

A QUALITATIVE EXPLORATION OF SEXUALLY TRANSMITTED
AND BLOOD BORNE INFECTIONS (STBBIS) IN A CANADIAN
PROVINCE: THE UTILITY OF THE SOCIAL ECOLOGICAL MODEL
IN UNDERSTANDING AND REDUCING THE SPREAD OF STBBIS IN
NOVA SCOTIA

by

Tamer Wahba

Submitted in partial fulfilment of the requirements
for the degree of Master of Science

at

Dalhousie University
Halifax, Nova Scotia
November 2019

© Copyright by Tamer Wahba, 2019

DEDICATION

This work is dedicated to the soul of my father, Dr. Mohamed Wahba, for his kindness, care, and love, and for his endless support throughout his life and even after he passed away. His selflessness and generosity will always be remembered, and he will not be ever forgotten.

TABLE OF CONTENTS

DEDICATION	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	vii
LIST OF FIGURES	viii
ABSTRACT.....	ix
LIST OF ABBREVIATIONS USED.....	x
ACKNOWLEDGEMENTS	xi
CHAPTER 1: INTRODUCTION.....	1
1.1. Background	1
1.2. Objectives	5
1.3. Researcher’s Positionality	5
CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK	7
2.1. Literature Review	7
2.1.1. Rates of Selected STBBIs in Nova Scotia in 2016.....	7
2.1.2. Risk Factors for Acquiring STBBIs	11
2.1.3. Magnitude of the Problem.....	12
2.1.4. Testing for STBBIs	14
2.1.4.a. Facilitators to Testing for STBBIs.....	15
2.1.4.b. Barriers to Testing for STBBIs.....	15
2.1.4.c Testing for STBBIs in Nova Scotia	16
2.1.5. Nova Scotia’s Response to STBBIs.....	17
2.1.5.a. Public Health Role	17
2.1.5.b. Disease Surveillance.....	18
2.1.6. Pan-Canadian STBBI Framework for Action.....	18
2.1.7. Global Target for the Elimination of HIV: UNAIDS 90-90-90.....	19
2.1.8. Point Of Care Testing.....	20

2.1.9. STBBIs and Stigma.....	22
2.2. The Social Ecological Model	23
2.2.1. The SEM for Health Promotion	25
2.2.2. Examples of Using the SEM in Health Promotion	28
2.3. Benefits of the Study	28
Chapter 3: METHODS.....	30
3.1. Research Design	30
3.2. Sampling	30
3.3. Recruitment of Participants.....	31
3.4. Participants' Privacy and Confidentiality	32
3.5. Data Collection	33
3.6. Data Analysis.....	37
CHAPTER 4: RESULTS	42
4.1. Theme One: Contributors to STBBI Rates	43
4.1.1. Individual Contributing Factors.....	44
4.1.1.1. Demographics.....	45
4.1.1.2. Individual Behaviours	45
4.1.1.3. Individual Attitudes	47
4.1.1.4. Individual Beliefs	48
4.1.1.5. Limited Awareness and Knowledge	49
4.1.1.6. Relocation	49
4.1.2. Interpersonal Contributing Factors	50
4.1.3. Community Contributing Factors	52
4.1.4. Organizational Contributing Factors.....	53
4.1.5. Policy Contributing Factors	55
4.2. Theme Two: Current Preventative Actions.....	56
4.2.1. Federal Actions.....	57

4.2.2. Provincial Actions	58
4.2.2.1. Community Actions	59
4.2.2.2. Organizational Actions	60
4.2.2.3. Policy Actions	62
4.3. Theme Three: Strategies and Actions	64
4.3.1. Individual Level	65
4.3.2. Interpersonal Level.....	66
4.3.3. Community Level.....	68
4.3.4. Organizational Level	69
4.3.5. Policy Level.....	71
4.4. Theme Four: Perspectives on Testing	75
4.4.1. Effects of Increased Access to Testing.....	75
4.4.2. Knowing the Denominator	77
4.4.3. Insights into HIV POCT	77
4.4.3.1. Benefits.....	77
4.4.3.2. Drawbacks	78
4.4.3.3. Provisions.....	79
4.4.3.4. Lack of Availability of HIV POCT in Nova Scotia	80
CHAPTER 5: DISCUSSION	82
5.1. Theme 1: Contributors to STBBI Rates	82
5.1.1. Individual Contributing Factors.....	82
5.1.2. Interpersonal Contributing Factors	87
5.1.3. Community Contributing Factors	89
5.1.4. Organizational Contributing Factors.....	91
5.1.5. Policy Contributing Factors	93
5.2. Theme Two and Theme Three: Current Preventative Actions; Strategies and Actions	94

5.2.1. Individual Actions	94
5.2.2. Interpersonal Actions	96
5.2.3. Community Actions	98
5.2.4. Organizational Actions	99
5.2.5. Policy Actions	101
5.3. Theme Four: Perspectives on Testing	104
5.4. Strengths and Limitations	106
5.5. Future Research Directions	107
CHAPTER 6: CONCLUSION, RECOMMENDATIONS, AND KNOWLEDGE	
TRANSLATION	109
6.1. Conclusion	109
6.2. Recommendations	111
6.3. Knowledge Translation	113
REFERENCES	115
APPENDIX	132

LIST OF TABLES

Table 1: Interview guide.....	35
Table 2: Themes and subthemes of the interviews.....	43

LIST OF FIGURES

Figure 1: Distribution of notifiable diseases reported in Nova Scotia by disease category, 2016	7
Figure 2: Chlamydia crude rates per 100, 000 population from 2007 – 2016	8
Figure 3: Infectious syphilis and gonorrhoea crude rates per 100, 000 population from 2007 – 2016	9
Figure 4: Hepatitis C crude rates per 100, 000 population from 2007 – 2016.....	10
Figure 5: HIV crude rates per 100,000 population from 2007 – 2016.....	10
Figure 6: Locations of sexual health centres in Nova Scotia	17
Figure 7: Bronfenbrenner’s influential levels on a developing human	25
Figure 8: A variation on the SEM for health promotion.....	27
Figure 9: Main objective of interview guide questions	35
Figure 10: Deductive thematic analysis of questions 2, 3, 4, 5, and 7.....	40
Figure 11: Inductive thematic analysis of questions 1, 6, 8, 9, 10, and 11.....	41
Figure 12: Contributors to high rates of STBBIs in Nova Scotia	44
Figure 13: Current provincial preventative actions in NS	58
Figure 14: Strategies and actions needed as seen by study participants.....	65

ABSTRACT

Rates of sexually transmitted and blood borne infections (STBBIs) have been on the rise over the last two decades in Canada. The goal of this study was to better understand the local factors contributing to the spread of STBBIs in Nova Scotia to develop potential strategies for prevention in this province. This goal was achieved through semi-structured interviews with senior Nova Scotia public health officials. The Social Ecological Model was used to help frame the thematic analysis of the data. Key themes that emerged from the data included contributors to STBBI rates, current preventative actions, strategies and actions, and perspectives on testing. The results suggested that more education on STBBIs, reduction of stigma, more conversations on sexuality, enhancement of the current surveillance system, utilization of the Pan-Canadian STBBI Framework for Action, and use of Point Of Care Testing, are important strategies to prevent the spread of STBBIs.

LIST OF ABBREVIATIONS USED

ART: Antiretroviral Therapy
CATIE: Canadian AIDS Treatment Information Exchange
CIHI: Canadian Institute for Health Information
CPHA: Canadian Public Health Association
DHW: Department of Health and Wellness
HBV: Hepatitis B Virus
HCV: Hepatitis C Virus
HCV POCT: Hepatitis C Point Of Care Testing
HIV: Human Immunodeficiency Virus
HPV: Human Papilloma Virus.
MOSH: Mobile Outreach Street Health.
MSM: Men who have sex with men
NGOs: Non-governmental organizations.
NSHA: Nova Scotia Health Authority
PHAC: Public Health Agency of Canada
POCT: Point of Care Testing
PrEP: Pre-Exposure Prophylaxis.
STBBIs: Sexually Transmitted and Blood Borne Infections
STI: Sexually Transmitted Infection
UNAIDS: Joint United Nations Programme on HIV/Acquired Immune Deficiency Syndrome
UNICEF: United Nations International Children's Emergency Fund
WHO: World Health Organization

ACKNOWLEDGEMENTS

First and foremost, I would like to thank **God Almighty** for giving me the strength, knowledge, and opportunity to undertake this research study and to complete it. Without his support and blessings, this achievement would not have been possible.

I would like to express my most sincere gratitude and grateful appreciation to **Dr. Jacqueline Gahagan**, Professor of Health Promotion and the Director of the Gender and Health Promotion Studies Unit at the School of Health and Human Performance, Dalhousie University and **Dr. Robin Urquhart**, Assistant Professor, Department of Surgery at Dalhousie University and cross-appointed with the Department of Community Health and Epidemiology, Dalhousie University. I was fortunate to conduct this work under their valuable supervision. Their sincere support, guidance, continuous encouragement, and constructive comments will always be remembered.

I am greatly indebted to **Dr. Todd Hachette**, Professor, Department of Pathology and Laboratory Medicine, Chief, Division of Microbiology, Capital District Health Authority, for his great cooperation, valuable recommendations, and kind help and support.

Many thanks are also extended to **Dr. Audrey Steenbeek**, Professor, School of Nursing, Department of Community Health and Epidemiology, for the time she devoted and for her precious help, guidance, and support.

I would like to thank **Ms. Sarah Fleming**, Senior Epidemiologist, First Nations and Inuit Health Branch, Indigenous Services Canada, Government of Canada, for her sincere help and valuable effort in this work.

I would also like to thank **Ms. Margaret Jorgensen**, Dr. Robin's research coordinator, for her appreciated effort in this study.

The person with the greatest indirect contribution to this work is my mother, **Mrs. Nawal Shoukry Saad**, who has taught me the beauty of helping people and caring about others. All attempts are not enough to thank her for her constant care, prayers, support, and encouragement.

Special thanks are due to my wife, **Mrs. Noha Elshamy**, for her love, prayers, care, and most importantly, her great sacrifices. Without her understanding, patience, and continuing support, I would not accomplish this work. Many thanks for being in my life, Noha!

A very special thanks to my precious sons, **Karim and Omar**, for their continuing support, and for encouraging me to have a better future for them.

I would like to thank my brother, **Dr. Khaled Wahba**, and my sister, **Mrs. Hanan Wahba**, for supporting me spiritually throughout writing this thesis and my life in general.

Last but not least, I wish to express my deepest gratitude to **all my study participants**. Without their willing cooperation, this work would not have been possible.

CHAPTER 1: INTRODUCTION

1.1. Background

Sexually transmitted and blood borne infections (STBBIs) have been on the rise since the late 1990s. A recent World Health Organization (WHO) (WHO, 2016a) report indicated that approximately 357 million new infections of chlamydia, gonorrhoea, syphilis, and/or trichomoniasis are acquired globally each year. There are multiple ways to acquire an STBBI with some pathogens such as chlamydia, gonorrhoea, and syphilis being transmitted sexually, while others are transmitted both sexually and through exposure to infected blood, such as Human Immunodeficiency Virus (HIV) (Thomas, Bassi, Continoho, & Goyal, 2017). The Hepatitis C Virus (HCV), is most commonly transmitted by blood, but can be also transmitted sexually (Terrault, 2002) especially among high risk populations such as HIV-infected men who have sex with men (MSM) (Tohme & Holmberg, 2010).

The Public Health Agency of Canada (PHAC) states that rates of STBBIs reported to the Canadian Notifiable Disease Surveillance System have increased since 1997 (Public Health Agency of Canada [PHAC], 2012a). Moreover, PHAC (2012b) asserted that the percentage of people living with HIV increased by 11.4% from 2008 to 2011. In 2013, the Canadian national rate of the HCV was 29.6 per 100,000 population (Government of Canada, 2016). Canadian national rates of chlamydia, gonorrhoea, and infectious syphilis increased between 2001 and 2010 as follows: 161.4 to 277.6, 21.8 to 33.4, and 0.9 to 5.2 per 100,000 population, respectively (Government of Canada, 2010).

In Nova Scotia, the main STBBIs that are of public health significance include: chlamydia, gonorrhea, hepatitis B, hepatitis C, HIV, and infectious syphilis (Nova Scotia Department of Health and Wellness [DHW], 2017). Specifically, rates of chlamydia (the most common notifiable infection), gonorrhea, hepatitis C, and HIV continue to increase despite efforts to reduce them (Nova Scotia DHW, 2017). Although the rate of infectious syphilis has decreased since 2013, it still represents a significant public health issue for Nova Scotia as the reported rate in 2016 was higher than the level reported prior to a large syphilis outbreak that took place in Nova Scotia from 2008 to 2013 (Nova Scotia DHW, 2017).

The consequences of STBBIs are numerous and can drastically impact the health of individuals, families, and communities. *Treponema Pallidum*, the bacterium that causes syphilis, can be transmitted trans-placentally and cause congenital infection (Kamb et al., 2010). This infection can produce severe anomalies and death during the perinatal period (Kamb et al., 2010). There is also the potential for congenital transmission of HIV from an infected mother who is either unaware of her HIV infection, untreated, or acquired the virus after receiving a negative prenatal screening result (Lang et al., 2018).

There are various drug combinations approved by Health Canada to treat HCV and HIV (Canadian AIDS Treatment Information Exchange [CATIE], 2017a; Saag et al., 2018). However, HCV and HIV infections have several long-term consequences if left untreated. For instance, Deeks, Lewin, & Havlir (2013) declared that multimorbidity associated with HIV disease has a significant impact on patients' health as they get older. Nagaoki et al. (2016) asserted that hepatocellular carcinoma may occur among hepatitis

C patients, especially among the older age male population, even when the infection is adequately controlled. In addition, Myers et al. (2014) affirmed the rising trend of advanced liver diseases among chronic HCV patients in Canada.

Treatment of STBBIs and their associated health outcomes has led to a significant health expenditure for the Canadian government. For example, the lifetime cost of treating a patient with HCV in 2013 was estimated to be CAN \$64,694 (Myers et al., 2014). In addition to the physical and financial burdens of these infections, patients may suffer psychological conditions such as depression and anxiety. Moreover, social stigma experienced by patients can exacerbate patients' emotional distress and increase depression (Stahlman et al., 2015).

One of the most effective methods in reducing rising rates of STBBIs is preventing their spread through early diagnosis and early treatment of new cases. Therefore, targeted prevention efforts could be achieved by increasing access to testing (Gahagan, Condran, Sharma, & Hatchette, 2015). However, many Nova Scotians may not have access to preventive healthcare services because they do not have family physicians or because medical services are not available in their geographic areas. Notably, around 60% of the Nova Scotia population is rural. Lack of timely access to healthcare services, paired with the fact that many cases are asymptomatic especially in their initial stages, can result in the continuing spread of these infections among other factors. As a solution to this problem, other Canadian provinces including Alberta, British Columbia, Manitoba, Ontario, and Quebec are using the Point of Care Testing (POCT) method to test and initially diagnose certain infections such as HIV (Minichiello et al., 2017). Recently, Health Canada has approved HCV POCT for use in Canada

(CATIE, 2017). However, there is currently a very limited access, and not available other than through some pilot studies, in the Atlantic provinces to these POCT technologies (Gahagan, Condran, & Hajizadeh, 2015; Gahagan, Condran, Sharma, & Hatchette, 2015).

To better understand and ultimately help prevent the spread of STBBIs, a conceptual framework could be used as a guide to organize contributing factors and needed actions. The Social Ecological Model (SEM) is a conceptual framework that is used by many health researchers and health agencies to understand and control health-related conditions (United Nations International Children's Emergency Fund [UNICEF], 2009). DiClemente, Salazar, Crosby, and Rosenthal (2005) used the SEM to improve their prevention and control efforts among adolescents with sexually transmitted infections (STIs) in the United States. Similarly, the Centers of Disease Control and Prevention in the United States use this model in their efforts to prevent diseases such as colorectal cancer (CDC, 2015) and conditions such as violence (CDC, 2018a).

Public health has been defined as *"the science and art of preventing disease, prolonging life and promoting human health through organized efforts and informed choices of society, organizations, public and private, communities and individuals"* (Amory, W. C. E., 1920). Given that STBBI rates are continuing to increase, further prevention efforts must be taken. Public health officials are important stakeholders in combating STBBIs in Nova Scotia. They work continuously with health policymakers to support and promote good health for all Nova Scotians to protect them from various health problems. Therefore, interviewing local public health officials is beneficial in informing preventive interventions and programs in the province. To my knowledge, no

other researcher interviewed them to obtain their perspectives on causes of rising rates of STBBIs in the province and methods of prevention using the SEM.

1.2. Objectives

The goal of this research was to create evidence-informed recommendations on how to prevent the spread of STBBIs through increased access to, and uptake of STBBI testing in an effort to reach the undiagnosed population. The objectives were:

1. To undertake in-depth interviews with a purposive sample of senior Nova Scotian public health officials to explore: (a) reasons for rising STBBI rates in Nova Scotia, and (b) strategies to improve both prevention of STBBIs and access to testing for STBBIs in the province.

2. To use the collected data to frame evidence-based recommendations in relation to the scaling-up of STBBI testing programs and interventions in Nova Scotia.

1.3. Researcher's Positionality

My personal and professional characteristics played a role in selecting this topic to be my master's thesis research. I am a middle aged, male physician who immigrated to Canada from the Middle East. I hold a bachelor's degree in Medicine as well as a master's degree in Paediatrics from Egypt. I have a special interest in infectious diseases, as is reflected by the extra training I undertook in infectious diseases at Cairo University Hospitals (Cairo, Egypt) and Alberta Children's Hospital (Calgary, AB). During my professional life as a physician, I came to recognize the importance of having both public health and clinical medicine support each other to safeguard the overall health of the population. After I moved to Canada, I realized the challenges facing international

medical graduates wishing to practice in their professions in Canada. Therefore, I chose public health to be my field. After I completed my bachelor's degree in Health Sciences (Public Health) at Cape Breton University in Sydney, Nova Scotia, I started my graduate studies in the Department of Community Health and Epidemiology at Dalhousie University. While in Halifax, I also became a member of the Chebucto West Community Health Board.

Being a Paediatrician with special training in infectious diseases, I had the opportunity to examine and treat many patients suffering from various health problems including STBBIs such as hepatitis B, and hepatitis C. I was able to treat them, but I was not able to reduce the emotional, psychological, and social impacts of their infections. Also, I could not help babies born to HIV infected mothers beyond prescribing ART.

I am confident that many infections can be prevented whether by vaccines, education, or changing behaviours and habits. However, this requires concerted efforts from the whole community and decisions from local policy makers. Therefore, I decided to focus on the topic of STBBI prevention in my graduate studies aiming to protect many people and save many lives.

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

In this chapter, I present the findings from the literature review and describe the conceptual model that I used in this study.

2.1. Literature Review

2.1.1. Rates of Selected STBBIs in Nova Scotia in 2016

STBBIs represent a significant public health concern for Nova Scotia. According to the 2016 annual report of notifiable diseases issued by the Department of Health and Wellness (DHW), 50.7% of notifiable diseases were STIs and 5.4% were blood-borne (Nova Scotia DHW, 2017) (figure 1).

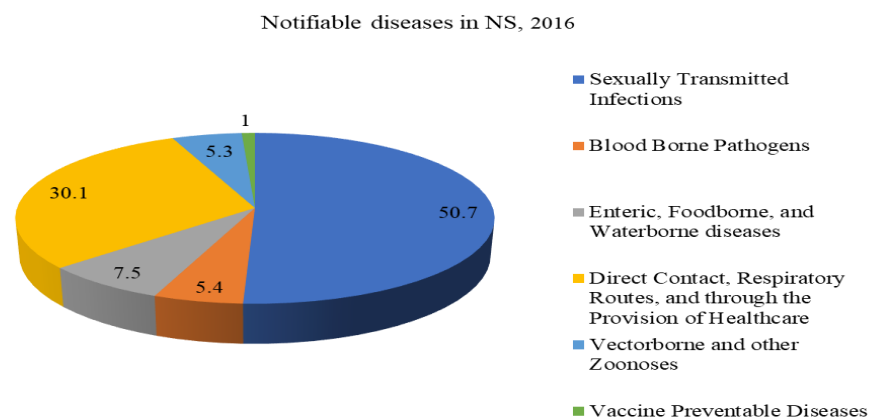


Figure 1: Distribution of notifiable diseases reported in Nova Scotia by disease category, 2016

Data retrieved from <https://novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf>

Among STIs, chlamydia was reported to have the highest rate (308.7 per 100,000 population) with a predominance among the young female group. This represents a

continuation of the increasing trend reported since 2007 (Nova Scotia DHW, 2017) (figure 2).

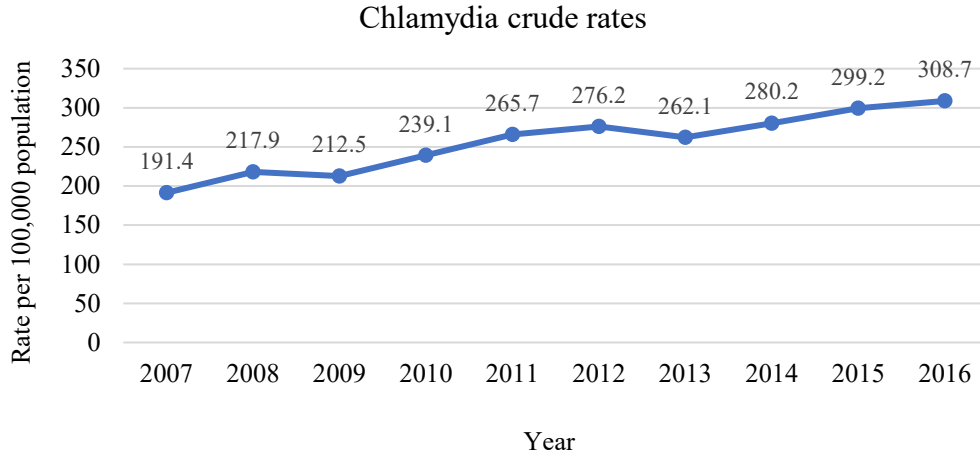


Figure 2: Chlamydia crude rates per 100, 000 population from 2007 – 2016

Data retrieved from: [//novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf](http://novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf)

Rates of gonorrhoea infection also continue to rise. In 2016, the rate of gonorrhoea was 21.3 per 100,000 population, an increase from 13.7 per 100,000 population in 2015 (Nova Scotia DHW, 2017) (figure 3). In contrast to chlamydia infection, males between the ages of 15 – 24 years were the predominant group for gonorrhoea infection (Nova Scotia DHW, 2017). After the infectious syphilis outbreak happened in the province between 2009 to 2013, its rate dropped in 2016 to 1.9 per 100,000 population; a consecutive decrease in the reported rates since 2013. Infectious syphilis was found predominantly among males between the ages of 15 – 39 years (Nova Scotia DHW, 2017) (figure 3). (Nova Scotia DHW, 2017) (figure 3).

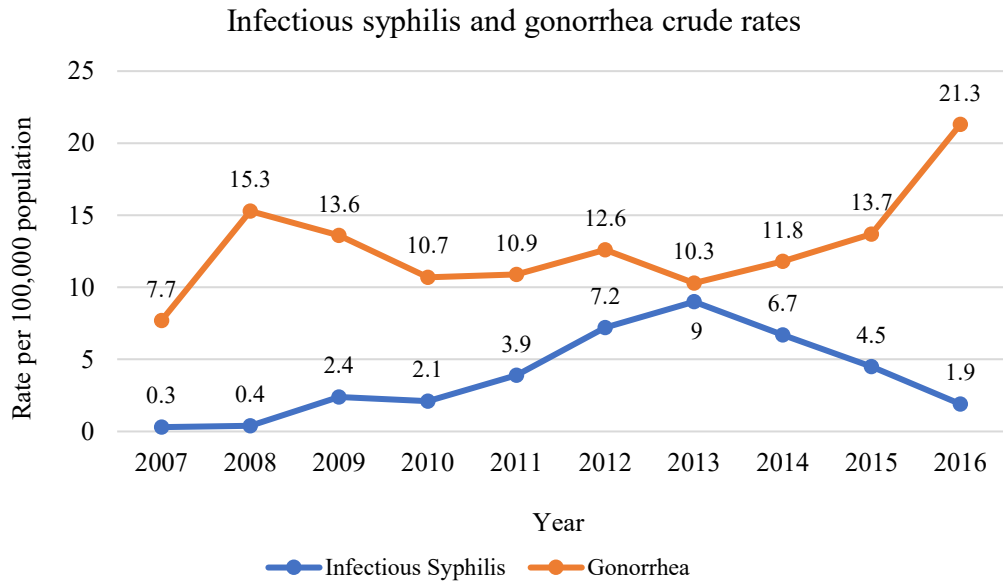


Figure 3: Infectious syphilis and gonorrhea crude rates per 100, 000 population from 2007 – 2016

Data retrieved from: [//novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf](http://novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf)

The rate of HCV infection was 31.5 per 100,000 population in 2016, a decrease from previously reported rates in 2014 and 2015 (Nova Scotia DHW, 2017) (figure 4). The Eastern Health Zone in Nova Scotia reported the highest incidence rate of HCV infection in 2016, as compared to other health zones (Nova Scotia DHW, 2017). The rate was highest among males aged 25 – 39 years (Nova Scotia DHW, 2017). Nova Scotia reported a higher rate of HCV infection in 2015 (36.2 per 100,000 population) than the national rate (30.4 per 100,000 population) (Nova Scotia DHW, 2017). The acute hepatitis B rate in 2016 increased to 1.1 per 100,000 population in comparison to 2015 rate of 1 per 100,000 population (Nova Scotia DHW, 2017). Most hepatitis B cases were males 25 years and older (Nova Scotia DHW, 2017).

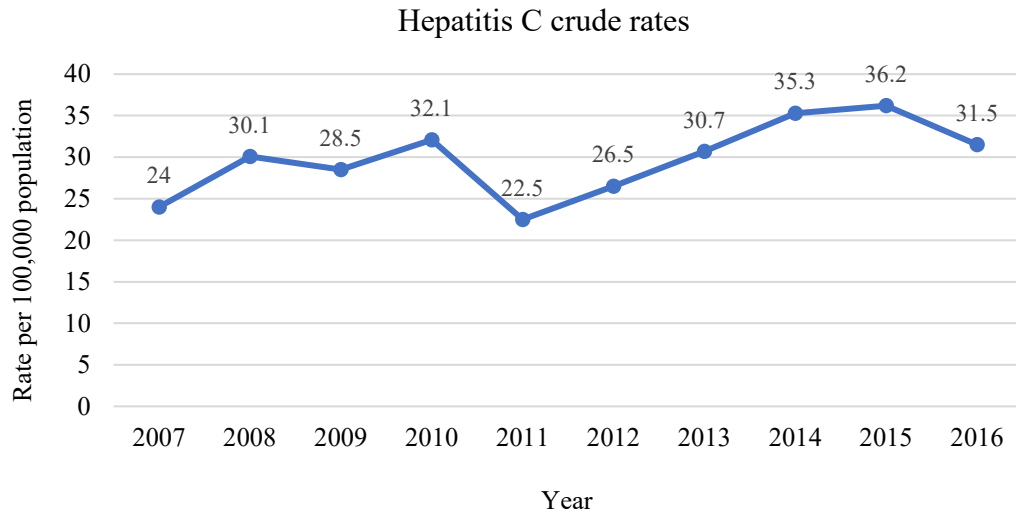


Figure 4: Hepatitis C crude rates per 100, 000 population from 2007 – 2016

Data retrieved from: [//novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf](http://novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf)

During 2016, the HIV infection rate was 1.7 per 100,000 population, a slight decrease from 1.8 per 100,000 population as reported in 2015 (Nova Scotia DHW, 2017) (figure 5). Most HIV cases were males aged 25 – 59 years (Nova Scotia DHW, 2017).

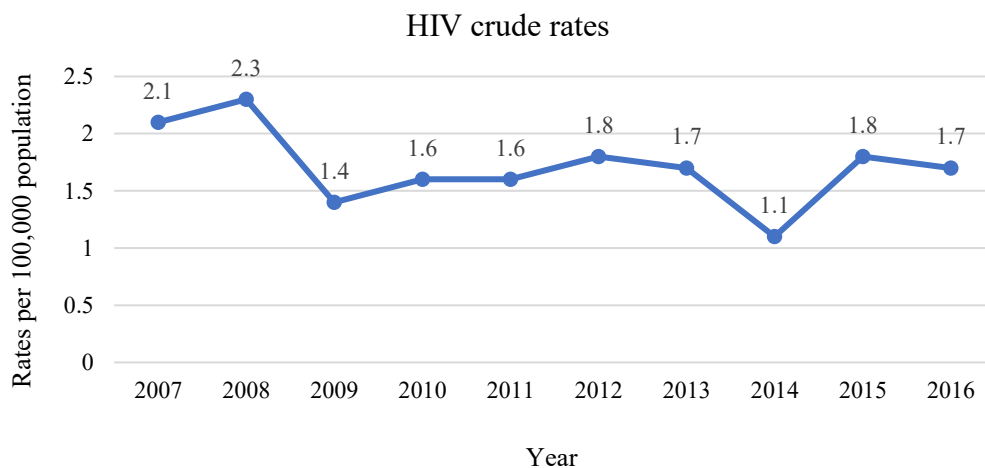


Figure 5: HIV crude rates per 100,000 population from 2007 – 2016

Data retrieved from: [//novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf](http://novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf)

2.1.2. Risk Factors for Acquiring STBBIs

Many social, economic, and cultural determinants of health contribute to the spread of STBBIs. Aral, Lipshutz, and Blanchard (2007) recognized that priority populations such as sex workers and their clients, injection drug users, and MSM may be at higher risk of contracting an STBBI. For example, Leber, MacPherson, and Lee (2008) suggest that MSM, having multiple sexual partners, and unprotected oral sex were contributing to the dramatic rise of infectious syphilis rates in Canada from 2008 to 2012. Co-infection with HIV was described as another important contributor (Fisman & Laupland, 2011). A more recent Canadian study conducted by Bajaj et al. (2017) described female sex, poverty, binge drinking, and low literacy levels as key determinants associated with the acquisition of STBBIs. In addition, biological factors, such as the existence of another STBBI, enhance the likelihood of infection transmission (Aral, Lipshutz, & Blanchard, 2007). Bradshaw, Matthews, and Danta (2013) showed that transmission of HCV is increased among HIV-infected MSM. A lack of access to medical services was described by Eden and Johnson (2016) as another risk factor. The authors described the difficulty of obtaining traditional laboratory testing especially in outlying and rural areas as it requires multiple meetings with healthcare providers which may not be accessible. As a result, positive cases may remain undiagnosed and untreated (Eden & Johnson, 2016). Two additional risk factors that were highlighted by the Canadian Public Health Association (CPHA) are disability and mental health (Canadian Public Health Association [CPHA], n.d.). The CPHA declared that priority population categories are not mutually exclusive as there is interaction between members of different groups within a community (CPHA, n.d.).

The PHAC reported that the most common age category for contracting HIV was between 15 and 29 during the period from 1985 to 2011, with the highest rate among the MSM population (PHAC, 2014). Injection drug use has been proven to be a common cause of HCV infection in Canada and the infection may occur shortly after starting injections (Roy et al., 2007). Locally, the DHW reported that during 2016, teenagers and young adult males were associated with greatest incidence of gonorrhoea, HIV, hepatitis B, hepatitis C, and infectious syphilis while young females aged 15-24 years had the highest rates of chlamydia (Nova Scotia DHW, 2017).

The reasons for the high incidence rates of STBBIs among youths were discussed by Gevelber and Biro (1999), who described having multiple sexual partners, practising unsafe sex, and selecting high-risk sexual partners as contributing factors to high rates among youth. In addition, Elkington, Bauermeister, and Zimmerman (2010) associate psychological distress among adolescence who acquire an STBBI.

2.1.3. Magnitude of the Problem

STBBIs have serious health and social consequences if not diagnosed and managed in a timely manner. The WHO recognized STBBIs as a major hazard to sexual and reproductive health and with newborn and child health (WHO, 2016a). Some infections such as hepatitis B, hepatitis C, and HIV tend to be chronic illnesses and have life-long impacts on patients, families, and communities if not appropriately treated. Van der Meer et al. (2017) described the importance of treating hepatitis C patients, as prolonged unmanaged infection may result in liver cirrhosis and hepatocellular carcinoma. Consequences of HIV infection include multisystem diseases, opportunistic infections, and adverse effects of ART (Currier & Havlir, 2017). Moreover, HIV

infection is a risk factor for co-infection with other STBBIs, such as syphilis (Burchell et al., 2015). The PHAC noted that many HIV positive individuals are unaware of their infection as it estimates that approximately 25% of HIV-infected people in Canada are undiagnosed (Public Health Agency of Canada, 2012c). Brenner et al. (2007) found that new and undiagnosed cases are responsible for approximately 50% of HIV transmission.

Other STBBIs, such as chlamydia, may cause pelvic inflammatory disease, infertility, ectopic pregnancy, and miscarriages if the infection goes untreated or is recurrent (Hillis, Owens, Marchbanks, Amsterdam, & Mac Kenzie, 1997). Such STBBIs are a common cause of ophthalmia neonatorum as babies' eyes may acquire the pathogen from an infected birth canal (Zikic et al., 2018). Gonorrhea may cause similar complications among female patients, while prostatitis orchiepididymitis may occur in males (Di Paolo, 2018). Infectious syphilis rates increased in Canada by 101% between 2003 and 2012 (Totten, MacLean, & Payne, 2015). Many serious complications may occur if syphilis remains undiagnosed and untreated. For example, cardiovascular, neurological and other systemic diseases may emerge (Singh, & Romanowski, 1999). Cooper & Sánchez (2018) describe congenital syphilis as a “failure to the public health system to provide optimal prenatal care to pregnant women” and note that its lack of treatment may expose many infants' lives to danger. In addition to the physical impacts of STBBIs on patients, psychological disorders, such as depression, and social stigma are also associated with them (Stahlman et al., 2015).

2.1.4. Testing for STBBIs

Testing for STBBIs is the cornerstone of reducing, or at least slowing, the rising rates of these infections because it facilitates diagnosing and treating positive cases, and thereby preventing their spread. STBBI testing is highly recommended by the PHAC (2013), especially among high risk groups. Therefore, educating people about the importance of testing is a key component of a public health prevention strategy (Gahagan, Condran & Hajizadeh, 2015).

Accurate diagnosis of STBBI cases is achieved mainly through laboratory testing (Ridgway, 2000). Screening for infections is essential as certain STBBIs are easily spread and many are asymptomatic, particularly during the early stages of infection. Although screening can be on anyone, Grimes and Schulz (2002) identify it as tests conducted among people at increased risk of acquiring a disease or condition. The WHO provides guidelines as to which characteristics are essential for a successful screening program, including: the condition represents an important health problem; the condition is treatable; confirmatory tests are available; the tests are acceptable to the population; there is a proper understanding of the natural history of the disease or infection; there is an agreed upon policy on who to treat; the test is cost effective and has high sensitivity; and there is continuity of case finding (WHO, 2010). The WHO Sexually Transmitted Diseases Diagnostics Initiative summarized the criteria of an effective screening test in the acronym ASSURED. This acronym stands for: Affordable, Sensitive, Specific, User-friendly, Rapid and robust, Equipment-free and Deliverable to end-users (Peeling, Holmes, Mabey, & Ronald, 2006).

2.1.4.a. Facilitators to Testing for STBBIs

Authors such as Scheim and Travers (2017) discussed facilitators and barriers to testing. They found that including testing as part of the general healthcare routine, especially among young adults (McDonagh et al., 2017), engagement in risky sexual relations, caring about one's sexual partners, and being able to access trusted testers, to secure one's confidentiality (Simmons et al., 2011), are drivers to increased STI testing. Additionally, Peralta, Deeds, Hipszer & Ghalib (2007) described access to rapid and free STBBI testing methods as well as convenient locations as motivators for testing. Other factors such as sickness of a family member and preparation for marriage are considered to also promote testing (Nannozi, Wobudeya, Matsiko & Gahagan, 2017). Further, Traversy, Austin, Ha, Timmerman, and Gale-Rowe (2015) described how increase normalization of HIV testing can act as a facilitator as this strategy decreases stigma.

2.1.4.b. Barriers to Testing for STBBIs

People may get tested for STBBIs through blood and urine tests; however, many Nova Scotians, as well as other Canadians have a variety of barriers to testing. One of the big barriers is that people have no access to testing because of the shortage of physicians (Islam, 2014). Tilson et al. (2004) described fear of stigma, lack of knowledge of STBBIs, lack of awareness about available health services, methods of specimen collection, and long wait times to be other barriers to testing. Low perception of risks of STBBIs was described by Nyasulu, Fredericks, Basera, and Broomhead (2018) to be a barrier to medical care. Additionally, asymptomatic nature of some STBBIs prevents patients from seeking testing as they are not aware by their infections (Avuvika et al.,

2017). Therefore, educating people on the long-term impacts of asymptomatic infections is a strategy to promote testing (McDonagh et al., 2018). Other patient-level barriers include misconceptions on the role of rapid diagnostic tests, wariness on their accuracy, and judgemental attitudes by the testing staff members (Pai et al. 2015). In Nova Scotia, Back (2014) identified stigma, marginalization, discrimination, and poverty to be the main barriers to HIV testing in the province.

2.1.4.c Testing for STBBIs in Nova Scotia

Currently, there are six sexual health centres located in Halifax, Sydney, Stellarton, Amherst, Bridgewater, and Sheet Harbour (figure 6). These centres support sexual health and provide supplies for engaging in safe sex, training sessions for professionals, and educational programs to the community. Only one of these six sites, the Halifax Sexual Health Centre provides STBBI testing (Sexual Health Nova Scotia, 2018). Other testing sites are located at the Dickson Building in Halifax (Nova Scotia Health Authority [NSHA], 2017) and in Sydney, Cape Breton (The Aids Coalition of Cape Breton, 2014). As there are currently only three specialized testing sites for STBBIs in the province (two of which are in Halifax), there is a limited accessibility to testing in Nova Scotia to testing services for this group of infections, especially among people who are living in rural or remote areas (Back, 2014).

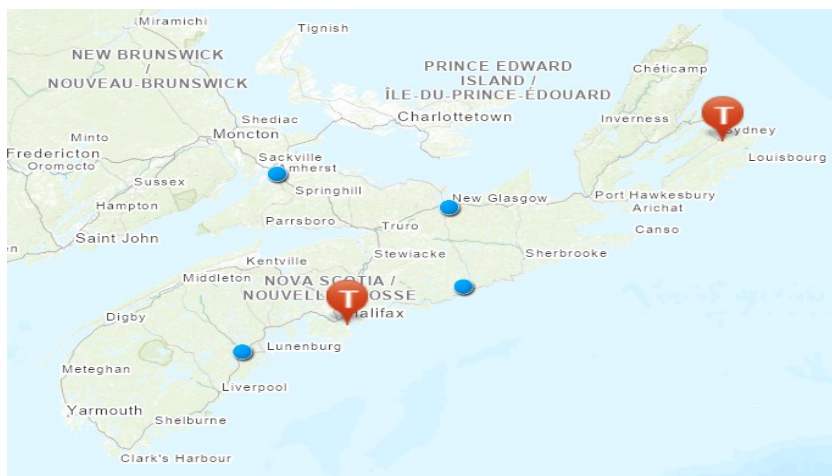


Figure 6: Locations of sexual health centres in Nova Scotia

To protect testers' confidentiality, testing for STBBIs in Nova Scotia can be done anonymously, where there is no link back to the personal identifiers, or non-nominal, where the person ordering the test knows the identity of the person being tested. The NSHA STI clinic provides non-nominal testing where a confidential identification number is used to protect testers' identity (NSHA, 2017), while the Halifax Sexual Health Centre provides anonymous testing where codes on swabs and samples are used in order to hide testers' personal and health card information (Halifax Sexual Health Centre, n.d.). The testing centre in Sydney conducts anonymous HIV testing and non-nominal testing for HBV, HCV, and syphilis (The AIDS Coalition of Cape Breton, 2014).

2.1.5. Nova Scotia's Response to STBBIs

2.1.5.a. Public Health Role

The Nova Scotia Health Protection Act provides the legal framework enabling public health officials to protect the public from harms without encroaching on civil rights and liberties (Nova Scotia Legislature, 2003). Based on assigned responsibilities,

the Public Health Department is responsible for monitoring, investigating, and responding to notifiable diseases and conditions, including STBBIs in the province, and reports its findings to the Nova Scotia DHW (Nova Scotia DHW, n.d.). Public health nurses are responsible for investigating cases of STBBIs. This can include contact tracing and providing education about sexual health and disease prevention.

2.1.5.b. Disease Surveillance

Disease surveillance is one of the public health pillars in Nova Scotia. The NSHA conducts surveillance while the DHW produces an annual report of notifiable diseases, including STBBIs. It contains highlights, trends, and comparisons with national data (Nova Scotia DHW, 2018). Shrader-Frechette (2007) recognized the importance of population-based healthcare and surveillance of diseases and infections in protecting peoples' health. There are several advantages to public health that result from conducting disease surveillance, including: having up-to-date health status reports about communities; quick actions by public health authorities when needed; development of hypotheses in the case of outbreaks and epidemics; and the proper allocation of resources by health authorities (Lawson, Williams, & Williams, 2001).

2.1.6. Pan-Canadian STBBI Framework for Action

To reduce the impact of STBBI nationally by 2030, and to contribute to the global target of reducing HIV, viral hepatitis, and STIs, the PHAC developed an Action Framework to tackle the problem (Government of Canada, 2018a). The main objectives are to reduce the incidence of STBBI in Canada; increase access to testing, treatment and support; and combat stigma around STBBI. There are four pillars associated with this

framework. The first pillar is prevention, which emphasizes education, vaccination, and increased access to safer-sex materials and harm reduction programs. Further, it highlights the importance of building on the front-line healthcare practitioners' knowledge and promoting culturally and age-appropriate sexual health information (Government of Canada, 2018a). The second pillar is testing, which advocates for increased access to all available evidence-based testing technologies to simplify testing and eliminate barriers to facilitate early detection of positive cases, such as POCT (Government of Canada, 2018a). The third pillar is treatment, focusing on the removal barriers to treatment and increasing access to various treatment options to treat patients early in the course of their infections (Government of Canada, 2018a). The fourth pillar is patient support, which stresses the need to increase access to social networks and engaging patients in their communities' various activities (Government of Canada, 2018a). Similarly, the Nova Scotia Advisory Commission on AIDS (2013) recommended increasing access to testing, normalizing testing for STBBI, reducing stigma, and updating the provincial policies regarding HIV.

2.1.7. Global Target for the Elimination of HIV: UNAIDS 90-90-90

The Joint United Nations Programme on HIV/AIDS (UNAIDS) campaign to end the HIV epidemic ("90-90-90") sets bold targets with the aim of eliminating HIV by 2020 (UNAIDS, 2014). In December 2013, stakeholders around the world set the new 2020 target of HIV as: 90% of all people living with HIV will know their HIV status; 90% of all people with diagnosed HIV infection will receive sustained ART; and 90% of all people receiving ART will have viral suppression (UNAIDS, 2014).

Although some countries, such as Sweden, have already achieved the 90-90-90 target (Gisslén et al., 2017), Canada is still working towards achieving this goal by 2020 (Government of Canada, 2017). In a systematic analysis of national HIV treatment cascades aimed to identify the barriers to achieve 90-90-90 targets in 69 countries, Levi et al. (2016) found that diagnosis was the greatest barrier. However, providing ART to diagnosed cases was also frequently reported as a barrier (Levi et al., 2016). Therefore, achieving this goal may not be possible because HIV prevalence still high (Green, 2018).

2.1.8. Point Of Care Testing

Point Of Care Testing (POCT) is defined as “*an analytical test performed at or near the site of a patient, in a setting that is distinct from a normal hospital clinical laboratory*” (Willmott & Arrowsmith, 2010, p. 159). It has many advantages, such as: it shortens the period between case diagnosis and initiation of an appropriate treatment; it saves cost of transporting and preparing clinical samples; and it is an easy to use testing method because it does not require a clinic or hospital setting and can be done by untrained staff (Luppa, Müller, Schlichtiger, & Schlebusch, 2011).

Different types of POCT devices have been approved for use by Health Canada. For example, the INSTI HIV-1/HIV-2 Antibody test is a POCT approved for HIV serologic testing. This test has sensitivity and specificity exceeding 99% (Galli et al., 2013). There is a saliva-based testing method that also has high sensitivity and specificity (Tsai et al., 2018). However, a positive test is a presumptive positive that requires confirmation by traditional laboratory blood testing (Greenwald, Burstein, Pincus, & Branson, 2006). Most Canadian provinces, excluding the Atlantic provinces, are using

HIV POCT (CATIE, 2015). Gahagan, Condran and Hajizadeh (2015) suggest that the lack of HIV POCT in Nova Scotia may be related to decisions of local health authorities, lack of financial coverage of testing cost, or the lack of a billing code, among other factors. However, participants of a survey conducted by Lewis, Gahagan and Stein (2013) confirm their willingness to use this technique for testing, even where there may be an additional cost for the service. The same finding was described in a systematic review conducted by Minichiello et al. (2017).

Many benefits can be achieved by using HIV POCT. First, it can reach people who have never been screened for HIV (Castel et al., 2012). Second, HIV POCT could be used to early detect the infection among high-risk people. This advantage meets the PHAC recommendation of annual (at minimum) testing of high-risk populations (PHAC, 2012c). Third, people who use rapid HIV POCT would be able to receive their testing results at the same visit (Pottie et al., 2014). A fourth benefit of this method of testing is that it can serve less developed and rural areas in which people have no access to traditional methods of HIV testing and thereby expedite access to treatment (Broeckeaert & Challacombe, 2015; Ha et al., 2014; Lewis, Gahagan, & Stein, 2013). However, Minichiello et al., (2017) recommend further research on the strategies needed to scale up HIV testing using the rapid method, POCT, in medically underserved areas.

Recently, Health Canada approved the use of point-of-care antibody tests for screening people for exposure to HCV. This technology enables patients to receive their results in 20 minutes. Positive results indicate presence of antibodies to hepatitis C. The accuracy of this test is 98% however, it is recommended to do laboratory blood testing to check HCV's genetic material (CATIE, 2017b) and to confirm the initial diagnosis.

There are other rapid POCT technologies to test for multiple STBBIs. For instance, although not yet approved for use in Canada, there are multiplex kits that test for the combination of HIV, HCV, and syphilis, or HIV, HCV, and HBV. In a study conducted by Hess, Fisher and Reynolds (2014), 948 blood specimens were analyzed to check the sensitivity and specificity of Point-of-Care Rapid Combination Syphilis-HIV-HCV Tests. The authors found that the sensitivity of the HIV tests ranged from 95.7–100% and the specificity was 99.7–100%. The sensitivity and specificity of the HCV test were 91.8% and 99.3%, respectively. However, the treponemal-test sensitivity when compared to *Treponema Pallidum* Particle Agglutination Assay ranged from 44.0 - 52.7%. The non-treponemal test sensitivity and specificity when compared to Rapid Plasma Reagin was 47.8% and 98.9%, respectively (Hess, Fisher & Reynolds, 2014). The value of this technology lies in its ability to offer easier access for more at-risk populations who generally do not intersect with formal healthcare systems or services, and to diagnose and consequently treat positive cases in a timely manner (Pai, Sollis, & Peeling, 2013). Notably, some organizations recognized the usefulness of multiplex tests to facilitate testing (Wells & Jones, 2017).

2.1.9. STBBIs and Stigma

Previous research found that the fear of social stigma associated with a positive STBBI result can prevent people from seeking out testing. Salters-Pedneault (2016) defined stigma as “a preconceived idea or stereotype that causes someone to devalue or think less of the person in question” (para 1). Gahagan, Fuller, Proctor-Simms, Hatchette, and Baxter (2011) noted that stigma and discrimination are major barriers to seeking testing. Efforts are needed to reduce fear of testing-related social stigma. If this

fear persists, many people will remain undiagnosed and untreated, physical and psychological conditions of patients will continue to deteriorate, infections will spread, and STBBI rates will continue to rise.

Many researchers provided various methods to combat stigma. For instance, Mahendra, Gilborn, George, Samson, and Mudoï (2006) as well as Oanh, Ashburn, Pulerwitz, Ogden & Nyblade (2008) declared that actions must focus on three levels: the individual, the environmental, and the political. Nyblade, Stangl, Weiss, and Ashburn (2009) provided an example of how to combat stigma on these three levels by discussing approaches to reducing HIV stigma in healthcare settings. They ascertained that increasing awareness about stigma and educating healthcare workers and trainees about methods of HIV transmission can contribute to reducing stigma on the individual level (Nyblade, Stangl, Weiss, & Ashburn, 2009). On the political level, the authors proposed that implementing certain policies such as proper training of staff, monitoring of stigma among healthcare workers, and involving patients in daily life aspects would result in a reduction of HIV stigma. They encouraged patients to be involved in their communities, share in decision-making processes, and resist stigma in their workplaces and families (Nyblade, Stangl, Weiss, & Ashburn, 2009).

2.2. The Social Ecological Model

The SEM consists of multiple influential levels as first described by Bronfenbrenner in the 1970s (Bronfenbrenner, 1994). Many researchers have used the model as a framework for health-related studies because of its usefulness in determining health behaviours and needed actions (UNICEF, 2009). For instance, Bull and Shlay

(2005) used this approach in studying dual protection from STIs and unwanted pregnancy. The authors framed their research findings based on the various levels of the SEM. Also, Baral, Logie, Grosso, Wirtz, and Beyrer (2013) used a modified SEM in their assessment of risks of HIV epidemics.

The SEM was first described by the Russian-American developmental psychologist, Urie Bronfenbrenner. Bronfenbrenner found that many environmental influences can affect human's development, as a human being interacts with his/her environment (Bronfenbrenner, 1979). He classified these influences into microsystem, mesosystem, exosystem, and macrosystem (McLeroy, Steckler, & Bibeau, 1988, p354) (figure7).

The microsystem level consists of the direct interaction between a person and his/her immediate surrounding people such as family members, peers, teachers, or coworkers (Bronfenbrenner, 1994, p39). McLeroy, Steckler, and Bibeau (1988, p354) defined the mesosystem level as the reciprocal relationships between an individual's various microsystems, which may be described as a "system of microsystems" (Bronfenbrenner, 1994, p 40). The third level is the exosystem, which is defined as the influence of the larger social system, such as social services or local politics, on an individual and how he/she feels the positive and negative forces of those influences, although he/she is not directly involved in them (Bronfenbrenner, 1994, p 40). Galinsky (1999) described the influence of a parent's workplace on children as an example of this system. The last level of this conceptual framework is the macrosystem, which refers to the cultural beliefs and norms of the society (McLeroy, Steckler, & Bibeau, 1988, p354)

that are believed to be a model for those cultures and subcultures (Bronfenbrenner, 1994, p40).

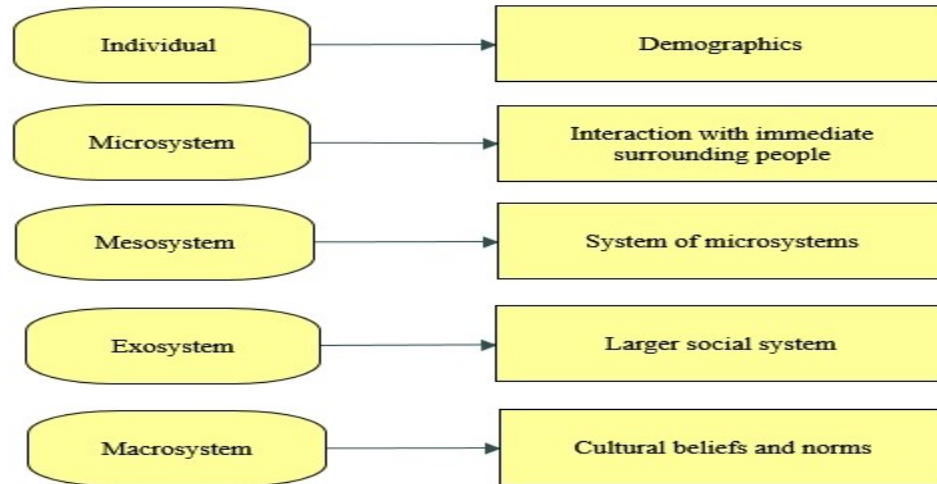


Figure 7: Bronfenbrenner's influential levels on a developing human

2.2.1. The SEM for Health Promotion

In the context of health promotion, a variation on the SEM is widely used and recognized by many researchers and health authorities (U.S. Department of Health and Human Services, 2008). As described by McLeroy, Steckler, and Bibeau (1988, p355), it consists of five influential levels: individual, interpersonal, institutional, community, and public policy (figure 8). The authors included personal attitudes, beliefs, perspectives, knowledge, perception of risk, and skills in the individual level, while they described social networks, such as families, friends and colleagues, as the interpersonal level of the framework. Individual level factors influence acquisition of STBBIs as misconception on methods of pathogen transmission and prevention would increase it. Therefore, Bull and Shlay (2005) described the importance of interventions that address the individual level such as boosting self-esteem. The third influential level is the community. This level

represents the relationships between organizations, institutions, and networks within defined boundaries (UNICEF, 2009). Many sociologists recognize the importance of the community in improving public health, for instance, Beauchamp (1985) sees the significance of shared commitment between a community's members, including its organizations and institutions, in protecting individual health. The United Nations International Children's Emergency Fund (UNICEF) (2009) described the organizational level (the fourth level) as the action of various organizations or institutes that serve an individual or group. Further, McLeroy, Steckler, and Bibeau (1988, p359) discussed the importance of organizations in promoting health, as people are spending more than one third of their lives in organizational settings, such as schools, universities, and workplaces, and are building relations with others within those same organizations. Accordingly, employing health promotion programs in those institutes would be influential in preventing various diseases and infections including STBBIs. The last level of this framework is public policy that set laws and policies at all levels, local and national (McLeroy, Steckler, & Bibeau, 1988, p355). Many researchers note the success of public policy in protecting health. For example, McKinlay and McKinlay (1977) attribute the decline in mortality rates in the United States during the last century to the improvement in food and water quality, sanitation, and housing as a result of implementing public policies. Notably, employing policies that target the spread of STBBIs, such as the use of clean needles to inject drugs, would be beneficial in protecting the community.

Generally, using multilevel conceptual frameworks, such as the SEM, for health promotion is beneficial and training public health students on using these frameworks to

improve health is highly recommended by the Institute of Medicine and the Association of Schools of Public Health in the United States (Hernandez, Rosenstock, & Gebbie, 2003). However, there is an argument between researchers about the number of levels that can be best used. For instance, Stokols (1996) recommends using at least two levels as targeting all levels is impractical. On the other hand, Golden and Earp (2012) see that sustainable improvement of health could be achieved if all levels are targeted as levels are interactive.

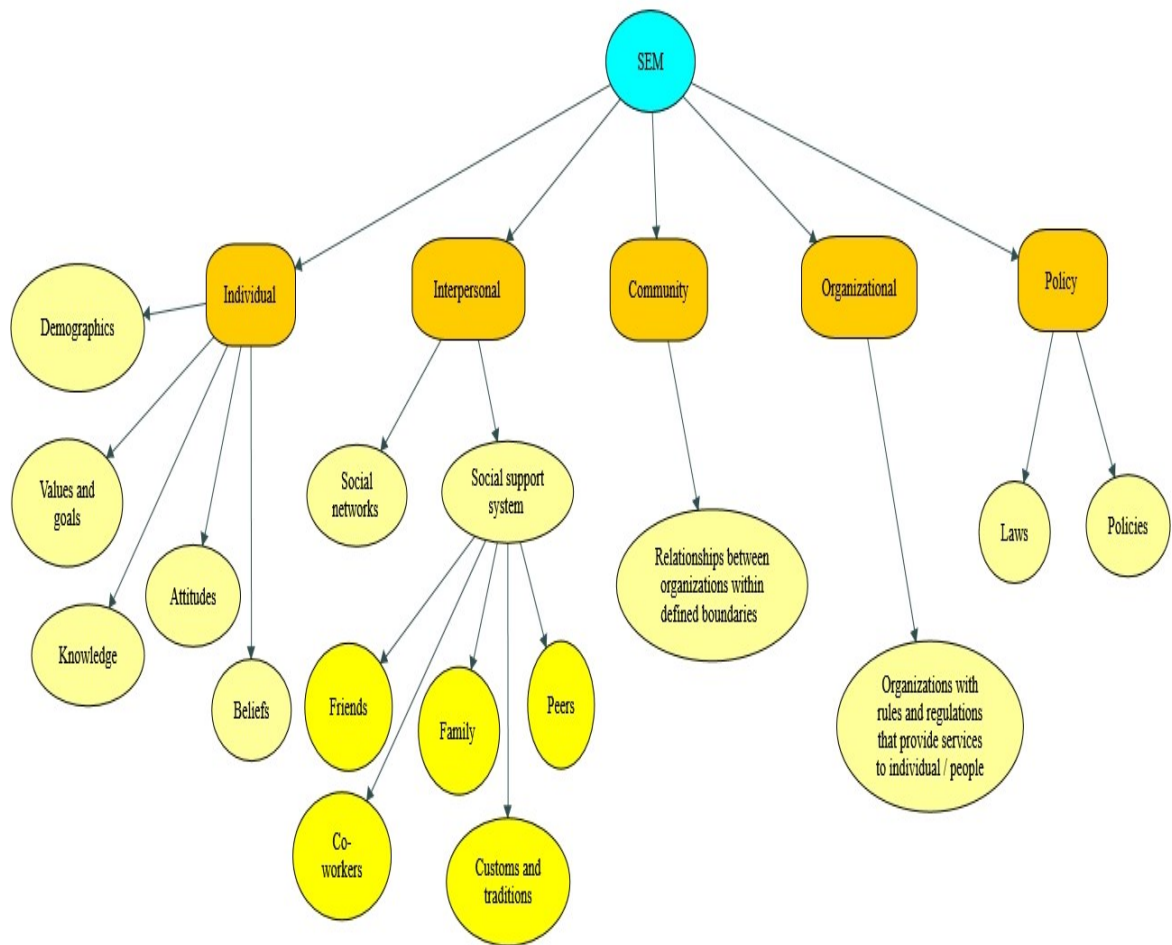


Figure 8: A variation on the SEM for health promotion

Retrieved from www.unicef.org/cbsc/files/Module_1_SEM-C4D.docx

2.2.2. Examples of Using the SEM in Health Promotion

Many health researchers used the SEM in studies to identify causes/risk factors of a public health issue and/or to provide a solution to it. For example, Kumar et al. (2012) used the model in describing the drivers of the uptake of the H1N1 vaccine and the WHO used four levels of the model (intrapersonal, relations, society, and community) to determine risk factors for violence (WHO, 2018). Latkin, German, Vlahov, and Galea (2013) followed a social ecological approach to identify levels of influence on risk factors for HIV infection and methods of preventing it. The model has also been used to understand determinants of smoking, physical activity and nutrition, sexual activity, and planning programs (Golden & Earp, 2012).

2.3. Benefits of the Study

This study addressed possible socioecological factors underlying the spread of STBBIs and methods of prevention from the perspective of local senior public health officials with experience in the field of STBBIs in Nova Scotia. By using a well-validated and extensively used framework, this research has resulted in evidence-based recommendations around the interventions needed to tackle the rising rates of STBBIs in the province.

The outcomes that are expected to result from these recommendations are that they will inform dialogue and decision-making around policy and programming related to STBBIs in Nova Scotia. Patients and communities will benefit from this because more patients will be diagnosed and treated and spread of infections will be reduced. Benefits

will be extended to the government because the financial burden of treating these infections and their complications will be reduced eventually.

Chapter 3: METHODS

This chapter describes the methods used to conduct this qualitative study aimed at exploring the issue of STBBIs in Nova Scotia and to analyze its data.

3.1. Research Design

To learn about local contributors to rising rates of STBBIs in Nova Scotia and possible strategies to reduce their spread, a series of in-depth interviews with a purposive sample of Nova Scotian public health officials was conducted. These interviews reflected participants' perspectives and perceptions on the rise of STBBIs in Nova Scotia and the recommended approaches they believed may assist in addressing the problem. The SEM was used to help in organizing the data for analysis. Approval from the NSHA Research Ethics Board was obtained to perform this study.

3.2. Sampling

A purposive sampling technique was used in this study. This method relies on researcher's judgement on choosing participants that help address research objectives and answer research questions (Etikan, Musa, & Alkassim, 2016). It is efficient for data collection as described by Tongco (2007). There are various types of purposive sampling such as maximum variation sampling, homogenous sampling, and critical case sampling (Etikan, Musa, & Alkassim, 2016). However, for this study, the expert sampling method, which relies on recruiting experts in a field, was selected. This method was chosen because experts' views on provincial STBBI rates and their recommendations on preventing STBBI spread and increasing access to testing were needed.

Although a purposive sampling technique empowers researchers to generalize their research findings and often fits with all research stages, it has certain disadvantages (Sharma, 2017). Sharma (2017) described the difficulty to defend representativeness of the sample as one of the disadvantages. However, Sharma (2017) described using a well studied theoretical framework or presenting experts' elicitation as alleviating factors to this disadvantage. In this thesis research, experts in the field of STBBI were interviewed and the goal was to build an understanding of a phenomenon and describe processes.

3.3. Recruitment of Participants

Public health officials from each of Nova Scotia's four health zones were recruited. They were recruited because they are responsible for promoting and protecting the health of the population and preventing diseases, infections, and injuries. In addition, they are working with other governmental officials to help develop policies that secure healthy living to each Nova Scotian. To be included in this study, all participants met the following criteria:

- A Nova Scotian senior public health official.
- Experienced in the field of STBBI.
- Worked in the provincial health authorities (NSHA or DHW) for at least 5 years.
- Fluent in English.

Participants were recruited actively whereby an email containing an introduction to the interviewer, myself, and a brief description of the study was sent to each participant along with the invitation to participate in the project. Upon participant's

acceptance of this invitation, another email was sent to provide him/her with more details about the study along with the interview guide (table 1) that contained all questions that were asked during the interview. Furthermore, the informed consent form and the NSHA Research Ethics Board approval to conduct the study were sent to all participants. One participant contacted the interviewer through an email to contribute to the study, accordingly, a similar email was sent. Recruitment of participants continued until a state of data saturation was achieved at which point no new substantive information was heard. Data saturation started on the seventh interview; however, two more interviews were conducted to ensure that no more new information would emerge.

3.4. Participants' Privacy and Confidentiality

Every effort was made to protect the participants' privacy and confidentiality. To ensure adherence to the institutional privacy/confidentiality policies and practices, the "Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans" training course was completed. Participants' personal information were removed from transcripts and not shared with others.

All study materials were kept in a secure and locked filing cabinet within the office of the Cancer Outcomes Research Program. Electronic files were stored on secure computer facilities within the NSHA. All materials will be stored for seven years in a secure area (locked filing cabinet) in the office of the Cancer Outcomes Research Program or an approved storage facility owned or leased by the NSHA. After the aforementioned time period, all hard copies of data related to this study will be destroyed

by cross-cut shredding and secure recycling of the resulting paper waste. Electronic data will be destroyed using file shredding software.

3.5. Data Collection

With the consent of each participant, semi-structured one-on-one interviews were conducted, audio-recorded, and transcribed verbatim. Informed consent was obtained from each participant prior to the interview at the participant's office. Semi-structured interviews were the selected method because it is an appropriate way to conduct formal interviews, it provides room for topical trajectories if needed, and it enables the interviewer to obtain all required information in one session (Russel Bernard, 1988).

For this study, a one-on-one interview format was preferred over other forms of interviews. The one-on-one interviews provided the opportunity for participants to fully express their opinions and for the interviewer to ask follow-up questions.

Many advantages were gained by recording the interviews. By recording the interviews, the interviewer was provided the freedom to be able to focus on the interviewees' responses and to ask follow-up questions, while not being distracted by the need to write notes. Also, it allowed a thorough examination of responses, the ability to listen to participants' answers as many times as needed. Further, recording the interviews facilitated transcribing verbatim all responses by a transcriptionist. The data was imported into the NVivo 11 software which is a qualitative data analysis software produced by QSR International. To protect participants' and study's confidentiality, a confidentiality agreement was signed with the transcriptionist.

To help prompt discussion in the interviews, an interview package containing background information about the selected STBBIs was sent to participants prior to each interview. The information provided to the participants was sourced from the DHW 2016 Notifiable Diseases Annual Report which includes data related to STBBIs and other notifiable diseases, from 2007 to 2016 in Nova Scotia (Nova Scotia DHW, 2017). This research study focused on the following issues:

- Local contributors to rising rates of STBBIs in Nova Scotia including chlamydia, gonorrhea, hepatitis B, hepatitis C, infectious syphilis, and HIV.
- Current preventative strategies.
- Additional preventative actions including methods of increasing access to and uptake of STBBI testing in Nova Scotia.

Each open-ended interview question was designed to obtain information related to the study objectives. An interview guide (table 1) was developed to organize the questions and the objective each question sought to address. Further questions were included on the interview guide to address STBBI testing rates in Nova Scotia and the use of POCT in the province (figure 9) (table 1). Questions were then rearranged into an order that would contribute to a smooth interview process. Using an interview guide helped to focus the questions, and consequently the responses, in such a way that missing information was addressed, interview questions were tracked, and interview objectives were met within the predetermined time (one hour). Asking open-ended questions provided the opportunity for participants to express their views and for the interviewer to learn more from the interviewees. Participants were allowed to skip questions they did not want to answer.

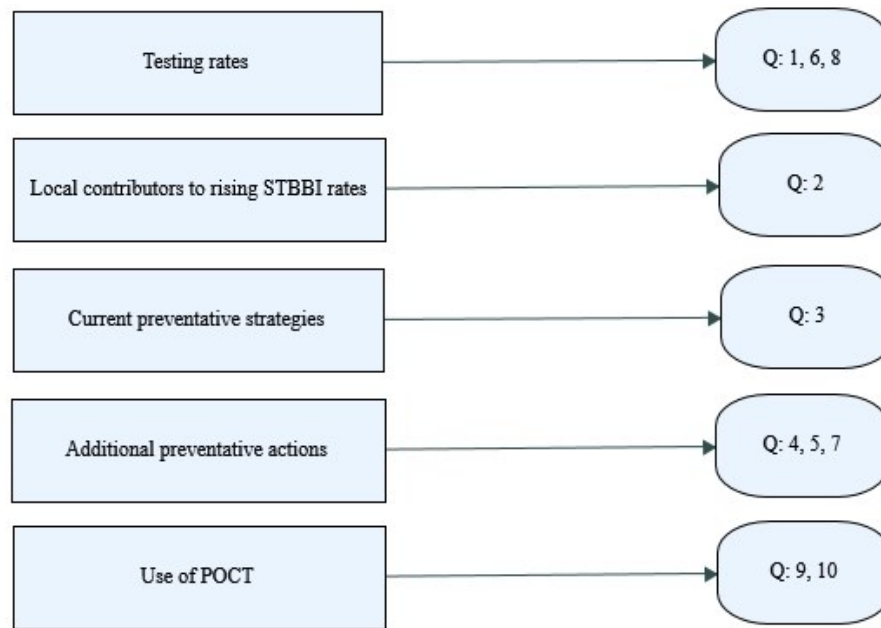


Figure 9: Main objective of interview guide questions

Table 1: Interview guide

	Question	Objective(s)
1	What is your interpretation of the current STBBIs' rates in Nova Scotia based on recent surveillance data?	-An opening question to get the study participants' opinions about the current rates of chlamydia, gonorrhoea, hepatitis B, hepatitis C, HIV, and infectious syphilis. -To understand the cause(s) of the dramatic change in the infectious syphilis rate since 2013.
2	In your opinion, what are the main contributors to the rising rates of STBBIs in Nova Scotia?	-To understand the contributing local factors of rising rates of STBBIs from the perspective of local public health officials.
3	From your perspective, what are the actions taken by the	-To understand what the government, (federal or provincial), has done to combat the problem.

	government to reduce the spread of STBBIs in Nova Scotia?	
4	In your opinion, what further actions need to be taken to prevent the spread of STBBIs? Please provide examples. Are there any barriers to such actions?	- To learn about the actions that have not yet taken place, from local public health officials' perspectives, and to know why those actions have not yet been implemented.
5	From your perspective, how can we shift from treating STBBIs to preventing them?	-To understand how we can prevent the spread of STBBIs using the five influential levels of the SEM. -To identify how population-based healthcare could be employed to eliminate the problem.
6	In your opinion, how would increasing access to testing for STBBIs influence the rates of infection?	-To understand how each participant, perceives the importance of testing for STBBIs which would suggest how the government perceives it. -To learn how increasing testing for STBBIs would be reflected on the rates from the participants' perspective. -To explore the size of the hidden part of the iceberg (i.e. untested people).
7	In your opinion, what strategies could be initiated, or modified, to increase testing for STBBIs in the province?	-To learn about potential strategies that the government is thinking about to deal with the problem.
8	How can we get a more accurate picture of testing rates? (Do we have a provincial denominator	-To learn about current testing rates for STBBIs in the province to know whether the rate is accurate, underestimated, or overestimated.

	for testing rates, for example, HIV?)	- To understand whether the rate matches the number of vulnerable people existing in the province.
9	Given that most Canadian provinces (except the Atlantic provinces) use POCT methods for certain STBBIs, do you think the use of this technology would be beneficial in reducing the spread of STBBIs in Nova Scotia? Why or why not?	-To understand how the provincial government perceives the use of innovative testing methods for STBBIs such as the POCT.
10	From your perspective, how can the use of POCT methods influence STBBI rates in medically deprived areas in the province?	-To understand whether the POCT would be beneficial in rural areas, where people have no access to medical services such as testing for STBBIs, or not, from the perspective of experienced local public health officials.
11	Do you have any other comments you would like to share with me on the issue of STBBI prevention in Nova Scotia?	-To provide the opportunity to study's participants to provide any additional information they believe could be beneficial to the study.

3.6. Data Analysis

The results of this study were analyzed using thematic analysis. Braun and Clarke (2006, p79) define thematic analysis as “*a method for identifying, analysing and reporting patterns, themes, within data*”. It relies on researchers’ thinking, understanding, and interpretation of the collected data (Anzul, Downing, Ely, & Vinz,

2003: 207). Thematic analysis is a method of analysis that is widely used in qualitative studies (Boyatzis, 1998; Roulston, 2001). There are two types of thematic analysis, inductive and deductive. Inductive thematic analysis is data-driven whereas coding process takes place without fitting data into a framework (Braun and Clarke, 2006), i.e. ‘bottom up’ way (Frith & Gleeson, 2004). In contrast, deductive thematic analysis is theory-driven where analysis relies on the researcher’s theoretical interest in the area (Braun and Clarke, 2006), i.e. ‘top down’ way (Boyatzis, 1998).

There are many advantages to the use of thematic analysis in this study. As thematic analysis is characterized by its flexibility (Braun and Clarke, 2006), this method facilitated performing both inductive and deductive methods. In addition, inductive thematic analysis helped to summarize large data corpus into comprehensible data and results, enhanced the interpretation of the data, and promoted the discovery of unanticipated insights. On the other hand, there were also some challenges that were encountered when using this method. The main challenge encountered during the thematic analysis of the data was choosing the right fit for the data, as some data fit into more than one level within the SEM. To address this problem, I chose the SEM level that aligned more directly to the meaning of the data, using the description provided by UNICEF (2009) for each level (figure 8). Another challenge was the possibility of failing to code data that appeared insignificant on the first review of a transcript. To avoid this problem, I reviewed the transcripts twice, attuning myself to subsequent insights and codes to ensure these were captured, if present, in the transcript during the second read. These challenges are recognized by Braun and Clarke (2006) to be common in qualitative research.

To familiarize myself with the data, I reviewed all transcripts twice and also compared the written transcripts with the recorded version of the interviews to ensure their completeness and precision. After reviewing the transcripts, I grouped all answers from the interviews under their corresponding questions (i.e. nine responses were collected under each question). Then, I imported each question and its corresponding answers into NVivo 11 software for analysis.

The type of thematic data analysis used was dependent on the purpose of each interview guide question. To analyze the causes of rising STBBIs in Nova Scotia, current preventative actions, and strategies and barriers for more prevention, an explicit and detailed analytical method was required. Therefore, the five levels of the SEM: individual; interpersonal; community; organizational; and policy were used to perform a deductive thematic analysis to interview guide questions 2, 3, 4, 5, and 7. Several codes emerged from data under the broad levels of the model as shown in the codebook (Appendix 1). Similar codes were merged and patterns of these codes were identified to form themes (figure 10). This technique corresponds with the recommendations of Braun and Clarke (2006) who see the advantages of using deductive thematic analysis if a researcher wants to answer a specific question, a detailed analysis is required, and a frame is available.

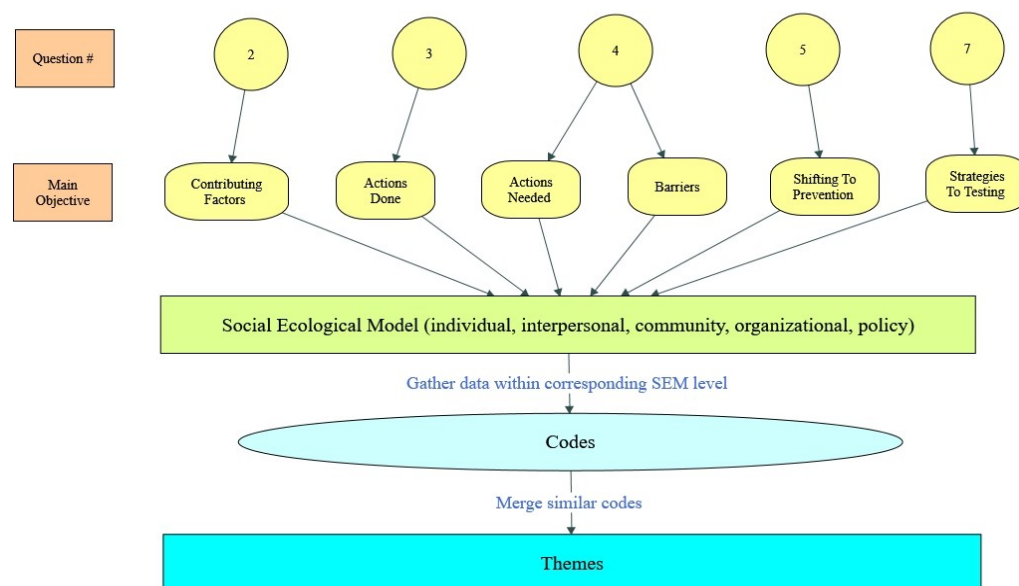


Figure 10: Deductive thematic analysis of questions 2, 3, 4, 5, and 7

To learn about the current testing rates for STBBIs, anticipated effects of increasing access to testing, and participants' views on using POCT, an inductive thematic analysis was carried out. As the analysis was data-driven and because no suitable frame existed to fit the response into, an inductive thematic analysis was used to analyze interview guide questions 1, 6, 8, 9, 10, and 11 (figure 11). This method matches with the recommendations of Braun and Clarke (2006) if no suitable frame is available. Accordingly, various codes were created as shown in the codebook (Appendix 1) and through the identification of patterns, themes were also developed.

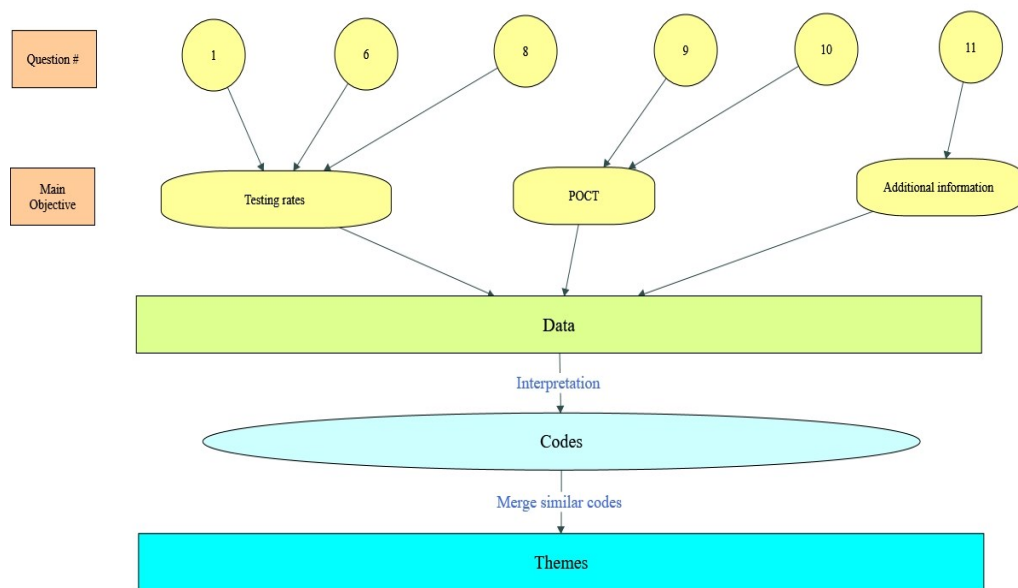


Figure 11: Inductive thematic analysis of questions 1, 6, 8, 9, 10, and 11

After defining and refining all themes, each theme and subtheme was named.

Each theme name was chosen carefully to reflect the content of the theme. All resulting themes and subthemes were reviewed by the researcher’s supervisors for validation purposes.

CHAPTER 4: RESULTS

The following chapter presents the results of analyzing all participants' perspectives who have on-the-ground public health experience on STBBIs in Nova Scotia. Nine semi-structured interviews were conducted from May 2018 to September 2018 with senior public health officials among the four health zones. Six participants were interviewed at the central health zone and one participant was interviewed at each of the other health zones: northern; eastern; and western. An inductive, data-driven, analysis of questions number 1, 6, 8, 9, 10, and 11, along with a deductive, theory-driven, analysis of questions number 2, 3, 4, 5, and 7, resulted in four main themes. The first theme describes the factors that contribute to rising STBBI rates in Nova Scotia. These contributing factors are categorized into: 1) individual, 2) interpersonal, 3) community, 4) organizational, and 5) policy. Individual contributing factors are further subcategorized into demographics, behaviours, attitudes, beliefs, limited awareness and knowledge, and relocation. The second theme describes the preventative actions taken by the federal and provincial governments to tackle the rising STBBI rates in Nova Scotia. These actions are grouped into those initiated by the federal government and those actions put into place by the provincial government. The third theme describes the strategies and actions needed to reduce STBBIs in Nova Scotia. These strategies and actions are classified into those possible at the: 1) individual level, 2) interpersonal level, 3) community level, 4) organizational level, and 5) policy level. The fourth and final theme highlights participants' perspectives on testing for STBBIs in Nova Scotia. This theme touches on: 1) the effects of increased access to testing, 2) the importance of knowing the denominator, and 3) insights into HIV POCT, including benefits, drawbacks, provisions,

and lack of availability of HIV POCT in Nova Scotia. Themes and subthemes are presented in table (2).

Table 2: Themes and subthemes of the interviews

Theme	Subtheme
Contributors to STBBI Rates	Individual contributing factors: - Demographics - Individual behaviours - Individual attitudes - Individual beliefs - Limited awareness and knowledge - Relocation Interpersonal contributing factors Community contributing factors Organizational contributing factors Policy contributing factors
Current Preventative Actions	Federal actions Provincial actions - Interpersonal actions - Community actions - Organizational actions - Policy actions
Strategies and Actions	Individual level Interpersonal level Community level Organizational level Policy level
Perspectives on Testing	Effects of increased access to testing Knowing the denominator Insights into POCT - Benefits - Drawbacks - Provisions - Lack of availability of HIV POCT in Nova Scotia

4.1. Theme One: Contributors to STBBI Rates

This theme explains factors that contribute to the current rates of STBBIs in Nova Scotia. These factors were classified using the five levels of influence in the SEM. Thus, the contributing factors are presented in the following five groups: individual,

interpersonal, organizational, community, and policy. Examples of local contributors to high rates of STBBIs are shown in figure (12).



Figure 12: Contributors to high rates of STBBIs in Nova Scotia

4.1.1. Individual Contributing Factors

Study participants recognized a number of individual-level factors as contributing to the rising rates of STBBIs in Nova Scotia. Specifically, the following factors were identified: demographics, individual behaviours, individual attitudes, individual beliefs, limited awareness and knowledge, and relocation.

4.1.1.1. Demographics

Participants noted that STBBIs, especially chlamydia and gonorrhoea, are more common among younger age groups (specifically being in one's teens and 20s). However, they also affirmed that STBBIs are also common in older age groups. They suggested that late diagnosis amongst these older age groups, such as in HIV cases, may be a contributing factor to the rising rates of STBBIs in Nova Scotia. Participants proposed that separation between regular sexual partners in this age group may lead to engagement in new sexual relationships. These new relationships can lead to additional spread of STBBIs in Nova Scotia if a partner is infected. One participant noted, *"People that are in their 50s and their 60s in our new environment of second relationships and people that are out dating now after divorces or whatever"* (Participant 4).

Demographics have an impact on the risk for acquiring and transmitting STBBIs. Being a part of a marginalized population can increase the risk of an individual contracting an infection, and thereby contributing to the rise in the rates. Participants confirmed that marginalized populations have limited access to medical services, and therefore the spread of STBBIs among these populations is common. In addition, because marginalized individuals often lack social, emotional, and informational supports and companionship, their abilities to make healthy choices for themselves and their families are decreased.

4.1.1.2. Individual Behaviours

Many study participants reflected on MSM as a major risk factor to the high rates of STBBIs. For instance, MSM was a risk factor associated with the infectious syphilis

outbreak that occurred in Halifax 2009 – 2010. Participants perceived that anonymous sexual activity was occurring among this population throughout the province. Other factors such as lack of access to medical services, lack of use of protective barriers, and fear of stigma also likely contribute to the transmission of STBBIs within the MSM population. One participant said, *“I think that is a big driver for sexually transmitted blood borne infections in MSM”* (Participant 1).

Participants stated sharing needles among those who use drugs is another contributor to the transmission of some STBBIs such as HCV. Through the use of unclean needles and related injection equipment, people who inject drugs may pass STBBIs to another person. Participants declared that this behaviour is seen in correctional facilities where residents have no access to clean needles or safe injection facilities. One participant said, *“I see a major contributor to certainly Hepatitis-C is our lack of both harm reduction and treatment within our correctional facilities”* (Participant 8).

Participants recognized other risky behaviours as contributors to the rising rates of STBBIs in Nova Scotia. For example, they described engaging in unprotected sex practices as a facilitator to the spread of infections. They provided reasons for this behaviour such as people may not be sexually satisfied with the use of barriers, or even have no access to them. According to the participants, unsafe sex practices may also be exacerbated by other risky behaviours such as binge drinking. For example, one of the participants connected binge drinking among university students with acquiring STBBI through practicing unprotected sex: *“That kids who drink in university and get drunk are more likely to have sex which is unprotected sex”* (Participant 6).

Greater travel, both within and outside of the province, has also helped contribute to rising rates of STBBI. For example, within Nova Scotia, travelling to larger cities for the purpose of engaging in sexual relations has become more common in contrast with the past. This behaviour can lead to individuals bringing back infections to their rural communities. One participant said, *"I think people are much more willing to travel, so, I think it's definitely increase in risk behaviours"* (Participant 5). Some study participants affirmed that free times and vacations are facilitators to the spread of the infections if people engage in risky sexual relations during those times. They ascertained the rise of STBBIs rates after vacations especially among university students. For example, one participant stated, *"We could see spikes in chlamydia when the kids went home and came back from their vacations and stuff like that"* (Participant 6).

4.1.1.3. Individual Attitudes

Participants described changing attitudes around sexuality since the early 2000s as a contributing factor to the rising rates of STBBI in Nova Scotia. Specifically, they described how individuals underestimate the importance of safe sex practices such as using protective barriers. They suggested that because STBBI treatments are readily available, some individuals prefer to not use protection in favour of getting treated after symptoms occur. Participants provided an example about improved effectiveness and accessibility of HIV treatment. They suggested that people are therefore less concerned about becoming infected because they no longer see HIV as a life-threatening condition but instead see it as a chronic disease that can be easily controlled. One participant wondered, *"Are they choosing to not use the protection and then just use treatment as the*

option?" (Participant 3). Participants pointed out that this attitude is even more prevalent with bacterial infections because people see them as more easily treated.

Study participants also described peoples' worry to be examined by healthcare professionals as a contributor that may prevent them from seeking medical support especially if they were previously treated with judgemental or uncompassionate staff. Participants provided urethral swab as an example of diagnostic procedures that may prevent patients from being diagnosed and treated as they see it painful. One participant said, *"I think there's the stress of the professionals and the institutions and things like that"* (Participant 4).

4.1.1.4. Individual Beliefs

Individual beliefs were perceived as another contributing factor to the rising rates of STBBIs in Nova Scotia. Some participants suggested that individuals may believe that engaging in risky sexual activity will not result in any long-term complications. This can lead to the increased likelihood of those individuals engaging in risky sexual behaviour, such as unprotected sex, which in turn can lead to the further spread of STBBIs. One participant noted, *"There's a separation between cause and effect for people in terms of engaging in sexual activity"* (Participant 3). Additionally, participants described how some people assume that they are not at risk of contracting the infections and therefore do not adhere to safe sex practices. One participant stated, *"Even for people who may be part of our typical risk categories may not see themselves at risk for whatever reason"* (Participant 7). Lastly, some participants acknowledged that affected people may believe that they are disconnected from the healthcare system and they have no access to it. As a

result, those affected individuals may be less likely to reach out for medical care.

According to one participant, this belief reflects negatively on determining the provincial testing rate for STBBI and defining to what extent Nova Scotians are medically served.

One participant said, *“There’s probably some areas that we have illness that we don’t know about”* (Participant 3).

4.1.1.5. Limited Awareness and Knowledge

Participants recognized that there is a lack of knowledge about the methods of transmission of STBBIs, the methods of prevention, the seriousness and complications associated with the infections, the available health services, and the importance of healthy sexuality as a way of preventing the spread of these infections. Study participants also suggested that because the early stages of the infections are often asymptomatic, infected people might not be aware that they are infectious to others. Consequently, those individuals may not use barriers, whereas if they were aware of their infected state, they might choose to use protective options. One participant provided an example of such infections: *“chlamydia can often be asymptomatic”* (Participant 8).

4.1.1.6. Relocation

Study participants described how people relocate for various reasons such as retirement, work, or to live closer to their family members. They noted that if individuals are infected before they move, they can contribute to the spread of infections in their new communities. They added that relocation of infected individuals may give a false impression of high incidence rates in those communities. One participant said, *“Most of the cases that we are picking up are people that have been tested out of the province”*

(Participant 5). According to participants, communities that are attractive to young adults, have higher rates of STBBIs. One participant said, *"We see an influx of university students and military in Halifax and that tends to create some spread"* (Participant 1).

4.1.2. Interpersonal Contributing Factors

Study participants suggested that there are several interpersonal factors that contribute to the rise in STBBI rates in the province. Participants declared that the main interpersonal contributing factor to the increase in STBBIs in Nova Scotia is the perceived or actual stigma and judgement toward people who are seeking testing for STBBIs. Concerns about stigma and judgement can prevent individuals from getting tested and treated. Stigma was described by participants to be more prominent in small communities where everyone knows each other. Participants suggested that existing social norms in such communities may prevent people from getting testing because individuals do not want to be stigmatized by their communities. One participant said, *"They're smaller communities, whether it's rural or urban people in the rural areas, they're such small communities they don't want anybody to know if they get tested"* (Participant 5). Another participant confirmed, *"We haven't overcome the stigma or talked about sexuality so until we get that we're still, we're going to constantly have this interaction with the STBBIs"* (Participant 3). Additionally, participants recognized that affected individuals might feel judged by employees at healthcare facilities when they ask about the reason for the visit before seeing the physician. One participant affirmed, *"The stigma around sexually transmitted blood-borne infections not only by members of the public but also the healthcare community"* (Participant 4).

Another important interpersonal factor described by study participants was the role of social media. Social media (e.g., dating applications and social networking services) connects people and provides them with opportunities to engage in sexual activities. Participants described how these applications and networking services can also affect communities' ethics. For example, one participant stated, *"I do think social media has done both, it's increased information and availability around being able to have sex and it's also decreased a bit of the stigma as well around having sex, so and taking away from I guess I say traditional values of the past"* (Participant 6). Participants asserted that the effect of social media has been augmented by other changes in cultural norms such as increases in divorce rates, greater sexual freedom, and the growing perception of STBBIs as insignificant issues.

Participants provided an additional interpersonal contributing factor when they declared that many physicians do not have the required training to open a conversation about sexuality and STBBIs. Because of this lack of training, physicians may fail to initiate a needed dialogue with their patients about the topic. Therefore, one participant said, *"There's a lot of work I think that we need to do especially in the primary care community around education of primary care providers in their ability to have an open conversation with clients or patients around sexual health"* (Participant 4). Another participant stated, *"Healthcare providers are often even more adverse to asking, especially if the healthcare provider is younger than, you know you've got a 60, 65 year old woman or man you know almost that kind of generational difference that it's kind of impolite to ask those questions"* (Participant 7).

4.1.3. Community Contributing Factors

Community factors can also influence the rates of STBBIs. Study participants suggested that there is a lack of adequate communication between various provincial health authorities. Consequently, there is a lack of coordinated responses to the rising trend of STBBIs. One participant said, *"We tend to work in silos in the healthcare system"* (Participant 8). Additionally, participants noted that while community organizations, such as religious institutions and schools, are willing to discuss many public health issues with their clients, such as smoking and seat belts, they are reluctant to discuss the topic of healthy sexuality or sexual health promotion. Subsequently, lay people may not have access to information about healthy sexuality, which may lead to higher risk of exposure to infections. One participant stated, *"If we talk to some young adults and they say well yeah if I knew that before I was going out on a Friday night or whatever, it might change what I do"* (Participant 6).

Insufficient action by community organizations to support people who have been recently released from prisons was described by study participants to be another community contributing factor to the rise of STBBI rates. Participants believed that community organizations should communicate with each other to support individuals recently released from prison, both medically and socially. One participant said, *"Lack of coordination when people are discharged from a correctional facility to have appropriate healthcare supports whether it is primary care or supports/treatment for addiction issues and/or mental issues"* (Participant 8).

Following the infectious syphilis outbreak in Nova Scotia from 2009 to 2013, there was a dramatic drop in new infections. Study participants described two community-level actions as explanations for this drop. First, the NSHA conducted a campaign targeting populations at risk, including MSM. This campaign increased people's awareness about syphilis, the importance of adhering to safe sex practices, and the importance of testing. Second, the NSHA and a key STI clinic in Halifax coordinated their efforts in terms of increasing testing for and treating the infection. Some participants expressed their wonder about the drop of infectious syphilis rate as it was associated with the rise of other STBBIs rates. One participant said, *"I am not sure what the reason for the decrease in syphilis is, because it has occurred simultaneously with rises in chlamydia and gonorrhoea"* (Participant 1). However, participants declared that the main reason for the decreasing rates of infectious syphilis was due to higher testing rates, which were a result of the educational campaign and messages put out by the NSHA. Therefore, participants ascertained the importance of testing. One participant stated, *"Testing is part of a prevention response"* (Participant 7).

4.1.4. Organizational Contributing Factors

Participants described several organizational factors as contributing to the rising STBBI rates in Nova Scotia. Explicitly, participants related these factors to the insufficient financial and human resources in the province. One organizational factor is the shortage of physicians in Nova Scotia. The shortage of physicians means that sexual health clinics, as well as community clinics, are unable to meet the demand for consulting clients. According to participants, the shortage of family physicians has another drawback as it impacts peoples' ability to access to laboratory tests and infectious

diseases specialists. The alternatives are to obtain a referral from an emergency department physician, walk-in clinics, or sexual health clinic. However, obtaining a referral from these facilities is also challenging due to long wait time. As a result, people may not have access to appropriate tests/investigations or more specialized medical services. One participant said, *"Individuals do not have access to a family doctor for care and then it becomes very challenging to get in to see the infectious disease physicians because they need a referral"* (Participant 1). Participants acknowledged that the impact of insufficient funding is reflected in the difficulties faced by community groups who work with high-risk people to prevent the spread of infections. They confirmed that the lack of resources made it challenging for these community groups to provide their regular services. One participant said, "Our community groups that are on the ground working with risk populations they're not funded sufficiently and in a sustainable way" (Participant 7).

Participants also noted that people in rural areas might find access to testing challenging due to the lack of testing sites in their areas based on health authority decisions about location of services. Accordingly, patients may be required to travel to another location to be tested, which may not be feasible because of the long geographic distance between their homes and testing sites, or because they may not have access to transportation. Consequently, it may be difficult for patients to access treatment within a reasonable amount of time. One participant stated, *"I do not think that we have enough sexual health services in the rural areas"* (Participant 2). Participants described the prolonged lack of access to medical services to be one of the main contributors to the

rising STBBI rates. One participant noted, *"Longstanding issues around lack of access to healthcare, lack of access, therefore lack of access to treatment"* (Participant 8).

Study participants described some deficiencies in the Nova Scotian surveillance system. They correlated these deficiencies with the rising rates of STBBIs in the province. For example, they declared that causative factors remain unknown for an extended period because there is a long time between occurrence of infections and data collection. Therefore, evidence-based prevention efforts are delayed. One participant said, *"The challenge that we have, as you can see, this data is collected provincially but it is done on an annual basis, and it tends to be a year and a half to two years behind"* (Participant 1). Furthermore, participants recognized that harm reduction programs provided by the provincial government are not enough to mitigate the effects of infections and to reduce their spread. Therefore, one participant wondered, *"I mean we do a little bit around harm reduction for Hep-C, HIV, AIDS and stuff like that, but do we do enough?"* (Participant 6).

4.1.5. Policy Contributing Factors

Participants noted that current prevention policies are not enough to prevent the spread of STBBIs in Nova Scotia. They identified numerous deficits at this level, which have contributed to the rising rates of STBBIs in the province. Participants identified the lack of a provincial framework that addresses sexuality and STBBIs in the Nova Scotia context to be one of the main contributors. This lack of Nova Scotia specific framework leads to a lack of coordination when designing responses to the rising rates. They affirmed that many researchers and officials are looking at the problem, but their efforts

are not coordinated. One participant said, *"We have lots of good initiatives and people on the ground here and there, but things are kinds of fragmented"* (Participant 7).

Participants described the provincial health authorities' response to STBBIs as reactive rather than proactive. They rooted this response in the lack of sufficient financial and human resources. They characterized this reactive policy as including only treating cases, notifying partners, and conducting surveillance, without looking proactively at actions that prevent the occurrence of new incidences. One participant said, *"In public health, we know that we should be working further upstream and looking at the determinants and preventing a lot of these"* (Participant 5).

Study participants described the low ranking of sexual health on the government's list of priorities to be an additional contributor to the rising rates of STBBIs. This low ranking means that the government does not allocate much resources to address STBBI issues. Participants attributed the cause of this low standing to a lack of political will. Therefore, one participant stated, *"It may be that something nationally needs to happen first before it trickles down to the provinces and the local levels"* (Participant 6).

4.2. Theme Two: Current Preventative Actions

This theme presents the actions that are taken at both the federal and provincial levels of government to combat the continuously rising trend of STBBI rates. Study participants identified the following actions:

4.2.1. Federal Actions

Study participants stated that the PHAC provides guidelines and best practice information about STBBIs through the Canadian Guidelines on Sexually Transmitted Infections. These guidelines are directed to public health professionals and practitioners across the country to help them in diagnosing, treating, and preventing STBBIs. One participant said, *“Federal government, from the public health side, provides what I would call support around best practice information and sharing of best practice information across jurisdictions”* (Participant 1).

Additionally, participants stated that the federal government funds the National Collaborating Centre for Infectious Diseases. The role of this centre is to coordinate prevention efforts through creation of networks and partnerships to battle various infectious diseases, including STBBIs, in Canada. One participant noted, *“Through the national collaborating center of infectious disease, which is funded by the federal government, we have had some coordination across Canada using different strategies for addressing certain infections, especially syphilis”* (Participant 1).

The PHAC developed the national framework, the Pan-Canadian Framework on Sexually Transmitted and Blood Borne Infections, which aims to reverse the trend of rising rates of STBBIs and to work on eliminating their spread by 2030. This framework presents four pillars (prevention, testing, treatment, and support) on which each provincial government is expected to act. Study participants believed that utilizing this framework is important in directing the public health efforts in the province in this regard. In addition, they see it as supporting STBBI prevention efforts. One participant

stated, "The starting point is actually having something like the national framework that pulls all those different levels together and using that as our guide in Nova Scotia"

(Participant 8).

4.2.2. Provincial Actions

Based on the levels of influence within the SEM, current provincial preventative actions are classified into interpersonal, community, organizational, and policy actions (figure 13).



Figure 13: Current provincial preventative actions in NS

4.2.2.1. Community Actions

Participants described various community groups and Non-governmental organizations (NGOs) that work to prevent the spread of STBBIs in Nova Scotia such as the Mobile Outreach Street Health (MOSH) program that reaches out to underserved people and provides them with education and healthcare services. The provincial government works to prevent rising STBBI rates by funding some of those groups. In addition, it collaborates with some of these groups to connect high-risk individuals with healthcare programs that help to prevent the spread of STBBIs. One participant stated, *"We are working right now with MOSH and some of the other, some of the needle exchange programs to find out could we be offering some connection there"* (Participant 3).

Additionally, participants recognized the role of some groups that act as advocates to the government. Participants offered the example of the Nova Scotia Advisory Commission on AIDS that advises the government about HIV/AIDS and also supports collaborative activities related to STBBIs among provincial government agencies, academia, health professionals, the private sector, and community groups. This advisory commission connects government with the most affected patients and promotes stigma reduction. Participants appreciated the role of such groups in reducing the STBBI rates in the province. One participant said, *"I feel very fortunate in Nova Scotia that we have the Commission for HIV/AIDS who provide a significant leadership role in trying to advance this agenda and work with the community"* (Participant 4).

Study participants also expressed the value of the efforts of certain First Nations communities that contribute to the reduction of STBBI rates by either providing essential harm reduction services in their communities or by an abstinence approach. One participant said, *“Some of the First Nations communities prefer the abstinence approach and in some communities you can understand why they want that, because their poverty rates are so much higher”* (Participant 5). Participants described those initiatives as being primitive, however, they expect more contribution by those communities. One participant stated, *“Some First Nations communities are definitely starting to support and provide some harm reduction initiatives in terms of clean needles and distribution”* (Participant 5).

4.2.2.2. Organizational Actions

Study participants described various organizational activities designed to reduce the spread of STBBIs. They stated that the Public Health Services office within the NSHA follows up on cases to ensure that they are linked to the healthcare system, to confirm that they receive the appropriate treatment, and to ensure that sexual and drug partners of a case are notified if the patient does not notify them him/herself within a specific period. Therefore, the office is considered to have an interpersonal role as well. One participant said, *“In the case of syphilis or in the case of HIV, ensuring that they’re linked to care for anti-retroviral treatment to make sure their viral load is low”* (Participant 1).

Participants explained the role of two Nova Scotian health organizations during STBBI outbreaks. They affirmed that the NSHA (a provincial health authority) and the

DHW (a provincial government department) react by conducting surveillance to collect data that are later used to identify individuals at risk and to provide education and services to those identified groups. They remarked that data collected through surveillance are used to develop strategies and recommendations based on the needs of local areas. One participant noted, *"We do individual case investigation, case management, and contact management so there is some education being done with individuals"* (Participant 5).

Participants recognized the role of various organizations to educate people on healthy sexuality. They said that teachers at public schools educate their students about puberty and sexual health. Also, they stated that there are some awareness campaigns about STBBIs at universities to educate students about the risks of such infections. Moreover, participants mentioned that there are programs at correctional facilities to educate their clients on the importance of healthy sexuality and the methods of preventing the spread of STBBIs. However, participants commented negatively on such initiatives in terms of implementing the sexual health curriculum in schools. One participant said, *"We have a very good curriculum product, how it's actually delivered in individual classrooms is quite variable depending on the interest, the skills, the training that the teacher has had to deliver that curriculum in an effective way"* (Participant 8). Another participant stated, *"I don't think it's always proactive enough, sometimes it's a little bit more reactive"* (Participant 5).

Participants further described the inconsistency of prevention efforts across the health zones within the NSHA. For example, they defined actions of one health zone to decrease the risk of blood-borne infections. They said that this specific health zone works

with local municipal councillors to purchase kiosks which are used as safe drug injection sites in areas known with high rates of injection drug users. Also, they described another action in one health zone to promote testing and to prevent the harms of stigma. They declared that this health zone facilitates the transportation of individuals to testing sites away from their communities. Participants added that to promote testing for gonorrhoea, one health zone provides vaginal swabs to interested females so that they can self-collect the samples. This discrepancy makes people tend to go to a few select places for testing. Therefore, one participant said, *“We have different testing capabilities, it would be nice if we could standardize that across the province”* (Participant 1).

4.2.2.3. Policy Actions

Participants described several provincial policy actions to reduce the spread of STBBIs. One such action exists under the Nova Scotia Health Protection Act whereby healthcare providers are required to report specific notifiable diseases or conditions, including STBBIs, to the Public Health Services department. Study participants explained that because of this requirement, the department can help to prevent the spread of the infections. One participant said, *“Public health practitioners, when a disease such as an STI is notifiable under the Act, there is a response in terms of contact tracing, education of the client, from a population and an individual level”* (Participant 4).

Participants described how the provincial government works to increase the uptake of testing by funding sexual health clinics and testing providers in the province. Additionally, the provincial government funds treatment for people who do not have access to a drug plan, thereby ensuring that infected individuals receive treatment and do

not go on to pass the infections on to others. One participant said, *“I don’t think it’s widely known that if all else fails, public health will pay for your medication, so and it will”* (Participant 2)

The treatments for HCV and HIV infections have been shown to be effective at viral load suppression. As such, they are effective both as a treatment as well as a preventative method for further spread of the infections. One participant said, *“The suppression seems to prevent transmission which has really made a huge difference in the rates of new infections”* (Participant 1). Participants recognized the role of the provincial government in removing barriers to these treatments and thereby the government role in preventing the further spread of these two infections. Furthermore, participants ascertained that the provincial government funds pre-exposure prophylaxis for HIV (PrEP) because its efficacy in preventing HIV acquisition has been proven if taken continuously by an individual before exposure to HIV infection. One participant said, *“PrEP for HIV has been added to Nova Scotia Pharmacare which is good”* (Participant 7). As another preventative action, the provincial government funds HBV and human papilloma virus (HPV) vaccines for students at schools to immunize them against these infections at an early age and before they start engaging in sexual practices. Moreover, the provincial government provides vaccines to high-risk groups to further prevent the spread of infections. One participant stated, *“We provide vaccines, there are some publicly-funded vaccines for people who are involved in risky behaviours”* (Participant 5).

The Nova Scotia Department of Education and Early Childhood Development also has a role in the prevention of STBBIs. Participants discussed how the department

includes curriculum for students in grades four to six that addresses sexual health.

According to one participant, *"A big emphasis was in the development of the sexual health book that has been continued to be supported throughout the province, so that was in development in 2005 but that's still a living document, it's still updated constantly, and we're continuously still supporting that in the schools"* (Participant 3).

Participants described that because an infected mother can transmit pathogens to her fetus, the provincial government has a policy that all pregnant women be routinely screened for STBBIs in order to be able to diagnose and treat infections and to prevent maternofetal transmission of pathogens. One participant noted, *"We ensure every pregnant woman has an STI test that's one very small window in a woman's life"* (Participant 3).

4.3. Theme Three: Strategies and Actions

This theme presents numerous strategies and actions described by study participants to enhance preventative efforts and to reduce the spread of STBBIs in the province. The needed strategies and actions were classified into five levels using the SEM (figure 14).



Figure 14: Strategies and actions needed as seen by study participants

4.3.1. Individual Level

The individual level of action is intended to facilitate changes through influencing an individual's behaviours, beliefs, attitudes, and knowledge.

Participants suggested the main action needed at the individual level is to educate people about STBIs, including the methods of spreading infection, manifestations, and prevention techniques. Participants described the importance of making sure that people understand the complications associated with those infections and the extent to which

those infections may affect their lives and communities. They suggested that it is crucial for everyone to recognize they may be at risk of acquiring a STBBI. Participants further noted that people should understand the importance of testing, especially among high-risk individuals. One participant noted, *“If they are still taking those risks, they would at least understand testing and testing would be easy for them”* (Participant 3). Additionally, participants affirmed that people must understand treatment is a form of prevention and therefore the cornerstone to saving many lives. It is equally important that people recognize that testing and diagnosis must precede treatment. Participants recognized various educational methods as described in a later corresponding section.

Participants also insisted that people must be made aware of the rising trend of STBBIs to prompt them to seek out more information and solutions. One participant said, *“Parents will be saying well what are my children learning in school or what’s happening over here? Why are we not investing?”* (Participant 7). They suggested that this, in turn, would lead to the formation of a political push to solve these issues, which they see as the main driver for getting politicians to act.

4.3.2. Interpersonal Level

Interpersonal level actions are intended to facilitate changes by influencing conversations and interactions between individuals. They are also meant to promote changes to current cultural norms such as standards, expectations, and rules within a community.

Participants described the initiation of conversations about sexuality in a non-discriminatory manner as the main action that should be carried out at the interpersonal

level to decrease the rising trends of STBBIs in Nova Scotia. Participants declared the importance of discussions about sexuality between people and their healthcare providers as well as between students and their teachers. They also emphasized the role of families in creating conversations about sexuality with their children, as a way to protect them from the risk of infection. Participants also described how healthcare providers, teachers, and interested individuals should receive training on ways of initiating these conversations. One participant stated, *"I think some of these issues are not the comfort zone for a lot of physicians and others in the province"* (Participant 7). Participants recognized being able to have these types of conversations is an important step in combating stigma. With decreased stigma of these topics, interested individuals would be able to engage in useful and honest discussions with experienced and trusted people, freely and without judgement. Participants also recognized that changing cultural norms in a way that normalizes conversations about sexuality would be valuable. By normalizing conversations about sexuality, individuals will have greater opportunities to speak more on the topic. This is especially important for people who are at higher risk of acquiring the infections. For instance, one participant noted, *"We need to continue that education and the normalization of the conversations in our youth"* (Participant 6).

Study participants described another strategy to combat the rise of STBBIs. They highlighted the importance of utilizing social media to spread prevention messages and describe the consequences of STBBIs, thus illustrating the importance of testing and treatment. One participant stated, *"I think if social media has played a part in getting us to where we are at with STBBIs, I think social media can play a part in reducing them as well"* (Participant 6). This strategy is expected by those participants to be successful

because social media is widely used, especially by youth and young adults who are at higher risk of acquiring these infections.

Lastly, because alcohol and drug use are associated with risky sexual behaviour and thereby greater risk of acquiring a STBBI infection, participants described addressing binge drinking and drug use as part of the needed cultural change. One participant stated, *“The culture of alcohol and drugs in Nova Scotia and our ability to begin to look at that and the connectivity of that as it relates to our increased rates of STIs is really important”* (Participant 4).

4.3.3. Community Level

Community level actions are intended to facilitate change by influencing the conversations between community institutions. These conversations represent potential sources of community communication and support.

Participants indicated the importance of engaging various local sectors in a discussion about the incidence of all STBBIs. This was seen as a way to encourage the provision of comprehensive and coordinated services to the public. One participant stated, *“I think that conversation will be rich with opportunities that we can take and move forward”* (Participant 6). Participants regarded the conversations between public health, primary care, provincial health authorities, and non-healthcare sectors as essential to undertaking the needed actions and strategies that may change the conditions in which people live, which have led them to be at higher risk of contracting STBBIs. Participants also believe that these conversations could potentially lead to the development of a comprehensive plan to educate people on sexuality and STBBIs in community locations,

such as schools and universities. Participants noted that focusing efforts solely on the healthcare model is not enough and that having a clear understanding of the social factors that contribute to the problem is imperative. One participant stated, *"The ability even to prevent within the healthcare paradigm is limited, so ultimately it understands what the social factors and contexts which are contributing to this ongoing increase in STBBIs"* (Participant 8).

4.3.4. Organizational Level

Organizational level actions are intended to facilitate change by influencing organizational systems such as local health authorities, community health clinics, universities, and community-based organizations, and other potential sources of organizational support.

According to study participants, one of the most critical actions needed at the organizational level is to have an efficient surveillance system that can collect and report data in a more timely manner. Participants believed an effective active surveillance system would enhance the ability of public health organizations to understand risk factors and risk conditions, determine populations at risk, and anticipate problems. Consequently, this would enable more proactive approaches to prevention, testing, and treatment. One participant said, *"We need a sustained surveillance plan to ensure that we're closing the loop on collecting, seeing the increase in rates, collecting the risk factor information and then taking public health actions"* (Participant 1). Participants described how Panorama, a new surveillance system that collects and shares information related to the public health nationally, could improve the current surveillance system.

According to participants, if the government supports provincial community clinics to conduct STBBIs tests, positive results would be centralized whereby patients' histories and risk factors would be reported instantly to the public health department. One participant said, *"I think we need just to support the network of community clinics that we have in the province or even other healthcare providers around being able to offer these tests and that way it can be the sort of centralization can happen after a positive test occurs"* (Participant 1).

Participants emphasized that primary care physicians need to receive appropriate training on preventing, testing, and treating such types of infections. They also need to be trained on how to initiate a conversation with people on healthy sexuality and STBBIs, provide pre-and post-test counselling, and how to offer PrEP. One participant said, *"If someone can't have an open conversation with me then the testing is only as good as the result, but I'm left with the result without the care and support and the treatment that should follow the testing"* (Participant 4). To normalize conversations about sexuality and STBBIs with the public, participants recommended the NSHA and the DHW work with Nova Scotians to shift their ideas about the topic. Participants believed this would encourage testing, treatment, and consequently, prevention. This change in the common perception of STBBIs is required to achieve the national goal of reducing those infections by 2030. Participants again noted the importance of having testing aligned with other services, such as education on the topic of sexuality and support with regard to harm reduction programs. Also, they stressed the importance of having patients feel safe. One participant stated, *"We have to align it with you know confidentiality, the respect, the privacy, and breaking down the barriers"* (Participant 4). Participants went on to

describe the importance of offering such services in a caring, compassionate, non-discriminative manner by dedicated staff.

As HIV POCT could be offered through various organizations, such as community clinics, pharmacies, community-based organizations, and youth health centres, participants suggested that researchers at universities should conduct local pilot studies to determine the effect of using HIV POCT on testing rates at such organizations. One participant said, *"Do some more of that locally to see what might work here and then if it's working let's scale that up. If it's not, look at why and make some changes"* (Participant 7).

Participants described the importance of engaging people with lived experience with STBBIs and/or associated risk factors in conversations with health authorities to build good relationships with high-risk populations and to increase high risk groups' trust in the healthcare system. It would also be helpful to engage high-risk populations and learn from their experiences, which could be beneficial in developing consistent protective strategies. One participant said, *"We need to engage those folks that are being affected cause they probably have lots of good ideas and whether they are plausible or not, I do not know, but at least it is a place to start"* (Participant 6).

4.3.5. Policy Level

Policy level actions are intended to facilitate change by influencing the activities that can implement existing policies or initiate new policies in relation to, for example, STBBI testing policies.

Participants discussed the importance of getting the topic of STBBIs higher on the NSHA and the DHW priority list. Specifically, participants noted that the NSHA and DHW should also regularly revise health protection policies to ensure they are current, updated, and evidence-based, work collaboratively with all partners, and modify actions according to the needs of the population. One participant noted, *“The more that we can align and embed these initiatives into the broader priorities and initiatives within the health authority, within the DHW, we could, I think would facilitate the comprehensive response”* (Participant 7).

Given that there is no provincial framework to address healthy sexuality, including STBBIs prevention, study participants declared the importance of utilizing the national PHAC framework as a starting point. Participants believe that if they use the pillars of prevention, testing, treatment, and support, the NSHA and the DHW will have more opportunities to fill the gaps in their work and to link public health with primary care. One participant said, *“All those pieces there that we need to pull that together and then to move forward is work to say what is in the national framework and then what is needed and how do we advance all those areas at a provincial and local level here in Nova Scotia”* (Participant 8).

Study participants noted the importance of investing time and money into having broad conversations with all partners, including: NGOs, First Nations communities, those living with HIV or other STBBIs, and people from high-risk populations. Those conversations would help to develop a proactive, comprehensive, and coordinated approach to sexual health education, harm reduction, improving access to testing, providing treatment, combating stigma, and improving individuals' social factors. One

participant said, *"It needs some investment from all levels of government to sit down and have a conversation, look at our current data, evidence, our incident rate and come up with some realistic ideas"* (Participant 6). Participants stressed the importance of turning such conversations to actions. Therefore, they suggested such an approach would need to be well coordinated so as to have continuous follow-up on the intended progress and to ensure the collaborative work of all partners. One participant said, *"We've got to make those come alive versus have the conversation"* (Participant 3).

Participants emphasized the need for increased access to STBBI testing and treatment in all of Nova Scotia. Participants recognized that the inability to access these services is the main problem and a huge barrier to the prevention of the spread of these infections especially in underserved areas. One participant stated, *"We need probably more sexual health services beyond the urban core of Halifax"* (Participant 2). However, to increase access to such care, participants mentioned that financial and human resources in the province should be sought to provide more testing programs and to improve the access to care. One of the suggested strategies to increase access to testing in the province is to use non-traditional testing methods such as HIV POCT. Participants recognized that HIV POCT can reach people in their local areas where affected individuals may otherwise not have the necessary resources to be tested. Additionally, participants recognized HIV POCT as a potential harm reduction tool. One participant said, *"Access to the POCT you know another opportunity to understand and for people to have a sense that something is available to them"* (Participant 4). To achieve equity among Nova Scotians, participants stated that screening methods should be standardized across the province. Accordingly, people would have access to the same tests wherever they are

located in the province. Additionally, participants suggested extending testing for HCV infection to include more people as this strategy increases the likelihood of diagnosing asymptomatic cases. One participant stated, *“We should be leaning towards the guidelines that they use in the US where they recommend screening for people born of a certain age, as opposed to just injection drug users or MSM”* (Participant 5).

Participants stated that broadening immunization strategies would be another approach to tackle the rising rates of the infections in the province. If more people are immunized, more infections could be prevented, especially in high-risk populations. They emphasized the importance of enabling people to access vaccines. As an example, one participant wondered, *“Could we be providing HPV vaccine to people that are HIV positive as well? Could we broaden that out to make it, to possibly be catching a bigger net with some high-risk populations?”* (Participant 3).

Reaching out directly to affected individuals has been recognized by participants as a needed strategy to increase testing and access to services. One participant provided an example on the strategy of one healthcare centre in one health zone on providing its services to high risk individuals. That participant said, *“It’s providing those services where those folks are and not expecting them to access services the way maybe you or I would access services”* (Participant 5). Participants noted that one method to deliver services to people at their locations is to utilize a mobile bus that could be operated in the province.

Educating students at schools on the importance of healthy sexuality and the consequences of acquiring an STBBI was recognized by all participants as another essential strategy to reduce the rates of STBBIs. Participants believe that a policy to

normalize sex education at schools and expand the discussion about this topic in schools' curricula, would result in students learning more about sexual health in a way that would decrease their likelihood of getting an infection. Therefore, one participant said, *"We would love for every school to have the best education around STBBI prevention"* (Participant 3). However, participants emphasized the importance of the proper selection of teachers that teach this topic, so as to gain favourable outcomes and to avoid misinformation.

To conclude policy needed actions, participants affirmed the importance of improving peoples' determinants of health as a solution to the problem. One participant said, *"They need the income, they need the education, they need the environments to really enable them to access the services and to be supportive in their choices"* (Participant 5).

4.4. Theme Four: Perspectives on Testing

This theme presents participants' views on increased access to testing for STBBIs and current testing problems. Also, it describes their views on HIV POCT as a testing method that has been licenced and used in Canada since 2005 and not yet used in Nova Scotia or the Maritime provinces. Accordingly, this section is further categorized into three subsections: effects of increased access to testing, knowing the denominator, and insights into HIV POCT.

4.4.1. Effects of Increased Access to Testing

Participants noted that increased access to testing would result in increasing rates of infections because more cases would be diagnosed. They further noted that eventually,

STBBI rates would decrease as positively diagnosed cases would be treated and the spread of the infections would lessen. One participant said, *"I think you would see that the rates would go up because I think that we only know currently tip of the iceberg"* (Participant 2). Participants declared that greater access to testing is an integral part of a preventative response because both positively and negatively diagnosed cases are given the opportunity to be counselled on the methods of prevention. One participant stated, *"I think increasing the access to testing gives us an opportunity to actually provide counselling as well on the frequency of testing, which can in the future result in picking up infections earlier"* (Participant 1). Additionally, high-risk individuals would have the opportunity to be connected with healthcare providers. Participants stated that testers could be counselled on the use of PrEP for HIV, which would be a step toward achieving the global target of this infection by 2020. One participant noted, *"We now have PrEP as a viable option for a larger number of people financially, you know sanctioned by the government, we can offer PrEP to people who test"* (Participant 7).

On the other hand, participants described the disadvantages of increased access to testing. They suggested that people might come to rely on testing and treatment of STBBI rather than adherence to safe sex practices as a sort of prevention. Given the ease of accessing treatment, people may not worry as much about getting the infection. One participant said, *"I think sometimes it has a negative effect when you have increased access to testing, the prevention message also gets lost"* (Participant 4).

4.4.2. Knowing the Denominator

Study participants declared that they have no accurate picture on the current testing rate for STBBIs in Nova Scotia. However, they recognized that knowing the total number of people tested is essential to be able to calculate incidence rates, interpret trends, and enable epidemiologists to detect a true outbreak. One participant stated, *“If testing rates have remained pretty stable, we probably have more evidence to suggest because these are brand new cases, they were previously undiagnosed, but if our rates have increased in testing, then perhaps this is an impact”* (Participant 7). However, participants pointed out that the Public Health Department does not have access to the testing rate because testing laboratories report only the number of positive cases to the department. One participant said, *“If someone does not test positive for a disease, then we do not have a legal or ethical reason to look at an individual’s testing results”* (Participant 1).

4.4.3. Insights into HIV POCT

4.4.3.1. Benefits

Study participants described many benefits of using HIV POCT. They believed the use of this testing technology would enable people living in rural and medically deprived areas to have access to testing. They suggested that geographically closer access would motivate people who had never been tested before to get tested. One participant said, *“I think there’s a population that POCT can work really well and I think we need to explore the investment there”* (Participant 3).

Participants recognized the ease of HIV POCT as another benefit to this testing method. They affirmed that medical professionals are not required to complete extensive training to be able to offer this test. Therefore, they suggested that HIV POCT could be offered by community-based organizations, pharmacies, or community clinics. One participant stated that HIV POCT can *“Expand where people can go and how they can get it”* (Participant 7). One participant noted that this is especially important in the Nova Scotia context where there is a shortage of physicians. *“Absolutely it would increase access in areas where there are no physicians”* (Participant 6).

Another benefit recognized by participants is the fact that HIV POCT provides an initial result during the same visit as the test itself. However, those with reactive test result will still be required to undergo a standard HIV confirmatory test. This may help reduce the spread of the infection because those who have a reactive HIV POCT result can be referred to treatment and care. One participant noted, *“It is quick, you know I think it takes like 20 minutes to get the test done and the result”* (Participant 5). Some participants asserted that POCT technology could be even more beneficial if more than one STBBI to be tested for at the same time. One participant said, *“There are multiplex platforms as well too so you can screen for more than one at a time and I think that would be very acceptable to people”* (Participant 7).

4.4.3.2. Drawbacks

Although many benefits were listed by participants, some participants identified drawbacks to using HIV POCT. Participants affirmed that the results obtained through HIV POCT must be confirmed with other conventional HIV tests. One participant said,

"They still need to be validated with an actual blood test" (Participant 8). Participants commented on another drawback whereby they expressed their concerns around inequity if HIV POCT is only available for a fee and whether certain cohorts of population would then have access to it. One participant wondered, *"Our Indigenous populations, our African populations in Nova Scotia, MSM, our gay men, with those population groups would POCT work for them?"* (Participant 4). Because training to use HIV POCT is not extensive, an initial diagnosis can be provided by medical professionals who may not necessarily be able to follow up with appropriate treatment or counselling. One participant noted that it is unethical to provide a patient with a reactive test result if the healthcare professional is unable to provide the healthcare needed. That participant said, *"It's sometimes a challenge we face in public health for many diseases, not just STBBIs, if we're enabling people to be diagnosed with a disease but not enabling for them to be readily counselled on what the meaning of that and the treatment options that may or may not be available to them"* (Participant 1).

4.4.3.3. Provisions

Study participants discussed certain provisions that would need to be met in order to reap the full benefits of using HIV POCT in the province. Participants noted that HIV POCT should be linked to care, such that individuals who receive the HIV POCT would have access to pre and post counselling along with their results, as well as be treated if necessary. One participant questioned, *"While I think it is incredibly important as a tool, what needs to be built around that tool to support the individual?"* (Participant 4). Relatedly, health professionals chosen to be able to provide HIV POCT would be required to fully understand the effects of the results on the individuals who are tested in

order to direct them appropriately. One participant noted, *“People need to feel safe and that they’re not going to be judged negatively”* (Participant 7).

However, seven of nine participants declared that having HIV POCT as a testing tool in the province would be beneficial, especially if associated with the provisions discussed. One participant stated, *“I think it would be part of that toolbox around testing and the importance of being able to have testing”* (Participant 4). Though, one participant declared uncertainty about the full impacts and usefulness of the HIV POCT, as it is not yet used in the province, and stated, *“I think yes, and then I think no, I do not know, it is just going to, it may just send them for more testing, I do not know”* (Participant 6). Another participant emphasized that HIV POCT should be associated with other actions as there are no major impacts on preventing the spread of STBBIs by using a single method. That participant said, *“We need to look at that carefully, there may be advantages, but there's no silver bullet, there's not one thing that's going to be, all of a sudden be the kind of a magic answer”* (Participant 8).

4.4.3.4. Lack of Availability of HIV POCT in Nova Scotia

Participants identified four reasons why HIV POCT is not currently available in Nova Scotia. First, there is a lack of communication and outreach about HIV POCT; accordingly, people are unaware of this testing technology. One participant stated, *“I do not think there has been enough awareness made around the POCT, which might be part of the problem or part of our strategy that we need to engage folks in”* (Participant 6). The second reason is that STBBI is not on the government’s list of priorities. For example, one participant said, *“When you look at what the public health priorities are for*

the next year or two years, you know it's not on there" (Participant 6). Participants noted a third reason being the lack of a billing code for the testing kits of HIV POCT, meaning this is not covered by the Nova Scotia Medical Services Insurance. One participant noted, *"Testing is covered, but the test kits are not"* (Participant 7). The final reason related to issues around equity as many people may not be able or willing to pay the cost of this testing technology. As described by one participant, *"I think there's definitely some financial, so unless we were actually passing the cost on to the patient or the client, which does you know bring up the whole equity issue"* (Participant 7).

CHAPTER 5: DISCUSSION

In this chapter, the four themes presented in the results section are discussed. I also present the strengths and limitations found within this thesis. Finally, I provide suggestions for further research directions that could be explored in the area of STBBIs in Nova Scotia.

5.1. Theme 1: Contributors to STBBI Rates

One of this study's objectives was to explore the local factors that contribute to the rising STBBI rates in Nova Scotia. Several factors were identified as contributors to these rising rates. This section discusses those factors according to their corresponding level of the Social Ecological Model.

5.1.1. Individual Contributing Factors

Demographics such as age and income act as determinants for acquiring STBBIs. Participants of this study described young age groups as being the group most likely to be exposed to these infections. They noted that teenagers and young adults are at high risk because they may practice unprotected sex with multiple sexual partners. This risky behaviour is further aggravated by insufficient knowledge about the methods of transmission of pathogens or means of prevention. Young adults' lack of knowledge could be related to their lower use of sexual health services as described by Cassidy, Steenbeek, Langille, Martin-Misener, and Curran (2018) who found that university students at two Canadian universities did not sufficiently utilize available sexual health services on campus. Middle-aged and older adults are also at risk of acquiring STBBIs if

they practice unprotected sex with high-risk casual partners. Many researchers (e.g., Thomas, Lansky, Weiner, Earp, and Schoenbach, 1999; Raj et al., 2007) discussed the behaviour of non-condom use among various age groups including middle and older age populations. However, Sanders et al. (2015) provided a rationale for this behaviour as they declared that erectile dysfunction may prevent middle-aged men and young men with condom associated erection problems from using this protective method. Therefore, erectile dysfunction topic should be taught to healthcare providers who can then prescribe medications to remedy the situation (Athanasiadis et al., 2006). Rabathaly and Chattu (2019) added an additional explanation for high rates of the infections in older age groups as they ascertained that current sex education messages are directed more toward young adults rather than higher age groups.

Another demographic factor reported by participants is how poverty and unemployment may lead individuals to engage in sex work to earn an income. This finding matches with the findings of Parker, Easton, and Klein (2000) who described poverty as one of the factors that increase peoples' vulnerability and the findings of Ntumbanzondo, Dubrow, Niccolai, Mwandagalirwa, and Merson (2006) who found that some sex workers may even negotiate not using condoms for more money. Notably, on the 2016 census data, Nova Scotia had the highest rate of poverty (17.2%) among Canadian provinces, where 155,000 persons were considered low income (Nova Scotia Advocate, 2017). Also, according to the Nova Scotian Finance and Treasury Board, the unemployment rate in the province was 7.7% in October 2018 (Government of Nova Scotia, 2018b).

Individual behaviours were described by participants to be the most significant contributing factors. Based on a thematic analysis of all responses, individuals' engagement in unsafe sex practices is the most prominent factor at this level. Participants perceived three main reasons for this behaviour. The first reason described was dissatisfaction with the use of barriers (e.g., male condoms), as the use of such barriers may impede the desired sexual pleasure. This finding is in agreement with those of Higgins, Hoffman, Graham, and Sanders (2008) who affirmed that the use of male condoms is the most common cause for sexual dissatisfaction. Young adults may use condoms with the intention only to prevent pregnancy, and not to avert STBBIs (Blanc & Rojas, 2018). Accordingly, those young people may acquire STBBIs by engaging in unprotected sex where there is not a risk of pregnancy, including oral sex (Yang et al., 2015). The second reason suggested as leading to the engagement in unsafe sexual practices was the availability of treatment for many STBBIs. Because treatment is readily available, study participants proposed that many people felt the risks involved with acquiring the infections were lower, thus underestimating the significance of contracting them. This matches with the findings of other researchers such as Hogan and Salomon (2005) and Crepaz, Hart, and Marks (2004) who proposed a direct relationship between risky sexual behaviour and the availability of ART, whereby the availability of treatment actually promotes risky sexual behaviour. However, participants' perceptions of this relationship must be taken with caution because this study did not include the perceptions of people who engaged in risky sexual behaviour or people who had obtained STBBIs. Researchers such as Risher, Rehle, Simbayi, Shisana, and Celentano (2016) found that people using ART were actually less likely to engage in risky sexual behaviour. The third

reason considered as contributing to engagement in unsafe sexual practices is the lack of public awareness of the sequelae of acquiring STBBIs; therefore, people do not sufficiently recognize their hazards and complications. This reason corresponds with the WHO (2012a) report on the importance of educating people on the consequences of those infections.

Study participants also described the potential influence of engaging in new unprotected sexual relations after divorce or the death of one's regular sexual partner to increasing the risk of STBBI acquisition. This result is in accordance with McKay, Quinn-Nilas, and Milhausen (2017) who ascertained the association between divorce/separation, condom use, and acquiring infections, especially among males. Notably, according to the Canadian Finance and Treasury Board (2015), the divorce rate in Nova Scotia was 5% in 2015, a rise from 3.9% in 1996. In addition, the widow rate increased to 6.1% in 2015 from 5.6% in 1996 (Finance and Treasury Board, 2015).

Similar to the findings of several other studies (e.g., Beyrer et al., 2012; Burchell et al., 2015), MSM behaviour that relies on anal sex was described as a common risk factor in acquiring STBBIs, including HIV as declared by CDC (2018b). The reason is related to the transmission of pathogens through injuries that can occur during anal intercourse, given that the lining of the receptive anus is thin (CDC, 2018c). Even if a condom is used, condom breakage may reach 2% and can lead to transmission of pathogens (Shaeffer & McNabb, 2018). Further, HIV infection seen among the MSM population predisposes them to acquire other STBBIs. For example, Burchell et al. (2015) declared that infectious syphilis rates are over 300 times higher in HIV-infected

MSM. The effect of MSM behaviour is augmented by other factors such as access to healthcare and receiving PrEP as discussed in a later section.

Other individual behaviours recognized by participants as contributing to high STBBI rates were binge drinking and injection drug use. Participants described how individuals who engage in binge drinking may be at higher risk for contracting STBBIs because they may have unprotected sex involuntarily. Notably, decision making with regard to sex is impaired by alcohol use especially if sexual stimulation exists (Scott-Sheldon et al., 2016). This finding is in accordance with the report published by the PHAC (2015), which states that binge drinkers are prone to self-induced harms including STBBI acquisition. This finding is further supported by the findings of Flegel, MacDonald, and Hébert (2011) who affirmed the negative impacts of binge drinking on sociality and sexuality. Participants confirmed that binge drinking is commonly seen among young adults, and therefore contributes to the high incidence rates of STBBI in this age group. This finding agrees with the results of Makenzius and Larsson (2013) who ascertained the mutual association between alcohol drinking and sexual intercourse in young age groups.

Injection drug use is a behaviour that was recognized by study participants as a common method of the transmission of blood borne pathogens, such as HCV and HIV. Transmission of pathogens is caused by sharing unclean needles; therefore, transmission of pathogens is more common among populations that do not have access to clean needles or supervised injection sites, such as prisoners. As described by researchers (e.g., Mezaache et al., 2018), unsafe injection practices are a well-known method to transmit viral infections among drug users.

5.1.2. Interpersonal Contributing Factors

At the interpersonal level, participants described various factors that contribute to the rising rates of STBBIs in Nova Scotia. Geographically, the province is the second smallest of Canada's provinces and territories and has a large rural population. Therefore, participants perceived that much of Nova Scotians have conservative traditions and habits that make STBBI acquisition unacceptable and is considered to be a breach of values. As a result, stigma plays a vital role in the spread of STBBIs in Nova Scotia, whereby individuals may not seek testing or medical care to avoid stigma. Participants described another reason for stigma, by which lack of information on how STBBIs are spread may lead people to avoid dealing with infected persons. This attitude toward infected individuals was also found by Lieber et al. (2006) who described how people are extremely cautious when dealing with patients who are infected by STBBIs. These patients often find themselves socially isolated and discriminated against (Lieber et al, 2006).

Social media was seen by study participants as a useful tool in connecting people for various reasons. However, they ascertained that some individuals use social media to initiate anonymous sex through dating and sex applications, which can lead to unprotected sexual practices and thus increasing the risk of acquiring infections. Accordingly, social media was viewed by participants to be one of the contributors to high STBBIs rates in Nova Scotia. This finding is supported by the findings of many researchers (e.g., Enomoto, Noor, & Widner, 2017; Nadarzynski et al., 2019) who correlated the increase of STBBIs rates with the extensive use of social media. In a study conducted in the United States and New Zealand by Enomoto, Noor, and Widner (2017),

the authors found that STBBIs are more common among populations who use dating sites such as Match.com, OKCupid, and Down Dating. Further, they confirmed that dating sites are regularly updated, so as to match as many people as possible. Alloway et al. (2014) provided a rationale on why social media may contribute to the spread of STBBIs. The authors declared that social media allows individuals to be exposed to others who they would not otherwise meet (Alloway et al., 2014). Second, they proposed that frequent users of dating sites have less compassion for people (Alloway et al., 2014) and therefore may be less concerned about spreading STBBIs to them. Accordingly, people who are not concerned about the well being of others or are narcissistic (Widman & McNulty, 2011) may choose not to use protective barriers, and thereby spread these infections to their partners.

Lack of conversation and communication on the topic of healthy sexuality was described as an additional contributor at the interpersonal level. Participants described how many parents do not sufficiently discuss this topic with their teenagers because they may feel nervous to initiate such a conversation with them. Sexuality was described by Boone and Lefkowitz (2007) to be ranked lower in priority than other health-related issues in conversations between mothers and their adolescent children. Therefore, children grow up not receiving useful information on healthy sexuality from the person they should trust most in their lives. Additionally, many physicians do not initiate conversations about sexuality with their clients because they are either not well trained or feel awkward to speak with them about it. Participants connected this issue with insufficient training in medical schools on sexual health topics. A similar finding was described by Coleman et al. (2013) who quantitatively and qualitatively confirmed the

deficiencies of the sexual health curriculum at medical schools in Canada and the US. According to the authors, medical students and physicians are not well prepared to adequately address their patients' sexual health needs (Coleman et al., 2013).

5.1.3. Community Contributing Factors

Participants perceived three contributing factors at the community level of the SEM as influencing rising STBBI rates. First, there is an uncoordinated and reactive response from the government toward rising STBBI rates in the province. Further, there is inadequate communication between various governmental sectors to tackle the problem of STBBIs. However, incorporating all sectors is an important strategy to meet public health needs (Collins, Greenall, Mallouris, & Smith, 2016). As an example of the importance of solidifying actions toward a solution, during the infectious syphilis outbreak in Nova Scotia from 2009 to 2013, targeted efforts made by the local health authorities succeeded in reversing the rising rates of infectious syphilis. However, this was not the case with other infections, despite the similarity in the mode of transmission between infectious syphilis and other STBBIs. According to study participants, the rationale for this discrepancy is related to more testing for infectious syphilis than for other STBBIs and explicit sex education messages sent out by the health authorities to the public. However, other factors may be in place that assisted in the early diagnosis and treatment of infectious syphilis, including aggressive contact tracing for testing and treatment. Overall, four main strategies are needed to tackle STBBI outbreaks: expand on testing; aggressive contact tracing; educating people and physicians on the symptoms and signs of the infections; and strengthening the safer sex messages (Doherty et al., 2002).

The second community factor described by participants is the reluctance of some community organizations, such as religious institutes, in the province to discuss healthy sexuality in contrast with other public health issues (e.g., smoking). This attitude could be related to individuals' sense of discomfort to discuss this sensitive topic in their public realms. However, research has shown that religion can be useful in shaping sexual behaviours among its followers (Lee, Dancy, Florez, & Holm, 2013). For example, some religions prohibit practicing sex before marriage (Lee, Dancy, Florez, & Holm, 2013). Therefore, believers of these faiths may be protected from STBBIs by remaining abstinent. However, some other religions discourage their followers from using contraception (Romo, Lefkowitz, Sigman, & Au, 2002), thereby potentially exposing their followers to STBBIs unintentionally.

The third community factor described by participants as influencing the rising rates of STBBIs in Nova Scotia is insufficient social and medical support to specific populations, such as marginalized people and newly released prisoners. This finding matches with the findings of several researchers (e.g. Adelson, 2005; Van Den Tillaart, Kurtz, & Cash, 2009; and Browne et al., 2012) who confirmed health disparities among marginalized people because of health inequities. Participants proposed the cause of this gap in social and medical support to the inadequate funding received by associations that help these marginalized groups, to the extent that it challenges their existence. Notably, more research is needed to determine how to effectively increase services to marginalized individuals in Nova Scotia context.

5.1.4. Organizational Contributing Factors

Thematic analysis of interviewees' responses resulted in four organizational factors. First, there is a prolonged shortage of family physicians in Nova Scotia. This shortage is obviously seen in rural areas as many primary care providers prefer not to serve in underserved or remote locations (Miedema, Easley, Fortin, Hamilton, & Tatemichi, 2009). However, there are also shortages in central zone. Overall, the number of physicians in the province is decreasing as they either retire or leave the province for better income and lower taxes (Canadian Institute for Health Information [CIHI], 2016).

The second organizational factor described by participants is that Nova Scotians have few opportunities to be tested for STBBIs, especially in rural areas. Because there is a lack of family physicians, people do not have access to laboratory investigation requisitions, which are required by laboratories to conduct testing. In addition, other than the Halifax Sexual Health Centre, sexual health centres in the province do not test for STBBIs (NSHA, 2017). Accordingly, people may need to travel to other cities to be tested, which is often not feasible due to the long geographic distances and lack of access to public transportation, especially in rural areas (Robertdevet, 2017). While patients may be able to access STBBI testing in their local emergency departments and walk-in clinics, many people are not willing to wait for several hours to be seen. CIHI (2017) noted that emergency department wait times in Nova Scotia are increasing. This issue has been further exacerbated with closure of hospitals in Nova Scotia (Coates, 2019).

The third organizational factor described by participants is related to how the Nova Scotian notifiable disease surveillance system faces disparity between incident

times and data collection. It is possible however that data collection may be being collected in a timely manner, and the delay in taking action may exist around the analysis of the data or the distribution of results to stakeholders. As a result, evidence-based preventative efforts may be delayed. This is opposite of what should be a result of an efficient surveillance system as described by Lawson, Williams, and Williams (2001) whereby they defined an efficient surveillance system as having up-to-date health status reports about communities that lead to quick actions by public health authorities when needed, and the development of hypotheses in the case of outbreaks and epidemics. According to participants, one of the possible causes of this disparity in Nova Scotia is insufficient financial and human resources.

The fourth organizational factor described is how current harm reduction programs are insufficient in Nova Scotia. For example, there are no safe injection sites among the province that can prevent the spread of blood borne pathogens such as HCV and HIV. This is unfortunate because safe injection sites have been shown to be crucial in diminishing the physical, social, and financial impacts of STBBIs (Hilton, Thompson, Moore-Dempsey, & Janzen, 2001), in reducing mortality rates related to drug injection overdose (Bowers, 2017), and in educating IDU on safer injection techniques (Kral & Davidson, 2017). This lack of harm reduction programs could be related to insufficient financial and human resources. However, a proposal for a safe injection site has been made, accordingly, progress is being made on this issue.

5.1.5. Policy Contributing Factors

Numerous policy level contributing factors associated with the STBBI rates in Nova Scotia were highlighted in this study. One of these policy factors is that there is no provincial framework on how to address STBBI prevention in Nova Scotia. Frameworks are important because they can help to guide principles, prioritize issues, and organize actions within healthcare (Conway, McMillan, & Becker, 2006). The efforts made by local public health officials and investigators to reduce the spread of these infections have not yet sufficiently succeeded to achieve the goal of reducing all STBBI incidence rates. According to participants, the reason is related to absence of a provincial framework that can guide such efforts based on Nova Scotia's needs. This lack of guidance has led the NSHA and DHW to be reactive rather than proactive in their response to the problem. However, this reactive approach is exacerbated by impediments such as the delayed Nova Scotian surveillance system described by participants. Therefore, the provincial response to rising STBBI rates depends mainly on treating patients and notifying partners. Nevertheless, this tactic is insufficient because many cases with STBBIs remain undiagnosed and untreated. As an example, CATIE (2018) estimated that 14% of HIV cases were undiagnosed in 2016.

Another policy level factor described by participants as a contributor to the rise of STBBI rates is that there is insufficient government funding for prevention work. Findings of this study illustrate some reasons for low spending on STBBI prevention in Nova Scotia. First, there is a lack of political will from local decision makers to address the issue of STBBIs. This lack of political will has been reported globally (WHO, 2016b). Therefore, the World Health Assembly recommended building on political will

in its strategy on tackling STIs (WHO, 2016b). The World Health Assembly also recommended increasing funding on STIs prevention programs to reduce spread of the infections (WHO, 2016b). This building on political will should also include urging politicians to address efficiently the problem of stigma (WHO, 2012b). Second, costs associated with prevention work is a challenging factor especially with the lack of sufficient public health resources (Aral & Blanchard, 2012). Rinaldi, Kiadaliri, and Haghparast-Bidgoli (2018) declared the importance of the accurateness of cost-effectiveness studies to convince policy makers of the benefits of prevention programs. More studies are needed to determine the effectiveness and costs of STBBI prevention programs in Nova Scotia.

5.2. Theme Two and Theme Three: Current Preventative Actions; Strategies and Actions

One of the study's objectives was to determine what can be done to respond to the rising rates of STBBIs in Nova Scotia and eliminate their spread. This section presents the current actions put in place to prevent the rise of STBBI rates and compares them with additional strategies and further actions that are needed. Both current and potential future actions correspond to the five levels of influence of the SEM.

5.2.1. Individual Actions

Study participants expressed that interventions are needed at the individual level. The main point that participants stressed is that people should receive more education about STBBI rates in their communities, their modes of transmission, methods of protection (including testing and treatment), and the complications associated with

STBBIs. This finding matches with the findings of Siegel, Lekas, Onaga, Verni, and Gunn (2017) who reported that many of their study's participants engaged in unprotected sex because of their faulty concepts and strategies. Therefore, the authors ascertained the importance of sexual health education, especially among dating sites users (Siegel, Lekas, Onaga, Verni, and Gunn, 2017). Study participants argued that greater education would lead to an adjustment of individuals' behaviours, attitudes, and beliefs. Participants described how educating people on the rising trend of STBBIs would initiate a political drive, whereby voters would push their politicians to be more accountable for the rising rates of STBBIs and therefore act to address the situation with the aim of achieving lower rates of infections.

There are several ways to deliver information about STBBIs to Nova Scotians. However, Slovic (1986) declared that integrity of information and peoples' perceptions of hazards should be considered in communicating risks with public. One method is to use the internet and cell phone messages to educate people about STBBIs. Kang, Skinner, and Usherwood (2010) asserted that there are benefits of using the internet and cell phones to educate young adults on STBBIs and to raise their awareness about the importance of testing for the infections. This finding agrees with the findings of Levine (2011) who confirmed the usefulness of using new technologies to promote for sexual health among youth. Another way to deliver information about STBBIs is through mass media, such as addressing the issue on talk show programs. According to the research findings of Flora and Wallack (1990), many physicians use mass media to promote for health with a positive attitude. Another important method for delivering such messages is to reach students through symposiums at schools and universities, which may serve to

create an open discussion on the topic with people who are at high risk of getting the infection. In addition, mailing attractive postcards with messages and information about STBBIs to residences can serve to spread the word about STBBIs and could also be a way to normalize conversations about the infections between parents and their children.

5.2.2. Interpersonal Actions

The only current preventative interpersonal-level action described by participants is that the Public Health Office of the NSHA assists patients to inform their partners of their infections if the patients feel uncomfortable to do so. This action ensures that current and past sexual partners are informed of the likelihood of their infection, while also relieving patients from any embarrassment they may feel by sharing the information. This action prevents the further spread of the infections because patients' contacts are requested to be tested and, if they are infected, treated.

However, study participants believed that there are more actions needed at the interpersonal level. They see normalizing conversations about STBBIs among people as an essential step toward decreasing the spread of STBBIs. Participants stressed the role of families in initiating open conversations with their teenage children about the topic. Having such conversations between parents and their teenage children would provide youth the opportunity to speak openly with a person they trusted. This would also give parents the opportunity to direct their teenagers toward a healthy path. This theory matches with the findings of Taylor-Seehafer and Rew (2000) who recognized the presence of a caring adult as a protective factor from engaging in early sexual relations that may predispose to risky sexual behaviour. However, parents must establish a good

relationship with their teenagers in advance, so that adolescents feel secure discussing such topics with their parents and do not feel blamed if they have questions about the topic. This topic may be especially sensitive as there are usually tensions between the parent group and the teenage group because of conceptual differences (Solomon, Warin, Lewis, & Langford, 2002).

Participants asserted that more conversation about STBBIs in the community would lead to a change in the cultural norms, which currently trend towards avoiding discussing the topic. A similar finding was described by Gupta et al. (2015) who affirmed the lack of sufficient conversations on sexual health between youths and their parents and teachers in a way that fosters them to seek information from youth development professionals working at community-based organizations. Creating such conversations is an important step in reducing stigma, especially if paired with a reliable sexual health education (Katz, 2015). As these conversations become more common, people will start to consider STBBIs as just another public health issue that exists in their community without stigmatizing patients. As stigma decreases, people will also start to engage patients with STBBIs in the community's activities without fear of getting the infection. This engagement would be reflected positively on patients as they would not feel that they are rejected by their community.

Participants described how counteracting the effects of social media as a method of connecting people for sex through online applications is another necessary intervention at the interpersonal level. The effect of social media on rising STBBI rates is augmented by the development of specific geosocial networking applications that connect people who share similar interests within a certain geographic location, allowing for more

opportunities for individuals to physically meet. As an example, Lehmilller and Ioerger (2014) described in their study the number of MSM that met through smartphone applications for the purpose of engaging in sex was much higher than other methods used to meet for the same purpose. Consequently, these applications may provide more opportunities to spread STBBIs. This interpretation agrees with the findings of Phillips et al. (2014) who found the HIV prevalence rate among their MSM study population who used the geosocial networking applications in Washington, DC to be 13.1 %, with 23.4 % of those cases unaware of their infection. Social media could be an important tool to educate people about STBBI sequelae and complications, and how to prevent the spread of infections through testing, treatment, and using barriers as declared by study participants. This finding fits with the findings of Gabarron et al. (2019) who described Facebook advertisements to be an efficient and economical method for sexual health promotion among youth. Gabarron and Wynn (2016) found social media was efficient in promoting sexual health education. A reduction of STBBI rates is anticipated by participants if social media is used in this way.

5.2.3. Community Actions

Study participants stated that further actions are needed to broaden the conversations on STBBI prevention. They affirmed that conversations should include all parties concerned, including people infected with STBBIs. This finding agrees with the recommendations provided by several researchers (e.g. Birkhead et al., 2007; VanDevanter et al., 2002) who affirmed that collaboration between various departments and institutions is a recommended strategy to prevent the spread of STBBIs. Thus, the NSHA and the DHW must have more conversations with: 1) the Department of

Education and Early Childhood Development to update and to enrich the sexual health curriculum taught to students; 2) researchers at academic institutes with the aim of employing more researchers to serve increasing community needs; 3) NGOs concerned with improving the social and medical aspects of marginalized populations, in order to educate those groups on available health services in their areas and to promote for their health; and 4) the media to spread awareness of STBBI facts and prevention techniques to the public. In addition, the health authorities should collaborate with First Nations communities in this regard, given these communities often have several factors that accelerate STBBI spread including stigma, fear of loss of confidentiality, and beliefs (Wardman and Quantz, 2006). However, even with First Nations communities' limited financial resources and limited access to healthcare services (Lavoie, 2013), study participants appreciated the role that some of these communities play in providing basic harm reduction programs to their people.

5.2.4. Organizational Actions

The main actions presently performed by the provincial health authorities are surveillance, following up with cases, and the notification of partners. Study participants discussed how these actions benefit the community, but they highlighted the drawbacks of the current surveillance system and how it is unable to address the rising rates of STBBIs as discussed in a previous section. It is important to improve the reliability of the Nova Scotian surveillance system so as to be able to prevent the spread of STBBIs.

To enhance the surveillance of STBBIs, it is important to identify risk factors that predispose people to the infections. Behavioural surveillance was described by

Rietmeijer, Lansky, Anderson, and Fichtner (2001) to be beneficial in preventing the spread of STBBIs through early detection of risky behaviours. Behavioural surveillance can inform what types of prevention programs are needed and monitor the progress of these programs (McGarrigle et al., 2002). This type of surveillance can be operationalized through surveys directed to the general population and surveys targeted towards high risk population (McGarrigle et al., 2002). However, because this type of surveillance should be done on a regular basis and it needs regular update of questions, it can be a costly undertaking (McGarrigle et al., 2002). Early detection of outbreaks is also required to implement efficient actions (Farrington, Andrews, Beale, & Catchpole, 1996). Mostashari and Hartman (2003) recognized syndromic surveillance as a tool to confirm or to deny real outbreaks during their early stages.

However, to follow trends, epidemiologists need to know an accurate denominator to calculate rates. In this study, all participants were unable to provide a clear picture on the current testing rate for STBBIs in Nova Scotia because there is an absence of an exact denominator number for the equation. Therefore, participants urged that laboratories should provide all testing results, whether negative or positive, to the public health department in the province, in order to centralize STBBI data in Nova Scotia. Carmeli et al. (2007) see laboratory data centralization, whereby data pass from regional jurisdictions to a shared governance point, as a step toward achieving better public health outcomes in various conditions, including infectious diseases. Van Dyck, Behets, Crabbe, and Berkley (1996) also recognized laboratories' roles in supporting epidemiologists and public health systems through documenting infections. However, laboratories may have the legal right to refuse to report negative results to the public

health department. Therefore, the lack of coordinated laboratory information should be addressed by the government.

5.2.5. Policy Actions

Study participants identified that utilizing the Pan-Canadian STBBI Framework for Action is the most important strategy needed at the policy level. According to participants, the national framework would help compensate for the lack of provincial approaches in place that address the growing STBBI problem in Nova Scotia. The strength of the Pan-Canadian STBBI framework is that its four pillars (prevention, testing, treatment, and support) rely on proactive actions to enhance prevention, expand on STBBI testing, increase access to treatment, and increasing support to patients to ensure their inclusion in various life activities without judgement or stigma by their communities. Given that many primary healthcare providers do not address the topic of STBBI unless a problem arises with their patient, Nusbaum and Hamilton (2002) recommend the use of more proactive approaches to further remove barriers to sexual healthcare.

According to the national framework, multiple actions need to be implemented simultaneously to achieve a successful prevention strategy (Government of Canada, 2018a, p10). Thereby, behavioural changes should be accompanied by other measures including education, a broader, more inclusive immunization program, and additional harm reduction programs. Education is seen by study participants as well as researchers such as Nusbaum and Hamilton (2002) as a crucial step needed to prevent the spread of these infections. According to research exploring the degree of knowledge of sexuality

among high school students, there is a lack of information about several aspects of the topic among this group offered in school settings (Langille, Andreou, Beazley, & Delaney, 1998). Langille, Andreou, Beazley, and Delaney (1998) found that many students had little knowledge about the complications associated with chlamydia, including the risk of infertility.

Participants noted that the Nova Scotia Department of Education and Early Childhood Development formed a sexual health curriculum to raise school children's awareness about healthy sexuality. Teaching sexual health curriculum at schools was welcomed by many parents (McKay, Pietrusiak, & Holowaty, 1998; Weaver, Byers, Sears, Cohen, & Randall, 2001). However, Langille, MacKinnon, Marshall, and Graham (2001) described barriers to school-based sexual health education, including the dissociation between the material taught and personal relevance; judgemental attitudes of some teachers that could be associated with insufficient knowledge about the topic; and the topic being undervalued by some students. Hence, study participants highlighted the importance of proper selection of teachers to teach this curriculum.

Further, participants emphasized that education should also include raising peoples' awareness about the importance of testing. This finding is similar to the research findings of Dube, Harris, Gahagan, and Doucet (2017) who ascertained that educating youth on HCV/HIV testing would provide them with accurate information on the options of testing and treatment available to them. Notably, increasing access to testing and consequently to treatment would eventually augment prevention (Government of Canada, 2018a). Dodd, Garnett, and Hallett (2010) described the benefits of a "Universal Test-and-Treat intervention" for HIV prevention and the eventual decrease in costs of

providing ART. They suggested that everyone be tested for HIV annually and then treated immediately with ART if they are infected (Dodd, Garnett, and Hallett, 2010). However, this strategy can be negatively impacted by poor engagement in HIV care (Gardner, McLees, Steiner, del Rio, and Burman, 2011). All study participants noted that executing the national framework in Nova Scotia faces one main challenge: the lack of financial and human resources. Study participants stressed the need to increase current provincial funding for programs on sexual health. Further, it is essential to consider the strategies recommended by the framework within the existing context in Nova Scotia and adapt accordingly. As an example, the national framework recommends increasing access to all testing modalities including HIV POCT. However, this testing method is not yet used in Nova Scotia. Therefore, it is recommended to understand local barriers to HIV POCT use if we are to design approaches and strategies to support its availability and use in the province.

To ensure the success of the national framework, it is important to monitor the progress of each pillar (PHAC, 2018, p2). To monitor for behavioural changes, Konings, Bantebya, Caraël, and Bagenda (1995) used two indicators: proportion of people reporting sex with at least one non-regular partner in the past 12 months, and proportion of people used a condom during their last sexual intercourse with a non-regular partner. MacPhail and Campbell (1999) recommended combining qualitative indicators on psycho-social changes and the responses of communities to interventions with quantitative indicators such as STBBI rates and survey results concerning knowledge, attitudes, perception, and behaviour to determine the degree of success of employed strategies. Notably, further research on methods for monitoring the behavioural changes,

testing, treatment, patients' inclusion, and anti-stigma programs in the context of Nova Scotia are required.

5.3. Theme Four: Perspectives on Testing

All participants identified testing for STBBIs as an essential component for any strategy aiming to prevent the spread of such infections. The Pan-Canadian STBBI Framework for Action recommends expanding testing for STBBIs and recognizes the benefits of using HIV POCT to obtain preliminary diagnoses of cases and to reduce patients' fear of stigma from primary healthcare providers (Government of Canada, 2018, p11). However, there is less access to testing in small Canadian provinces, including Nova Scotia, where testing for STBBIs rely only on conventional testing methods (Kielly et al., 2018). In that way, there is no access to HIV POCT in Nova Scotia as a result of various factors including the lack of billing code, whereby testing kits are not covered by insurance companies (Gahagan, Condran, & Hajizadeh, 2015).

Some study participants stipulated accessibility to the healthcare system as a provision to the use of HIV POCT in the province to assure that the confirmatory conventional testing is in place. However, accessibility to the healthcare system may not be available to many Nova Scotians because of several factors including lack of physicians and long geographic distances. Participants described their concern around falsely assuring patients that they do not have an infection, if there is a possibility that they do if testing relies only on HIV POCT. Participants voiced these concerns despite the very high sensitivity and specificity of the only licenced testing kit in Canada (INSTI

HIV-1/HIV-2 antibody test), which reaches 99.84% sensitivity for HIV-1 and 100% for HIV-2, and specificity of 99.80% (Adams et al., 2017).

On the other hand, study participants noted that using HIV POCT can lead to the benefit of earlier abstinence from sex in those who have tested positive for the infection. Knowing about one's infectivity and accompanying behavioural change of abstinence are considered as a preventative action as many patients prefer to practice abstinence until they complete their treatment, especially if they have good communications with their partner(s) (Gallo et al., 2016). There is a conflict between using HIV POCT to provide cases with their initial positive results of HIV and preventing them from early knowing their health status because HIV POCT is not yet implemented in the province for the above-mentioned reasons. There is an ethical dilemma here, which necessitates a decision from the provincial health policy makers. However, according to the WHO (2017), each human has: "*The right to the highest attainable standard of health*". This can be interpreted as each patient has the right to know about his/her health condition and the right to seek medical care that improves his/her health status. Therefore, to achieve the concept of health equity in Canada as described by the WHO (n.d.), it's important to have HIV POCT in Nova Scotia as this testing technology is successfully used in most Canadian provinces, including: Ontario (Lazarus et al., 2016), British Columbia (Guenter et al., 2008), and Manitoba (Johnston, Reimer, Wylie, & Bullard, 2018). Further, Pai (2015) described the potential benefits of multiplex POCT for STBBIs, however, the author indicated the need for further research to find probable risks and challenges of multiplexed POCT. Notably, employing new health policies needs an alteration of priorities and significant political will (Mhatr & Deber, 1992).

5.4. Strengths and Limitations

One major strength of this thesis is that it explored local causes of continuously rising STBBI rates in Nova Scotia. Another strength is that it compared current preventative actions with further needed strategies from the perspective of local public health officials that have experience and knowledge around the local causes of the rising STBBI rates. Another strength is that participants from the four Nova Scotia health zones were interviewed thereby covering the experience and knowledge of STBBIs from across the province. The response rate in this study was high, as nine participants were recruited out of the initially planned target (twelve participants). Further, some of the recruited participants had similar job positions as the non-responders, increasing the likelihood that they would have provided similar information. The use of semi-structured interviews with open-ended questions is another strength of this study because this type of question provides an opportunity to hear more from participants and not limit their responses to a set of choices. Accordingly, unanticipated answers were received.

One more strength of this research is the use of a well-validated and extensively utilized model, the SEM, to guide the analysis of certain questions that addressed the main objectives of the study. The SEM worked as a frame that helped to organize the data. Using this model helped also to gain an understanding of the interactive effects of various SEM levels on STBBI acquisition. Further, it assisted in the categorization of the actions achieved and others needed to tackle the STBBI problem in Nova Scotia. However, fitting the data into that frame was challenging in some situations where the data fit into more than one level.

The key limitation of this study is that it only included one perspective, that of senior public health officials in Nova Scotia. While study participants had a high-level perspective on the topic, they may not have been fully aware of the challenges that face the front-line clinicians, laboratory directors, community-based STBBI prevention programs, or people with lived experience. Considering these perspectives would allow us to learn how other relevant stakeholders view and understand the STBBI situation in Nova Scotia and to gain insight into the actions people are taking to protect themselves from getting these infections. Further, it would have clarified the challenges that people at risk or with lived experience face when accessing testing and/or treatment services, and that healthcare providers face in delivering services to STBBI patients.

The main challenge encountered in this study was that arranging for one-on-one interviews was time consuming, because the wait times between initial contact and response from participants ranged between a few hours and three weeks. In addition, some potential participants did not respond at all.

5.5. Future Research Directions

In this study, I identified various actions taken by the government and others that should be taken to help reduce the spread of STBBIs in Nova Scotia. However, further research should be done to explore individuals' perspectives as well as healthcare providers' views on STBBIs in the province because there are many other relevant perspectives on STBBIs that we need to learn about. Additionally, research should be done to determine the appropriate location of non-traditional testing technologies (e.g. HIV POCT) in rural and remote Nova Scotia. These testing technologies should be

located in areas so as to ensure their accessibility to people living in those areas. Research should also be done to determine how people accessing these testing technologies will be able to access the appropriate follow up and care if necessary. Although participants identified some harm reduction programs in the province, further research should be done with regard to such programs in the province to mitigate the effects of STBBIs. Also, it is important to explore methods of eliminating and monitoring stigma in Nova Scotia being one of the pillars of the Pan- Canadian Framework on STBBIs. Finally, it is helpful to investigate the benefits, risks, and challenges of employing multiplex POCT in Nova Scotia.

CHAPTER 6: CONCLUSION, RECOMMENDATIONS, AND KNOWLEDGE TRANSLATION

In this chapter, I present the conclusion of this research and recommendations for next steps moving forward.

6.1. Conclusion

This study explored local contributing factors to the rising rates of STBBIs in Nova Scotia. It also investigated current actions being taken by the government, both federal and provincial, to reduce the spread of STBBIs in the province. Further, this study delved into the preventative actions needed to reduce STBBI rates in Nova Scotia and what barriers such actions may encounter in the province. Lastly, participants' views on the topic of testing for STBBIs in Nova Scotia were explored.

The four key themes emerged from this study include: 1. Contributors to STBBI Rates, 2. Current Preventative Actions; 3. Strategies and Actions; and 4. Perspectives on Testing. The five levels of influence of the SEM enhanced the classification of contributing factors and actions (current and needed). Individuals' behaviours were found to be the prominent factor at the individual level of contributing factors. However, the effect of this factor is augmented by other factors belonging to other levels of the model, such as stigma (interpersonal level) and lack of access to medical care due to shortage of physicians (organizational level).

Despite the actions taken by the government to prevent the spread of STBBIs (e.g., funding of healthcare providers, immunization programs, and PrEP), many other

actions are needed. At the individual level, educating people on the risks of STBBIs and methods of prevention was described as a crucial step in any prevention strategy. At the interpersonal level, reducing stigma around testing for STBBIs and the patients of such infections would increase testing rates and thereby lead to more and earlier treatment, and consequently, assist prevention. At the community level, more cooperation between community organizations is needed to better guide people in navigating the healthcare system. The most important action at the organizational level is to enhance the Nova Scotia surveillance system to be able to collect and analyze data within a short time of occurrence of the infections, in order to be able to execute suitable preventative actions. Another important action at the organizational level is to have conversations with the public, including high risk individuals, to develop solutions to the problem. Finally, at the policy level, utilizing the national framework is the cornerstone to preventing the spread of STBBIs in Nova Scotia, as its four elements address the problem of STBBIs proactively. Achieving a high testing rate is associated with increased access to treatment and would be the basis of a successful prevention program.

Using an inductive method of analysis, the fourth theme emerged whereby participants recognized the importance of increasing access to testing, including HIV POCT. However, participants set some provisions to the use of this technology including timely access to healthcare upon a positive case. They also provided some reasons for why HIV POCT should be used in the province and why it is not yet utilized.

6.2. Recommendations

In this section, I present high-level recommendations to the NSHA, DHW, PHAC, and Nova Scotian policy makers.

1. Develop and implement a comprehensive education strategy, in collaboration with community, medical schools, and governmental partners (e.g., Department of Education and Early Childhood Development), that (1) enhances awareness of STBBI rates; (2) increases knowledge around STBBI prevention, testing, and treatment; and (3) supports a normalizing of STBBI conversations in physicians' offices, homes, schools, and communities. Components of this strategy might include:
 - Enhanced, mandatory training on healthy sexuality to all teachers of sexual education at the grade school level to ensure they can effectively teach the material and answer students' inquiries in a non-judgemental manner.
 - Update the medical school curriculum to provide medical students with more training on healthy sexuality, STBBI prevention and methods of initiating open conversations with clients on the topic.
 - Educate physicians through Continuing Medical Education conferences and websites on the importance of offering testing for STBBIs to their patients and PrEP to high-risk individuals.
 - Develop a mass media campaign, including the use of social media, to share information on the importance of regular testing for STBBIs and methods of prevention by NSHA and DHW.

2. Enhance the current surveillance system to ensure timely data collection, data analysis, monitoring of STBBI rates, and appropriate responses to events/outbreaks. Components of an enhanced surveillance system must include:
 - Sufficient resources (funding and expertise) to create and maintain such a surveillance system.
 - A coordinated communications system to share information with stakeholders outside of the public health circle to include other stakeholders such as infectious disease specialists and NGOs.
 - Both sentinel and syndromic surveillance systems to detect outbreaks earlier.
 - Requirements that laboratories report the total number of tests performed each year, including positive and negative tests, to the public health department. This would provide a denominator to determine the trends in testing.
 - Monitoring the testing rate for STBBIs and the utilization of harm reduction programs in correctional facilities to prevent the spread of infections in such organizations.
3. Create regular open conversations between the provincial health authority and the public that includes all communities' representatives including youth, infected people, and marginalized individuals. Conversations should serve to gain the trust of communities and to learn from their experiences regarding the topic of sexuality. These conversations could be initiated and coordinated through Community Health Boards.
4. Adopt and use the four pillars of the Pan-Canadian STBBI Framework for Action: prevention, testing, treatment, and support. Strategies to do this might include:

- Utilizing non-traditional testing technologies, (e.g. HIV POCT) that rely less on highly skilled healthcare professionals. As an example, have these non-conventional testing technologies available in pharmacies where people may test themselves more easily and more frequently.
- Establishing agreements between the NSHA and selected Nova Scotia physicians to accept new STBBI patients referred by the public health department for treatment and follow up for their infections. This would help to address the issue of many physicians not being willing to accept new patients and would thereby increase access to primary healthcare services.
- Developing indicators to monitor the progress of each pillar to ensure that advances are made on the Pan-Canadian STBBI Framework for Action.

6.3. Knowledge Translation

To help ensure the key findings and recommendations from this study reach the people and organizations who can put it to practical use, the results will be provided to public health officials in the form of a short report. Key Public Health officers within NSHA, Chief Medical Officer of Health in the province, Deputy Chief Medical Officer of Health, Medical Officers of Health, and the regional office of PHAC in Halifax will be contacted to share the results with them. The results will be submitted in health-related journals such as the *Canadian Journal of Public Health* and the *Canadian Communicable Disease Report*. Further, the findings will be presented at national conferences such as the Canadian Conference on HIV/AIDS Research 2020. Moreover, members of the Legislative Assembly will be contacted to present the problem and the recommendations

to them. In addition, the results will be disclosed to any person or organization who might be interested in the topic.

REFERENCES

- Adams, S., Luo, W., Wesolowski, L., Cohen, S. E., Peters, P. J., Owen, S. M., & Masciotra, S. (2017). Performance evaluation of the point-of-care INSTI™ HIV-1/2 antibody test in early and established HIV infections. *Journal of Clinical Virology*, 91, 90-94.
- Adelson, N. (2005). The embodiment of inequity: Health disparities in Aboriginal Canada. *Canadian journal of public health*, 96(2), S45-S61.
- AIDS Coalition of Cape Breton. (2014). Services. Retrieved from <http://aidscoalitionofcapebreton.ca/services/>
- Alloway, T., Runac, R., Qureshi, M., & Kemp, G. (2014). Is Facebook linked to selfishness? Investigating the relationships among social media use, empathy, and narcissism. *Social Networking*, 3(03), 150.
- Amory, W. C. E. (1920). The untilled field of public health. *Mod Med*, 2.
- Anzul, M., Downing, M., Ely, M., & Vinz, R. (2003). *On writing qualitative research: Living by words*. Routledge.
- Aral, S. O., & Blanchard, J. F. (2012). The Program Science initiative: improving the planning, implementation and evaluation of HIV/STI prevention programs. *Sex Transm Infect*, 88(3), 157-159.
- Aral, S. O., Lipshutz, J., & Blanchard, J. (2007). Drivers of STD/HIV epidemiology and the timing and targets of STD/HIV prevention. *Sexually Transmitted Infections*, 83(suppl 1), i1-i4.
- Athanasiadis, L., Papaharitou, S., Salpiggidis, G., Tsimtsiou, Z., Nakopoulou, E., Kirana, P. S., ... & Hatzichristou, D. (2006). Educating physicians to treat erectile dysfunction patients: Development and evaluation of a course on communication and management strategies. *The journal of sexual medicine*, 3(1), 47-55.
- Avuvika, E., Masese, L. N., Wanje, G., Wanyonyi, J., Nyaribo, B., Omoni, G., ... & McClelland, R. S. (2017). Barriers and facilitators of screening for sexually transmitted infections in adolescent girls and young women in Mombasa, Kenya: A Qualitative Study. *PloS one*, 12(1), e0169388.
- Back, L. (2014). Review of Nova Scotia's Strategy on HIV/AIDS.
- Bajaj, S., Ramayanam, S., Enebeli, S., Nsohtabien, H., Andkhoie, M., Yaghoubi, M., ... & Farag, M. (2017). Risk Factors For Sexually Transmitted Diseases in Canada and Provincial Variations. *Social Medicine*, 11(2), 62-69.
- Baral, S., Logie, C. H., Grosso, A., Wirtz, A. L., & Beyrer, C. (2013). Modified social ecological model: a tool to guide the assessment of the risks and risk contexts of HIV epidemics. *BMC public health*, 13(1), 482.
- Beauchamp, D. (1985). Community: The Neglected Tradition of Public Health. *The Hastings Center Report*, 15(6), 28-36. doi:10.2307/3563066

- Beyrer, C., Baral, S. D., Van Griensven, F., Goodreau, S. M., Chariyalertsak, S., Wirtz, A. L., & Brookmeyer, R. (2012). Global epidemiology of HIV infection in men who have sex with men. *the Lancet*, 380(9839), 367-377.
- Birkhead, G. S., Klein, S. J., Candelas, A. R., O'Connell, D. A., Rothman, J. R., Feldman, I. S., ... & Flanigan, C. A. (2007). Integrating multiple programme and policy approaches to hepatitis C prevention and care for injection drug users: a comprehensive approach. *International Journal of Drug Policy*, 18(5), 417-425.
- Blanc, A. M., & Rojas, A. T. (2018). Condom use, number of partners and sexual debut in young people in penile-vaginal intercourse, oral sex and anal sex. *Revista internacional de andrologia*, 16(1), 8-14.
- Boone, T. L., & Lefkowitz, E. S. (2007). Mother-adolescent health communication: Are all conversations created equally?. *Journal of Youth and Adolescence*, 36(8), 1038-1047.
- Bowers, L. (2017). Safe Injection Sites and Drug Injection Overdose: A Literature Review. Available at SSRN 3415130.
- Boyatzis, R. E. (1998). Transforming qualitative information: Thematic analysis and code development. sage.
- Bradshaw, D., Matthews, G., & Danta, M. (2013). Sexually transmitted hepatitis C infection: the new epidemic in MSM?. *Current opinion in infectious diseases*, 26(1), 66-72.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Brenner, B. G., Roger, M., Routy, J. P., Moisi, D., Ntemgwa, M., Matte, C., ... & Leblanc, R. (2007). High rates of forward transmission events after acute/early HIV-1 infection. *Journal of Infectious Diseases*, 195(7), 951-959.
- Broeckaert, L., & Challacombe, L. (2015). Rapid point-of-care HIV testing: A review of the evidence. Toronto, Canada. Canada: Action Plan 2015-2020. Halifax, NS: Dalhousie University.
- Bronfenbrenner, U. (1994). Ecological models of human development. *International encyclopedia of education*, 3(2), 37-43.
- Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge: Harvard Press.
- Browne, A. J., Varcoe, C. M., Wong, S. T., Smye, V. L., Lavoie, J., Littlejohn, D., ... & Fridkin, A. (2012). Closing the health equity gap: evidence-based strategies for primary health care organizations. *International Journal for Equity in Health*, 11(1), 59.
- Bull, S. S., & Shlay, J. C. (2005). Promoting "dual protection" from pregnancy and sexually transmitted disease: a social ecological approach. *Health Promotion Practice*, 6(1), 72-80.

- Burchell, A. N., Allen, V. G., Gardner, S. L., Moravan, V., Tan, D. H., Grewal, R., ... & McGee, F. (2015). High incidence of diagnosis with syphilis co-infection among men who have sex with men in an HIV cohort in Ontario, Canada. *BMC infectious diseases*, 15(1), 356.
- Canadian AIDS Treatment Information Exchange. (2015). Rapid point-of-care HIV testing: A review of the evidence. Retrieved from <http://www.catie.ca/en/pif/spring-2015/rapid-point-care-hiv-testing-review-evidence>
- Canadian AIDS Treatment Information Exchange. (2017a). Chronic hepatitis C treatment combinations. Retrieved from <http://www.catie.ca/en/practical-guides/hepc-in-depth/treatment/chronic-hepc-treatment-combinations>
- Canadian AIDS Treatment Information Exchange. (2017b). New point of care hepatitis C antibody test approved in Canada. Retrieved from http://www.catie.ca/en/catieneews/2017-02-08/new-point-care-hepatitis-c-antibody-test-approved-canada?utm_source=fb&utm_campaign=020917&utm_medium=socmed&utm_content=en
- Canadian AIDS Treatment Information Exchange. (2018). The epidemiology of HIV in Canada. Retrieved from https://www.catie.ca/en/fact-sheets/epidemiology/epidemiology-hiv-canada#footnote1_cskqu4g
- Canadian Institute for Health Information. (2016). Physicians in Canada, 2016. Retrieved from https://www.cihi.ca/sites/default/files/document/physicians_in_canada_phys2016_en.pdf
- Canadian Institute for Health Information. (2017). Emergency department wait times in Canada continuing to rise. Retrieved from <https://www.cihi.ca/en/emergency-department-wait-times-in-canada-continuing-to-rise>
- Canadian Public Health Association. (n.d.). Factors Impacting Vulnerability to HIV and other STBBI's. Retrieved from http://www.cpha.ca/uploads/pdf_files/fiv_en.pdf
- Carmeli, B., Eshel, T., Ford, D., Greenshpan, O., Kaufman, J., Knoop, S., ... & Renly, S. (2007, May). Public health affinity domain: a standards-based surveillance system solution. In *NSF Workshop on Intelligence and Security Informatics* (pp. 147-158). Springer, Berlin, Heidelberg.
- Cassidy, C., Steenbeek, A., Langille, D., Martin-Misener, R., & Curran, J. (2018). Sexual health service use among university undergraduate students in Nova Scotia. *Canadian Journal of Human Sexuality*, 27(3), 207–214. <https://doi-org.ezproxy.library.dal.ca/10.3138/cjhs.2017-0030>
- Castel, A. D., Magnus, M., Peterson, J., Anand, K., Wu, C., Martin, M., ... & Hader, S. (2012). Implementing a novel citywide rapid HIV testing campaign in Washington, DC: findings and lessons learned. *Public Health Reports*, 422-431.
- CDC. (2015). Social Ecological Model. Retrieved from www.cdc.gov/cancer/crccp/sem.htm

- CDC. (2018a). The Social-Ecological Model: A Framework for Prevention. Retrieved from www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html
- CDC. (2018b). HIV Transmission. Retrieved from: <https://www.cdc.gov/hiv/basics/transmission.html>
- CDC. (2018c). Anal Sex and HIV Risk. Retrieved from <https://www.cdc.gov/hiv/risk/analsex.html>
- Coates, A. M. (2019). Sustaining Rural Access to Emergency Care through Collaborative Emergency Centres in Nova Scotia. *Health Reform Observer—Observatoire des Réformes de Santé*, 7(2).
- Coleman, E., Elders, J., Satcher, D., Shindel, A., Parish, S., Kenagy, G., ... & Lunn, M. R. (2013). Summit on medical school education in sexual health: report of an expert consultation. *The journal of sexual medicine*, 10(4), 924-938.
- Collins, C. J., Greenall, M. N., Mallouris, C., & Smith, S. L. (2016). Time for full inclusion of community actions in the response to AIDS. *Journal of the International AIDS Society*, 19(1), 20712.
- Conway, J., McMillan, M., & Becker, J. (2006). Implementing workforce development in health care: A conceptual framework to guide and evaluate health service reform. *Human Resource Development International*, 9(1), 129-139.
- Cooper, J. M., & Sánchez, P. J. (2018, April). Congenital syphilis. In *Seminars in perinatology*. WB Saunders.
- Crepaz, N., Hart, T. A., & Marks, G. (2004). Highly active antiretroviral therapy and sexual risk behavior: a meta-analytic review. *Jama*, 292(2), 224-236.
- Currier, J. S., & Havlir, D. V. (2017). CROI 2017: Complications and Comorbidities of HIV Disease and Its Treatment. *Topics in antiviral medicine*, 25(2), 77.
- Deeks, S. G., Lewin, S. R., & Havlir, D. V. (2013). The end of AIDS: HIV infection as a chronic disease. *The Lancet*, 382(9903), 1525-1533.
- Di Paolo, G. (2018). Sexually Transmitted Diseases in Adolescence. In *Good Practice in Pediatric and Adolescent Gynecology* (pp. 211-238). Springer, Cham.
- DiClemente, R. J., Salazar, L. F., Crosby, R. A., & Rosenthal, S. L. (2005). Prevention and control of sexually transmitted infections among adolescents: the importance of a socio-ecological perspective—a commentary. *Public health*, 119(9), 825-836.
- Dodd, P. J., Garnett, G. P., & Hallett, T. B. (2010). Examining the promise of HIV elimination by ‘test and treat’ in hyper-endemic settings. *AIDS (London, England)*, 24(5), 729.
- Doherty, L., Fenton, K. A., Jones, J., Paine, T. C., Higgins, S. P., Williams, D., & Palfreeman, A. (2002). Syphilis: old problem, new strategy. *Bmj*, 325(7356), 153-156.

- Dube, A., Harris, G., Gahagan, J., & Doucet, S. (2017). Bridging the silos in HIV and Hepatitis C prevention: a cross-provincial qualitative study. *International journal of public health*, 62(7), 739-746.
- Eden, P. R., & Johnson, J. (2016). Point-of-care testing and its implications for STIs. *MLO: medical laboratory observer*, 48(3), 22-24.
- Elkington, K. S., Bauermeister, J. A., & Zimmerman, M. A. (2010). Psychological distress, substance use, and HIV/STI risk behaviors among youth. *Journal of youth and adolescence*, 39(5), 514-527.
- Enomoto, C., Noor, S., & Widner, B. (2017). Is social media to blame for the sharp rise in STDs?. *Social Sciences*, 6(3), 78.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4.
- Farrington, C. P., Andrews, N. J., Beale, A. D., & Catchpole, M. A. (1996). A statistical algorithm for the early detection of outbreaks of infectious disease. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 159(3), 547-563.
- Finance and Treasury Board. (2015). MARITAL STATUS OF NOVA SCOTIANS, 2015. Retrieved from https://novascotia.ca/finance/statistics/topic_news.asp?id=11281&fto=23w&rdval=2015-11
- Fisman, D. N., & Laupland, K. B. (2011). Sexually transmitted infections in Canada: A sticky situation. *Canadian Journal of Infectious Diseases and Medical Microbiology*, 22(3), 80-82.
- Flegel, K., MacDonald, N., & Hébert, P. C. (2011). Binge drinking: all too prevalent and hazardous.
- Flora, J. A., & Wallack, L. (1990). Health promotion and mass media use: Translating research into practice. *Health Education Research*, 5(1), 73-80.
- Frith, H., & Gleeson, K. (2004). Clothing and embodiment: men managing body image and using thematic analysis in psychology. *Psychology of Men and Masculinity*, 5(1), 40-48.
- Gabarron, E., & Wynn, R. (2016). Use of social media for sexual health promotion: a scoping review. *Global health action*, 9(1), 32193.
- Gabarron, E., Luque, L. F., Schopf, T. R., Lau, A. Y., Armayones, M., Wynn, R., & Serrano, J. A. (2019). Impact of facebook ads for sexual health promotion via an educational web app: a case study. In *Healthcare Policy and Reform: Concepts, Methodologies, Tools, and Applications* (pp. 990-1003). IGI Global.
- Gahagan, J. C., Fuller, J. L., Proctor-Simms, E. M., Hatchette, T. F., & Baxter, L. N. (2011). Barriers to gender-equitable HIV testing: going beyond routine screening for pregnant women in Nova Scotia, Canada. *International Journal for Equity in Health*, 10(1), 1.
- Gahagan, J., Condran, B., Hajizadeh, M. (2015). HIV Point-of-Care Testing (POCT) in Canada: Action Plan 2015-2020. Halifax, NS: Dalhousie University.

- Gahagan, J., Condran, B., Sharma, S., & Hatchette, T. (2015). HIV Point of Care Testing (POCT) in Halifax, Nova Scotia: A Pilot Study.
- Galinsky, E. (1999). Ask the children: What America's children really think about working parents. William Morrow and Company, Inc., 1350 Avenue of the Americas, New York, NY 10019 (US, \$25; Canada, \$37). Web site: <http://www.familiesandwork.org>.
- Galli, R. A., Green, K. F., La Marca, A., Waldman, L. F., Powers, R. E., Daly, A. C., & Shackleton, C. R. (2013). Evaluation of the accuracy and ease of use of a rapid HIV-1 Antibody Test performed by untrained operators at the point of care. *Journal of Clinical Virology*, 58, e65-e69.
- Gallo, M. F., Margolis, A. D., Malotte, C. K., Rietmeijer, C. A., Klausner, J. D., O'Donnell, L., & Warner, L. (2016). Sexual abstinence and other behaviours immediately following a new STI diagnosis among STI clinic patients: Findings from the Safe in the City trial. *Sex Transm Infect*, 92(3), 206-210.
- Gardner, E. M., McLees, M. P., Steiner, J. F., del Rio, C., & Burman, W. J. (2011). The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. *Clinical infectious diseases*, 52(6), 793-800.
- Gevelber, M. A., & Biro, F. M. (1999). Adolescents and sexually transmitted diseases. *Pediatric Clinics of North America*, 46(4), 747-766.
- Gisslén, M., Svedhem, V., Lindborg, L., Flamholz, L., Norrgren, H., Wendahl, S., ... & Sönnnerborg, A. (2017). Sweden, the first country to achieve the Joint United Nations Programme on HIV/AIDS (UNAIDS)/World Health Organization (WHO) 90-90-90 continuum of HIV care targets. *HIV medicine*, 18(4), 305-307.
- Golden, S. D., & Earp, J. A. L. (2012). Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. *Health Education & Behavior*, 39(3), 364-372.
- Government of Canada. (2010). REPORT ON SEXUALLY TRANSMITTED INFECTIONS IN CANADA: 2010. Retrieved from http://publications.gc.ca/collections/collection_2013/aspc-phac/HP37-10-2010-eng.pdf
- Government of Canada. (2016). Report on Hepatitis B and C in Canada: 2013. Retrieved from <http://healthycanadians.gc.ca/publications/diseases-conditions-maladies-affections/hepatitis-b-c-2013-hepatite-b-c/index-eng.php>
- Government of Canada. (2017). Summary: Measuring Canada's Progress on the 90-90-90 HIV Targets. Retrieved from <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/summary-measuring-canada-progress-90-90-90-hiv-targets.html>
- Government of Canada. (2018a). Reducing the health impact of sexually transmitted and blood-borne infections in Canada by 2030: A pan-Canadian STBBI framework for action. Retrieved from <https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/reports-publications/sexually-transmitted-blood-borne-infections-action-framework.html>

- Government of Nova Scotia. (2018b). LABOUR MARKET TRENDS - OCTOBER 2018. Retrieved from https://novascotia.ca/finance/statistics/topic_news.asp?id=14301
- Green, J. (2018). Lesotho nears 90-90-90 goal; HIV prevalence still high. *Infectious Diseases in Children*, 31(4), 9. Retrieved from <http://ezproxy.library.dal.ca/login?url=https://search-proquest-com.ezproxy.library.dal.ca/docview/2191284043?accountid=10406>
- Greenwald, J. L., Burstein, G. R., Pincus, J., & Branson, B. (2006). A rapid review of rapid HIV antibody tests. *Current infectious disease reports*, 8(2), 125-131.
- Grimes, D. A., & Schulz, K. F. (2002). Uses and abuses of screening tests. *The Lancet*, 359(9309), 881-884.
- Guenter, D., Greer, J., Barbara, A., Robinson, G., Roberts, J., & Browne, G. (2008). Rapid point-of-care HIV testing in community-based anonymous testing program: a valuable alternative to conventional testing. *AIDS patient care and STDs*, 22(3), 195-204.
- Gupta, N., Chandak, A., Gilson, G., Pelster, A. K., Schober, D. J., Goldsworthy, R., ... & Fisher, C. (2015). Discovering sexual health conversations between adolescents and youth development professionals. *American journal of sexuality education*, 10(1), 21-39.
- Ha, S., Paquette, D., Tarasuk, J., Dodds, J., Gale-Rowe, M., Brooks, J. I., ... & Wong, T. (2014). A systematic review of HIV testing among Canadian populations. *Can J Public Health*, 105(1), 53-62.
- Halifax Sexual Health Centre. (n.d.). STI TESTING. Retrieved from <http://hshc.ca/sti-testing/>
- Hernandez, L. M., Rosenstock, L., & Gebbie, K. (Eds.). (2003). *Who will keep the public healthy?: educating public health professionals for the 21st century*. National Academies Press.
- Hess, K. L., Fisher, D. G., & Reynolds, G. L. (2014). Sensitivity and specificity of point-of-care rapid combination syphilis-HIV-HCV tests. *PloS one*, 9(11), e112190.
- Higgins, J. A., Hoffman, S., Graham, C. A., & Sanders, S. A. (2008). Relationships between condoms, hormonal methods, and sexual pleasure and satisfaction: an exploratory analysis from the Women's Well-Being and Sexuality Study. *Sexual health*, 5(4), 321-330.
- Hillis, S. D., Owens, L. M., Marchbanks, P. A., Amsterdam, L. E., & Mac Kenzie, W. R. (1997). Recurrent chlamydial infections increase the risks of hospitalization for ectopic pregnancy and pelvic inflammatory disease. *American journal of obstetrics and gynecology*, 176(1), 103-107.
- Hilton, B. A., Thompson, R., Moore-Dempsey, L., & Janzen, R. G. (2001). Harm reduction theories and strategies for control of human immunodeficiency virus: a review of the literature. *Journal of Advanced Nursing*, 33(3), 357-370.

- Hogan, D. R., & Salomon, J. A. (2005). Prevention and treatment of human immunodeficiency virus/acquired immunodeficiency syndrome in resource-limited settings. *Bulletin of the World Health Organization*, 83, 135-143.
- Islam, N. (2014). The dilemma of physician shortage and international recruitment in Canada. *International Journal of Health Policy and Management*, 3(1), 29.
- Johnston, J. B., Reimer, J. N., Wylie, J. L., & Bullard, J. (2018). Observational study of the populations accessing rapid point-of-care HIV testing in Winnipeg, Manitoba, Canada, through a retrospective chart review of site records. *Sexually transmitted infections*, 94(3), 194-199.
- Kamb, M. L., Newman, L. M., Riley, P. L., Mark, J., Hawkes, S. J., Malik, T., & Broutet, N. (2010). A road map for the global elimination of congenital syphilis. *Obstetrics and gynecology international*, 2010.
- Kang, M., Skinner, R., & Usherwood, T. (2010). Interventions for young people in Australia to reduce HIV and sexually transmissible infections: a systematic review. *Sexual Health*, 7(2), 107-128.
- Katz, A. (2015). Narratives Towards Ending Stigma: HIV-Related Stigma in the Netherlands from the Standpoint of Those who Experience it First-Hand.
- Kielly, J., Kelly, D. V., Hughes, C., Day, K., Hancock, S., Asghari, S., ... & Nguyen, H. (2018). Adaptation of POCT for pharmacies to reduce risk and optimize access to care in HIV, the APPROACH study protocol: examining acceptability and feasibility. *Pilot and feasibility studies*, 4(1), 59.
- Konings, E., Bantebya, G., Caraël, M., & Bagenda, D. (1995). Validating population surveys for the measurement of HIV/STD prevention indicators. *Aids*.
- Kral, A. H., & Davidson, P. J. (2017). Addressing the nation's opioid epidemic: lessons from an unsanctioned supervised injection site in the US. *American journal of preventive medicine*, 53(6), 919-922.
- Kumar, S., Quinn, S. C., Kim, K. H., Musa, D., Hilyard, K. M., & Freimuth, V. S. (2012). The social ecological model as a framework for determinants of 2009 H1N1 influenza vaccine uptake in the United States. *Health Education & Behavior*, 39(2), 229-243.
- Lang, R., Skinner, S., Ferguson, J., Jadavji, T., Stadnyk, M., & Gill, J. (2018). HIV infection after prenatal screening: an open window leading to perinatal infection. *AIDS care*, 1-4.
- Langille, D. B., Andreou, P., Beazley, R. P., & Delaney, M. E. (1998). Sexual health knowledge of students at a high school in Nova Scotia. *Canadian Journal of Public Health*, 89(2), 85-89.
- Langille, D., MacKinnon, D., Marshall, E., & Graham, J. (2001). So many bricks in the wall: young women in Nova Scotia speak about barriers to school-based sexual health education. *Sex Education*, 1(3), 245-257.

- Latkin, C. A., German, D., Vlahov, D., & Galea, S. (2013). Neighborhoods and HIV: a social ecological approach to prevention and care. *American Psychologist*, 68(4), 210.
- Lavoie, J. G. (2013). Policy silences: why Canada needs a National First Nations, Inuit and Métis health policy. *International journal of circumpolar health*, 72(1), 22690.
- Lawson, A. B., Williams, F. L., & Williams, F. (2001). *An introductory guide to disease mapping*. John Wiley.
- Lazarus, L., Patel, S., Shaw, A., Leblanc, S., Lalonde, C., Hladik, M., ... & Tyndall, M. W. (2016). Uptake of community-based peer administered HIV point-of-care testing: findings from the proud study. *PloS one*, 11(12), e0166942.
- Leber, A., MacPherson, P., & Lee, B. C. (2008). Epidemiology of infectious syphilis in Ottawa: Recurring themes revisited. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 401-405.
- Lee, Y. M., Dancy, B., Florez, E., & Holm, K. (2013). Factors related to sexual practices and successful sexually transmitted infection/HIV intervention programs for Latino adolescents. *Public Health Nursing*, 30(5), 390-401.
- Lehmiller, J. J., & Ioerger, M. (2014). Social networking smartphone applications and sexual health outcomes among men who have sex with men. *PLoS One*, 9(1), e86603.
- Levi, J., Raymond, A., Pozniak, A., Vernazza, P., Kohler, P., & Hill, A. (2016). Can the UNAIDS 90-90-90 target be achieved? A systematic analysis of national HIV treatment cascades. *BMJ global health*, 1(2), e000010.
- Levine, D. (2011). Using technology, new media, and mobile for sexual and reproductive health. *Sexuality Research and Social Policy*, 8(1), 18-26.
- Lewis, N. M., Gahagan, J. C., & Stein, C. (2013). Preferences for rapid point-of-care HIV testing in Nova Scotia, Canada. *Sexual health*, 10(2), 124-132.
- Lieber, E., Li, L., Wu, Z., Rotheram-Borus, M. J., Guan, J., & National Institute of Mental Health (NIMH) Collaborative HIV Prevention Trial Group. (2006). HIV/STD stigmatization fears as health-seeking barriers in China. *AIDS and Behavior*, 10(5), 463-471.
- Luppa, P. B., Müller, C., Schlichtiger, A., & Schlebusch, H. (2011). Point-of-care testing (POCT): Current techniques and future perspectives. *TrAC Trends in Analytical Chemistry*, 30(6), 887-898.
- MacPhail, C., & Campbell, C. (1999). Evaluating HIV/STD interventions in developing countries: do current indicators do justice to advances in intervention approaches?. *South African Journal of Psychology*, 29(4), 149-165.
- Mahendra, V. S., Gilborn, L., George, B., Samson, L., & Mudoji, R. (2006). Reducing AIDS-related stigma and discrimination in Indian hospitals.
- Makenzius, M., & Larsson, M. (2013). Early onset of sexual intercourse is an indicator for hazardous lifestyle and problematic life situation. *Scandinavian journal of caring sciences*, 27(1), 20-26.

- McDonagh, L. K., Saunders, J. M., Cassell, J., Bastaki, H., Hartney, T., & Rait, G. (2017). Facilitators and barriers to chlamydia testing in general practice for young people using a theoretical model (COM-B): a systematic review protocol. *BMJ open*, 7(3), e013588.
- McDonagh, L. K., Saunders, J. M., Cassell, J., Curtis, T., Bastaki, H., Hartney, T., & Rait, G. (2018). Application of the COM-B model to barriers and facilitators to chlamydia testing in general practice for young people and primary care practitioners: a systematic review. *Implementation Science*, 13(1), 130.
- McGarrigle, C. A., Fenton, K. A., Gill, O. N., Hughes, G., Morgan, D., & Evans, B. (2002). Behavioural surveillance: the value of national coordination. *Sexually Transmitted Infections*, 78(6), 398-405.
- McKay, A., Pietrusiak, M. A., & Holowaty, P. (1998). Parents' opinions and attitudes towards sexuality education in the schools. *The Canadian Journal of Human Sexuality*, 7(2), 139-146.
- McKay, A., Quinn-Nilas, C., & Milhausen, R. (2017). Prevalence and correlates of condom use among single midlife Canadian women and men aged 40 to 59. *The Canadian Journal of Human Sexuality*, 26(1), 38-47.
- McKinlay, J. B., & McKinlay, S. M. (1977). The questionable contribution of medical measures to the decline of mortality in the United States in the twentieth century. *The milbank memorial Fund Quarterly. health and Society*, 405-428.
- McLeroy, K. R., Steckler, A., & Bibeau, D. (1988). The social ecology of health promotion interventions. *Health Education Quarterly*, 15(4), 351-377.
- Mezaache, S., Protopopescu, C., Debrus, M., Morel, S., Mora, M., Suzan-Monti, M., ... & Roux, P. (2018). Changes in supervised drug-injecting practices following a community-based educational intervention: A longitudinal analysis. *Drug and alcohol dependence*, 192, 1-7.
- Mhatr, S. L., & Deber, R. B. (1992). From equal access to health care to equitable access to health: a review of Canadian provincial health commissions and reports. *International Journal of Health Services*, 22(4), 645-668.
- Miedema, B., Easley, J., Fortin, P., Hamilton, R., & Tatemichi, S. (2009). Crossing boundaries: Family physicians' struggles to protect their private lives. *Canadian Family Physician*, 55(3), 286-287.
- Minichiello, A., Swab, M., Chongo, M., Marshall, Z., Gahagan, J., Maybank, A., ... & Asghari, S. (2017). HIV Point-of-Care Testing in Canadian Settings: A Scoping Review. *Frontiers in public health*, 5.
- Mostashari, F., & Hartman, J. (2003). Syndromic surveillance: a local perspective.
- Myers, R. P., Krajden, M., Bilodeau, M., Kaita, K., Marotta, P., Peltekian, K., ... & Sherman, M. (2014). Burden of disease and cost of chronic hepatitis C virus infection in Canada. *Canadian Journal of Gastroenterology and Hepatology*, 28(5), 243-250

- Nadarzynski, T., Burton, J., Henderson, K., Zimmerman, D., Hill, O., & Graham, C. (2019). Targeted advertisement of chlamydia screening on social media: A mixed-methods analysis. *Digital Health*, 5, 2055207619827193.
- Nagaoki, Y., Aikata, H., Nakano, N., Shinohara, F., Nakamura, Y., Hatooka, M., ... & Fukuhara, T. (2016). Development of hepatocellular carcinoma in patients with hepatitis C virus infection who achieved sustained virological response following interferon therapy: A large-scale, long-term cohort study. *Journal of gastroenterology and hepatology*, 31(5), 1009-1015.
- Nannozi, V., Wobudeya, E., Matsiko, N., & Gahagan, J. (2017). Motivators of couple HIV counseling and testing (CHCT) uptake in a rural setting in Uganda. *BMC public health*, 17(1), 104.
- Nova scotia Advisory Commission on AIDS. (2013). About the Commission. Retrieved from <https://novascotia.ca/aids/aboutthecommission.asp>
- Nova Scotia Advocate. (2017). Where the poor people live: Stats Canada puts Nova Scotia poverty on the map. Retrieved from: <https://nsadvocate.org/2017/09/18/where-the-poor-people-live-stats-canada-puts-nova-scotia-poverty-on-the-map/>
- Nova Scotia Department of Health and Wellness. (2017). NOTIFIABLE DISEASES IN NOVA SCOTIA 2016 SURVEILLANCE REPORT. Retrieved from <https://novascotia.ca/dhw/populationhealth/documents/Annual-Notifiable-Disease-Surveillance-Report-2016.pdf>
- Nova Scotia Department of Health and Wellness. (n.d.). Communicable Disease, Prevention, Management, & Response Protocol. Retrieved from <https://novascotia.ca/dhw/publichealth/documents/06-Communicable-Disease-Protocol.pdf>
- Nova Scotia Health Authority. (2017). STI and STD Clinic. Retrieved from <http://www.nshealth.ca/service-details/STI%20and%20STD%20Clinic>
- Nova Scotia Legislature. (2003). BILL NO. 26. Retrieved from https://nslegislature.ca/legc/bills/59th_1st/1st_read/b026.htm
- Ntumbanzondo, M., Dubrow, R., Niccolai, L. M., Mwandagalirwa, K., & Merson, M. H. (2006). Unprotected intercourse for extra money among commercial sex workers in Kinshasa, Democratic Republic of Congo. *AIDS care*, 18(7), 777-785.
- Nusbaum, M. R., & Hamilton, C. D. (2002). The proactive sexual health history. *American Family Physician*, 66(9), 1705-1722.
- Nyasulu, P., Fredericks, M., Basera, T. J., & Broomhead, S. (2018). Knowledge and risk perception of sexually transmitted infections and relevant health care services among high school students in the Platfontein San community, Northern Cape Province, South Africa. *Adolescent health, medicine and therapeutics*, 9, 189.
- Nyblade, L., Stangl, A., Weiss, E., & Ashburn, K. (2009). Combating HIV stigma in health care settings: what works?. *Journal of the International AIDS Society*, 12(1), 1.

- Oanh, K. T. H., Ashburn, K., Pulerwitz, J., Ogden, J., & Nyblade, L. (2008). Improving hospital-based quality of care in Vietnam by reducing HIV-related stigma and discrimination.
- Pai, N. P. (2015). Multiplexed point-of-care assays for HIV and co-infections for resource constrained settings: a perspective. *Future microbiology*, 10(9), 1393-1396.
- Pai, N. P., Sollis, K., & Peeling, R. W. (2013). Rapid hepatitis C tests: better than the gold standard?. *Expert review of molecular diagnostics*, 13(3), 221-223.
- Pai, N. P., Wilkinson, S., Deli-Houssein, R., Vijh, R., Vadnais, C., Behlim, T., ... & Wong, T. (2015). Barriers to Implementation of Rapid and Point-of-Care Tests for Human Immunodeficiency Virus Infection: Findings From a Systematic Review (1996–2014). *Point of care*, 14(3), 81.
- Parker, R. G., Easton, D., & Klein, C. H. (2000). Structural barriers and facilitators in HIV prevention: a review of international research. *Aids*, 14, S22-S32.
- Peeling, R. W., Holmes, K. K., Mabey, D., & Ronald, A. (2006). Rapid tests for sexually transmitted infections (STIs): the way forward. *Sexually transmitted infections*, 82(suppl 5), v1-v6.
- Peralta, L., Deeds, B. G., Hipszer, S., & Ghalib, K. (2007). Barriers and facilitators to adolescent HIV testing. *AIDS patient care and STDs*, 21(6), 400-408.
- Phillips, G., Magnus, M., Kuo, I., Rawls, A., Peterson, J., Jia, Y., ... & Greenberg, A. E. (2014). Use of geosocial networking (GSN) mobile phone applications to find men for sex by men who have sex with men (MSM) in Washington, DC. *AIDS and Behavior*, 18(9), 1630-1637.
- Pottie, K., Medu, O., Welch, V., Dahal, G. P., Tyndall, M., Rader, T., & Wells, G. (2014). Effect of rapid HIV testing on HIV incidence and services in populations at high risk for HIV exposure: an equity-focused systematic review. *BMJ open*, 4(12), e006859.
- Public Health Agency of Canada, Centre for Communicable Diseases and Infection Control. (2012c). Human immunodeficiency virus: HIV screening and testing guide. Retrieved from: http://www.catie.ca/sites/default/files/EN_HIV-Screening-Guide-2013.pdf
- Public Health Agency of Canada. (2012a). Report on Sexually Transmitted Infections in Canada: 2010. (Ottawa: Public Health Agency of Canada).
- Public Health Agency of Canada. (2012b). Summary: Estimates of HIV prevalence and incidence in Canada, 2011. Retrieved from <http://www.phac-aspc.gc.ca/aids-sida/publication/survreport/estimat2011-eng.php>
- Public Health Agency of Canada. (2013). Canadian Guidelines of Sexually Transmitted Infections. Retrieved from <http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-5-2-eng.php>
- Public Health Agency of Canada. (2014). Population-Specific Status Report: HIV/AIDS and Other Sexually Transmitted and Blood Borne Infections among Youth in Canada. Retrieved from <http://www.phac-aspc.gc.ca/aids-sida/publication/ps-pd/youth-jeunes/chapter-chapitre-3-eng.php#footnote9>

- Public Health Agency of Canada. (2015). Alcohol Consumption in Canada. Retrieved from: <http://healthycanadians.gc.ca/publications/departement-ministere/state-public-health-alcohol-2015-etat-sante-publique-alcool/alt/state-phac-alcohol-2015-etat-aspc-alcool-eng.pdf>
- Rabathaly, P. A., & Chattu, V. K. (2019). Emphasizing the importance of sexual healthcare among middle and old age groups: A high time to re-think?. *Journal of Natural Science, Biology and Medicine*, 10(1), 91.
- Raj, A., Reed, E., Miller, E., Decker, M. R., Rothman, E. F., & Silverman, J. G. (2007). Contexts of condom use and non-condom use among young adolescent male perpetrators of dating violence. *AIDS care*, 19(8), 970-973.
- Ridgway, G. L. (2000). Laboratory Diagnosis of Sexually Transmitted Diseases: Pp 135; Sw fr 35/\$31.50, in developing countries Sw fr 24.50. Geneva: World Health Organisation, 1999. ISBN 92 4 154501 1.
- Rietmeijer, C. A., Lansky, A., Anderson, J. E., & Fichtner, R. R. (2001). Developing standards in behavioral surveillance for HIV/STD prevention. *AIDS Education and Prevention*, 13(3), 268-278.
- Rinaldi, G., Kiadaliri, A. A., & Haghparast-Bidgoli, H. (2018). Cost effectiveness of HIV and sexual reproductive health interventions targeting sex workers: a systematic review. *Cost Effectiveness and Resource Allocation*, 16(1), 63.
- Risher, K., Rehle, T., Simbayi, L., Shisana, O., & Celentano, D. D. (2016). Antiretroviral treatment and sexual risk behavior in South Africa. *AIDS and Behavior*, 20(4), 710-716.
- Robertdevet. (2017). Where the poor people live: Stats Canada puts Nova Scotia poverty on the map. *The Nova Scotia Advocate*. Retrieved from <https://nsadvocate.org/2017/09/18/where-the-poor-people-live-stats-canada-puts-nova-scotia-poverty-on-the-map/>
- Romo, L. F., Lefkowitz, E. S., Sigman, M., & Au, T. K. (2002). A longitudinal study of maternal messages about dating and sexuality and their influence on Latino adolescents. *Journal of Adolescent Health*, 31(1), 59-69.
- Roulston, K. (2001). Data analysis and 'theorizing as ideology'. *Qualitative research*, 1(3), 279-302.
- Roy, É., Alary, M., Morissette, C., Leclerc, P., Boudreau, J., Parent, R., & ... Claessens, C. (2007). High hepatitis C virus prevalence and incidence among Canadian intravenous drug users. *International Journal Of STD & AIDS*, 18(1), 23-27. doi:10.1258/095646207779949880
- Russel Bernard, H. (1988). *Research methods in cultural anthropology. Qualitative and*
- Saag, M. S., Benson, C. A., Gandhi, R. T., Hoy, J. F., Landovitz, R. J., Mugavero, M. J., ... & Del Rio, C. (2018). Antiretroviral drugs for treatment and prevention of HIV infection in adults: 2018 recommendations of the International Antiviral Society–USA Panel. *JAMA*, 320(4), 379-396.

- Salters-Pedneault, K. (2016). What is Stigma and How Does it Apply to Mental Health?. Verywell. Retrieved from <https://www.verywell.com/stigma-a-definition-of-stigma-425329>
- Sanders, S. A., Hill, B. J., Janssen, E., Graham, C. A., Crosby, R. A., Milhausen, R. R., & Yarber, W. L. (2015). General Erectile Functioning among Young, Heterosexual Men Who Do and Do Not Report Condom-Associated Erection Problems (CAEP). *The journal of sexual medicine*, 12(9), 1897-1904.
- Schein, A. I., & Travers, R. (2017). Barriers and facilitators to HIV and sexually transmitted infections testing for gay, bisexual, and other transgender men who have sex with men. *AIDS care*, 29(8), 990-995.
- Scott-Sheldon, L. A., Carey, K. B., Cunningham, K., Johnson, B. T., Carey, M. P., & MASH Research Team. (2016). Alcohol use predicts sexual decision-making: a systematic review and meta-analysis of the experimental literature. *AIDS and Behavior*, 20(1), 19-39.
- Sexual Health Nova Scotia. (2018). Retrieved from shns.ca
- Shaeffer, A. D., & McNabb, D. M. (2018). Condoms.
- Sharma, G. (2017). Pros and cons of different sampling techniques. *International Journal of Applied Research*, 3(7), 749-752.
- Shrader-Frechette, K. (2007). *Taking action, saving lives: our duties to protect environmental and public health*. Oxford University Press.
- Siegel, K., Lekas, H. M., Onaga, M., Verni, R., & Gunn, H. (2017). The strategies of heterosexuals from large metropolitan areas for assessing the risks of exposure to HIV or other sexually transmitted infections from partners met online. *AIDS patient care and STDs*, 31(4), 182-195.
- Simmons, E. M., Brown, M. J., Slye, K., Ma, M., Sutton, M. Y., & McLellan-Lemal, E. (2011). Barriers and facilitators to testing in primary care among health care providers. *Journal of the National Medical Association*, 103(5), 432-438.
- Singh, A. E., & Romanowski, B. (1999). Syphilis: review with emphasis on clinical, epidemiologic, and some biologic features. *Clinical microbiology reviews*, 12(2), 187-209.
- Slovic, P. (1986). Informing and educating the public about risk. *Risk analysis*, 6(4), 403-415.
- Solomon, Y., Warin, J., Lewis, C., & Langford, W. (2002). Intimate talk between parents and their teenage children: democratic openness or covert control?. *Sociology*, 36(4), 965-983.
- Stahlman, S., Grosso, A., Ketende, S., Sweitzer, S., Mothopeng, T., Taruberekera, N., ... & Baral, S. (2015). Depression and social stigma among MSM in Lesotho: implications for HIV and sexually transmitted infection prevention. *AIDS and Behavior*, 19(8), 1460-1469.
- Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American journal of health promotion*, 10(4), 282-298.

- Taylor-Seehafer, M., & Rew, L. (2000). Risky sexual behavior among adolescent women. *Journal for Specialists in Pediatric Nursing*, 5(1), 15-25.
- Terrault, N. A. (2002). Sexual activity as a risk factor for hepatitis C. *Hepatology*, 36(S1).
- Thomas, G., Bassi, T., Continoho, M. M., & Goyal, A. (2017). Unit-5 Various Modes of Transmission of HIV.
- Thomas, J. C., Lansky, A., Weiner, D. H., Earp, J. A., & Schoenbach, V. J. (1999). Behaviors that facilitate sexual transmission of HIV and STDs in a rural community. *AIDS and Behavior*, 3(4), 257-267.
- Tilson, E. C., Sanchez, V., Ford, C. L., Smurzynski, M., Leone, P. A., Fox, K. K., ... & Miller, W. C. (2004). Barriers to asymptomatic screening and other STD services for adolescents and young adults: focus group discussions. *BMC public health*, 4(1), 21.
- Tohme, R. A., & Holmberg, S. D. (2010). Is sexual contact a major mode of hepatitis C virus transmission?. *Hepatology*, 52(4), 1497-1505.
- Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and applications*, 5, 147-158.
- Totten, S., MacLean, R., & Payne, E. (2015). Infectious syphilis in Canada: 2003-2012-CCDR: Volume 41-02, February 5, 2015 Canada Communicable Disease Report. *CCDR*, 41, 02.
- Traversy, G. P., Austin, T., Ha, S., Timmerman, K., & Gale-Rowe, M. (2015). Good news on HIV: An overview of recent evidence on barriers and facilitators to HIV testing. *Canada Communicable Disease Report*, 41(12), 302.
- Tsai, C. T., Robinson, P. V., de Jesus Cortez, F., Elma, M. L., Seftel, D., Pourmandi, N., ... & Bertozzi, C. R. (2018). Antibody detection by agglutination-PCR (ADAP) enables early diagnosis of HIV infection by oral fluid analysis. *Proceedings of the National Academy of Sciences*, 201711004.
- U.S. Department of Health and Human Services, Secretary's Advisory Committee. (2008, December 11). Phase I report: recommendations for the framework and format of healthy people 2020. Retrieved from <http://www.healthypeople.gov/2010/hp2020/advisory/phasei/summary.htm>.
- UNAIDS. (2014). 90-90-90 An ambitious treatment target to help end the AIDS epidemic. Retrieved from http://www.unaids.org/sites/default/files/media_asset/90-90-90_en_0.pdf
- UNICEF. (2009). MODULE 1: What are the Social Ecological Model (SEM), Communication for Development (C4D)? Retrieved from https://www.unicef.org/cbsc/files/Module_1_SEM-C4D.docx
- Van Den Tillaart, S., Kurtz, D., & Cash, P. (2009). Powerlessness, marginalized identity, and silencing of health concerns: Voiced realities of women living with a mental health diagnosis. *International journal of mental health nursing*, 18(3), 153-163.

- Van der Meer, A. J., Feld, J. J., Hofer, H., Almasio, P. L., Calvaruso, V., Fernández-Rodríguez, C. M., ... & Trapero-Marugan, M. (2017). Risk of cirrhosis-related complications in patients with advanced fibrosis following hepatitis C virus eradication. *Journal of hepatology*, 66(3), 485-493.
- Van Dyck, E., Behets, F., Crabbe, F., & Berkley, S. (1996). The STD laboratory.
- VanDevanter, N., Hennessy, M., Howard, J. M., Bleakley, A., Peake, M., Millet, S., Cohall, A., Levine, D., Weisfuse, I. & Fullilove, R. (2002). Developing a Collaborative Community, Academic, Health Department Partnership for STD Prevention. *Journal of Public Health Management and Practice*, 8(6), 62–68.
- Wardman, D., & Quantz, D. (2006). Harm reduction services for British Columbia's First Nation population: a qualitative inquiry into opportunities and barriers for injection drug users. *Harm Reduction Journal*, 3(1), 30.
- Weaver, A. D., Byers, E. S., Sears, H. A., Cohen, J. N., & Randall, H. E. (2001). Sexual health education at school and at home: Attitudes and experiences of New Brunswick parents. *Canadian Journal of Human Sexuality*, 11(1), 19-32.
- Wells, C., & Jones S. (2017). Multiplex Testing for Sexually Transmitted Infections: Diagnostic Accuracy, Clinical Utility, and Cost Effectiveness. CADTH. Retrieved from <https://www.cadth.ca/sites/default/files/pdf/htis/2017/RB1095%20Multiplex%20esting%20for%20STIs%20Final.pdf>
- Widman, L., & McNulty, J. K. (2011). Narcissism and sexuality. *The handbook of narcissism and narcissistic personality disorder: Theoretical approaches, empirical findings, and treatments*, 351-359.
- Willmott, C., & Arrowsmith, J. E. (2010). Point-of-care testing. *Surgery (Oxford)*, 28(4), 159-160.
- World Health Organization. (2010). WHO Recommendations on the Diagnosis of HIV Infection in Infants and Children. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK138555/>
- World Health Organization. (2012a). Sexually transmitted infections (STIs). Retrieved from https://apps.who.int/iris/bitstream/handle/10665/75838/WHO_RHR_12.31_eng.pdf
- World Health Organization. (2012b). Sexually transmitted infections (STIs): the importance of a renewed commitment to STI prevention and control in achieving global sexual and reproductive health (No. WHO/RHR/12.31). World Health Organization.
- World Health Organization. (2016a). Sexually transmitted infections (STIs). Retrieved from <http://www.who.int/mediacentre/factsheets/fs110/en/>
- World Health Organization. (2016b). Global health sector strategy on sexually transmitted infections 2016–2021. 2016. Retrieved from: <http://www.who.int/reproductivehealth/publications/rtis/ghss-stis/en/>.
- World Health Organization. (2017). Human rights and health. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/human-rights-and-health>

- World Health Organization. (2018). The ecological framework. Retrieved from <http://www.who.int/violenceprevention/approach/ecology/en/>
- World Health Organization. (n.d.). Health equity. Retrieved from https://www.who.int/topics/health_equity/en/
- Yang, C. J., Chang, S. Y., Wu, B. R., Yang, S. P., Liu, W. C., Wu, P. Y., ... & Chang, S. C. (2015). Unexpectedly high prevalence of *Treponema pallidum* infection in the oral cavity of human immunodeficiency virus-infected patients with early syphilis who had engaged in unprotected sex practices. *Clinical Microbiology and Infection*, 21(8), 787-e1.
- Zikic, A., Schünemann, H., Wi, T., Lincetto, O., Broutet, N., & Santesso, N. (2018). Treatment of Neonatal Chlamydial Conjunctivitis: A Systematic Review and Meta-analysis. *Journal of the Pediatric Infectious Diseases Society*

APPENDIX

Appendix 1: Codebook

Name	Description
Actions done	Actions that were taken by the government, provincial or federal, to counter the rising rates of STBBIs in Nova Scotia
Federal actions	Actions that were taken by the federal government to reduce the spread of STBBIs nationally
Provincial actions	Actions that were taken by the provincial government to reduce the spread of STBBIs in Nova Scotia
Actions done community	Actions that were taken at the community level (e.g., community-level institutions, media, and electronic communities) to reduce the spread of STBBIs
Actions done Individual	Actions that were taken by people themselves to reduce the spread of STBBIs in Nova Scotia
Actions done interpersonal	Actions that were taken at the interpersonal level (e.g., families, friends, colleagues, and contacts) to reduce the spread of STBBIs in Nova Scotia
Actions done organizational	Actions that were taken by governmental organizations to reduce the spread of STBBIs in Nova Scotia
Actions done policy	Policies that were taken or created to reduce the spread of STBBIs in Nova Scotia including funding
Actions needed	Actions that are required to reduce the spread of STBBIs
Action needed community	Future actions that are required at the community level (e.g., community-level institutions, media, electronic communities) to reduce the spread of STBBIs in Nova scotia
Actions needed individual	Future actions that are required at the individual level to reduce the spread of STBBIs in Nova scotia
Actions needed interpersonal	Future actions that are required at the interpersonal level (e.g., family, friends, and colleagues) to reduce the spread of STBBIs in Nova scotia
Actions needed organizational	Future actions that are required at the organizational level (e.g., governmental agencies) to reduce the spread of STBBIs in Nova scotia
Actions needed policy	Policies that are required to be modified or maintained, including funding, to reduce the spread of STBBIs in Nova Scotia

Name	Description
Barriers	Any barriers to testing, including potential barriers in future or those that have been faced in the past
Community barrier	Any barrier to testing due to a community's financial or social status
Individual barrier	Any barrier to testing due to an individual's perception, awareness, or beliefs
Interpersonal barrier	Any barrier to testing due to a mark or disgrace (e.g. stigma) associated with a person who is receiving testing for STBBIs or has a STBBI
Organizational barrier	Any barrier to testing due to an organizational issue
Policy barrier	Any barrier to testing due to faulty or lack of policy
Comments	Participants' comments at the end of the interview
Contributing factors	Local contributing factors to rising rates of STBBIs in Nova Scotia
Community contributing factors	Contributing factors to the rising rates of STBBIs in Nova Scotia that fit in the community influential level of the SEM (e.g., culture, community-level institutions, media, and electronic communities) which represent potential sources of community communication and support
Individual contributing factors	Contributing factors to the rising rates of STBBIs in Nova Scotia that fit in the individual influential level of the SEM (e.g., individual's beliefs, thoughts, knowledge, behaviours, and attitudes)
Interpersonal contributing factors	Contributing factors to the rising rates of STBBIs in Nova Scotia that fit in the interpersonal influential level of the SEM (e.g., relations with family members, friends, and others)
Organizational contributing factors	Contributing factors to the rising rates of STBBIs in Nova Scotia that fit in the organizational influential level of the SEM (e.g., healthcare systems, healthcare plans, local health departments, clinics, and professional organizations that represent potential sources of organizational messages and support)
Policy contributing factors	Contributing factors to the rising rates of STBBIs in Nova Scotia that fit in the policy influential level of the SEM (e.g., policies that support healthy behaviours, access to testing, services, funding, and navigation of the problem by the government)
Effects of increased testing	The impacts of increased testing for STBBIs
Benefits of testing	Benefits that would be gained if rates of testing for STBBIs increased in Nova Scotia

Name	Description
Drawbacks of testing	Negative impacts of increased testing rates for STBBIs
Reflection on rates	The effects of higher rates of testing for STBBIs on STBBI rates
Infectious syphilis	Infectious syphilis status in Nova Scotia
Dramatic decrease, how	Causes of dramatic decrease in infectious syphilis rates in Nova Scotia since 2013
Coordination	Coordination between various healthcare facilities or authorities
Educating people	Education as a method used to combat the infectious syphilis outbreak in Nova Scotia
Surveillance	Close watch of STBBIs
Targeted actions	More focused actions to combat rising rates of STBBIs
Testing for IS	Testing as a method used to combat the infectious syphilis outbreak in Nova Scotia
Treating IS	Treating cases as a method used to combat the infectious syphilis outbreak in Nova Scotia
Factors IS	Contributing factors to the infectious syphilis outbreak in Nova scotia
Outbreak IS	Outbreak of infectious syphilis in Nova Scotia
Strange	Decrease in infectious syphilis rates while other STBBI rates increase
Interpretation of rates	How interviewees interpret current STBBIs rates in Nova Scotia
Rates	Participants' perceptions of STBBI rates in Nova Scotia
Ebb and flow	Rates of infections that have a rhythmic pattern of decline and regrowth
High or increasing rates	STBBIs that participants believe have high or increasing rates
Low or decreasing rates	STBBIs that participants believe have low or decreasing rates
Provincial VS National rates	Provincial rates of STBBIs in comparison with national rates of STBBIs
Stationary rates	STBBIs that participants believe have static rates
POCT	Participants' perspectives on the use of the Point Of Care Testing method for STBBIs in the Nova Scotia context

Name	Description
Agree	Participants see POCT as a useful method for testing for STBBIs in Nova Scotia
Benefits of POCT	Benefits that are expected by using the POCT method
Disagree	Participants see POCT as not being a useful method for testing for STBBIs in Nova Scotia
Drawbacks of POCT	Disadvantages of using the POCT method
Lack of use	Participants' perspectives on the reasons POCT is not used in Nova Scotia
Not sure	Participants are not sure whether POCT would be beneficial in Nova Scotia
Things to think about	Issues that should be understood to evaluate the efficiency of using the POCT method for STBBIs in Nova Scotia
With POCT	Conditions that must be available if using POCT
Shifting to prevention	Shifting from only treating STBBIs to preventing their spread using the five influential levels of the SEM
Shifting to prevention community	Shifting from only treating STBBIs to preventing their spread at the community level of the SEM
Shifting to prevention individual	Shifting from only treating STBBIs to preventing their spread at the individual level of the SEM (e.g., individual's beliefs, thoughts, perceptions, and needs)
Shifting to prevention interpersonal	Shifting from only treating STBBIs to preventing their spread at the interpersonal level of the SEM
Shifting to prevention organization	Shifting from only treating STBBIs to preventing their spread at the organizational level of the SEM
Shifting to prevention policy	Shifting from only treating STBBIs to preventing their spread at the policy level of the SEM
Strategies to testing	Strategies that could be initiated or modified to increase testing for STBBIs in Nova Scotia
Actions required	Actions that are required to have a reliable strategic plan to increase uptake of testing for STBBIs in Nova Scotia

Name	Description
Actions required community	Actions that are required, at the community level, to have a reliable strategic plan to increase uptake of testing for STBBIs in Nova Scotia
Actions required individual	Actions that are required, at the individual level, to have a reliable strategic plan to increase uptake of testing for STBBIs in Nova Scotia
Actions required interpersonal	Actions that are required, at the interpersonal level, to have a reliable strategic plan to increase uptake of testing for STBBIs in Nova Scotia
Actions required organizations	Actions that are required, at the organizational level, to have a reliable strategic plan to increase uptake of testing for STBBIs in Nova Scotia
Actions required policy	Actions that are required, at the policy level, to have a reliable strategic plan to increase uptake of testing for STBBIs in Nova Scotia
Testing methods	Characteristics of a test that could facilitate its uptake by people
Testing rates	Participants' perspectives on the current picture of testing rates for STBBIs in Nova Scotia
Problems in rates	Problems that participants see in determining rates
Solutions	Solutions that the participants suggested would be helpful in getting a better picture of testing rates
Type of infection	The effects of the nature of the STBBI on its prevention