTE amount in the current sexual health program” (Participant 1). Public health budgets have diminished, with non-replacement of vacant positions and a shrinking sexual health program that has resulted in fragmentation and sharing of staff between programs. These factors make it challenging to put in place an effective implementation strategy for population health. Without access to resources, there was a mismatch between what was required through the OPHS and what could be implemented within health units. Having

scarce resources and insufficient time, forced sexual health to choose carefully what they were able to do and be involved in.

However, some participants acknowledged that PHNs were an untapped resource within sexual health. PHNs were not utilized to their full potential, based on the PHN scope outlined in the public health core competencies. Managers and supervisors proposed that PHNs could do the work that health promoters or epidemiologists do, which could fill the gaps in the lack of human resources needed to move to a population health approach:

> I think we as a health unit really push the nurse to be much more clinical and we really allowed our health promoters to really take over the health promotion component of things. They are very skilled but I think as a result of that, we have done a disservice to our nurses. We really haven't hired or grown or provided opportunities and experiences for our nurses to build their capacity in health promotion (Participant 2).

Readiness for Implementation - Theme: Gaining access to data to inform program changes.

Participants identified needing access to data to move toward upstream approaches. Within health units, a significant amount of data is required by programs, and access to data assisted to make the changes required to move towards population health:

> I think I need, I think we could use more staff and use more analysis of data, and we could use more epidemiologists. In this building, I think we're all struggling because you know, data is what drives. Everywhere in the standard says data, data, data, getting the data is the problem (Participant 10).

Participants pointed out that there was population-level data collected in their health unit but was not specific to sexual health. Furthermore, where there was access to data for sexual health, it was not as readily available, due to a lack of epidemiologists. This created a prioritization of data requests at most health units: “The thing is that for us is in order for us to get something done and has to go on to a project list and be prioritized” (Participant 6). This prioritization of data requests presented a barrier since there were greater data priorities in the health unit that prevented sexual health from gaining access to data required to make decisions.

Discussion

This study has contributed new knowledge about barriers and facilitators influencing the implementation of a population health approach in sexual health within Ontario’s public health units from manager and supervisor perspectives. This new perspective offered insight into how the tension between individual care and population health might be resolved. Despite promising outcomes that population-level interventions can deliver, implementation of a population health approach was hampered by external policy, lack of resources, and the valuing of individual clinic focused nature of sexual health programs. However, facilitators that assisted in moving health units towards a population health approach were external partnerships, staff training on population health, and access to data to inform programs.

Sexual health managers and supervisors identified that external policies, like the OPHS and the potential amalgamation of health units, greatly influenced a shift to population health because the focus of health units was elsewhere. Initiatives outlined in

the OPHS for sexual health requires capacity at the local level to deliver programming associated with these directives. However, these policies fail to address the organizational contexts that assist with achieving successful implementation, like having the necessary resources (Watt, Sword, & Krueger, 2005). Fragmentation of sexual health within public health units and inadequate resources make it difficult for sexual health to respond to the programming demands, let alone move towards population health (Richardson, 2015). Although there is public health reporting to the MOHLTC through Annual Services Plans (ASPs) to demonstrate OPHS implementation, information required by health units to submit on sexual health is not necessarily reflective of a population health approach (MOHLTC, 2018).

Adequate resources (e.g., financial, human) are critical for sexual health to manage current demands and implement new initiatives, such as shifting to a population health approach (Brownson et al., 2012). Interviewees identified that sexual health is understaffed with limited budgets to meet sexual health programs and service demands, which impacted focusing on population health. Evidence suggests that public health performance is hindered when financial and human resources are not available (Brownson, Allen, Duggan, Stamatakis, & Erwin, 2012; Guyon & Perreault, 2016). In addition, when faced with limited resources, it is difficult to advocate for health units to put resources into an approach that will prevent future health issues, when there are more immediate health concerns that need to be addressed (Richardson, 2012), such as rising rates of STBBIs. However, the utilization of PHNs to their fullest scope of practice can help with resource shortages. Based on the core competencies for PHNs, nurses should be

able to assist with program planning, critically appraise evidence, and recognize trends in epidemiological data (Community Health Nurses of Canada, 2009) - skills needed to support implementing a population health approach. However, individual-focused clinic work was valued over population health work by sexual health PHNs, which negatively influenced implementing a population health approach. This finding is consistent with recent research that identified that PHNs are more comfortable working on a one-to-one basis than at a population level (Cohen, 2006; Mabhala, 2015). This discomfort comes from a perceived lack of confidence and skills in population health, personal interest, and lack of competence due to inexperience in care beyond the individual (Cohen; Mabhala).

More training is required for nurses in population health while in undergraduate nursing programs, to ensure they have the knowledge and skills to work in areas like public health. Furthermore, at the organizational level, research suggests that senior leadership does not value population health approaches and still views the priority of public health as one-on-one care (Cohen, 2006). As well, a lack of education and skills in population health among managers is not a role model for staff, furthering emphasis on individual care (Cohen). However, organizational culture is a factor that positively influences a move towards population health. Having leaders who are aware of the components of a population health approach and have a sense of ownership and responsibility for leading this type of approach, act as champions, to ensure successful implementation of a population health approach (Cohen et al., 2014).

Given that sexual health has been focused on providing individual care, offering education on the principles of population health succeeded to move PHNs forward

because having skilled and competent staff who understand a population health approach is essential to moving upstream (Guyon & Perreault, 2016; Mabhala, 2015). Providing professional development opportunities, such as community development, appraising research, and policy development will increase the success of implementing population level interventions (Mabhala). If staff lacks confidence with the components of a population-health approach, then PHNs are not going to want to move in this direction (Mabhala). Perhaps a blend of professionals would be ideal, such as having health promoters complement the work of PHNs, as health promoters can assist with policy development and advocacy, and building community capacity (Health promotion Canada, 2015).

A lack of epidemiologists and evaluators, or having these professionals supporting multiple programs, created a prioritization of data requests within health units. This affected the collection of data needed to support population health in sexual health because other programs received priority. The capacity of health units to meet information demands of the different areas in their health unit influences performance (Region of Peel, 2019). If health units are not able to assess population-level health problems and actions, this hinders moving forward with changes (Region of Peel). As well, the development of indicators that can track the progress of achieving population health goals is vital to show the benefit of this type of approach (Cohen et al., 2014). Inadequate support in developing population-level indicators from trained staff will affect quality improvement processes within health units (Region of Peel, 2019).

As a facilitator, being networked with external organizations is critical in being able to move forward population-level changes (Region of Peel, 2019). Participants demonstrated a commitment to developing and fostering inter-sectoral partnerships. These partnerships were used to help move interventions forward to deliver clinic services or collaborate on health promotion campaigns. Partnerships with external organizations are necessary for a strong public health system that can reduce health inequities (Region of Peel, 2019). Community partnerships are an effective strategy for implementing interventions (e.g., health behaviours) aimed at marginalized groups, as they have closer connections with these groups (O'Mara-Eves et al., 2015; Valaitis et al., 2020). As well, research shows that public health alone is insufficient to improve population health and that partnerships ensure a coordinated effort in working towards the goal of improved health in the community (Estacio, Oliver, Downing, Kurth, & Protheroe, 2017; Littlecott, Fox, Stathi, & Thompson, 2017).

Organizational incentives to assist with implementing a population health approach in sexual health were not something that participants mentioned. This represents a missing factor, and since no one spoke about this, it is something that MOHLTC or health units may need to create to help facilitate the implementation of a population health approach.

Study Strengths and Limitations

A strength of this study was that we were able to gather insights about barriers and facilitators to implementing a population health approach from a purposeful sample of experienced managers/supervisors working in a range of health units serving rural,

urban, and mixed populations across Ontario. Given their levels of experience and the diversity of programs, we were able to obtain a clear picture of the factors influencing the implementation of a population health approach. The coding structure was reviewed several times by co-authors to ensure the trustworthiness of the findings. Finally, the primary author works in sexual health programming at an Ontario public health unit, which helped to understand the context and support the interpretation of results.

Concerning study limitations, the anticipated public health unit amalgamation created a challenge for participant recruitment. Furthermore, although data were collected from managers/supervisors in sexual health, perspectives of frontline staff and senior management could have provided additional valuable insights. Finally, this study was conducted at one point in time, limiting our understanding of how other contextual changes such as the COVID-19 pandemic might have influenced the results.

Conclusion

As reform in sexual health programs and services happens within public health, the population health approach has a role in improving the overall health and sexual well-being of populations (Cohen et al., 2014). This study demonstrated that there are internal and external barriers and facilitators that policy-makers, decision-makers, and public health administrators need to consider if they want to move towards a population health approach in sexual health. There needs to be an investment made by both the MOHLTC and local public health units to ensure that there are adequate human resources to meet program demands. This involves having not only the right number of staff but also the staff with the right skillset and knowledge to implement a population health approach,

which may mean providing professional development on the key components of a population health approach. Adequate resources are important to the success of implementing any new initiative and should be considered at the local level before any major changes are made to guarantee success. Finally, inter-sectoral partners can be leveraged as key contributors to the population health agenda and offers an opportunity to combine resources to make a bigger impact on population health.

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CHAPTER FIVE

A Multiphase Mixed Methods Study on the Integration of a Population Health Approach in Sexual Health Programs and Services in Ontario Public Health Units

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Abstract

Purpose: Present the integration of qualitative interviews and a survey aimed to address how a population health approach was implemented within sexual health programming in public health.

Method: This multi-phase mixed-methods study involved a cross-sectional online survey assessing the extent that a population health approach has been implemented in sexual health in Ontario public health units. Descriptive statistics were applied to quantitative data. In the qualitative descriptive component, in-depth interviews with managers and supervisors were conducted, exploring barriers and facilitators to implementing a population health approach. Inductive and deductive approaches were used for analysis.

Results: Fifteen surveys and ten interviews were completed with sexual health managers/supervisors from 34 public health units. Qualitative findings explained factors that enabled or were barriers to implementing a population health approach. Lack of resources available to health units, differing priorities between health units and community stakeholders, and access to evidence around population-level interventions influenced implementation. However, qualitative data to explain some quantitative findings (e.g., low implementation of activities related to using principles of social justice) were absent.

Conclusion: Qualitative findings explained the quantitative results, revealing factors influencing the implementation of a population health approach. Further qualitative

exploration could be valuable to understand barriers and enablers to implementing population health activities in sexual health programming.

Keywords: Public health, Sexual health, Population health, Mixed methods

Background

In Ontario, Canada, sexual health programming offered by public health have a unique structure compared to how other public health programs and services are delivered. Generally, direct client care is delivered in clinics by public health nurses, nurse practitioners, and physicians through sexual health services. Clinic services often include health education, assessment, diagnosis, treatment, and contact tracing for sexually transmitted and blood-borne infections (STBBIs), mandated by the Ontario Health Protection and Prevention Act (HPPA; Health Protection and Promotion Act, O. Reg. 135/18, O. Reg. 569, 2018). Rates have been rising for gonorrhea, chlamydia, and syphilis across Canada, and in Ontario specifically (Choudhin, Miller, Sandhu, Leon, & Aho, 2018a; Choudhin et. al., 2018b; Choudhin et al., 2018c; Public Health Ontario, 2019). Although rates of STBBIs have become impossible to ignore, clinical services have prioritized the detection and treatment of STBBIs, leaving little opportunity to focus on delivering services and programs that more broadly focus on sexual health promotion. In addition to treating and detecting STBBIs, public health's mandate is to improve overall sexual health promotion – meaning a shift in how services/programs are structured, offered, and delivered to include population health (Chadwick et al., 2018). Currently, there is a gap in understanding the extent that population health activities can

support sexual health programming and factors influencing their implementation. This study applied a mixed methods (MM) approach to fill this knowledge gap – by measuring the extent that population-level activities are implemented in sexual health programming and exploring factors that influence implementation. Using a MM approach, we end up with findings that are more complete, comprehensive, that expand our understanding, and provide us with answers to not only "how much" (e.g., degree of implementation) but also an understanding of "why" (factors that influenced implementation).

Public Health and Population Health

In Ontario, local public health units are responsible for the delivery of public health services (Lyons, 2016). A board of health governs each of the 34 public health units, with a Medical Officer of Health (MOH), usually a physician with training in public health, who is responsible for day-to-day operations (Lyons). Boards of health are governed by the HPPA, with Ontario Public Health Standards (OPHS) guiding the programs and services delivered by health units (Lyons). Costs are shared between the Ministry of Health and Long-Term Care (MOHLTC) and local municipalities (Lyons).

Population-based interventions in the delivery of public health programs and services are now emphasized in the current OPHS (MOHLTC, 2018). The OPHS and associated MOHLTC protocols provide guidance to public health units on implementing population health approaches in general (e.g., focusing on social determinants of health) but do not provide specific instructions on how to implement at a local level, nor do they have accountability mechanisms (e.g., indicators for reporting to the Ministry) to assure

that a population health approach happens. Implementation of a population health approach depends on factors present within local public health units. These health units depend on direction from senior leadership (e.g., MOH, Board of Health) to implement a population health approach in programs, including sexual health. As well, health unit priority setting and financial resources, such as public health spending and workforce elements (e.g., staffing), impact the extent that a population health approach will be implemented (Ministry of Health, 2019).

Moving to a population health approach is complex and requires efforts in multiple areas, such as engaging with individuals and communities using evidence to plan programming and focusing on determinants of health (Jobse, Adams, & Levy, 2014; Olson Keller, Strohschein, Lia-Hoagberg, & Schaffer, 2004). These activities, and others, are noted in the Population Health Key Elements Template (Health Canada, 2001, https://www.phac-aspc.gc.ca/ph-sp/pdf/overview_handout_black-eng.pdf), which includes eight elements with associated activities that are required to implement a population health approach. This template assists organizations like public health to identify areas of focus to achieve a population-level approach. This template was chosen for this study because of its relevance to the Canadian context and its comprehensive list of defined elements and accompanying details on activities to address them (Health Canada).

Barriers and Facilitators to Implementing a Population Health Approach in Public Health

A critical review of the literature from 2007 to 2020 and encompassing North America, Europe, and Australia was conducted to identify barriers and facilitators to implementing a population health approach within public health (Frost, Valaitis, Jack, Akhtar-Danesh, & Butt, submitted). Papers were included if they discussed any of the eight key elements of a population health approach (Health Canada, 2001), along with associated implementation barriers and/or facilitators. Barriers and facilitators for four elements from the Population Health Template (2001) were found. Implementation barriers for the element *Addressing the Determinants of Health and their Interaction* included the bureaucratic nature of public health (e.g., accountable to a Board of Health), while a facilitator identified was a supportive political environment within each community serviced by public health (Brassolotto, Raphael & Baldeo, 2014). For the element *Collaborate Across Sectors and Levels,* barriers included time to develop partnering relationships and conflicting ideas occurring between the partners; a facilitator was being in close geographic proximity to stakeholders (Sibbald et al., 2012). Barriers for the element *Employ Mechanisms for Public Involvement* included insufficient funding for health promotion and prevention programs; however, public health leaders' understanding of the importance of public participation was a critical facilitator (Aston, Meager-Stewart, Edwards & Young, 2009). Finally, barriers for the element *Base Decisions in Evidence* included insufficient resources/financial constraints, while support

from administration, positive attitudes of managers, and training of staff in evidence-based policy-making were facilitators (Van de Goor et al., 2017).

Figure 1 provides an overview of the steps taken in this multi-phase sequential MM design.

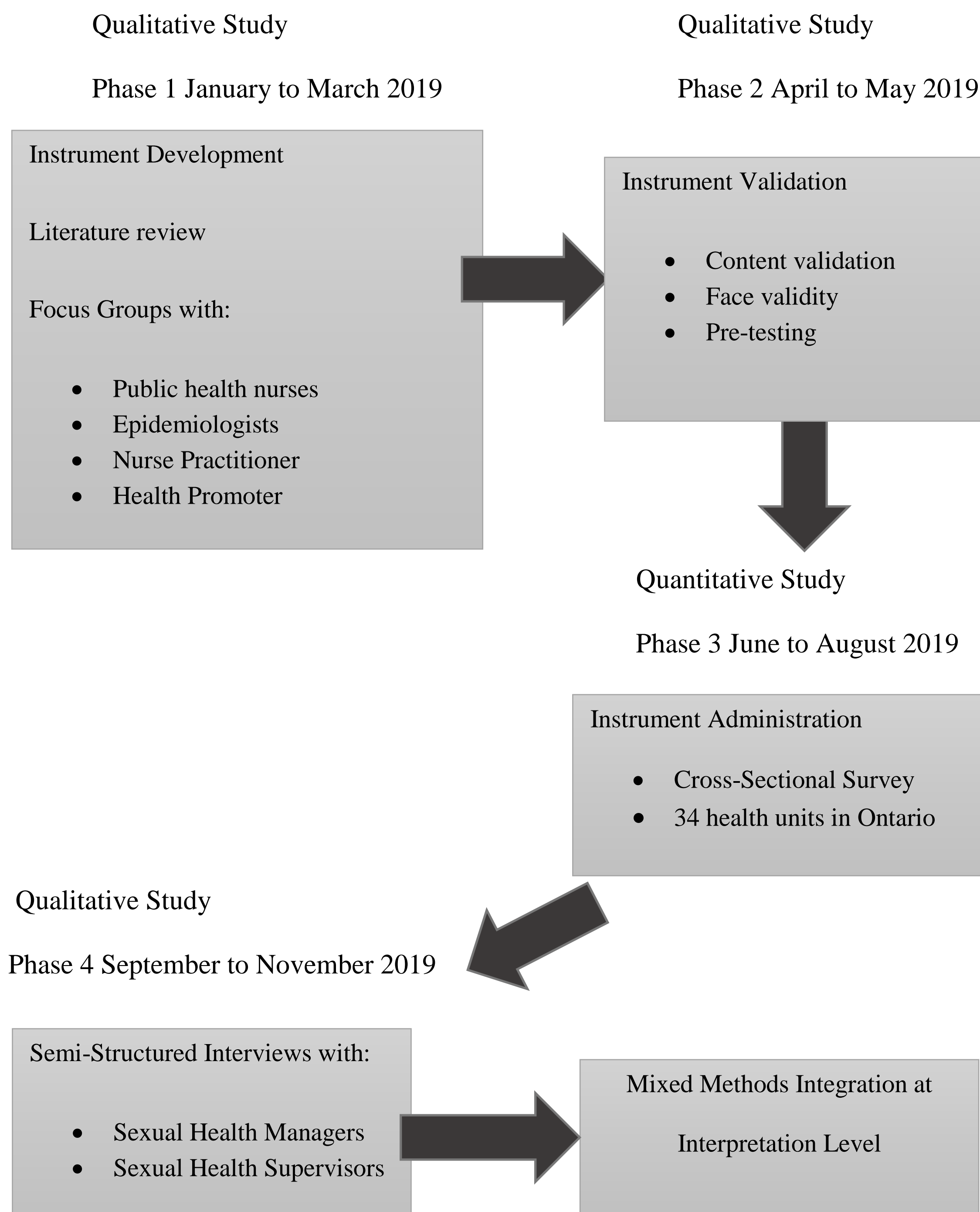

Figure 1. Mixed multi-phase sequential design (qual, qual, quan, QUAL)

The Mixed Methods Study Context and Aim of the Paper

The first two phases consisted of the creation and validation of items for a survey to identify the extent that a population health approach was implemented in sexual health programs and services in Ontario health units, while phase three consisted of a cross-sectional survey. Details of the methods and findings of these phases can be found in an earlier paper (Frost, Valaitis, Jack, Akhtar-Danesh, & Butt, submitted). From the survey of public health managers working in sexual health, we learned that among the eight population health elements examined, two had a high degree of implementation, and six were described as being implemented to a lower extent. The fourth and final phase involved completing a qualitative descriptive study that involved interviewing sexual health program managers and supervisors to identify individual, program, and structural factors, and then explain how they influenced the implementation of a population health approach within sexual health.

The purpose of this paper is to show how the qualitative findings from the fourth phase explain the quantitative results to answer the question: In what ways do qualitative interviews with managers, supervisors or staff serve to contribute to the understanding of what has been integrated from a population health approach into sexual health within Ontario public health units?

Methods

Study Design

A four-phase MM design with the sequential use of qualitative and quantitative approaches for data collection and analysis was utilized. A MM design allowed for the

use of qualitative data in a targeted way, to gain an understanding of barriers and facilitators that affected the extent that health units were able to implement a population health approach, as revealed by the survey results.

Quantitative Study: Online Survey

Sample and Recruitment

To measure the extent to which population health programs were implemented in each of Ontario's public health units, we invited one sexual health manager from each health unit to participate. This was an organizational survey where managers were advised to consult with other individuals in their health units (e.g., epidemiologists, public health nurses) to provide a single view. Managers/supervisors dedicated solely to STBBI case management were excluded because case management for this study was considered part of infectious disease programming and not sexual health programming.

Measures

The validated and pre-tested instrument (from phases 1 and 2) was developed to measure the extent that a population health approach was implemented in sexual health programs and services. The survey consisted of 69 items (Frost et al., submitted). Where appropriate, survey items (activities such as offer access for youth 24 years of age and collect information to identify priority populations) were listed under headings representing the eight key elements of the Population Health Template (Health Canada, 2001) and were measured on a 5-point Likert scale (*1* = never to *5* = always). The survey included items applicable to both sexual health promotion programs and/or sexual health

services (e.g., sexual health clinics). We also included items to capture the geographical area of the health unit (e.g., rural, urban), disciplines consulted with while completing the survey and an open-ended section at the end of the survey that asked for general feedback. The survey was completed by one health unit representative from each health unit utilizing input from relevant staff. (Frost et al., submitted). Participants were invited to complete the survey by email, with email reminders sent every two weeks for a total of two reminders.

Data Analysis

Categorical variables were used to capture the type of population served (e.g., rural or urban). The 5-point Likert scale used to measure the degree that each of the eight key elements was implemented was considered a continuous variable. Descriptive statistics included the mean and standard deviation (Daniel & Cross, 2013).

Qualitative Descriptive Study

Methodological principles drawn from fundamental qualitative description (Sandelowski, 2000) were used to inform decisions related to sampling, data collection, and analysis in this phase. Qualitative description was chosen for its relevance in MM research and where professionals' experiences on a topic are desired (Neergaard, Olesen, Andersen, & Sondergaard, 2009; Sandelowski, 2000).

Sample and Recruitment

In this phase, individuals were contacted from the pool of 15 sexual health managers who completed the online survey. Individuals holding these positions were purposefully sought because we believed they would be best to articulate and explain

individual, organizational, and system factors that influence the extent that a population health approach is implemented in the current and proposed amalgamated public health structure. They could also easily reach out to front-line staff, other managers or senior leaders to obtain input where needed.

Responses were received from 15 of the total 34 managers in Ontario health units. Given this, all survey respondents were invited to participate in the interview. To be included, participants must have served in a leadership position within public health and/or sexual health, ensuring those who participated could knowledgeably respond to interview questions. If the manager decided not to participate, they were asked to forward the email invitation to staff who would be knowledgeable about the topic. Eleven managers and one supervisor from 10 health units agreed to participate in the interview (two health units' involved two participants). The first author conducted telephone interviews, which were 45-60 minutes in length; two interviews were conducted through a secure online platform. Interviews were audio-recorded.

Data collection

The semi-structured interview guide was designed to prompt participants to explain their experience of implementing a population health approach and discuss their perceptions of potential challenges and factors that might enable implementation in the proposed public health structure. It was based on five domains from the Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2009) and included one overarching question for each domain with prompts. The domains included *inner setting*, *outer setting*, *characteristics of individuals*, *characteristics of the intervention*,

and *processes*. For example, under *inner setting*, an interview question was "What resources are being provided for the implementation of the population health approach in your program and ongoing operations? Prompts: training sessions; education; evidence from the literature; physical space; time."

Ethics

Verbal consent was acquired and confidentiality was assured at all stages of the research. Ethics approval was obtained from Hamilton Integrated Research Ethics Board (HiREB #5692) for this study.

Data Analysis

Interview recordings were transcribed verbatim. NVivo 12 (QRS international, 2018) was used for data management and coding. Interview data were analyzed inductively and deductively (Elo & Kyngäs, 2007; Hsieh & Shannon, 2014). The first author-led analysis. Each interview transcript was first read individually, and interviews were coded inductively staying close to the language used by participants. Then codes, which captured participants' perceptions and personal experiences with implementing a population health approach, were organized under concepts from the CFIR framework domains (Damschroder et al., 2009). As analysis proceeded, multiple coding cycles were performed where emergent themes were iteratively generated, reviewed by the research team, compared across the data set, and refined until we felt that we had produced a concise set of themes under each domain that reflected the data.

Mixed Methods Design Analysis

Analysis of data occurred in three phases. There was an initial analysis of quantitative results, followed by the analysis of the follow-up qualitative interviews, and then analyzed using the MM question to see how qualitative data helped explain quantitative results (Creswell & Plano Clark, 2011). This analysis procedure in this explanatory design gave a voice to study participants and offered depth and breadth of understanding of the factors that influenced implementing a population health approach within sexual health (Creswell & Plano Clark; Tariq & Woodman, 2013). Once data from the two study components were independently analyzed, an explanatory MM analysis was initiated. For multi-phase designs, there is a merging of quantitative and qualitative data to answer the MM question (Creswell & Plano Clark). A joint display was chosen to merge and present the quantitative and qualitative data (Creswell & Plano Clark). This involved using a table (supplemental file 1) displaying quantitative and qualitative results under each element of the population health template (Health Canada, 2001). The extent that health units implemented activities associated with that element was displayed as a proportion of the total number of health units responding, and qualitative results were reviewed to identify meaningful comments applicable to each activity in the table. Activities given a score of 4.0 or 5.0 (5=always) for the extent of implementation by health units were categorized as *highly implemented*; activities that were given a score of 3.0 showed evidence of a *moderate degree of implementation,* and activities that were given a score of 1.0 or 2.0 (1=never) were categorized as *low implementation.* For the qualitative data, the term "most" was used when discussing common ideas shared by 7 to

10 of the sample participants, whereas “some” was used for 3 to 6 participants, and “few” was used to represent ideas shared by 1 to 2 participants.

Findings

The survey was completed by managers from 15 Ontario public health units (serving n = 2 rural, n = 1 urban, n = 12 rural/urban populations). Following the analysis of quantitative data, 12 sexual health leaders from 10 health units completed an in-depth interview. Of these leaders, 11 were managers and 1 was a supervisor. There were eight participants with 5 years or less experience in management and ten that had 10 years or more years of experience in public health. Results are presented in the form of a narrative weaving approach, which involves presenting quantitative and qualitative findings after each other; findings are organized according to the eight population health elements, highlighting how qualitative results explained the quantitative findings (Fetters, Curry, & Creswell, 2013; Health Canada, 2001). Activities are presented in italics, while themes associated with the qualitative findings are bolded. Not all activities for each element are presented, due to journal word limits. However, quantitative results and related qualitative themes are presented for all activities in supplemental file 1.

Population Health Element A: Focus on the Health of Populations

This element provides guidance that public health actions should be directed to an entire population, or a specific sub-population, rather than individuals (Public Health Agency of Canada [PHAC], 2013). Within this element, ten activities were listed which mainly focused on collecting and using data, addressing stigma, and working with

priority populations. Qualitative findings supported the quantitative results for six activities.

Activities related to working with priority populations were highly implemented by health units, which was explained by a few interview participants. They indicated that at their health unit, they *collect information to identify priority populations, collaborate with priority populations,* and *provide individuals within priority populations with targeted health information to make decisions about their sexual health*. In the theme - **participating in the planning process to implement change -** some health unit staff explained that they participate in the planning process by collecting data to assess whether their clients are from priority populations. In addition to creating working groups to lead health promotion campaigns to target priority populations and ensure these populations have access to services, one manager further explained the added value of these collaborations in the delivery of programming:

> We have created a whole priority populations working group where we have folks who are in those groups who are assigned to specific populations and part of their work is promoting our services and with an end goal of hopefully being able to deliver services if they're needed in the community (Participant 7).

However, a few participants explained that **assessing barriers and needs of priority populations in the community** was difficult to accomplish for health units. As one manager described their struggles as follows: “It's difficult to engage the population, the high-risk population that you're trying to reach” (Participant 10). As well, there was a discussion that participants’ **health units are supportive of a population health approach**. In this theme, participants mentioned that their health units were using population health approaches to identify and target interventions to priority populations.

Population Health Element B: Address the Determinants of Health and their Interactions

For this element, addressing determinants of health means taking action based on analyses and understandings of the entire range of the determinants of health (PHAC, 2013). Embedded in this element were eight activities related to access to clinic services and characteristics of sexual health programs and services (e.g., using principles of social justice, using trauma and violence-informed care) that focus on broader determinants of health. The quantitative results for five of these activities were explained by qualitative results.

Some participants noted that the activities *offering access for youth 24 years of age or under* and *offering access to adults over the age of 25* was highly implemented, ensuring that both adults and youth could access sexual health programs and services in the theme - **sexual health clinic services address patient needs.** Participants explained that public health was often the only clinic offering STBBI services in their community. Providing STBBI testing and treatment remained a priority, regardless of age: “There weren’t necessarily age restrictions on the STBBI testing that was sort of a bit more open because we didn’t want any barriers.” The activity *ensure accessibility,* was highly implemented. One manager mentioned that **the geographical area of the health unit determines how easily changes can be made to programming**. Specifically, the participant mentioned that in rural areas, health units need to “Look at each sort of county and their needs” (Participant 3) to tailor sexual health services.

As well, despite **increased resource utilization in sexual health clinics**, health units' highly implemented *ensuring quality in programs are offered*, but qualitative data did not support this result. Most participants reported that their health unit was understaffed with capacity issues, which could influence the quality of programming. This prompted sexual health to review clinic services they were providing, as they were no longer able to keep up with the volume of clients. However, in the face of significant resource issues, a few **managers were involved in population health changes.** These participants mentioned that their health unit was creative in utilizing nursing staff in advanced roles (e.g., nursing project officer) to support sexual health staff and work on program evaluation pieces, such as developing performance-monitoring indicators.

Population Health Element C: Base Decisions in Evidence

Using a population health approach requires that quantitative and qualitative evidence on determinants of health be used to identify priorities and strategies to improve health and determine the effectiveness of interventions (PHAC, 2013). This element included three activities that focused on using evidence/guidelines for program planning and being involved in research. Qualitative findings supported all of the quantitative results in this element.

The use of best evidence/guidelines to inform decision-making in practice and/or program development was highly implemented among health units. Most participants brought up the theme - **need evidence of population health interventions**, to decide what interventions are effective in sexual health. These managers spoke of the value of reviewing evidence to guide their decision making around the allocation of resources to

make sure they invest services in the right areas: "I would need to look at the evidence that shows what interventions are effective and in order to know what resources would be required" (Participant 8).

However, despite the need for evidence to make decisions, the activity *get involved in primary research*, had low implementation. Participants mentioned that within health departments the **value of research** was viewed negatively, which influenced their organizations' participation in research. Some participants consistently cited the importance of support from senior leaders within their organization to participate in primary research. As one manager explained:

> I think there is great opportunity there but I just don't feel that a lot of the health unit buys into the value of research but I think it's more. I'm not talking about managers and frontline staff, I'm talking more of the MOH (Participant 10).

Reduced funding, capacity, and time affected the ability of sexual health programs and services to participate in research.

Population Heath Element D: Increase Upstream Investment

Increasing upstream investment means directing investments to areas that have the greatest potential to influence population health status positively (PHAC, 2013). In this element, ten activities related to the provision of information and education to the public, primary care, and within public health programs on sexual health; advocacy; and policymaking. Generally, qualitative results supported quantitative findings for this element, but there was variation among health units in the implementation of the upstream activities associated with this element. For most activities, about 60% of health units implemented them to a high degree, but qualitative findings did not support this.

Rather, qualitative findings supported low to moderate implementation, with only a few to some participants discussing these activities.

For example, one upstream activity - *provide information to the public on healthy sexuality and sexual health* - was highly implemented in sexual health services but had much more variation in the implementation within sexual health programs. Only a few participants described this activity as something they were doing. However, there was work being done to get messaging out to individuals at high risk for STBBIs, which highlighted that **sexual health programming needs to be tailored to local needs and populations.** As one participant explained, "We would be advertising on Grindr and different things and looking at how to reach priority populations and where do they meet and we've got to get to them where they're at" (Participant 10).

However, an exception within this element was the activity- e*ngage in health public policy to create supportive environments that enable people to lead healthy sexual lives*. This activity was implemented to a low extent by health units. The theme **participating in the planning process to implement changes** supported the quantitative result since only a few participants indicated that they engaged in this type of activity. These participants stated that their health unit was engaged in policy work through the development of working groups that focused on different areas such as school, community, and health care providers. The goal of this work would be: "influencing implementation of policy changes" (Participant 7).

Population Health Element E: Apply Multiple Strategies

The health of populations is associated with factors that fall outside the health system or established health sector that requires multiple strategies applied within multiple settings (PHAC, 2013). For this element, there were thirteen activities, many of which were only relevant for sexual health services and not sexual health programs. Activities for this element were related to STBBI screening, testing, and treatment; counselling; referrals for victims of violence; application of a sexual health framework to inform planning; provision of multiple intervention components (e.g., primary, secondary and, tertiary care); and community development work involving the public and primary care.

Most of the qualitative results supported the quantitative findings for this element. Similar to previous elements, there was variation among health units in the implementation of activities within this element. However, when it came to health units employing multiple strategies, such as offering multiple services within sexual health clinics or providing multiple intervention components within sexual health programming, qualitative results helped to explain some of the strategies or limitations that some health units experienced in conducting these activities.

Offering multiple services (e.g., sexually transmitted infection testing and naloxone) was highly implemented, but only a few participants mentioned that this activity was happening in their health unit. They noted that being **networked with other relevant programs in the health unit** was one way that sexual health was able to offer multiple services to clients: “Vaccine-Preventable Disease (VPD) and harm reduction, we

have worked out a thing where every person who comes in for needle exchange will be offered a flu shot” (Participant 5).

As well, the activity - *sexual health programming in your health unit provides multiple components in interventions (e.g. primary, secondary, and/or tertiary)* - was highly implemented. Qualitative findings helped explain some limitations related to this activity. Although some interview participants indicated that their health unit offered multiple components, the themes **modernized standards** and **resources available to sexual health** influenced the extent that this activity was happening. Health units pointed out that they engage in multiple strategies like working with school boards to support policy to providing education on sexual health, but these strategies were implemented on a much smaller scale than they had been previously. As noted by one participant:

> It's just more than we don't just do one strategy, it's reporting a multitude of strategies from case management to working with the school board to supporting policy to putting education out there but it's just so much more in a smaller scale than we used to (Participant 1).

In addition, participants stated that a decrease in budgets over the years had whittled away resources available for health promotion.

Population Health Element F: Collaborate Across Sectors and Levels

Improving health is a shared responsibility with “intersectoral collaboration" being the joint action among health and other groups to improve health outcomes (PHAC, 2013). There were seven activities in this element that focused on intersectoral partnerships with community stakeholders and local/provincial government. There was variation in the implementation of four activities, and qualitative findings helped to explain their low implementation. The activity- *work with other local municipal*

government services (e.g., housing, police, paramedics) to address issues related to sexual health in your community - was not discussed by participants.

Engaging in intersectoral partnerships to address health promotion and prevention was an activity that had variation in implementation among health units. In the theme **working and collaborating with multiple local and regional partners,** some participants indicated that they participate in community engagement but that aligning the health department's priority with those of community partners was challenging and influenced collaboration. One manager stated that: "…. they all certainly have their own strategic priorities" (Participant 4). In addition, *working with the provincial government to address issues related to sexual health* and *work with provincial government to provide updates on sexual health issues in your community,* were ways that health units were **networked with other sexual health programs** by holding provincially run meetings to support these programs. However, these meetings were not viewed as a venue for sharing sexual health issues: "I have never really found that folks typically use that as an opportunity for information sharing" (Participant 4). A few participants mentioned that this meeting had changed over the years and is now a combined infectious disease meeting, "95% of it is all around flu and other outbreaks" (Participant 6), leaving little opportunity to discuss sexual health.

Population Health Element G: Employ Mechanisms of Public Involvement

Employing mechanisms of public involvement promotes the participation of all Canadians in developing strategies to improve health and in determining health priorities (PHAC 2013). In this element, four activities looked at involving clients and the

community in planning. Qualitative results helped to explain two activities. First, *involve local community partners in planning* showed variation in implementation. Some participants mentioned the theme **sexual health programming is tailored to local needs and population**, as a way they were networked with external partners and how they included them in planning. These partnerships ensured that the needs of priority populations like LGBTQ2S living in a rural setting were assessed. However**,** the theme **working and collaborating with multiple local and regional partners** presented challenges for health units. Differing priorities between health units and community partners influenced the partnering relationship and was a barrier to developing strategies that everyone could agree on. One manager said:

> It is very difficult to bring community partners together, like the school board and some of the youth-serving agencies, and try and come up with strategies that everyone can agree on at the table. So community engagement is a barrier (Participant 4).

Second, *involve clients in planning* was an activity that had low implementation among health units, with a few participants mentioning that they **involve clients in planning** using client surveys. These surveys were done to ensure that hours of operation for sexual health clinic services were meeting their population's needs. On the other hand, the theme - **resources available to sexual health -** influenced the scope of this activity. Capacity within sexual health allowed health units to survey existing clients but did not allow expansion to include other community groups that might not be utilizing sexual health programming:

> We just don't have the capacity to be able to get input from clients. We may do a quick little survey for those that are coming to our clinic but that's a very select

> group, those that are already coming as opposed to the population itself (Participant 2).

Population Health Element H: Demonstrate Accountability for Health Outcomes

Demonstrating accountability for health outcomes requires an increased focus on determining the degree of change that can be attributed to an intervention (PHAC, 2013). There were fourteen activities listed in this element that centered around using and collecting information on a variety of sexual health topics, such as incidence of STBBIs, risk factors for STBBIs, or incidence of sexual violence. However, only two of these activities were explained through qualitative findings. *Report the incidence of STIs of your community to health care providers* and *make epidemiological data available on your website*. Both activities were highly implemented among health unitsbut only some participants indicated that their health unit **provided information and data to the community**. Those who did share this information used multiple ways (e.g., website, mail) to provide updates to community health care providers on the incidence of STBBIs in their community. Using the health department website to communicate sexual health information to health professionals in the community was the most common way to convey STBBI information: "As most health units do, we post a lot of information on our website" (Participant 3).

Discussion

One characteristic of mixed methods research is the articulation of a MM research question that ultimately drives analysis and integration of quantitative and qualitative data sets. By posing and then answering a MM question through the use of an integrated approach to data analysis, a more comprehensive and complete explanation of factors that

influence the implementation of population health approaches within Ontario sexual health programming in public health units was derived. The integrated approach to analysis expanded our understanding of the factors that influenced implementation in three main ways, by explaining: 1) factors that influenced why certain key elements were implemented to a low extent; 2) factors that were important for highly implementing key elements; and 3) why there is variation in implementing key elements.

First, we found that the lowest implemented activities among health units - *collaborate across sectors and levels* (element F) and *employ mechanisms of public involvement* (element G) were explained by qualitative results. Concepts from these elements are requirements in the OPHS: “The board of health shall collaborate with health care providers and other relevant partners to ensure access to….clinical services (e.g., sexual health, STI clinics [MOHLTC, 2018, pg. 44]). However, participants explained that differing agency priorities and a lack of resources influenced developing and maintaining partnerships with community stakeholders and the public. A study by Sibbald and colleagues (2012) also found that conflicting ideas and priorities between community partners and public health were barriers for health units in maintaining external partnerships. Insufficient funding for health promotion and prevention programs and increased workload demands were also noted in the literature as a factor that influenced health units engaging in public participation (Aston et al., 2009). With disinvestment in public health, resources available to health units have decreased over time, which has been felt in programs like sexual health, leaving less time for community

and public engagement activities (e.g., community development, advocacy) in favour of individually-focused clinic services (Guyon et al., 2017).

Second, over half of the activities listed under the highly implemented elements - *Focus on the health of populations* (element A) and *Address the determinants of health and their interaction* (element B) - were explained by qualitative results. Qualitative findings for element A indicated that *engaging priority populations* was a difficult task for health units because of resources but participants did discuss some work being done to reach high-risk groups (e.g., health promotion campaigns). Based on the evidence, public health interventions that utilize community partnerships are more successful in reaching individuals at high risk for STBBIs (O'Mara-Eves, 2015). Unfortunately, low implementation of activities [such as *engage in intersectoral partnerships*, *work with community stakeholders (e.g., teachers, community leaders) to assist them with identifying their attitudes, beliefs, and values related to sexual health*] related to building community partnerships presents a barrier to reaching priority populations. Health units need to devote more resources and develop better strategies for engaging priority populations in planning to ensure sexual health programming is meeting their needs.

For the element - *Address the determinants of health* -some activities had variation in implementation and had no qualitative data to explain the results - use trauma and violence-informed care, use principles of social justice to address the disadvantage of certain groups and provide supports to address broader social needs. Although these activities are important in public health practice they are not referenced in the OPHS (2018). Barriers to implementing other population health activities such as limited

resources, lack of sexual health-specific evidence on population-level interventions, or challenges engaging some populations related to being a government agency may explain this finding. As well, some activities may be too abstract and therefore difficult to operationalize. Social justice principles are seldom accompanied by an explanation of what is required for implementation, making it challenging for health units to apply (Buyx, Killar, & Laukötter, 2016). In addition, nurses working in public health have a better understanding of individual approaches than population-level ones, which highlights a gap that requires further exploration (Mabhala, 2015).

Third, qualitative data helped explain the elements- *base decisions in evidence* (element C) and *increase upstream investment* (element D) which had variation in the extent that they were implemented across health units. For *base decisions in* evidence, qualitative findings highlighted the theme that health units **need evidence of effective population health interventions** for sexual health to assist with making decisions on where investments need to be made. However, within health units, the **value of research** from upper leadership and reduced funding influenced a health unit's ability to implement this activity. There is evidence to suggest that public health needs a greater focus on evidence-informed decision-making (EIDM) but requires resource allocation (e.g., workforce, financial) and an organizational culture that supports this type of investment (Brownson, Allen, Duggan, Stamatakis, & Erwin, 2012). As well, developing a workforce that has skills to support EIDM and the formation of partnerships with external organizations (e.g., universities), can assist with the development and use of research that is relevant to public health (Brownson et al.). For the element - *increase*

upstream investment, quantitative findings demonstrated that policy work was not highly implemented among health units. However, qualitative findings provided insight into the fact that a few health units engaged in policy work with schools and the community but the exact work being done was not identified. Creating environments that promote health and prevent disease is the goal of policy work, with the core of this work centered on engaging with decision-makers and transferring evidence to them to influence public policy (Moloughney, 2012). However, using an evidence-informed approach is a critical way that health units can guide policy change but as described above, a lack of value in research by senior leaders hinders this process and influences policy work within sexual health.

Engaging members of the community in public health interventions is a way to reduce health inequities by ensuring that programs and services offered are appropriate, accessible, and utilized by end-users (Moloughney, 2012, & O'Mara-Eves et al., 2015).

Strengths and Limitations

For qualitative and quantitative data, utilizing the experiences of nursing managers and supervisors working in sexual health within public health units in Ontario, Canada, was both a strength and limitation. First, managers/supervisors are in a unique position to offer insight into what activities are occurring within their health unit as they have knowledge of front-line work and senior-level decisions. However, this means that only one group of nurses were captured at a specific point and did not consider the experiences of front-line nurses who deliver sexual health programs and services, or senior leadership who are responsible for program decision making. As well, during

phase 3 and phase 4 data collection, public health was in an unstable state. The Ontario government had announced the amalgamation of health units and provided information to health units on how this transition would occur in pieces (Izenberg, 2019). This impacted data collection because health units were busy trying to prepare for the amalgamation, which potentially impacted their willingness to participate in this study. Even though qualitative findings helped to explain the low implementation of many activities, there remained gaps in our understanding of some quantitative results. This may have been due to the short interview time, which impeded an in-depth discussion about all of the activities listed in the survey and factors that influenced their implementation.

Different frameworks supported the quant and QUAL studies. The qualitative interview guide was informed by CFIR domains (Damschroder et al., 2009) to identify factors influencing the implementation of a population health approach, while the survey tool was built on the Population Health Template to measure the extent of implementation of specific population health activities (Health Canada, 2001). CFIR was limited since community participation/engagement is a key activity embedded within public health, the OPHS, and a population health approach (Moloughney, 2012) but is missing as a concept from the CFIR.

Despite this limitation, each of these frameworks were useful for the individual studies. However, the struggle was in integrating the results, as interview questions did not relate to specific activities in the quantitative phase, which limited the findings that could be obtained. Integrating results from two studies can be challenging in MM research. Integration of two data sets is determined by the extent to which a meaningful

link between these different methods can be made (Uprichard & Dawney, 2019). Researchers need to acknowledge that combining different data types does not always integrate easily and as researchers, we need to focus on whether our understanding has been enriched by the combination of different types of data (Uprichard & Dawney). In the future, using one framework would be helpful as a way to reduce making merging results more challenging.

Conclusion

Overall, this study contributes insights into population health activities on which health units should focus. It contributes knowledge about activities that health units are implementing to achieve this goal and assists sexual health managers, senior management, and policy-makers with a better understanding of where resources, both financial and human, need to be invested. Using quantitative and qualitative methods contributed to our understanding of the extent that a population health approach had been implemented in sexual health programming and factors that influenced their implementation. Overall, increased resources are essential for sexual health to be able to implement the elements of a population health approach and meet the requirements of the OPHS. Opportunities for intersectoral collaboration and public participation can be leveraged to implement a population health approach, especially when it comes to engaging high-risk groups such as LGBTQ2S. This allows for the pooling of resources and building bridges between different actors to ensure programming is targeted appropriately to reduce health inequity. Opportunities for knowledge sharing with organizations like academic institutions can assist health units with participating in

research and EIDM, which offers interventions that can improve health for all. Broader upstream activities like social justice and engaging in healthy public policy were not highly implemented by health units with little to no qualitative findings to explain why. This inconsistency points to important areas for future research. Given that social justice is a foundational component of community health, it would be important to understand barriers to implementing interventions related to health equity.

Declaration of Conflicting Interest

The authors declare that there is no conflict of interest.

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Supplemental File 1: Mixed Methods Table

- SH = sexual health
- SHP = health promotion strategies to address prevention of STIs, unplanned pregnancy, which emphasize the importance of sexual health to the overall well-being of individuals, and looking at the wider determinants of health
- SHS = one-on-one clinic services that offer testing and treatment for STIs, advice, and information on sexual health, birth control, vaccination, and referral to specialists where appropriate
- Extent of implementation = health units rated the implementation of survey items on a scale of 1 (never) to 5 (always). These ratings were categorized into *low implementation* (i.e., activity scores of 1 or 2), *moderate implementation* (i.e., activity scores of 3), and *high implementation* (i.e., activity scores of 4 or 5) for presentation/summarization in Table 1. Some activities only had 14 responses versus 15.
    - Few = when discussing qualitative findings, 1 or 2 interview participants is categorized as *few*
    - Some = when discussing qualitative findings, 3 to 6 interview participants is categorized as *some*
    - Most= when discussing qualitative findings, 7-10 interview participants is categorized as *most*

Survey Items	Quantitative findings Sexual Health Programs			Quantitative findings Sexual Health Services			Qualitative themes (with CFIR domain and construct) and quotes that relate to key elements and respective survey items	How qualitative findings explain quantitative findings
Key Element A Focus on the Health of Populations	**Low**	**Moder-ate**	**High**	**Low**	**Moder-ate**	**High**		
1. Consider the social and cultural factors in the community (e.g., social norms/attitudes).	6.7% (n=1)	13.3% (n=2)	80% (n=12)	0% (n=0)	6.7% (n=1)	93.3% (n=14)	The Political Process of Public Health (Inner Setting, Culture) "Sometimes being a governmental agency, you know, we, even though we are very open and inclusive, the engagement isn't to the same extent to the sub-population that we are trying to reach" Assessing Barriers and Needs of Priority Populations	Quantitative results showed that the vast majority of health units surveyed were high implementers of this activity. Qualitative results supported this finding, by indicating that managers understand and consider the social and cultural factors when sexual health

							(Outer Setting, Patient Needs & Resources) "…creating more awareness about the LGBTQ2S population, so we initiated two studies to understand attitudes and beliefs in the community"	programming is developed.
2. Collect internal epidemiological data to inform program planning (e.g., risk factors, incidence, prevalence).	6.7% (n=1)	6.7% (n=1)	86.7% (n=13)	6.7% (n=1)	13.3% (n=2)	80% (n=12)	Resources Available to Sexual Health (Inner Setting, Available Resources) "If anything I feel like I need more epidemiology and you know, there's so much is based on data, data, data, but if you don't have enough people to pull the data and collect the data and then they want evaluation of everything you do and it's like you	Almost all health units were high implementers of collecting internal data to inform program planning, despite the fact that interview participants identified that resources available to sexual health, specifically epidemiologists, are lacking.

							know we're barely getting through the work but we're now supposed to do you know collect this stuff and then do this and collect more of this, than it's like you know it's just not enough people for sure"	
3. Use internal epidemiological data to inform program planning (e.g., risk factors, incidence, prevalence).	0% (n=0)	20% (n=3)	80% (n=12)	0% (n=0)	20% (n=3)	80% (n=12)	Access to Data to Assist with Making Program Changes (Inner Setting, Access to Knowledge & Information) "Our epidemiologist has done great work in summarizing the information that exists. You know information from iPHIS and information from the Community Health Survey and using that"	From the quantitative data, four-fifths of health units had high implementation of this activity. This was supported by the fact that most interview participants identified accessing/ using data to inform program planning.

							"We work very close with our epi team, identifying who were the high-risk population, we were looking at STBBI numbers and where the majority of the diagnosis were taking place" Participating in the Program Planning Process to Implement Changes (Process, Planning) "We've actually been doing you know kind of like vision planning, and looking at data and analyzing the data to kind of recreate ourselves again"	
4. Collect information to identify priority populations.	20% (n=3)	13.3% (n=2)	66.7% (n=10)	13.3% (n=2)	20% (n=3)	66.7% (n=10)	Participating in the Planning Process to Implement Changes (Process, Planning) "We collect data on how many people	Of health units surveyed, two thirds had a high degree of implementation of collecting

							are coming here right now, to get a sense of, you know, do they fit priority populations" Health Unit is Supportive of a Population Health Approach (Inner Setting, Leadership Engagement) "We're getting there. We're certainly strides in that regards to use more population health approaches in terms of identifying priority populations and identifying some interventions to target those priority populations"	information to identify priority populations. However, from the interviews, only a few participants reported that their health unit collected this information, which may explain why a third were not high implementers.
5. Address social stigma (disapproval of or discrimination against a person) in relation to sexually	26.7 % (n=4)	6.7% (n=1)	66.7% (n=10)	20% (n=3)	13.3% (n=2)	66.7% (n=10)	Need Evidence of Effective Population Health Interventions (Intervention Characteristics,	Two-thirds of health units indicated that they were high implementers of this activity.

transmitted infections?							Evidence Strength & Quality) “We know that different forms of stigma have a negative impact on people’s health, whether that is sexual health or mental health or otherwise. If there’s evidence that indicate different ways of fighting stigma at a population level, I think I would find that useful from my own perspective”	However, between 20 and 26% of health units were low implementers of this activity, which was corroborated by the interview data. The interviews showed that a few participants needed evidence on approaches to combat stigma in their community, before they could address stigma.
6. Collaborate with priority populations (e.g., LGBTQ2S, youth, post-secondary students, sex trade workers).	20% (n=3)	13.3% (n=2)	66.7% (n=10)	20% (n=3)	20% (n=3)	60% (n=9)	Participating in Planning Process to Implement Change (Process, Planning) “We have created a whole priority populations working group where we have folks who are in those groups who are assigned to	Collaborating with priority populations was highly implemented by more than half of health units surveyed. However, this was not supported by the interview data, with only a

							specific populations and part of their work is promoting our services and with an end goal of hopefully being able to deliver services if they're needed in the community. So as it stands currently, we have staff who are assigned to youth, we have identified youth between the ages of 15 and 29 being a high risk group by virtue of their age. We also have members who are reaching out to indigenous partners and LGBTQ2S and another group who is working with our incarcerated or recently institutionalized group. So we have identified these groups as being	few participants indicating that they collaborated with priority populations. In addition to this, a few interview participants mentioned that it is difficult to engage high risk populations, which might explain why this activity does not have a higher degree of implementation.

							high risk so we are doing outreach to those communities specifically" Assessing Barriers and Needs of Priority Populations in the Community (Outer Setting, Patient Needs & Resources) "It's difficult to engage the population the high risk population that you're trying to reach"	
7. Provide individuals within priority populations with targeted health information to make decisions about their sexual health (e.g., condom use).	13.3 % (n=2)	33.3% (n=5)	53.3% (n=8)	6.7% (n=1)	33.3% (n=5)	60% (n=9)	Participating in Planning Process to Implement Change (Process, Planning) "For sexual health promotion, I usually have a meeting at the beginning of the year and that's where we talk about okay we've already looked at priority populations what	Over half of the health units reported that this activity was highly implemented. However, the qualitative results did not support this finding, with only a few interview participants saying that their

							are the key things that we want to do and we will do campaigns with budgets, resources, and timelines and then from that we do a campaign wish list"	health units provided priority populations with targeted information.
8. Use geographical data to inform program planning (e.g., look at incidence of chlamydia by postal code).	40% (n=6)	13% (n=2)	47% (n=7)	47% (n=7)	13% (n=2)	40% (n=6)	Access to Data to Assist with Making Program Changes (Inner Setting, Access to Knowledge & Information) "We work closely with our epi team, identifying who were the high risk populations. We were looking at STBBI numbers and where the majority of diagnosis were taking place" Working, Collaborating with Local and Regional Partners	The quantitative data indicated a variation in the implementation of geographical data to inform program planning. Two fifths of health units were high implementers and two fifths of health units were low implementers of this activity. A few interview participants identified that their health units are using geographical data, but this finding

							(Outer Setting, Cosmopolitanism) "So when I first started in the organization, because we didn't have dedicated capacity for health analytics in sexual health, I worked with our epidemiologist to have a student come and do some GIS mapping of my chlamydia and gonorrhea cases, so we could have a better idea of what those clients looked like"	does not explain factors that prevented health units from utilizing this type of data.
9. Collect external data (e.g., OHIP billing, ER and hospital use data) to inform program planning.	53% (n=8)	6.7% (n=1)	40% (n=6)	60% (n=9)	0% (n=0)	40% (n=6)	Resources Available to Sexual Health (Inner Setting, Available Resources) "We could use more analysis of data, and we could use more	Quantitative data indicated that about half of the health units surveyed were low implementers of this activity. However, there were about two fifths of health

							epidemiologists. Data is what drives" "Our epidemiologist is pulled in a number of directions as well" Access to Data to Assist with Making Program Changes (Inner Setting, Access to Knowledge & Information) There has been other work that they've done in terms of collecting and utilizing from the data that we have from other sources that we have available to us from the community hospital healthcare etcetera"	units that were high implementers, which was reinforced by the qualitative data. A few interview participants indicated that their health unit collected this data. As well, the qualitative data indicated that health units suffered from a shortage of epidemiologists needed to collect data and that epidemiologists support multiple programs in the health unit, which does not allow them to focus fully on sexual health.

10. Provide advice for vaccine preventable infections (e.g., Hepatitis A, Hepatitis B, HPV) for those identified at risk.	6.7% (n=1)	6.7% (n=1)	87% (n=13)	0% (n=0)	0% (n=0)	100% (n=15)	No qualitative data was found related to this item	
Survey Items	**Quantitative findings Sexual Health Programs**			**Quantitative findings Sexual Health Services**			**Qualitative themes (with CFIR domain and construct) and quotes that relate to key elements and respective survey items**	**How qualitative findings explain quantitative findings**
Key Element B Address the Determinants of Health and their Interactions	**Low**	**Moder-ate**	**High**	**Low**	**Moder-ate**	**High**		
1. Ensure affordability (e.g., provide low lost birth control, travel vouchers).	N/A	N/A	N/A	0% (n=0)	0% (n=0)	100% (n=15)	Sexual Health Clinic Services (Outer Setting, Patient Needs & Resources) "The transition was influenced a lot by the standards and we had this big program saying you don't need low cost contraception anymore because you have OHIP+"	All health units highly implemented this activity in their sexual health services, but It was unclear what aspects of affordability they ensured. A few interview participants mentioned that their health unit

							"I would suggest some of the smaller health units like us are narrowing our programs, because you know primary care and OHIP+ came on board, you know"	has moved away from offering low cost birth control, because of OHIP+. This change in practice might not be reflected in the quantitative survey results.
2. Offer access for adults over the age of 25.	0% (n=0)	6.7% (n=1)	86.7% (n=13)	6.7% (n=1)	6.7% (n=1)	86.7% (n=13)	Sexual Health Clinic Services (Outer Setting, Patient Needs & Resources) "For us, for the STI clinic there's no change because we, there's no other STI clinic in the city that offers confidential - you don't need a health card or anything - free testing and treatment" "There weren't necessarily age restrictions on the STI, you know, testing that sort of	The vast majority of health units were high implementers of this activity. This finding was supported by the fact that most interview participants indicated that their health unit offered STI testing and treatment to everyone, regardless of age.

							is a bit more open because we didn't want to any barriers”	
3. Offer access for youth 24 years of age and under.	13.3 % (n=2)	13.3% (n=2)	73.3% (n=11)	20% (n=3)	0% (n=0)	80% (n=12)	Sexual Health Clinic Services (Outer Setting, Patient Needs & Resources) “We still want to, particularly or the priority populations like youth, to offer those services” Modernized Standards (Outer Setting, External Policy & Incentives) “All of a sudden that program pendulum shifted with where we were going, because we didn't have a distinct, you must offer so many hours of clinical services”	Quantitative data indicated that approximately two thirds of health units highly implemented this activity, which was supported by the interview data. However, the interviews also showed that the language in the modernized standards have influenced sexual health services being offered through their health units, which may explain why the number of health units that implemented this activity was not

								highly implemented across all health units.
4. Ensure quality in the programs offered (e.g., quality control, identify best practices, adequate staffing, gaps in current programs, conduct quality initiatives).	13.3 % (n=2)	13.3% (n=2)	73.3% (n=11)	20% (n=3)	0% (n=0)	80% (n=12)	Increased Resource Utilization with Sexual Health Clinics (Inner Setting, Tension for Change) “We were dealing with significant resource issues. In fact, that we were overwhelmed in our main clinic, and I think it was a recognition that we couldn't just keep doing what we're doing ‘cuz it just wasn't working. People were happy, everybody loves our service but staff were exhausted, and so we knew that we had to take a serious look at who we were	Ensuring quality in the programs offered in sexual health, was an activity that was highly implemented by almost all health units. Interview data did not validate this, as only a few participants mentioned quality improvement initiatives (e.g., the implementation of the nursing project officers and the development of performance indicators). Most interview participants reported that

							providing service to and were we truly meeting the needs" Managers Involved in Making Population Health Changes (Inner Setting, Leadership Engagement) "I have a nursing project officer that has been a position that I have developed that is in support of the whole area, so I oversee all infectious disease as well as sexual health service, so her role has been to work not only with the team themselves but we have other nursing practice officers that are embedded within the team to work with them to develop some of	sexual health programs are understaffed with limited capacity to meet program and service demands.

							those indicators (performance monitoring)" Resources Available to Sexual Health (Inner Setting, Available Resources) "I don't know about other places but we are pretty understaffed here"	
5. Ensure accessibility (e.g., local, easy to get to, flexible hours).	N/A	N/A	N/A	0% (n=0)	33.3% (n=5)	66.7% (n=10)	The geographical area of the health unit determines how easily changes can be made to programming (Outer Setting, Patient Needs & Resources) "For example, we have a geographic area to drive from the furthest reaches of one county to the other would be about 4 hours, so you know we do have to look at each	The quantitative data indicated that just over half of health units considered accessibility when it came to their clinic set-up, with one third moderately considering this. However, only one interview participant indicated that the needs of their communities are considered but

							sort of county and their needs for sure"	did not mention specifically how they ensure accessibility. Therefore, the interview data did not support the quantitative finding.
6. Use trauma and violence-informed care at the program level (e.g., understanding, recognizing, and responding to the effects of all types of trauma, such as sexual abuse, physical violence).	20% (n=3)	33.3% (n=5)	46.7% (n=7)	20% (n=3)	33.3% (n=5)	46.7% (n=7)	No qualitative data was found related to this item	
7. Use principles of social justice to address the disadvantage of certain groups that prevent equal access to determinants of health in your community.	26.7 % (n=4)	40% (n=6)	33.3% (n=5)	13.3% (n=2)	46.7% (n=7)	40% (n=6)	No qualitative data was found related to this item	

8. Provide supports to address broader social needs (e.g., referrals to address issues of poverty, lack of education, housing) for individuals engaged in high risk sexual behaviour.	40% (n=6)	20% (n=3)	40% (n=6)	20% (n=3)	33.3% (n=5)	46.7% (n=7)	No qualitative data was found related to this item	

Survey Items	Quantitative findings Sexual Health Programs			Quantitative findings Sexual Health Services			Qualitative themes (with CFIR domain and construct) and quotes that relate to key elements and respective survey items	How qualitative findings explain quantitative findings
Key Element C Base Decisions in Evidence	Low	Moder -ate	High	Low	Moder -ate	High		
1. Use the best available evidence/guidelines to inform decision making in practice and/or program development.	0% (n=0)	6.7% (n=1)	93.3% (n=14)	0% (n=0)	13.3% (n=2)	86.7% (n=13)	**Need Evidence of Effective Population Health Interventions** (Intervention Characteristics, Evidence Strength & Quality) "Once the evidence is in place and then we had a chance to review it, to make sure that we invest services in certain areas" "I would need to look at the evidence that	Almost all health units surveyed used the best available evidence/guidelines to inform decision making and/or program development, which was supported by the qualitative data. Most interview participants indicated that their health unit used available evidence/ guidelines.

							shows what interventions are effective and in order to know what resources would be required”	
2. Engage in evaluation to inform program planning	20% (n=3)	26.7% (n=4)	53.3% (n=8)	0% (n=0)	33.3% (n=5)	66.7% (n=10)	**Participating in the Planning Process to Implement Changes** (Process, Planning) “We are going to go through this process that we are calling a clinical review. We are going to start this process and look at, kind of do an in-depth, this is what we’re doing, this is what’s working, this is where we don’t have more time” “We did a program review, it was completed in 2015, so we looked at both our sexual health clinic services and sexual health promotion”	There is variation among health units in the extent that they engaged in evaluation to inform program planning. This finding was reinforced by the qualitative data, as most interview participants confirmed that evaluation occurred within their health units but that some evaluations were done a number of years ago. In addition to this, the interview data showed that sexual health programs and services do not have the same access to evaluators, which

							Resources Available to Sexual Health (Inner Setting, Available Resources) "So it's not so easy as it was years ago. We used to have our own evaluator and our own of epidemiologist and we're just able to go over and say can you do that. It has become too many projects now"	impacted being able to conduct evaluations to assist their health unit with program planning.
3. Get involved in primary research.	66.7% (n=10)	20% (n=3)	13.3% (n=2)	60% (n=9)	26.7% (n=4)	13.3% (n=2)	**The Value of Research** (Inner Setting, Culture) "I think there is great opportunity there but I just don't feel that a lot of the health unit buy into the value of research but I think it's more, I'm not talking about managers and frontline staff, I'm	The quantitative data showed that just over half of all health units were low implementers of this activity. Qualitative findings suggest that there are multiple reasons for this. One of the main reasons that was mentioned by interview participants, was that there is no support for sexual health research

							talking more of the MOH" "There used to be a very formalized relationship with our local [Name of University], and there was funding available for that. I think you know, back 20, 25 years ago. There was a different environment" "It would be more about capacity at the time"	by senior leadership in public health. In addition to this, reduced funding and capacity over time has affected the ability of sexual health programs and services to participate in research.
Survey Items	**Quantitative findings Sexual Health Programs**			**Quantitative findings Sexual Health Services**			**Qualitative themes and quotes that relate to key elements and respective survey items**	**How qualitative findings explain quantitative findings**
Key Element D Increase Upstream Investment	Low	Moder-ate	High	Low	Moder-ate	High		

1. Provide information to the public (e.g., youth) on healthy sexuality and sexual health (e.g., sexually transmitted infection risk factors).	13.3% (n=2)	26.7% (n=4)	53.3% (n=8)	6.7% (n=1)	20% (n=3)	73.3% (n=11)	**Sexual Health Programming Needs to Tailored to Local Needs and Populations** (Intervention Characteristics, Adaptability) "We're actually working on, a second phase of the public. Like we started with health care providers but the other piece that we're trying to work on is getting messages out to the people who you know, to prevent sexual health, you know, infection. We are just meeting with the community, the communications manager and the health promotion specialist for the next steps, which would be advertising on grinder and different	There was variation in the quantitative data between sexual health programs and sexual health services in the provision of information to the public on healthy sexuality. In sexual health programs, this activity was implemented to a high degree by about half of health units but in sexual health services, this was implemented to a high degree by three quarters of the health units. Qualitative data did not support this finding, as only a few participants identified this activity as something they are doing at their health units. In addition to this, interview participants mentioned that given the political nature of

							things and looking at how to reach priority populations and where do they meet and we've got to get to them where they're at"	public health, community partners are utilized to help 'move the work forward'.
2. Advocate for sexual health in schools.	6.7% (n=1)	26.7% (n=4)	66.7% (n=10)	13.3% (n=2)	26.7% (n=4)	60% (n=9)	**Modernized Standards** (Outer Setting, External Policy & Incentives) "Historically we really focused on getting those champions within the school. We talked a lot, we had you know campaigns, we had a lot of resources, we had more that upstream working with the LGBTQ community we network with the HIV association, actually we had a space in our office where we did programming, we did sort of some	Over half of the health units indicated that they had a high degree of implementation of this activity. Interview data did not support this finding and suggested that the modernized standards changed the role of sexual health in schools, with stronger advocacy occurring prior to the modernized standards. In addition, a few interview participants indicated that sexual health clinics in schools dissolved with the modernized standards.

							development supporting the curriculum” “We were in every school except the Catholic secondary school but we were in every school, we were supporting curriculum, we were doing events, we had LGBTQ support groups back then. We were, we were doing campaigns, we had worked with the school board on certain policies, and now it’s kind of like a line in each one of the standards” “Before the modernization of the standards, that was the clinical services nurses going out into the schools as well”	

3. Utilize social media marketing (e.g., Twitter, Facebook, dating apps) to educate the public.	13.3% (n=2)	26.7% (n=4)	60% (n=9)	20% (n=3)	13.3% (n=2)	66.7% (n=10)	**Implementing Changes to Sexual Health Programs and Services that Support a Population Health Approach** (Process, Executing) "We had some pressures and health promotion we've shifted from the traditional kind of poster campaign more to like a use of social media so we've had some good success with we think with buying advertising on Grinder or dating apps, targeting men who have sex with men" "We are increasingly using social media platforms in order to reach as many, as many clients and or	Quantitative data indicated that about two thirds of health units utilized social media marketing to a high degree. Some interview participants stated that social media is being utilized to provide education to the public, either through other programs in their health unit or directly by sexual health. This validated the quantitative findings. However, there was no interview data to suggest why some health units have lower implementation of this activity.

							members of the community in general"	
4. Provide standard sexual health messages (e.g., populations at risk and trends for sexually transmitted infections) to other programs in the health unit to ensure consistency	26.7% (n=4)	20% (n=3)	53.3% (n=8)	N/A	N/A	N/A	**Networked with Other Relevant Programs in the Health Unit** (Inner Setting, Networks & Communications) "We've actually done some orientation and support to the school team, who is now responsible for healthy sexuality in the schools" "We support other teams in the health unit with communicating, communicating for health, sexual health information and knowledge. One of the synergies that comes to mind, is the work that the sexual health team does and the work of the	Quantitative findings indicated that about half of health units collaborated with other programs in their health units to provide standard sexual health messages to a high degree. The qualitative data indicated that a few health units engaged in this activity, which sheds light on why there was variation in how this activity was implemented.

							school health program."	
5. Provide education to primary health care providers on healthy sexuality and sexual health (e.g., sexually transmitted testing in priority populations, first line sexually transmitted treatment).	20% (n=3)	33.3% (n=5)	40% (n=6)	13.3% (n=2)	26.7% (n=4)	60% (n=9)	**Working, Collaborating with Multiple Local and Regional Partners** (Outer Setting, Cosmopolitanism) "Now as far as the MOH and the sexual health team, there certainly, like for example, over the last couple months there's been an education session for Primary Health Care providers that nurses from the sexual health team have worked with the MOH to arrange and offer that education session" "We are having a whole syphilis presentation where our primary care providers have all been invited to attend	There is variation in the implementation of this activity among health units. However, for sexual health services, more than half of health units offered this type of education to primary health care providers to a high degree. Based on interview data, some participants mentioned that their health units offered education to primary health care providers on how to provide sexual health care to their clients. It does appear from the interview data, that when an education session was offered, it was more related to testing and treatment of STBBIs, which explains the

							and it's around staging and management, managing syphilis and providing medication and all of that but we have a focus on our primary care right now to try and build capacity in the community so that they are able to see some of the these folks and primary care settings versus coming to sexual health center every time for sexual health needs”	difference between quantitative findings for sexual health programs and sexual health services for this item.
6. Provide sexual health messages to community stakeholders (e.g., qualities of a healthy relationship, what is healthy sexuality).	20% (n=3)	46.7% (n=7)	33.3% (n=5)	26.7% (n=4)	33.3% (n=5)	40% (n=6)	**Networked with other Relevant Programs in the Health Unit** (Inner Setting, Networks & Communications) “We recently worked with seniors in our seniors program around the	Quantitative data showed that there is variation among health units in implementing this activity. There was only one interview participant that reported that their health unit provided sexual health messages to

							development of resource material for older adults at risk for STBBIs, as people are newly divorced or widowed and getting back into the dating game”	community stakeholders. This partially explains some of the quantitative results, but does not fully explain all of the quantitative findings.
7. Provide data or information to provincial organizations (e.g., Ministry of Health and Long-Term Care, Public Health Agency of Ontario) to assist with sexual health policy development.	40 (n=6)	20 (n=3)	40 (n=6)	33.3 (n=5)	26.7 (n=4)	40 (n=6)	**Networked with other Sexual Health Programs** (Inner Setting, Networks & Communications) “To be quite honest, I never really felt that many health units used that meeting (Provincial Infectious Disease Teleconference) to share. At least previously anyway…I have never really found that that folks typically use that as an opportunity for information sharing”	The qualitative findings for this activity is the same as those for item #2 in key element F. The findings explain that there is no opportunity for health units to discuss sexual health issues. There was variation in the implementation of this activity among health units. Interview data validates the low implementation associated with this activity. However, interview data did not provide any information on why some health units had

								higher implementation of this activity.
8. Engage in healthy public policy to create supportive environments that enable people to lead healthy sexual lives.	46.7% (n=7)	26.7% (n=4)	26.7% (n=4)	N/A	N/A	N/A	**Participating in the Planning Process to Implement Changes** (Process, Planning) "Going to be influenced by creating supportive environments, influencing behaviour, influencing implementation of policy changes" "Their going to kind of do a, working on policy. A group will work with community policy and a group that will work on health care providers, and a school team, and a community team. Then we are going to pick four communities and they	There is variation among health units in engaging in healthy public policy, but just over two fifths of the health units surveyed engaged in this activity to a low extent. This finding was substantiated by the qualitative data, with only a few interview participants that identified that their health unit engaged in this type of activity.

							will do some health strategies, like healthy built environment and things like that in certain communities”	
9. Provide data or information to national organizations (e.g., Public Health Agency of Canada) to assist with sexual health policy development.	53.3% (n=8)	13.3% (n=2)	33.3% (n=5)	60% (n=9)	6.7% (n=1)	33.3% (n=5)	No qualitative data was found related to this item	
10. Provide information to primary health care providers on healthy sexuality and sexual health (e.g., sexually transmitted testing in priority populations, first line sexually transmitted treatment).	13.3% (n=2)	26.7% (n=4)	53.3% (n=8)	6.7% (n=1)	20% (n=3)	73.3% (n=11)	No qualitative data was found related to this item	

Survey Items	Quantitative findings Sexual Health Programs			Quantitative findings Sexual Health Services			Qualitative themes and quotes that relate to key elements and respective survey items	How qualitative findings explain quantitative findings
Key Element E Apply Multiple Strategies	Low	Moder-ate	High	Low	Moder-ate	High		
1. To what extent do Sexual Health Services in your health unit offer sexually transmitted infection screening and/or treatment.	N/A	N/A	N/A	0% (n=0)	6.7% (n=1)	93.3% (n=14)	**Sexual Health Clinic Services Address Patient Needs** (Outer Setting, Patient Needs & Resources) "We offer sexually transmitted infection (STI) and then blood borne illnesses testing and some treatment. We also facilitate referrals to specialists in the community and beyond"	In sexual health services, almost all health units surveyed offer STI screening and/or treatment to a high degree. The interview data supported this finding by showing that testing and treatment of STIs are services offered at most health units.

							"We kind of take every syphilis client. We are managing that, because we are the experts in that"	
2. To what extent do Sexual Health Services in your health unit offer multiple services (e.g., sexually transmitted infection testing and naloxone).	N/A	N/A	N/A	0% (n=0)	6.7% (n=1)	93.3% (n=14)	**Networked with other Relevant Programs in the Health Unit** (Inner Setting, Networks & Communications) " Vaccine Preventable Disease (VPD) and harm reduction, we have worked out a thing where every person who comes in for needle exchange will be offered a flu shot and an assessment of their vaccines regularly, and the nurse will give the shot right then"	The vast majority of health units surveyed indicated that they highly implemented this activity. Interview data reinforced this finding, by showing that multiple services are being offered in one location to meet client's needs. However, only a few interview participants mentioned that their health unit did this, which conflicts with this item being highly implemented.

3. Have a written strategy (e.g., service plan, operational plan, logic model) that addresses sexual health issues within your community.	13.3% (n=2)	20% (n=3)	66.7% (n=10)	20% (n=3)	13.3% (n=2)	66.7% (n=10)	**Participating in the Planning Process to Implement Changes** (Process, Planning) "We used to do operational plans and all of them that kind of stuff, but do annual service plans now that we have templates" "We do it on an annual basis. So that information, that program plan informs the annual service plan that is provided to the Ministry so it's the whole you know objective and budget and everything"	Two thirds of health highly implemented this activity. Most interview participants stated that their health units had a written strategy. However, it was noted by interview participants that Annual Service Plans (ASPs), required by the MOHLTC, have replaced the traditional operational plan that health units used previously. This may explain some of the variation in implementation.
4. Sexual Health Programming in your health unit provide multiple components in interventions (e.g., primary, secondary, and/or tertiary interventions).	N/A	N/A	N/A	33.3% (n=5)	6.7% (n=1)	60% (n=9)	**Modernized Standards** (Outer Setting, External Policy & Incentives) "It's just more than we don't just do one strategy, it's reporting	Just over half of health units surveyed indicated that their health unit implemented this activity to a high degree for sexual health programming, with one third of

							a multitude of strategies from case management to working with the school board to supporting policy to putting education out there, but it's just so much more in a smaller scale than we used to” **Resources Available to Sexual Health** (Inner Setting, Available Resources) “Certainly budgets have not really changed over the years and they've kind of whittled away some of those operating lines were possible keeping stopping at the same level you have to look at some of those operating lines and certainly health promotion lines have	health units implementing this activity to a lower extent. Some interview participants indicated that their health unit offered multiple components in sexual health programming. Unfortunately, interview data revealed that budget constraints influenced the different components that are offered and the scope of interventions (i.e., less in health promotion) that were done.

							shrunk in my time here”	
5. Apply a sexual health framework to inform planning (e.g., The Health Impact Pyramid).	33.3% (n=5)	26.7% (n=4)	40% (n=6)	46.7% (n=7)	6.7% (n=1)	46.7% (n=7)	**Participating in the Planning Process to Implement Changes** (Process, Planning) “We created a strategic framework and the strategic framework was more about the sexual health well-being as opposed to managing STIs or focus on disease and things like that” “What I used was the framework that is there in the, I don’t know, the page number now, but it’s in the foundational principles as to what our goal is”	Quantitative data showed variation among health units in terms of implementation of this activity. There were just over two-fifths of health units that applied a sexual health framework to inform planning to a high degree, with just over two-fifths of health units that implemented this activity to a lower extent. Only a few interview participants indicated that their health units used a framework to guide their program planning process, which supported the low implementation

								finding for this activity.
6. Engage in community development activities (e.g., work with local community members, youth) to assist with improving sexual health programs for the community.	26.7% (n=4)	40% (n=6)	33.3% (n=5)	33.3% (n=5)	40% (n=6)	26.7% (n=4)	**Assessing Barriers and Needs of Priority Populations in the Community** (Outer Setting, Patient Needs & Resources) "We have brought some of the detention staff to the meetings and talked to them about the difficulties we are having trying to find people after they are released after detention, engaging them back in care, that kind of thing" "Every year we will see what we can do to get a better understanding of what the community needs and we constantly assess and reassess our internal	Quantitative data indicated wide variation among health units in how this activity was implemented. Some interview participants mentioned that community engagement happened at their health unit, which substantiated that some health units are implementing this activity.

							resources and our capacity and our ability to respond to changes in demand” “So now we are working with the health services from the universities and colleges and looking at how do we re-orientate services for them to go to, you know, that place”	
7. Provide multiple components in interventions (e.g., primary, secondary, and/or tertiary interventions).	40% (n=6)	20% (n=3)	40% (n=6)	13.3% (n=2)	33.3% (n=5)	53.3% (n=8)	**Modernized Standards** (Outer Setting, External Policy & Incentives) “Your standard campaigns, we had funds and resources allocated because sexual health was a program itself. Right now the budget is allocated within infectious diseases and that's the priority”	There is variation among health units in the implementation of this activity. A few interview participants indicated that primary interventions, such as health promotion, occurred in their health unit but that funding had changed over the years and health units now have less money available for primary prevention interventions.

							Budget Influences Implementing a Population Health Approach (Intervention Characteristic, Cost) "We also do some promotional campaigns, when we have the budget for it" **Sexual Health Clinic Services** (Outer Setting, Patient Needs & Resources) "Clinical services we have maintained over the years pretty much the same hours and locations"	Interview data reinforced that health units offered secondary interventions, such as clinic services.
8. Work with primary health care providers in your community to assess overlaps and	26.7% (n=4)	26.7% (n=4)	46.7% (n=7)	40% (n=6)	20% (n=3)	40% (n=6)	**Assessing Barriers and Needs of Priority Populations in the Community**	Quantitative data indicated that there is variation in the implementation of this activity among health units. A few

gaps in sexual health.							(Outer Setting, Patient Needs & Resources) "For sexual promotion, we did an environmental scan but we also kinda did even a local scan looking at other organizations is there a duplication in services, so no one else does STI presentations right but someone will do a presentation on HIV 101, so this is important to us, but this is where we have to ensure that we are providing service, because there is no other organization who has that knowledge and that ability to educate or even the odd time present"	interview participants indicated that their health unit looked at overlaps and gaps in services within their community to determine where sexual health services could be increased or decreased based on what was being offered within their community.

							Sexual Health Clinic Services (Outer Setting, Patient Needs & Resources) "Based upon capacity and other services in the community, what we are trying to do is to leverage what other services in the community are being offered. We stopped doing IUDs but will refer them onto the community, because there is capacity there" **Increased Resource Utilization with Sexual Health Clinics** (Inner Setting, Tension for Change) "We've kind of you know we use to be a come one come all, everybody come here	

							type approach and just realizing that so you know in this climate, duplication of services and you know we needed to look at who should we be servicing"	
9. To what extent do Sexual Health Services in your health unit offer pregnancy options counselling and/or post-abortion care.	N/A	N/A	N/A	0% (n=0)	6.7% (n=1)	93.3% (n=14)	No qualitative data was found related to this item	
10. To what extent do Sexual Health Services in your health unit offer contraceptive counselling and prescription.	N/A	N/A	N/A	0% (n=0)	6.7% (n=1)	93.3% (n=14)	No qualitative data was found related to this item	
11. To what extent do Sexual Health Services in your health unit offer counselling for sexual health concerns.	N/A	N/A	N/A	13.3% (n=2)	6.7% (n=1)	80% (n=12)	No qualitative data was found related to this item	

12. To what extent do Sexual Health Services in your health unit offer referral for sexual dysfunction.	N/A	N/A	N/A	60% (n=9)	13.3% (n=2)	26.7% (n=4)	No qualitative data was found related to this item	
13. To what extent do Sexual Health Services in your health unit refer victims of violence (e.g., sexual and domestic).	N/A	N/A	N/A	6.7% (n=1)	26.7% (n=4)	66.7% (n=10)	No qualitative data was found related to this item	
Survey Items	**Quantitative findings Sexual Health Programs**			**Quantitative findings Sexual Health Services**			**Qualitative themes and quotes that relate to key elements and respective survey items**	**How qualitative findings explain quantitative findings**
Key Element F Collaborate Across Sectors and Levels	Low	Moder-ate	High	Low	Moder-ate	High		
1. Engage in intersectoral partnerships (e.g., with education, police, housing, pharmacies, social services, and/or faith sectors), to address health	20% (n=3)	46.7% (n=7)	33.3% (n=5)	40% (n=6)	33.3% (n=5)	26.7% (n=4)	**Working, Collaborating with Multiple Local and Regional Partners** (Outer Setting, Cosmopolitanism) ‘I think community engagement with any	Quantitative data revealed that there is wide variation among health units with how this activity was implemented. Interview participants revealed that some of their health units are

promotion and prevention (e.g., primary, secondary, and/or tertiary).							of our community partners; they all certainly have their own strategic priorities. My experience that some are not necessarily that great at articulating those and getting us all aligned in the same direction” “We work with the AIDS committee and a lot of different places”	engaged in intersectoral partnerships, but the interviews also showed that there are challenges with engaging and sustaining these partnerships for health units (e.g. community partners have their own priorities). This finding helps explain the varying degrees of implementation of this activity.
2. Work with the provincial government (e.g., Ministry of Health and Long-Term Care) to address issues related to sexual health.	46.7% (n=7)	20% (n=3)	33.3% (n=5)	46.7% (n=7)	26.7% (n=4)	26.7% (n=4)	**Networked with other Sexual Health Programs** (Inner Setting, Networks & Communications) “To be quite honest, I never really felt that many health units used that meeting (Provincial Infectious Disease Teleconference) to	Just over two-fifths of the health units indicated that they are low implementers of this activity, but there was variation in the implementation of this activity among health units. Interview data revealed that there is no venue for health units to address sexual related issues

							share. At least previously anyway…I have never really found that folks typically use that as an opportunity for information sharing"	with the Ministry of Health and Long-Term Care, which validates the low implementation associated with this activity. However, interview data did not provide any information on why some health units had higher implementation of this activity.
3. Work with provincial government to provide updates on sexual health issues in your community.	46.7% (n=7)	26.7% (n=4)	26.7% (n=4)	46.7% (n=7)	26.7% (n=4)	26.7% (n=4)	**Networked with Other Sexual Health Programs** (Inner Setting, Networks & Communications) "Every teleconference has become a combined infectious disease and 95% of it is all around flu and all these other outbreaks that are not sexual health and we spend a few minutes on, the	As in item # 2 in element F, interview data supported the low implementation of this activity, as participants indicated that the provincial managers' meeting is not a place where sexual health issues can be discussed with the provincial government.

							chlamydia rate is increased by 8%, so every teleconference the rate keeps increasing and that's the end of it. So, it concerns me as the rate is so high for chlamydia, gonorrhea and syphilis all over Ontario but they're just telling me what I already know, yet that's it and does not care that cases are a huge problem. I don't understand, we're looking at all the rates of STIs are skyrocketing all over Ontario and we have five minutes, actually three seconds on the teleconference. The rate is 8%, this rate has increased 7% and that's how they say it and that's the end of it, there's no further discussion, so it's concerning"	

4. Work with other local municipal government services (e.g., housing, police, paramedics) to address issues related to sexual health in your community.	33.3% (n=5)	46.7% (n=7)	20% (n=3)	40% (n=6)	46.7% (n=7)	13.3% (n=2)	**Working, Collaborating with Multiple Local and Regional Partners** (Outer Setting, Cosmopolitanism) "We've worked strongly with municipalities. We've made some bylaws, from that higher level" "On population health, broad policy, we work with every municipality. We're connected with them and health in all policies"	There is variation in the work that health units do with local municipal government services to address issues related to sexual health. At least one-third of health units had a low implementation of this activity, with just over two-fifths of health units having a moderate degree of implementation. From the interviews, a few participants indicated that they worked with local municipal government services, which corroborated the low degree of implementation of this activity. However, it was not clear from those interviews if the nature of the relationship was

								related to addressing sexual health issues in their community or something different.
5. Engage in capacity building (e.g., naloxone training, harm reduction) across sectors (e.g., health, non-profit) to assist professionals in developing the skills required to provide sexual health care.	6.7% (n=1)	13.3% (n=2)	80% (n=12)	13.3% (n=2)	6.7% (n=1)	80% (n=12)	No qualitative data was found related to this item	
6. Work with community stakeholders (e.g., teachers, community leaders) to assist them with identifying their own attitudes, beliefs, and values related to sexual health.	33.3% (n=5)	40% (n=6)	26.7% (n=4)	40% (n=6)	33.3% (n=5)	26.7% (n=4)	No qualitative data was found related to this item	

7. Work with the federal government to address issues related to sexual health.	73.3% (n=11)	13.3% (n=2)	13.3% (n=2)	73.3% (n=11)	13.3% (n=2)	13.3% (n=2)	No qualitative data was found related to this item	
Survey Items	**Quantitative findings Sexual Health Programs**			**Quantitative findings Sexual Health Services**			**Qualitative themes and quotes that relate to key elements and respective survey items**	**How qualitative findings explain quantitative findings**
Key Element G Employ Mechanisms for Public Involvement	Low	Moderate	High	Low	Moderate	High		
1. Involve local community partners (e.g., advisory groups, youth committees) in planning.	40% (n=6)	40% (n=6)	20% (n=3)	46.7% (n=7)	26.7% (n=4)	26.7% (n=4)	**Sexual Health Programming Needs to be Tailored to Local Needs and Populations** (Intervention Characteristics, Adaptability) "The other approach is related to the LGBTQ, supporting community, a community coalition, so that's more of a population based	Quantitative data revealed that there was variation among health units in involving local community partners in planning. Some interview participants indicated that their health units involved community partners in planning. However, there was evidence from the interviews that engaging community

							approach and that was based on a survey that was done a few years ago, to find out what the needs were for that population, in a rural setting” **Working, Collaborating with Multiple Local and Regional Partners** (Outer Setting, Cosmopolitanism) “It is very difficult to bring community partners together, like the school board and some of the youth serving agencies and try and come up with strategies that everyone can agree on at the table, so community engagement is a barrier.”	partners is challenging, and presents a barrier for health units This may explain some of the variation in the implementation of this activity.
2. Involve clients in planning (e.g.,	60%	26.7%	13.3%	66.7%	20%	13.3%	**Involve Clients in Planning**	Quantitative data indicated that about

gathering feedback, co-design).	(n=9)	(n=4)	(n=2)	(n=10)	(n=3)	(n=2)	(Process, External Change Agents) "Yes, we did client surveys just to gauge things around what hours, what days, what do you like about the clinic, what don't you like about the clinic, what do you find at the barrier. So again, if we are going to offer services to our population, we wanted to make sure that they match what they needed and not what worked for us" **Resources Available to Sexual Health** (Inner Setting, Available Resources) "We just don't have the capacity to be able to get input from clients. We may do a	two-thirds of health units had low implementation of this activity. Interview data validated the quantitative finding, by showing that only a few participants identified that their health units involved clients in the planning process. However, the interviews also indicated that there are capacity issues within health units that influenced health unit's low application of this approach.

							quick little survey for those that are coming to our clinic but that's a very select group, those that are already coming as opposed to the population itself"	
3. Develop sex positive messaging (e.g., sex is healthy) in collaboration with the general public.	40% (n=6)	33.3% (n=5)	26.7% (n=4)	53.3% (n=8)	20% (n=3)	26.7% (n=4)	No qualitative data was found related to this item	
4. Involve provincial partners (e.g., Ontario HIV epidemiology and surveillance initiative) in planning.	46.7% (n=7)	40% (n=6)	13.3% (n=2)	53.3% (n=8)	33.3% (n=5)	13.3% (n=2)	No qualitative data was found related to this item	
Survey Items	**Quantitative findings Sexual Health Programs**			**Quantitative findings Sexual Health Services**			**Qualitative themes and quotes that relate to key elements and respective survey items**	**How qualitative findings explain quantitative findings**
Key Element H Demonstrate Accountability for Health Outcomes	Low	Moder-ate	High	Low	Moder-ate	High		

1. Report incidence of sexually transmitted infections of your community to health care providers.	13.3% (n=2)	13.3% (n=2)	73.3% (n=11)	13.3% (n=2)	13.3% (n=2)	73.3% (n=11)	**Provide information and data to the community** (Outer Setting, Cosmopolitanism) "We will push information out to them when we have it, but it is not actively available for them to come get it" "There's multiple ways, I don't think there's any one way, we whenever we update when we do a clinician update to update information to healthcare providers we send it out to all the healthcare providers and upload it to our website. And then whenever we can mail out a package or mail out information or do anything like that we always upload that	Quantitative data indicated that almost three-fourths of health units reported incidence of sexually transmitted infections to community health care providers to a high degree. However, only some interview participants indicated that their health units provided this type of information to health care providers, which does not corroborate the quantitative finding.

							information as well on the website, so they do have access. I want to say that we're trying really hard to tell them about our website and show them how to use it and show them where the information is, because half the time, their like I didn't even know this was there"	
2. Make epidemiological data available on your website (e.g., sexually transmitted infection incidence).	26.7% (n=4)	6.7% (n=1)	66.7% (n=10)	26.7% (n=4)	6.7% (n=1)	66.7% (n=10)	**Provide information and data to the community** (Outer Setting, Cosmopolitanism) "As most health units do, we post a lot of information on our website. Including our Community Health survey, it's all posted on as well" "Our health professional page, for our department. I	Two-thirds of health units implemented this activity to a high degree with about one-quarter of health units implementing this activity to a lower extent. Some interview participants indicated that their health units make data available on their websites. However, participants also indicated that their health unit did not make this type of

							know I have posted, updated gonorrhea testing guidelines and a link to the Canadian STI guidelines, how to order STI meds. We use to provide more epidemiology on our website, but when we revamped our web pages, that kind of got lost" "If you were to go on, you wouldn't necessarily see some of our trends or data, that sort of thing"	data available on their website, which validates the variation in quantitative findings.
3. Collect information on the incidence of sexually transmitted infection in your community (e.g., sexual transmitted and blood borne infections).	0% (n=0)	0% (n=0)	100% (n=15)	0% (n=0)	0% (n=0)	100% (n=15)	No qualitative data was found related to this item	

4. Collect data on the risk factors for sexually transmitted infections in your community (e.g., no condom use, multiple partners).	0% (n=0)	0% (n=0)	100% (n=15)	0% (n=0)	0% (n=0)	100% (n=15)	No qualitative data was found related to this item	
5. Use sexual health data that is collected to compare to other jurisdictions.	20% (n=3)	6.7% (n=1)	73.3% (n=11)	20% (n=3)	6.7% (n=1)	73.3% (n=11)	No qualitative data was found related to this item	
6. Use data on outcomes associated with unintended pregnancy for planning (e.g., abortion rates, teen pregnancy rates).	20% (n=3)	13.3% (n=2)	66.7% (n=10)	20% (n=3)	13.3% (n=2)	66.7% (n=10)	No qualitative data was found related to this item	
7. Use epidemiological products to provide a profile of your community (e.g., village of 100).	26.7% (n=4)	13.3% (n=2)	60% (n=9)	26.7% (n=4)	13.3% (n=2)	60% (n=9)	No qualitative data was found related to this item	

8. Collect socio-demographic information on individuals with sexually transmitted infections.	33.3% (n=5)	6.7% (n=1)	60% (n=9)	33.3% (n=5)	13.3% (n=2)	53.3% (n=8)	No qualitative data was found related to this item	
9. Use specific targets (e.g., reduce chlamydia by 5%) to determine success of interventions.	40% (n=6)	26.7% (n=4)	33.3% (n=5)	33.3% (n=5)	33.3% (n=5)	33.3% (n=5)	No qualitative data was found related to this item	
10. Collect information from your community on incidence of sexual violence (e.g., sexual assault, sexual abuse, intimate partner violence.	60% (n=9)	6.7% (n=1)	33.3% (n=5)	60% (n=9)	6.7% (n=1)	33.3% (n=5)	No qualitative data was found related to this item	
11. Collect information from your community related to sexual health discrimination (e.g., stigma against minorities,	53.3% (n=8)	20% (n=3)	26.7% (n=4)	60% (n=9)	6.7% (n=1)	33.3% (n=5)	No qualitative data was found related to this item	

older adults, LGBTQ2S).								
12. Examine Hospital Emergency Room visit data (e.g., individuals with an STI).	73.3% (n=11)	0% (n=0)	26.7% (n=4)	80% (n=12)	0% (n=0)	20% (n=3)	No qualitative data was found related to this item	
13. Collect information from your community on sexual experience (e.g., consensual, respectful, equity in relationships).	66.7% (n=10)	20% (n=3)	13.3% (n=2)	60% (n=9)	20% (n=3)	20% (n=3)	No qualitative data was found related to this item	
14. Collect information from your community on healthy sexual relationships (e.g., mutual respect, support, trust).							No qualitative data was found related to this item	

CHAPTER SIX

In this chapter, the key contributions of the findings from this thesis will be outlined. The implications related to the implementation of a population health approach within sexual health programs in public health practice, education, policy, and future research will be discussed. The study's strengths and limitations will be presented, along with how the results support our understanding of the extent that a population health approach was implemented in sexual health programs and services in Ontario public health units, and the factors that influenced implementation.

Key Contributions

Research evidence supporting a population health approach in public health was limited. Specifically, there was a lack of research on activities associated with a population health approach being implemented and the factors that influence their implementation in sexual health programs and services within public health. The research questions addressed in this thesis were:

1. To what extent have the key elements of a population health approach been incorporated into sexual health programming in Ontario public health units?

2. How do managers, supervisors, or staff working in Ontario public health units describe the factors that they perceive influence the implementation of the elements of a population health approach within sexual health programs and services?

3. In what ways do qualitative interviews with managers, supervisors or staff serve to contribute to the understanding of what has been integrated from a population health approach into sexual health within Ontario public health units?

The findings from this mixed-methods study have begun to fill this gap by contributing to our understanding of a population health approach in sexual health programs and services in Ontario public health units. No relevant instruments were found to measure the extent of implementation of activities associated with a population health approach in public health. To address this limitation, this study developed the first validated instrument to measure the extent of implementation of activities associated with a population health approach for use in a public health unit context. Finally, this study contributed to the rigor of this research and added to our understanding of how the use of a multi-phase mixed-methods research approach can provide a more comprehensive understanding of barriers and facilitators that influenced the implementation of population health activities. As such, the results from this multi-phase mixed methods study are relevant and meaningful for public health agencies that are implementing or are considering the implementation of a population health approach within sexual health programs and services, as well as relevant to researchers interested in this field.

Key Contributions from Each Chapter

This thesis was underpinned by the need to better understand a fundamental problem which was to see if health units had implemented a population health approach outlined for sexual health in the OPHS (MOHLTC, 2018), determine the extent of

implementation, and what enabled and impeded implementation. Given the novelty of this work, there was no known established tool to measure the implementation of population health activities in sexual health or, in any public health program. Therefore, the first step was to develop a validated tool (Chapter 3) that could measure the extent of implementation by health units in sexual health. A 69 item survey was developed using the eight key elements of the Population Health Key Elements Template (Health Canada, 2001). Items were based on a review of the literature and two focus groups with six diverse public health professionals that contribute to sexual health programming. For this new tool, its validity was tested and then administered to all 34 health units in Ontario. This measure provides an important starting point for examining the use of a population health approach in public health. This tool can be built upon in the future to assess how public health and other organizations implement population-level activities in sexual health, as well as assess changes over time. The strategy used to develop and test this questionnaire can also be helpful to others interested in measuring the population health approaches used in other health programs.

The tool was developed and administered to measure the extent that population health activities had been implemented. The findings revealed that certain population health elements and activities within those elements had higher implementation among health units than others. Based on this finding, it was recognized that additional data was required to better understand why certain key elements and activities were implemented to a higher or lesser extent. For example, results showed that the population health element *addressing determinants of health* was highly implemented by health units,

while c*ollaborate across sectors and levels* had limited implementation. As well, specific activities under some elements had a higher degree of implementation (e.g., *use of evidence/guidelines to inform practice*) than others (e.g., *being involved in primary research*). The reasons for these findings were not clear. Some literature suggested that funding, staffing levels, and organizational commitment can influence the ability of agencies like public health to collaborate with community organizations and that concepts like determinants of health are better understood and applied in public health compared to concepts like social justice (Brassolotto, Raphael, & Baldeo, 2013; Cohen et al., 2013; Estacio, Oliver, Downing, Kurth, & Protheroe, 2017; Littelcott, Fox, Stathi, & Thomson, 2017; Williamson, 2014). However, the literature on implementation of a population health approach focused on public health in general, rather than on specific programs such as sexual health. Given this, the logical next step was to conduct a qualitative study to better understand the barriers and facilitators that influenced implementation involving providers who were knowledgeable and experienced in sexual health programs and services.

For the qualitative study, a total of 12 managers/supervisors from 10 different health units participated in the semi-structured interviews that were guided by the CFIR domains (Damschroder et al., 2009). The majority of factors that influenced implementation were found to fall under the inner and outer settings in the CFIR domains. This means that the culture and leadership within public health units appear to play a large role in the extent that population health activities are implemented. Common challenges identified within health units were the value that staff placed on individual

clinic work, and in some cases how the broader health unit saw the role of sexual health to be clinically focused. This was confirmed by previous research (Cohen, 2006; Mabhala, 2015). Traditionally, the focus of sexual health has been on providing sexual health clinic services to the communities that they serve. With this longstanding history of engaging in individually-focused sexual health services, the shift to applying a population health approach was challenged with their need to achieve a balance between population health and individual care without major changes in staffing and the programs being offered. Furthermore, participants indicated that offering sessions on population health and engaging staff in the planning process facilitated buy-in and assisted with moving them towards a population health approach. This implies the need for more staff training in population health approaches followed by more engagement in planning processes.

As well, external government decisions influenced the capacity of public health to carry out a population health approach as changes to the OPHS negatively affected available resources to provide individually-focused sexual health services. The OPHS no longer indicated that public health was required to provide sexual health services, which lessened the emphasis on sexual health within health units. This also affected financial and human resources available to sexual health programming and influenced how likely it was that sexual health could implement a population health approach. Changes in how sexual health was seen within health units in light of the shift to population-based approaches ultimately determined what activities were considered important. Finally, the influence of the new standard also impacted having available staff and time to engage in

population health. Others have also noted that adequate resources are needed to implement a population health approach (Brownson, Allen, Duggan, Stamatakis, & Erwin, 2012; Guyon & Perreault, 2016). Limited resources led to the need to prioritize activities by senior leaders within the health unit and in sexual health. This meant that competing resources within health units for a population health approach limited staff available to focus on implementing broader population health since there were other mandated services including STBBI case management and clinic services. This meant that the standards that guide sexual health programming could not be fully implemented by health units. The leverage that working with external partners has in moving sexual health work forward, faster within the community was dampened by the inability to have the time and staff required to foster these relationships.

Following the qualitative study, it was essential to further understand how these qualitative findings explained the quantitative results by merging the findings. The integration of the quantitative and qualitative findings was done visually using a joint display. The joint display presented quantitative and qualitative data side by side to offer clarity about how the extent that health units implemented population health activities was reflected in the answers provided through sexual health managers'/supervisors' interviews. This process determined whether or not the qualitative data confirmed the scores obtained through the survey. Through the use of joint display analysis, we learned why certain key elements/activities were implemented: 1) to a low extent; 2) to a high level of implementation, or 3) had variation in implementation. Qualitative findings identify factors that influenced the extent of implementation which explain some of the

survey results. For example, activities under the elements a*ddress determinants of health and their interactions* and *collaborating with external partners* were not highly implemented by health units but qualitative interviews explained that differing priorities amongst health units and community agencies, and a lack of resources were factors that influenced these findings. Overall, this analysis approach resulted in a more comprehensive understanding by closely examining the integrated data.

The use of two frameworks, *Population Health Template* and *CFIR,* was beneficial for the individual studies but when integrating the results, the qualitative interview questions which were framed around the CFIR domains did not directly address specific activities examined in the quantitative phase that were organized under the Population Health Framework.

This study offers an example of how a joint display can effectively be used to help researchers gain a more comprehensive understanding of the data and provide more balanced and complete results. The "mixing' of the findings provided a valuable insight into the reasons why elements and activities were implemented to the extent they were or pointed to a gap in our understanding when there was no qualitative data to support quantitative findings. This offers an opportunity to further explore the reason for this in future research.

Discussion and Implications

From the findings of this thesis, several implications are presented for public health practice, education, policy, and future research.

Implications for Public Health Practice

In Chapter Three, the population health activity - building partnerships with community organizations, the public, and other government organizations (e.g., MOHLTC) - was not highly implemented by health units. Chapter Four provided further understanding of why this activity had lower implementation compared to other activities. Health units identified that they saw the advantage of engagement with community partners to move work forward but barriers such as busy schedules and differing priorities made it challenging to maintain partnerships. However, connecting with other sexual health programs was viewed as a necessary partnership and a way to stay up-to-date and utilize the expertise from other health units, especially during a time when health units have limited resources.

Others have found that with little time available for health units to foster and maintain partnerships and differing priorities between health units and community organizations, the ability to take advantage of joint projects or combined services to enhance the reach and scope that public health can have to improve outcomes for the public are dampened (Adetunji, 2013). When looking at tackling the range and depth of activities required to implement a population health approach, these partnering relationships are critical to enable public health units to move work forward, allow for a more cohesive community approach for addressing local needs jointly, and preventing duplication of services (Adetunji). The literature supported the findings by indicating that one of the main challenges of partnerships is bringing organizations from different sectors together for the common pursuit of public health (Adetunji; Varda, Shoup, &

Miller, 2012). Research also indicated that in public health the development of inter-organizational partnerships is a way to attain resources, share knowledge, and improve population health outcomes (Varda, Shoup, & Miller, 2012). Given the results of this study and others, it is evident that health units need to make collaboration a priority. These missed opportunities influence the reach that public health can have, which influences what can ultimately be achieved from a programming perspective.

Collaboration and *building community partnerships* are key ways to conduct research activities and obtain data to ensure its applicability to sexual health. Creating opportunities for discussions among researchers, practitioners, and community-based organizations is essential to bridging research and practice (Pinot, 2009). One way for public health to do this is to build stronger relationships with academia to develop the much-needed evidence base on effective public health practice (Ruggiero et al., 2020).

Surprisingly, the introduction of the Ontario Health Teams as a potential partner was not identified by participants to be a factor influencing the implementation of a population health approach. Ontario Health Teams were recently created to offer a coordinated approach to primary care, but it is unclear if and how public health will be integrated into this system (Ontario Ministry of Health and Long-term Care, 2019). These larger teams may influence the future implementation of population health activities in sexual health programs and services, to support a more integrated approach to serving the population. This presents an opportunity to develop partnerships with primary care that can have a huge impact on the ability of sexual health programs and

services to improve population health. These partnerships can extend the reach to the population and provide coordinated services that can prevent duplication.

This study showed that the element *addressing determinants of health* was highly implemented by health units, but certain activities within this element, like applying a social justice lens, were not. This activity may be too abstract and as a result, poses difficulties when trying to implement. As others have found, social justice principles are seldom accompanied by an explanation of activities for implementation, making it challenging for health units to apply (Buyx, Killar, & Laukötter, 2016). Future research is needed to explore how nurses can apply a population health approach in sexual health programs and services (Mabhala, 2015). This research will ensure that public health professionals can champion social justice principles and provide purposeful communication with decision-makers to educate them on effective interventions to address population health, assisting with achieving health equity (Kryzanowski et al., 2019).

Implications for Education

In Chapter Four, under the CFIR domain of *Implementation Climate,* it was clear from the interviews that there was a need to increase the capacity of sexual health staff to take on work related to population health. Sexual health staff valued clinic work more than population health activities. This finding indicates a potential need to equip PHNs and leaders with the skills and knowledge to address a population health approach. The implications for this finding include 1) professional development for current PHNs, and 2) undergraduate nursing or pre-service education.

PHNs were reported to be more comfortable with the individual-focused nature of sexual health program delivery compared with population-level approaches. The literature supports offering education and awareness about the principles of population health, which can help move sexual health nurses and leaders forward, providing them with the knowledge required to feel competent in understanding the components of a population health approach (Guyon & Perreault, 2016; Mabhala, 2015). This is essential to moving sexual health away from individual clinic services to more upstream thinking. Following this, an assessment of staff and leaders' knowledge and skills to identify gaps related to implementing a population health approach is required. This information can assist with professional development opportunities. Topics such as community development, critical appraisal of research, and policy development might be indicated to address knowledge gaps among sexual health staff and leaders (Mabhala). Providing educational opportunities for sexual health leaders may position them better to champion a population health approach and assist with moving away from the traditional focus on individual services. This will also require leaders to be trained in change management. Moving staff towards a population health approach will require strong leadership skills and a clear understanding of how to implement the necessary components of a population health approach to make this happen.

Laying the foundation for future PHNs in community health courses in undergraduate nursing programs would also assist with ensuring that future public health professionals can operationalize the components of a population health approach to bring about system-level changes (Erwin & Brownson, 2017; Ruggiero et al., 2020). Providing

public health professionals with knowledge of population health through continuing education courses can be achieved by establishing collaboration between public health and academia. These courses may keep public health professionals up-to-date on current concepts that may afford them the ability to enhance decision-makers (e.g., provincial government and policy-makers) understanding of population health, as it relates to improving health outcomes for communities (Erwin & Brownson, 2017; Ruggiero et al., 2020).

Implications for Policy

Results in Chapter Three showed that *engaging in public policy* was not highly implemented by health units. Key informant interview results reported in Chapter Four emphasized that the language in the OPHS policy that related to sexual health placed less emphasis on public health delivering sexual health services but rather ensuring the services would be available in the community. This change left public health staff working in sexual health feeling that their work was becoming less visible and appreciated. Also, the proposed amalgamation of 34 Ontario public health units to 10 (Ministry of Health, 2019) put planning on hold and created concern about resources available for sexual health programming and the priority of sexual health services within public health. These policies imply that the allocation of resources by the government to public health shapes the capacity of sexual health to implement a population health approach. Dwindling resources over time make it extremely challenging for programs like sexual health to implement the necessary activities to reach beyond the individual level. All levels of government need to recognize the importance of addressing a

population health approach for improved health outcomes (Mishra et al., 2020) and provide the necessary resources for its implementation. The rise in STBBIs demonstrates the need to make improvements in the way that sexual health is tackled by public health. As shown by the results in this thesis, interventions in sexual health are primarily targeted at the individual level to address STBBI rates. This targeted approach has the perceived benefit of directing resources to those who are high risk, however, interventions that focus more on structural contexts (e.g., collaboration, determinants of health) shows promise for improving population health more equitably (Aral et al., 2013; Dutton, 2020; Prescott et al., 2020). This is particularly important for policymakers to consider when looking at trying to affect change on a larger scale (Dutton). The activities identified in this thesis that are required for a population health approach provide a guide for policy-makers to determine the effectiveness of public health interventions.

Implications for Research

There was an identified gap in tools to measure the implementation of a population health approach. The tool developed and validated in this thesis provides a starting point to evaluate a population health approach but needs to be tested further for reliability. Reliability was not able to be determined due to the small sample size. Future research should be conducted to survey public health managers and /or supervisors across Canada to test the reliability of the tool. This revised tool could be administered to public health units in Ontario at another point in time to determine if there are any changes to the extent that a population health approach has been implemented in sexual health. Furthermore, given the variability of public health structures across Canada, additional

research to examine the validity of the tool with a pan-Canadian public health audience would also be valuable. Once reliability and further validity of the tool are determined with this larger sample, the tool could be administered to public health managers across Canada to compare and contrast the differences in the implementation of population health activities by province.

Future research should focus on the experiences of front-line staff who administer the programs and services in sexual health, to provide a fuller understanding of the barriers and facilitators to implementing a population health approach. Conducting research with this target group will assist public health in ensuring that they understand all of the factors that affect implementing a population health approach. As well, it is critical to elicit the viewpoint of senior administrators within public health units, as the knowledge and philosophical approach of these individuals were found to influence what key elements and activities were implemented by health units.

Public health nurses that work in sexual health have unique challenges in comparison to other programs in public health, as they need to balance providing clinic services and population health. Further exploration into the knowledge and skills of sexual health nurses and leaders in population health would be beneficial to understand their educational needs and work with academia to develop courses to assist with filling this knowledge gap.

Finally, with the implementation of Ontario Health Teams, which include primary care providers and hospitals, research is needed to explore what components of sexual health can be offloaded to these other health sectors and what needs to be retained by

public health. How Ontario Health Teams and public health can work together to avoid duplication of services requires further research.

Strengths and Limitations

The main strength of the MM analysis was that it offered a more in-depth understanding of the extent that population-level activities were implemented in sexual health programs and services. As well, it offered a new tool that measured implementation of population health activities that can be built upon in the future to create a validated instrument. Despite these strengths, there were a few limitations in this thesis. Determining the reliability of the tool developed was a limitation due to small sample size, Another limitation of this thesis was that it was conducted at one point in time, limiting our understanding of how contextual changes, such as the COVID-19 pandemic, might have influenced the results. In addition, this thesis only captured the voice of nurse managers/supervisors. PHNs on the front-line and senior-level decision-makers were not interviewed. Finally, the use of two frameworks was beneficial for the individual studies but when integrating the results, the qualitative interview questions which were framed around the CFIR domains did not relate to specific activities in the quantitative phase which were organized under the Population Health Framework.

Conclusion

This thesis summarizes the findings of a mixed-methods study that contributes to the field of public health through the exploration of Ontario public health unit managers' and supervisors' experiences in implementing activities associated with a population health approach within sexual health programs and services. A validated new tool to

measure the extent that a population health approach was implemented in sexual health programs in public health units was developed. The collective manuscripts represent a beginning understanding of how factors such as a lack of resources, external policy, community partnerships, and access to data influence implementing a population approach for sexual health. This understanding fills a research gap from the public health literature, specifically around sexual health. Results contribute to the evolving knowledge of population health and public health, practice, education, policy, and research in sexual health programming. Findings reinforce the need for investment in public health to affect change at the population level. Recommendations put forward can support future implementation of, and research in, a population health approach within public health.

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