

**Factors that Facilitate and Impede the
Implementation of Evidence-Informed Chronic Disease
Prevention Programs and Policies in
Rural Ontario Public Health Units**

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Practitioners, research funders, and policymakers acknowledge the need to implement evidence-informed public health (EIPH) practice to reduce the prevalence of chronic diseases. Although it is difficult to estimate how widely EIPH practices are being applied, several surveys in public health settings demonstrate that, on average, just over half of recommended health practices are implemented. In Canada, people living in rural and remote areas are most vulnerable to chronic diseases. However, the implementation of EIPH practice in rural Ontario public health units (PHUs) is a complex, multidisciplinary process, that occurs within heterogenous and dynamic communities and encompasses different sectors of society. Therefore, this study explores and develops a realist account of the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention (CDP) programs and policies in rural Ontario PHUs (i.e. Rural Public Health Systems – RuPHS).

Intensive, in-depth, semi-structured qualitative interviews and focus groups were conducted in six rural Ontario public health units. Fifteen executives (i.e. CDP Manager/Directors and MOH), participated in the interviews, and 50 public health staff in the area of CDP participated in the focus groups. Interview and focus group data were supplemented by field and reflective notes, and unobtrusive documents provided by the participants.

The primary method that was used was a qualitative collective case study (multiple), and the study perspective was based on a critical realist ontology. Propositions, sensitizing concepts, and a basic realist model was developed *a priori* based on extensive research. The Consolidated Framework for Implementation Research (CFIR) was also used to guide the research study. Inductive, deductive, abductive, and retroductive analysis procedures were used to produce a final data structure hierarchy (i.e. categorization scheme). The categorization scheme included five categories, seventeen (17) themes, twenty-one (21) subthemes, and eighty-one (81) factors that facilitated or impeded implementation of CDP programs and policies in rural Ontario PHUs, which were verified through member checks. Solutions were also identified to address barriers to implementation.

Factors that facilitated or impeded implementation were summarized under five broad categories and a further seventeen major themes within them. Major themes were as follows: evidence strength and quality, complexity, adaptability, trialability, cosmopolitanism, external policies and incentives, external leadership engagement, population external communication, reach, population needs and resources, structural characteristics, culture, implementation climate, readiness for implementation, intraorganizational networks and communications, individual identification with organization, and planning. Key lessons learned from the study were also identified.

Implementation was seen to be complex, and there was a plethora of related factors that facilitated and impeded the implementation of evidence-informed CDP programs and policies in Ontario rural PHUs, that occurred over time. These factors closely aligned to many of the factors in the CFIR, which was used to guide this study. Further, critical realism offered insight into the mechanisms (M) with the program and policy, the conditions and contexts (C), under which the generative mechanisms operated, and the patterns of outcomes (O) produced (i.e. realist model). Contributions of rural public health practice, strengths and limitations, and future research were also discussed.

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Dr. Erica Di Ruggiero, external examiner for this thesis, is the Director of the Centre for Global Health, Director of the Collaborative Specialization in Global Health, Associate Professor in the Division of Social and Behavioural Health Sciences, Associate Professor in the Institute of Health

Policy Management and Evaluation (non-budgetary cross-appointment), and Associate Member of the School of Graduate Studies at the Dalla Lana School of Public Health (University of Toronto). She is truly well accomplished and recognized in her field, and I was indeed honoured to be examined by such a knowledgeable and inspirational leader.

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List of Abbreviations

alPHa	Association of Local Public Health Agencies
APHEO	Association of Epidemiologists of Ontario
BCW	Behaviour Change Wheel
BOH	Board of Health
CAs	Census Agglomerations
CCHS	Canadian Community Health Survey
CDP	Chronic Disease Prevention
CFIR	Consolidated Framework for Implementation Research
CMAs	Census Metropolitan Areas
CMO	Context-mechanism-outcome configuration
CoP	Communities of Practice
CRDs	Chronic Respiratory Disease
CSDs	Census Subdivisions
CVDs	Cardiovascular Disease
CVF	Competing Values Framework
EIPH	Evidence-Informed Public Health
EOATN	Eastern Ontario Active Transportation Network
FTE's	Full-Time Equivalent
GM	General Manager
GRA	Graduate Research Assistance
HEIA	Health Equity Impact Assessment
HPPA	Health Protection and Promotion Act
LDCP	Local Driven Collaborative Projects
LHIN	Local Health Integration Network
MIZ	Strong Metropolitan Influenced Zone
MOH	Medical Officer of Health
MOHLTC	Ontario Ministry of Health and Long-Term Care
NCCMT	National Collaborating Centre for Methods and Tools

NRT	Nicotine Replacement Therapy
ODPH	Ontario Dietitians in Public Health
OECD	Organization of Economic Cooperation and Development
OPHS	Ontario Public Health Standards
OSPAPPH	Ontario Society of Physical Activity Promoters in Public Health
OTRU	Ontario Tobacco Research Unit
PARIHS	Promoting Action on Research Implementation in Health Services
PHO	Public Health Ontario
PHRED	Public Health Research, Education, Evaluation, and Development
PHU	Public Health Unit
PI	Principal Investigator
PTCC	Program Training and Consultation Centre
REB	Research Ethics Board
RRFSS	Rapid Risk Factor Surveillance System
RST	Rural and Small Town
RulPHS	Rural Public Health Systems
SDOH	Social Determinants of Health
SI	Student Investigator
SIRC	Society for Implementation Research Collaboration
TCAN	Tobacco Control Area Network
TDF	Theoretical Domains Framework
WHO	World Health Organization

Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

I. Introduction and Overview

The World Health Organization (WHO) recently declared that “chronic disease is the greatest public health challenge of the 21st century” (World Health Organization, 2014, p. ix). Internationally, chronic diseases are the major causes of mortality, disability, and public health burden (World Health Organization, 2014; Greenburg, Raymond & Leeder, 2011). Each year approximately 38 million people will die from chronic diseases, of which 40% of the deaths are premature (World Health Organization, 2014). In Canada, each year, 65% of all deaths are caused by four major chronic diseases, including cancer, cardiovascular disease (CVD), chronic respiratory disease (CRD), and diabetes (Public Health Agency of Canada, 2017). The risk factors associated with chronic diseases have been well established in the literature and include physical inactivity, unhealthy eating, obesity, and tobacco use (World Health Organization, 2014; Public Health Agency of Canada, 2016).

In Canada, rural and remote areas in particular have been found to have a higher prevalence of chronic diseases and rates of modifiable risk factors such as overweight/obesity, smoking, physical inactivity, unhealthy eating (Canadian Institute for Health Information, 2006) and alcohol use (i.e. heavy drinking) (Statistics Canada, 2018) compared to their urban counterparts. Challenges related to lower levels of education, low income, poverty, lack of access to programs and services, low population density, large geography, higher unemployment rates, environmental exposures, and an aging population, among others, negatively affect the health status of people living in rural areas (Canadian Institute for Health Information, 2006; Romanow, 2002; Crosby, Wendel, Vanderpool & Casey, 2012; Karunanayake, Rennie, Pahwa, Chen, & Dosman, 2011; Langley, 2011; Pahwa, McDuffie, & Dosman, 2006; Faria, Facchini, Fassa, & Tomasi, 2005).

In response to the chronic disease epidemic, the WHO concluded in their *Global Status Report on Non-Communicable Diseases 2014* that chronic disease evidence-based interventions were necessary to impact chronic diseases (World Health Organization, 2014). Despite great progress in the development of new evidence for chronic disease prevention in Canada, translating knowledge into practice to effectively reduce chronic diseases remains a conundrum, particularly for rural populations (Romanow, 2002). In response to this, bridging the gap between research and practice can be understood by identifying the factors that facilitate and impede implementation of evidence-

informed chronic disease prevention programs and policies in rural areas (Shaw, Gallant, Riley-Jacome & Spokane, 2006; Bosch, Weijden, Wensing & Grol, 2007). Yet very little is known about these factors in rural Ontario public health units (PHUs).

In Canada, over the past 20 years, there has been an explosion of interest in public health, regarding the reduction of preventable chronic diseases of public health importance (Ontario Ministry of Health and Long-Term Care, 1997, 2017). In the Canadian province of Ontario, chronic disease prevention has been recognized at the provincial level with the incorporation of the Chronic Disease Prevention and Well-Being Standards within the Ontario Public Health Standards (OPHS) (Ontario Ministry of Health and Long-Term Care, 2018a).

However, the implementation of evidence-informed public health (EIPH) practice in rural Ontario PHUs is a complex, multidisciplinary process, that occurs within heterogenous and dynamic communities, and encompasses different sectors of society (National Collaborating Centres for Public Health, 2016; Terashima, Guernsey, & Andreou, 2014; Canadian Institute for Health Information, 2006). Research shows a plethora of factors at multiple levels that can affect implementation of evidence-informed chronic disease programs and policies in rural areas. Some of these factors that impede implementation include disparities in access to health care and health care providers (Romanow, 2002; Moss, Racher, Jeffery, Hamilton, Burles, & Annis, 2012), challenges serving rural communities (i.e. low capacity – human, funding, resources) (Romanow, 2002; Warner, Harrold, Allen, & Lyons, 2010; Findholt, Davis & Michael, 2013), and physical, natural, and geographic barriers (i.e. lack of access to public transportation, inclement weather, and large geography), among others (Romanow, 2002; Boehm et al., 2013, Williams & Kulig, 2012). Some factors that facilitate implementation include partnership engagement and collaboration, building relationships, and a passion to improve the health of rural populations among professionals etc. (Raine et al., 2013; Honeycutt, Wile, Dove, Hawkins & Orenstein, 2015; Reddy et al., 2011; Kilty, 2007).

With the growing demands on resources and a general culture of accountability and transparency in public health, there has been greater political and societal pressures to demonstrate the integration of EIPH practice in optimizing public health outcomes (Wilson, Petticrew, Calnan & Nazareth, 2010; Dodge & Dion, 2011; Graham et al., 2006; Mitton, Adair, McKenzie, Patten, & Perry, 2007). The gap between EIPH practice in many areas of public health has been well documented and has been regarded as a “slow” and “haphazard” process (Lenfant, 2003; U.S. Department of Health & Human

Services: Agency for Health Research and Quality, 2001; Orszag & Ellis, 2007; Straus, Tetroe & Graham, 2009; Estabrooks, Thompson, Lovely, & Hofmeyer, 2006; Green, Ottoson, Garcia, & Hiatt, 2009). Failure to implement EIPH practice contributes to health inequities, inefficient use of resources, poor health outcomes, and low public confidence in public health services (Canadian Public Health Association, 2016; Graham et al., 2006; Berwick, 2003). Although it is difficult to estimate how widely EIPH practices are being applied, several surveys in public health settings demonstrate that, on average, just over half of recommended health practices are implemented (Glasgow & Strycker, 2000; McGlynn et al., 2003). Therefore, EIPH practices that have been found most effective are not necessarily those most commonly being used (Wandersman et al., 2008).

In the complex realm of implementation science, there are several characteristics that can impede EIPH practice (Graham et al., 2006). These characteristics explain a dynamic system (May, 2013). Grol and his colleagues (2007) referred to these complex characteristics of implementation as a “flock of birds”, “a colony of termites”, or the “immune system” (Grol, Bosch, Hulscher, Eccles, & Wensing, 2007). In response to this dynamic system, the field of implementation science is an emerging field worldwide (Brownson, Colditz & Proctor, 2012). There is a current wave of optimism that implementation science is an essential component that can effectively address this research to practice gap (Nilsen, 2015). This has fueled a growing literature on implementation frameworks, models, and theories (Moulin, Sabater-Hernandez, Fernandez-Llimos & Benrimoj, 2015).

Implementation theories, models, and frameworks can be used to understand how and why the implementation of EIPH practice fails or succeeds and allow further insight into the context and mechanisms that can facilitate or impede implementation of EIPH practices (Nilsen, 2015).

Prominent implementation scientists (i.e. Rogers, 1995; Damanpour, 1991; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Damschroder et al., 2009 etc.) have concerned themselves with implementation, diffusion of innovation, knowledge transfer, knowledge exchange, knowledge translation, and dissemination of research findings.

However, clearly articulated among researchers is the quantity, quality, and diversity of implementation theories, frameworks, and models (Moulin, Sabater-Hernandez, Fernandez-Llimos & Benrimoj, 2015; Nilsen, 2015). Kirk et al. (2016) have contributed to the thinking about the need for a comprehensive framework that:

[...] Would help to identify barriers to address and facilitators to leverage, which in turn, would inform choice of strategies that will increase the likelihood of

implementation success. In addition, this information can be used to adapt the intervention to fit the local context (Kirk et al., 2016 p. 11).

Not only do they suggest a broader view of determinants that contribute to implementation, but they also suggest that interventions should be specific to the local context and conditions, which may be particularly important in rural settings (Damschroder et al., 2009). Damschroder et al. (2009) defined context in relation to implementation science as “the set of circumstances or unique factors that surround a particular implementation effort” (p. 3). Their framework, the Consolidated Framework for Implementation Research (CFIR), is a meta-theoretical framework that identifies and standardizes relevant domains and constructs that can be readily operationalized within public health (Damschroder et al., 2009).

This particular research study (i.e. Rural Public Health Systems – RulPHS) contributes to the understanding of the implementation domains and constructs within their framework, by contributing a realistic account of factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario health units (i.e. purpose of the study).

Using collective (multiple) case design in six rural PHUs in Ontario, in-depth, semi-structured focus groups and interviews, supplemented with field and reflective notes and documents were the methods of data collection for this study. This study contributes to understanding the individual, contextual-related, structural factors, and mechanisms that affect how chronic disease programs and policies were implemented in rural public health settings (i.e. inner setting, outer setting, intervention characteristics, characteristics of individuals, and process) through inductive, deductive, abduction, and retroduction analysis procedures. Specifically, an evidence-informed realist model of rural public health by public health agents was developed (abduction method) through a review of the literature on rural health and implementation science (deductive method), analysis of interview and focus group data, supplemented by field notes and documents (inductive/deductive method), and reflection (i.e. retroductive method).

From the outset, it was anticipated that this study would also make a practical contribution to improve the performance of public health through a better understanding of these factors and how rural public health professionals can be better supported by policy, strategies for knowledge translation, evaluation and research, and funding etc. to minimize barriers and maximize assets related to implementation, in rural areas through the construction of new knowledge of these factors.

The methods of inquiry developed and applied here – specifically a critical realist ontology that drew upon the notion of underlying power structures that were independent of human conception and perception that is ontologically realist, epistemologically fallible¹, yet judgmentally rational (Bhaskar, 1978) and informed by a collective (multiple) case study method of qualitative research augmented by relevant research, and application of CFIR – were also anticipated to demonstrate promise for application in rural public health units and different contexts (rural secondary and tertiary healthcare settings, rural non-profit organizations etc., and among different stakeholders in rural areas). Further, it is anticipated that this study can provide an empirical contribution (i.e. empirically demonstrated mechanisms) to public health implementation research through a realist account of evidence-informed rural public health practice.

A review of the literature, the rationale for the study, methods, findings, and discussion follows. Further, a reader who is not familiar with this context might find the list of acronyms provided at the beginning of the thesis helpful.

¹ The term “fallible” refers to the limitations of scientific knowledge (i.e. ‘intellectualist fallacy’ or ‘prejudice’) (Sayer, 1992).

II. Literature Review

A. Place and Health

There is a growing interest in the relationship between place and health, specifically in the rural context (Pong, Desmeules & Lagacé, 2009). The fundamental question is, “Does where people live, work, and play have an impact on their health” (Pong, Desmeules & Lagacé, 2009, p.58; Pong, Desmeules, Guernsey, Manuel, Kazanjian, & Wang, 2012, p.61). Place is recognized as an important determinant of health, that describes a host of phenomena that include population size, geographical distance, socio-economic conditions, community structure, ethnic composition, occupational activities, lifestyle, and culture (Cummins, Curtis, Diez-Roux & Macintyre, 2007; Pong, Desmeules, Guernsey, Manuel, Kazanjian, & Wang, 2012). This wide range of both contextual factors and individual factors are relevant for understanding health variations between and within rural areas (Cummins, Curtis, Diez-Roux, & Macintyre, 2007). However, despite ongoing research, the mechanisms by which “rural place” affects health remains unclear with messy, complex, and inconsistent phenomena at play (Bourke, Taylor, Humphreys, & Wakerman, 2013).

B. Rural Definitions

The term “rural” is a multifaceted concept, which there is no universal agreement on its definition (Hart, Larson, & Lishner, 2005; du Plessis, Beshiri, Bollman, & Clemenson, 2001). In fact, reviews by Pitblado & Pong (1999), Williams & Cutchin (2002), and Pong & Pitblado (2001), pessimistically suggest that “there are almost as many definitions of rural as there are researchers” (Pitblado, 2005, p.163). Although policy analysts, policymakers, demographers, and researchers would prefer a standardized definition of ‘rural’, many researchers rely on either a subjective or objective approach when adopting a specific definition (Hart, Larson, & Lishner, 2005). According to Couper (2003), rurality is subjective, and “like beauty, rurality is in the eye of the beholder” (p.2).

Traditionally, the most widely used criteria when defining rurality has been based on univariate measures such as population size, population density, nearest neighbourhood distance, and access to facilities and services (Prieto-Lara & Ocaña-Riola, 2010). Generally, these definitions are subdivided into two categories: 1) technical (geographical distance); and 2) social factors (Vanderboom & Madigan, 2007). However, these monolithic classifications inarguably fail to capture differences within and between rural populations (Vanderboom & Madigan, 2007).

Conversely, rural areas are also sometimes characterized as simply “non-urban” (Hall, Kaufman, & Ricketts, 2006). This counterfactual urban experience is often described by rural “deficits” (Bourke, Taylor, Humphreys & Wakerman, 2013). Rural deficits are commonly referred to as disadvantages associated with living, playing, and working in rural areas. These deficits include lack of access to health care, health service closures, and shortage of doctors (Bourke, Taylor, Humphreys & Wakerman, 2013).

Adding to the complexity of defining rurality, attempts to differentiate among rural, remote, and northern are just as messy and inconsistent (Bourke, Taylor, Humphreys & Wakerman, 2013). Like rurality, there are a plethora of classification systems for defining remote (Wakerman, 2004). In general, international definitions of remote focus on environmental parameters that influence access to services and the distance from population centres based on socio-demographic variables of varying complexity (Wakerman, 2004). Moreover, it is difficult to generalize about the complex meanings of living in remote and rural areas (Williams & Kulig, 2012). For example, the experiences of receiving healthcare services vary depending on whether a person lives in the isolated north or close to an urban center (Williams & Kulig, 2012). Recognizing that rurality is complex and variable and that there is no satisfactory and universal definition of remote, hereafter, the word “rural” will encompass rural, remote, and northern (Wakerman, 2004).

Since rurality is an important aspect of any study design, it is critical that the rural definition chosen will be relevant to the research question and explicitly stated (Vanderboom & Madigan, 2007).

Although there are several definitions of rural that exists in Canada, there are three that are most commonly used (Williams & Kulig, 2012). These are as follows.

1. **Census rural** – census rural typically refers to a population outside of population centres of 1,000 persons and a population density of at least 400 persons per square kilometer, based on the current census population count (Statistics Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001).

2. **Rural and small town (RST)** – refers to areas outside Census Metropolitan Areas (CMAs) and Census Agglomerations (CAs) (Statistics Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001). A CMA has a total population 100,000 or more with 50,000 or more in its urban core (Statistics Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001). Whereas, a CA has a total population of less than 100,000 or more with 50,000 or more in its urban core (Statistics

Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001). Both CMAs and CAs refer to neighbouring municipalities and towns where 50% of the employed residents commute (Statistics Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001). RST is further divided into five zones based on the degree of influence to larger urban centres (Statistics Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001). They are defined as follows: (a) Strong Metropolitan Influenced Zone (MIZ) – Census subdivisions (CSDs) where at least 30% of the employed residents commute to any CMA or CA; (b) Moderate MIZ – CSDs where 5% to less than 30% of the employed resident's commute to any CMA or CA; (c) Weak MIZ – CSDs where more than zero but less than 5% of the employed residents commute to any CMA or CA; (d) No MIZ – CSDs where none of the employed residents commute to any CMA or CA (or the number of employed residents is less than 40); and (e) RST Territories – Refers to the non-CMA/CA parts of the Yukon, the Northwest Territories and Nunavut (i.e. the areas outside the CAs of Whitehorse and Yellowknife) (Statistics Canada, 2015a; du Plessis, Beshiri, Bollman, & Clemenson, 2001).

3. Organization of Economic Cooperation and Development (OECD) predominately rural regions – refers to having more than 50% of the population living in a rural community with a population density with less than 150 persons per square km (Organization for Economic Cooperation and Development, 1994).

Since there is no standard definition of rural, du Plessis, Beshiri, Bollman, & Clemenson (2001) strongly recommend that the appropriate definition should be determined by the research question. Williams & Kulig (2012) note that for many health researchers, the RST definition is one of the best definitions because it designates whole towns or communities as rural and allows for analysis of specific health indicators. A major strength of the RST definition is that it provides a distinction between five heterogeneity categories of rural and urban areas that can be appropriately compared (Williams & Kulig, 2012; Terashima, Guernsey, & Andreou, 2014; Canadian Institute for Health Information, 2006). However, a major disadvantage is that this definition does not account for social representation and heterogeneity within urban and rural areas (Terashima, Guernsey, & Andreou, 2014; Canadian Institute for Health Information, 2006).

C. The Rural Canadian Context

Although a universal definition of rural does not exist in Canada, the RST is an appropriate choice for this thesis because of its ability to discern differences in health outcomes between rural areas.

Based on this definition, approximately 19% to 30% or six million Canadians live in rural areas covering 95% of the country's landmass (duPlessis, Beshiri, Bollman, & Clemenson, 2001; Williams & Kulig, 2012). Although this figure has remained steady for 25 years, the overall RST population is decreasing (Bollman & Clemenson, 2008). This is attributed to the out-migration of youth, an aging population, lower level of human capital, and the inability to attract or retain immigrants (Williams & Kulig, 2012). Some authors even go far as to suggest that rural communities are "slowly dying" (Martinez, Pampalon, Hamel, & Raymond, 2004).

Rural Canada is highly diverse from an economic perspective (Sutherns, McPhedran & Haworth-Brockman, 2004). Economically, Canada's natural resources provide employment, oil, gas, forest products, food, and tax revenue from its rural Canada landscape (Sutherns, McPhedran & Haworth-Brockman, 2004). Rural settings across Canada range from its coastal regions on the eastern and western boundaries to its agrarian areas centrally to northern areas that are described by subarctic conditions, forests, and lakes (Leipert, 2005; Sutherns, McPhedran & Haworth-Brockman, 2004).

The demography of rural areas is also different compared to residents living in urban areas (Canadian Institute for Health Information, 2006). Most rural communities have a lower proportion of immigrants, a higher proportion of Indigenous People, a higher dependency ratio, a higher proportion of children and youth (0-19 years of age) and older adults (>60 years of age), and a lower proportion of working age adults (20-50 years of age) compared to urban counterparts (Canadian Institute for Health Information, 2006; Williams & Kulig, 2012; Malenfant & Morency, 2011; Statistics Canada, 2016). This is likely a result of working age adults moving out of rural areas to cities and major metropolitan areas for further employment and education opportunities, and older adults moving to rural areas when they retire (Desmeules, Luo, Wang & Pong, 2007; Williams & Kulig, 2012). Further, rural populations are on average less educated, have lower-incomes, and have higher unemployment rates than urban residents (Moazzami, n.d.; Statistics Canada, 2004).

D. Health Status and Determinants in Rural Canada and Efforts to Improve Them

In Canada, variations in health exist between rural and urban populations (Canadian Institute for Health Information, 2006). While there was a paucity of information on rural health in Canada, generally, the health status of individuals who reside in rural areas is inferior compared to those who live in urban areas and worsened with increase rurality (Canadian Institute for Health Information, 2006). Specifically, rural populations are found to have a disproportionate burden of non-communicable diseases and associated risk factors compared to urban populations (Canadian

Institute for Health Information, 2006). For example, rural residents have higher mortality rates for circulatory diseases, injuries, and suicide (Canadian Institute for Health Information, 2006). Health determinants such as overweight/obesity, unhealthy diet, smoking, physical inactivity (Canadian Institute for Health Information, 2006) and alcohol use (i.e. heavy drinking) (Statistics Canada, 2018) were also found to be higher in rural areas compared to urban counterparts.

Generally, factors that explain rural differentials can be best described from a socio-ecological perspective. There are a variety of factors at multiple levels (individual/interpersonal, community, organizational, and policy level) that contribute to health inequities in rural populations. Some of the factors include, but not limited to: (a) individual/interpersonal factors – isolation, low help-seeking behavior, high-risk behaviour, privacy and anonymity concerns, poor or fair self-rated health, and low socio-economic status; (b) community factors – lack of availability, accessibility, and poor utilization of healthcare services, poor infrastructure for health promoting behaviours (e.g. poor walkable communities, lack of physical activity facilities, lack of access to quality, and affordable nutrient dense food), lack of public transportation, lack of education, and employment opportunities; and; (c) organization/policy level factors – lack of effective and sustained health promotion programs, and restrictions on expressing non-mainstream cultural beliefs, particularly among Indigenous populations (Jiang, Li, Boyce, & Pickett, 2008; Slaunwhite & Macdonald, 2015; Ministerial Advisory Council on Rural Health, 2002; Fraser et al., 2002; Wainer & Chesters, 2000; Singh & Siahpush, 2002; Moazzami, n.d.; Statistics Canada, 2004; Walia & Leipert, 2012; Penney, Rainham, Dummer, & Kirk, 2014; Haman et al., 2010; Loucaides, Plotnikoff, & Bercovitz, 2007; Teufel-Shone, Fitzgerald, Teufel-Shone, & Gamber, 2009).

Of particular interest, Indigenous populations are disproportionately affected by rural health inequities. Many of the barriers experienced by Indigenous populations were rooted in the context specific to Indigenous communities, namely a history of colonization impacting health (i.e. decreased participation in traditional activities such as hunting resulting from adoption of cultural norms of Western society and forced acculturation (i.e. residential schools) (First Nation Information Governance Centre, 2012; Haman et al., 2010). The results from this review revealed a dearth of information for other sub-groups. Although this deficit view leads to a narrow focus on rural health problems, it is just as fundamentally important to focus on the positive attributes of rural life (Bourke, Humphreys, Wakerman & Taylor, 2010). Some benefits of living in rural areas include a lower incidence of cancer (except for cervical cancer in women and lip cancer in men), and a

stronger sense of community belonging compared to their urban counterparts (Canadian Institute for Health Information, 2006).

While there are notable assets in a rural setting, the focus is on the burden of disease, poor health outcomes, and lack of access to health care that is ingrained in health care systems, policy formulation, and research (Bourke, Humphreys, Wakerman & Taylor, 2010). This ‘deficit’ view of rural health focuses on ‘problems that need fixing’ that warrants attention among government, policy stakeholders, and researchers to address these unique challenges. While little has changed over the last 40 years in understanding the causes, prevention, and control of chronic diseases, understanding evidence-informed chronic disease prevention in rural areas has been relegated a low priority among policymakers, practitioners, and research funders (Lalonde, 1974; Romanow, 2002). The existing literature among rural populations is sparse, which is concerning considering that rural populations are most vulnerable to chronic diseases (Crosby, Wendel, Vanderpool & Casey, 2012; Patterson, Moore, Probst, Shinogle, 2004; Australian Institute of Health and Welfare, 2008; Canadian Institute for Health Information, 2006; Romanow, 2002; Eberhardt & Pamuk, 2004; Hartley, 2004). To date, there have been no reviews (narrative, literature, systematic) that have identified implementation factors that facilitate and impede the implementation of evidence-informed chronic disease programs and policies in rural areas. Therefore, this dearth of evidence suggests the need for a study to bridge the gap in the literature and provide insight into the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural areas.

E. A Vision for Evidence-informed Practice in Ontario Rural Public Health Units by Understanding Implementation Factors

There has been a recent resurgence in interest in public health in Canada to foster evidence-informed practice through the creation of resources and initiatives to guide policy and practice decisions (i.e. Public Health Ontario (PHO) Evaluation Resources, Public Health Ontario Snapshots (Public Health Ontario, 2017, 2019). Additionally, there are many sites on the World Wide Web (WWW) that provide information to public health professionals to guide program and policy decisions (cf. <http://www.nccmt.ca/>; <http://www.apheo.ca/>; <http://www.publichealthontario.ca/en/Pages/default.aspx>; <http://www.cihr-irsc.gc.ca/e/193.html>; <https://www.canada.ca/en/public-health.html/> as examples). Generally, there is a growing demand for public health resources and a general culture of accountability and transparency to deliver high impact programs and policies (Ontario Ministry of Health and Long-Term Care, 2017). In the

province of Ontario, in Canada, chronic disease prevention has been recognized as a priority with the incorporation of the Chronic Disease Prevention and Well-Being Standard in the OPHS (Ontario Ministry of Health and Long-Term Care, 2018a).

At the time of writing, there were 35 PHUs in Ontario, each serving a distinct geographic region governed by an autonomous, semi-autonomous, and regional Board of Health (BOH) (Ontario Ministry of Health and Long-Term Care, 2009, 2018b). The BOH is responsible for the delivery of local public health programs and services as defined by the Health Promotion and Protection Act (HPPA) (Ontario Ministry of Health and Long-Term Care, 2009, 2017). The BOH is largely made up of elected officials from the local municipal councils (Ontario Ministry of Health and Long-Term Care, 2009, 2017). The ministry cost-shares the expenses with the municipalities (Ontario Ministry of Health and Long-Term Care, 2009, 2017). Currently, the province funds 75% of public health, while the municipality funds the remaining 25%. PHUs are staffed by public health inspectors, dietitians, dentists, health promoters, epidemiologists, public health administrators, public health nurses, and a Medical Officer of Health (MOH), among others (Ontario Ministry of Health and Long-Term Care, 2009, 2017). The MOH is responsible for providing programs and services and is accountable to the BOH (Ontario Ministry of Health and Long-Term Care, 2009, 2017).

Ontario PHUs are governed under the OPHS (i.e. provincial regulations pursuant to the Health Protection and Promotion Act – HPPA (Ontario Ministry of Health and Long-Term Care, 2017). The OPHS policy framework provides guidelines and protocols for core functions of PHUs that are continually revised, as part of an evergreen process (Ontario Ministry of Health and Long-Term Care, 2008, 2018a). The most recent version of the OPHS came into effect in January 1, 2018 and was revised on July 1, 2018 (Ontario Ministry of Health and Long-Term Care, 2018a). Concurrently, there has been a recent resurgence in interest in the transformation of public health in Ontario. Specifically, the *Patients First: A Proposal to Strengthen Patient-Centred Health Care in Ontario* articulated by the government’s policy direction for the health system including public health units that would work more “closely with the Local Health Integration Networks (LHINs) to plan population health services” (Ontario Ministry of Health and Long Term Care, 2015, p. 6). Core functions of public health include health promotion and policy development, assessment and surveillance, health protection and disease prevention, and injury prevention (Ontario Ministry of Health and Long-Term Care, 2017). Programs include infectious diseases, environmental health, chronic disease and injuries, family health, and emergency preparedness (Ontario Ministry of Health and Long-Term Care, 2017).

PHUs are required under the OPHS to fulfill the minimum requirements of the Chronic Disease Prevention and Well-Being Standards protocol of the OPHS and report on specified performance, developmental, and monitoring indicators (Ontario Ministry of Health and Long-Term Care, 2018a). The goal of the Chronic Disease Prevention and Well-Being protocol is “to reduce the burden of preventable chronic diseases of public health importance and improve well-being” (Ontario Ministry of Health and Long-Term Care, 2018a, p. 28). Seven topic areas that address chronic disease risk factors outlined in the policy include built environment, healthy eating behaviours, healthy sexuality, mental health promotion, oral health, physical activity, sedentary behaviour, and sleep (Ontario Ministry of Health and Long-Term Care, 2018a). Furthermore, the policy document includes the Substance Use and Injury Prevention Standards protocol that emphasizes substance use (i.e. tobacco, e-cigarettes, alcohol etc.) (Ontario Ministry of Health and Long-Term Care, 2018a).

Further, health units are accountable to its municipal and provincial funders, as well as the public (Ontario Ministry of Health and Long-Term Care, 2011, 2012, 2017, 2018a). As a result, health units use different tools to assess their performance including accountability agreements, balanced scorecard (i.e. strategic plans), and audited financial reports (Ontario Ministry of Health and Long-Term Care, 2011, 2012, 2017, 2018a). Although few studies examined policy implementation (i.e. OPHS) in Ontario PHUs for evidence-informed chronic disease prevention (Valaitis et al., 2016), little is known about implementation in rural Ontario PHUs.

Rural Ontario PHUs are unique, so it is important to understand the difference in how rural PHUs operationalize the OPHS compared to their urban counterparts. According to Statistics Canada (2015b) peer groupings, there are 11 health units that are classified as “rural” (9 from Peer Group D, and 2 from Peer Group E). A peer group comprises health regions that have similar socio-demographic profiles that align with the RST definition of rural health (Statistics Canada, 2015b). From an epidemiological perspective, comparisons between communities that have similar socio-economic profiles can be easily compared.

F. Major Implementation Science Frameworks, Models, and Theories that are Relevant to Understanding the Implementation of Chronic Disease Prevention Programs and Policies in Rural Areas

The need to foster EIPH practice suggests the importance of implementation frameworks, models, and theories (hereafter called frameworks and models) that present a way to understand and explain implementation success or failures in public health organizations (Nilsen, 2015). However, there are

approximately 60 implementation frameworks and models thus emphasizing the quality, quantity, and diversity of frameworks and models used in implementation science (Moulin, Sabater-Hernandez, Fernandez-Llimos & Benrimoj, 2015; Nilsen, 2015; Tabak, Khoong, Chambers & Brownson, 2013). Further, within these frameworks and models there is a wide array of unstandardized multi-level constructs related to the innovation itself, individual characteristics, and the internal and external environment (Chaudoir, Dugan, & Barr, 2013; Damschroder et al., 2009). There is also considerable heterogeneity in the definition of these constructs (Damschroder et al., 2009). For example, the construct ‘fidelity’ is used synonymously with adherence, integrity, and quality of program delivery. This is further complicated by the lack of psychometric properties (i.e. validity, reliability) used to evaluate these constructs.

Nilsen (2015) posits that there are five types of frameworks and models. These are as follows: 1) process models; 2) determinant frameworks; 3) classic theories; 4) implementation theories; and; 5) evaluation frameworks. Further, there are three purposes of implementation frameworks and models that can be used to understand program and policy changes in public health organizations (Nilsen, 2015; Rycroft-Malone & Bucknall, 2010; Estabrooks, Thompson, Lovely & Hofmeyer, 2006; Kitson, et al., 2008). These were identified as follows: 1) to describe and/or guide the process of translating research into practice; 2) to understand and/or explain the influences of implementation outcomes; and; 3) to evaluate implementation outcomes (Nilsen, 2015; Rycroft-Malone & Bucknall, 2010; Estabrooks, Thompson, Lovely & Hofmeyer, 2006; Kitson, et al., 2008).

Seven frameworks and models have received considerable attention in public health. These are as follows: 1) Rogers Diffusion of Innovation Theory (Rogers, 1983); 2) The PRECEDE-PROCEED Model (Green & Kreuter, 1980, 1991, 1999, 2005); 3) PARIHS Framework: Promoting Action on Research Implementation in Health Services (Kitson, Ahmed, Harvey, Seers, & Thompson, 1996); 4) The RE-AIM Framework (Glasgow, Vogt, & Boles, 1999; Gaglio, Shoup, & Glasgow, 2013); 5) Conceptual Model for Considering the Determinants of Diffusion, Dissemination, and Implementation of Innovation in Health Service Delivery and Organization (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004); 6) The Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2009); and more recently; 7) The Theoretical Domains Framework (TDF) (Cane, O’Connor, & Michie, 2012; Michie et al., 2005) (Nilsen, 2015; Tabak, Khoong, Chambers, & Brownson, 2013).

Given the multiple and disparate frameworks and models being used in implementation science and notable considerations for overlapping, differing, and missing domains and constructs within each model, selecting an implementation model is a challenging task. Is it plausible, even given these challenges, to select the right model or framework that will provide a complete understanding and explanation of all aspects of implementation relevant to evidence-informed chronic disease prevention public health practice in rural areas? Does such a model exist? This is contestable. However, one may suggest that it is possible to select a suitable framework/model or multiple frameworks/models based on a public health practitioner's epistemological and ontological assumption.

In response to this, the CFIR was deemed most relevant to guide this study that would inform the implementation of evidence-informed chronic disease prevention programs and policies in rural areas. A description of the CFIR follows.

G. The Consolidated Framework for Implementation Research (CFIR)

The Consolidated Framework for Implementation Research (CFIR) has been a highly cited implementation framework in public health since its publication in 2009 (Tabak, Khoong, Chambers, & Brownson, 2013; Kirk et al., 2016). This framework was developed by identifying, consolidating and unifying common and non-overlapping constructs and domains from existing determinant frameworks and other relevant theories to develop a 'meta-theoretical framework' (Damschroder et al., 2009; Nilsen, 2015). This 'meta-theoretical framework' consists of five distinct domains and 39 standardized related constructs (Damschroder et al., 2009). The CFIR domains are as follows: inner setting (structural characteristics, networks and communication, culture, implementation climate, and readiness for implementation); outer setting (patient needs and resources, cosmopolitanism, peer pressure, and external policies & incentives); intervention characteristics (intervention source, evidence strength and quality, relative advantage, adaptability, trialability, complexity, design quality and packaging, and cost); process (planning, engaging, executing, reflecting, and evaluating); and characteristics of individuals (knowledge & beliefs about the intervention, self-efficacy, individual stage of change, individual identification with organization, and other personal attributes) (Damschroder et al., 2009).

Notably, the Society for Implementation Research Collaboration (SIRC) Instrument Review Project adapted some of the CFIR constructs in the development of a methodology for searching and

synthesizing quantitative instruments used to assess implementation in public health, mental health and school settings (Lewis et al., 2015).

The CFIR is comprehensive, meta-theoretical, and provides distinct and pragmatic domains and constructs (Lewis et al., 2015). Damschroder and colleagues posit that the CFIR can be used to guide data analysis, identify barriers and facilitators to program implementation, help inform scale up, or sustainment, and link CFIR constructs to program outcomes (Kirk et al., 2016; Damschroder et al., 2009). Further, this framework emphasizes the importance of contextual factors relevant to understanding ‘why’ an intervention is implemented in one setting and not in another (Damschroder et al., 2009).

H. General Basic Model (*stated a priori*).

Given that the study is leading toward an understanding of evidence-informed practice in Ontario PHUs, it is important that definitions emerging from the study are grounded by definitions and related concepts in the literature. Therefore, based on literature reviews on rural health and implementation science as previously synthesized, several propositions, and sensitizing concepts were developed and guided by the CFIR. The sensitizing concepts are identified in Box 1, and the propositions *a priori* are identified in Appendix A. The propositions and sensitizing concepts were used in the construction of the interview guide and focus group questions and represent a starting mindset that the researcher had when initiating discussion with participants. However, *a priori* assumptions and knowledge were “set aside” (but not abandoned) during discussions with participants with the analytic goal of being fully immersed in the participants ‘reality’ with an open mind, but not an “empty head” (Dey, 1999, p. 251)

The basic philosophical perspective adopted for this study was that of critical realism. The notion of “critical” in social science suggests that “explanations of social practices must be critical precisely in order to be explanatory, and that necessity of critique gives social science a potentially emancipatory character” (Sayer, 1997, p.473). In this way, Sayer (1992) posits that in order to understand social phenomena, we have to evaluate them critically. Therefore, critical realism (fallible, theory-laden²,

² Theory-laden independent in critical realism suggests that while theories help us to gain knowledge, they can “be more or less truth like” (Danermark, Ekström, Jakobsen, & Karlsson, 2002, p. 10)

independent, differentiated³, stratified⁴, linguistic⁵) can be seen as contributing to social change, particularly if there are social injustices (i.e. rurality) that underlie a problem that is critically assessed (Sayer, 1992, 1997).

Realism is a philosophical approach that was developed in response to the limitations of relativism and positivism (Bhaskar, 1978, 1989). Realism posits that generative mechanisms of causality are embedded in stratified social reality (fallibly interpreted social phenomena) (Bhaskar, 1975). Rather than focusing on predicting observable phenomena, critical realism acknowledges that reality includes structures, underlying mechanisms (which may not always be directly observable), and contexts that can affect outcomes (Bhaskar, 1975). According to Pawson and Tilley (1997):

The basic task of social inquiry is to explain interesting, puzzling, socially significant regularities (R). Explanation takes the form of positing some underlying mechanism (M), which generates the regularity and thus consists of propositions about how the interplay between structure and agency has constituted regularity. Within realist investigation, there is also investigation of how the workings of such mechanisms are contingent and conditional, and thus only fired in particular local, historical or institutional contexts (p. 71).

Critical realism reflects the complex interplay between agency and structure (Archer, 1995). To ground this study in a critical realist exploration, the study explored the interplay of individual's characteristics (human agents); mechanisms inherent in implementation (i.e. inner setting); and contexts, circumstances, and conditions that influenced implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs.

Figure 1 presents a basic model *a priori* of the major categories that were originally suggested for exploration, about the public health reality of implementing evidence-informed chronic disease programs and policies in rural areas and identifies the context-mechanism-outcome (CMO)

³ Social reality is differentiated into the modes of ideally, materially, socially, artefactually real entities (Fleetwood, 2005).

⁴ Bhaskar (1998) posits that reality is stratified (multi-layered) consisting of the actual (events generated by mechanisms), empirical (observable experiences) and real (mechanisms or structures that have generated the actual events).

⁵ For Sayer (1997) language is an essential social phenomenon. He states, "biological, chemical and physical powers are necessary conditions for the existence of the social world but the latter has properties-particularly, or essentially, communicative interaction and discourse, which are irreducible to or emergent from these ontological strata" (p. 464)

configurations that might emerge from this study. Box 1 presents a listing of sensitizing concepts that were used in the construction of the focus group questions and interview guide. The sensitizing concepts were developed from the review of the literature pertaining to rural health and implementation science. They were also informed by the researcher's *a priori* understanding of the factors likely to facilitate or impede the implementation of CDP programs and policies in rural Ontario PHUs. Appendix A also presents more in detail, the propositions that were developed *a priori* in relation to each major category (i.e. inner setting, outer setting, individual characteristics, intervention characteristics, and process). A description of the basic model (*a priori*) is as follows:

a. Agents and their Roles. Chronic Disease Prevention (CDP) teams in Ontario PHUs are actively involved in “reducing the burden of preventable chronic diseases of public health importance” (Ontario Ministry of Health and Long-Term Care, 2017, p.23). They are predominately staffed by health promoters, public health dietitians, public health nurses, support staff, dentists, epidemiologists, and administrators (i.e. MOH) who play a key role as “agents” to implementation of CDP programs and policies in public health (Ontario Ministry of Health and Long-Term Care, 2009, 2017). They deliver health promotion and disease prevention programs in accordance with the OPHS and are accountable to the BOH (Ontario Ministry of Health and Long-Term Care, 2009, 2017). This responsibility is carried out in collaboration with government, non-governmental, and community organizations operating at different levels with various perspectives, roles, and linkages (Ontario Ministry of Health and Long-Term Care, 2009, 2017). Individual mechanisms inherent to implementation that might emerge from this study include knowledge, self-efficacy, individual stage of change, individual identification with organization, attitude, leadership engagement, and other personal attributes (ambiguity, intellectual ability, values, capacity, learning style, and competence) (Damschroder et al., 2009; Glisson et al., 2008).

b. Agency. At present, there are 35 public health agencies (PHUs) across Ontario (Ontario Ministry of Health and Long-Term Care, 2009, 2018a). The WHO defines public health as “a social and political concept aimed at improving health, prolonging life and improving the quality of life among whole populations through health promotion, disease prevention and other forms of health intervention” (World Health Organization, 1998, p.13). They are individually responsible for implementing the OPHS within their geographic borders (rural, urban, rural/urban mix, remote) (Ontario Ministry of Health and Long-Term Care, 2009, 2018b).

c. Structure. Health units vary considerably in terms of organizational context, circumstances, and conditions based on a complex interplay of factors influenced by the inner setting, outer setting, implementation process, and intervention characteristics that affect implementation of evidence-informed chronic disease prevention programs and policies in rural areas.

d. Implementation. Implementation changes in response to individual characteristics, organizational, and intervention characteristics (Damschroder et al., 2009). As implementation is seen as a socially developed phenomenon, it is created through a dynamic process (planning, engaging, executing, and reflecting & evaluating (Damschroder et al., 2009). Since implementation research cuts across several disciplines including medicine, organizational behaviour, public health, political science, psychology, agriculture, and marketing, there is a growing and scattered literature on this topic and many perspectives to consider (Mitchell, Fisher, Hastings, Silverman & Wallen, 2010; Sales, Smith, Curran & Kochevar, 2006; van Achterberg, Schoonhoven, & Grol, 2008; Greenhalgh & Wieringa, 2011). There are several terms that describe moving knowledge to action in public health (Graham et al., 2006). Graham et al. (2006) review identified and operationalized a wide range of terms including knowledge translation, knowledge utilization, knowledge transfer, knowledge exchange, research utilization, implementation, diffusion, dissemination, continuing education, and professional development. One critical point, however, is that implementation, regardless of its depth or specificity, primarily focuses on the application or integration of evidence into practice or policy (Graham et al., 2006). Given that this paper requires a definition of implementation, the one that is cited most frequently in funding announcements of major funding agencies and in implementation and dissemination manuscripts is that “implementation is the process of putting to use or integrating evidence-based interventions within a setting” (Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008, p. 118). Within a realistic investigation, the workings of implementation mechanisms within a particular context, circumstance, and condition influence implementation of evidence-informed chronic disease prevention programs and policies in rural areas.

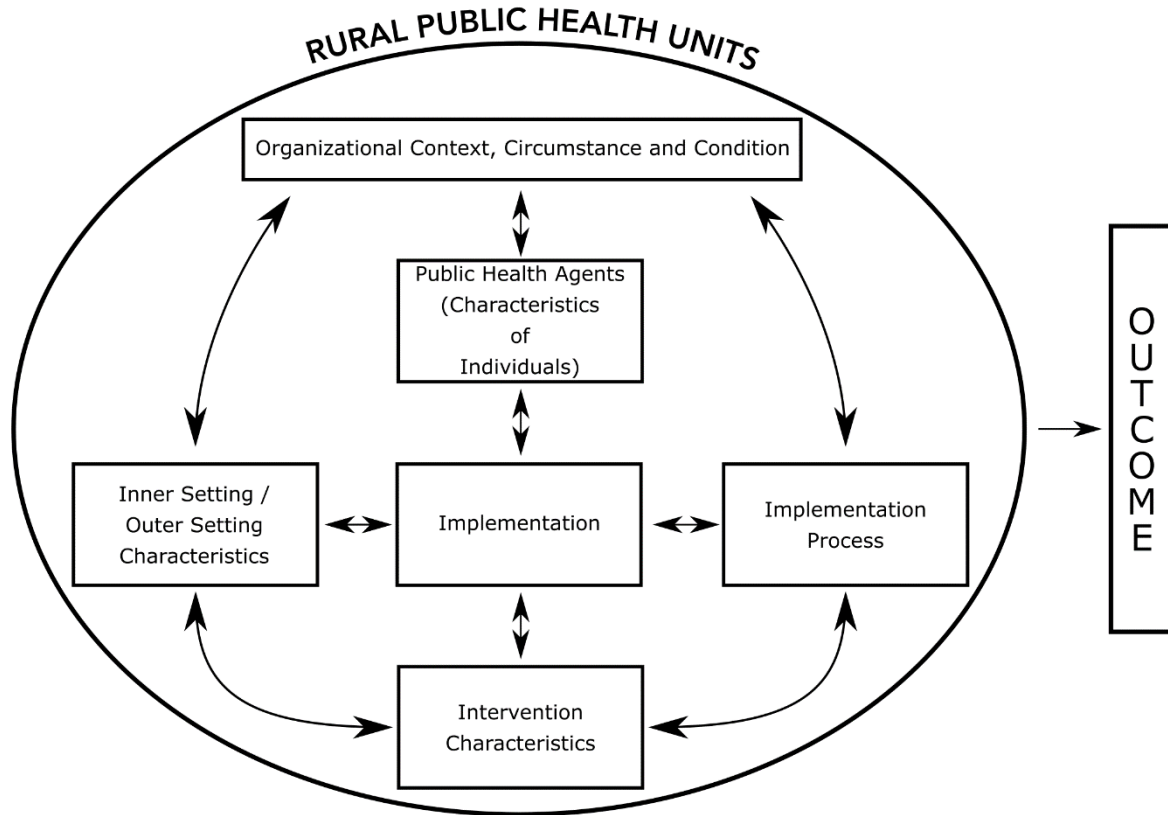
e. Agency versus Structure. This approach posits that rural public health agencies (i.e. rural PHUs) are embedded in complex structures that interact with a range of factors that influence implementation. Therefore, implementation is seen as a complex and dynamic process that has many convergent and divergent activities occurring over time, and these forces synergize to influence implementation outcomes (Urquhart, Sargeant, & Grunfeld, 2013; Chaudoir, Dugan, & Barr, 2013). For example, chronic disease prevention programs in Ontario rural PHUs (i.e. public health agency)

are embedded in an open system that are influenced by public health agents, organizational characteristics, and four major domains of implementation (i.e. inner setting, outer setting, process, and intervention characteristics) in which they interact. Guided by the CFIR, *a priori* factors likely to facilitate and impede implementation in Ontario rural PHUs are described in Appendix A. *A priori* factors were informed by the researcher's experience in public health and the literature pertaining to implementation science and rural health.

f. Summary. In short, evidence-informed chronic disease prevention practices in Ontario rural PHUs are influenced by a plethora of factors that facilitate or impede implementation. Public health professionals in chronic disease prevention are key agents of implementation. To understand how contexts (environment, circumstances, conditions) and mechanisms affect outcomes may generate a realistic understanding to these underlying factors that are or potentially at play, which would lead to the generation of new knowledge and transfer knowledge among public health professionals that will impact the implementation of evidence-informed chronic disease prevention programs and policies in rural PHUs.

Figure 1

Proposed Realist Model of Context-Mechanism-Outcome (CMO) Configurations in Rural Ontario PHUs



Note. Domains adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.

Sensitizing Concepts

- **Implementation** changes in response to individual characteristics, organizational, and intervention characteristics. As implementation is seen as a socially developed phenomenon, it is created through a dynamic process (planning, engaging, executing, reflecting, and evaluating). There are several terms that describe moving knowledge to action in public health, including knowledge translation, knowledge utilization, knowledge transfer, knowledge exchange, research utilization, implementation, diffusion, dissemination, continuing education, and professional development. One critical point, however, is that implementation, regardless of its depth or specificity, primarily focuses on the application or integration of evidence into practice or policy. There are a plethora of constructs and domains that can affect implementation. Although there is a burgeoning number of implementation models, frameworks, and theories, the CFIR is a highly cited implementation framework in public health since its publication in 2009. This comprehensive framework was developed by identifying, consolidating, and unifying common and non-overlapping constructs and domains from existing determinant frameworks and other relevant theories to develop a ‘meta-theoretical framework.’ The CFIR domains are as follows: inner setting (structural characteristics, networks and communication, culture, and implementation climate); outer setting (patient needs & resources, cosmopolitanism, peer pressure, external policy & incentives); intervention characteristics (intervention source, evidence strength and quality, relative advantage, adaptability, trialability, complexity, design quality & packaging, and cost); and process (planning, engaging, executing, reflecting & evaluating).

- **Rural** is a multifaceted concept which shares no universal consensus of what “rural” means among researchers, policy-analysts, and policymakers. Since there is no standard definition, the RST definition is one of the best definitions because it designates whole towns or communities and allows for analysis on specific health indicators. A major strength of the RST definition is that it provides a distinction between five heterogeneity categories of rural and urban areas that can be appropriately compared. However, a major

disadvantage is that this definition does not account for social representation and heterogeneity within urban and rural areas. In Canada, variations in health exist between rural and urban populations. While there was a paucity of information on rural health in Canada, generally, the health status of individuals who reside in rural areas is inferior compared to those who live in urban areas and worsened with increase rurality. Specifically, rural populations were found to have a disproportionate burden of non-communicable diseases and associated risk factors compared to urban populations. Factors that explain rural differentials can be best described from a socio-ecological perspective. Specifically, there were a plethora of factors at multiple levels (individual, interpersonal, community, organizational, and policy level) that contributed to health inequities in rural populations.

- **Relative advantage** is the subjective judgment of the advantages of implementing the innovation versus an alternative solution. The innovation may be perceived as having several benefits at the individual and/or organizational level, or not. If the potential adopters perceive that the innovation has several benefits, then it is more likely to be successfully adopted or implemented, but relative advantage alone does not ensure innovation adoption.
- **Compatibility** is held subjectively by the individual and the organization. Compatibility is the degree to which an intervention is perceived to be compatible with existing norms, values, and perceived needs of potential adopters. It is positively associated with successful assimilation of the innovation.
- **Trialability** is the ability to test the innovation on a small scale in the organization and to be able to modify or reverse the implementation process if warranted. Piloting innovations increase the likelihood of adoption.
- **Social capital** refers to features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit. Social capital is described as a collective value of social connections and includes civil society, community, social networks, participation, volunteering, trust, reciprocity, social

exclusion/inclusion and equity, and local opportunity structures. Organizations that have a strong stock of social capital are more likely to support implementation.

- ***Cosmopolitan*** is the degree to which an organization is externally networked with other organizations. It is what is either subjectively held by the individuals or is objective. It includes aesthetic cosmopolitanism, feelings of belonging, national economy, commitment to human rights and cultural diversity, cosmopolitanism disposition, and attitude. An organization is more likely to be deemed a ‘cosmopolitan’ organization if there are strong social connections both within and outside the organization that support the innovation.
- ***Peer pressure*** refers to the mimic or competitive pressure to adopt and implement an intervention from an external source such as competitors, communities, suppliers, and customers. Peer pressure can negatively or positively affect innovation adoption, irrespective of community need.
- ***External policies and incentives*** is a broad construct that includes external strategies to spread interventions including policy and regulations (government or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmarking reporting. External political mandates increase an organization’s predisposition to adopt the innovation. However, this policy push does not increase an organization’s capacity to implement the innovation, nor does it necessarily focus on local priorities.
- ***Leadership engagement*** is held subjectively by individual agents and what is used in decision-making and reflects commitment, accountability, and involvement in a position. It might be influenced by social, organizational, or individual factors. It may include attitudes, knowledge, normative beliefs, motivation, peer pressure, self-efficacy, outcome expectations, and incentives. Leaders who communicate the need for change, who possess a favorable attitude towards the innovation, exhibit managerial patience, establish a vision for improvement, align an innovation goal with the higher-level organizational goal, provide clarity about the change process, and follow through with the necessary resources

are more likely to develop a supportive implementation climate which in turn is related to implementation effectiveness.

- **Structures.** Structures either support or hinder decision-making in the organization. Structures may generate a learning organization. They might capture, share, and create new knowledge. Structural characteristics include resources, size, functional differentiation, and centralization. **Resources** are objective entities that might include varied forms of training, education, time, physical space, financial resources, and slack resources. The level of resources dedicated to innovation is positively associated with implementation. **Size** is an objective entity that refers to the number of people who are employed at the organization. However, organizational ‘size effect’ in relation to implementation might be a subjective entity that is influenced by organizational culture, or not. **Functional differentiation** is an objective entity that refers to the number of units the organization is divided into. **Functional differentiation** organizations generate, exchange, transfer, and translate knowledge. There is a positive relationship between innovation, and functional differentiation. **Centralization** is an objective entity that refers to the concentration of decision-making authority. A decentralized organization generates learning and knowledge that might transform culture and practice.

- **Organization culture** is not automatically created but consists of shared experiences, routines, values, beliefs, goals, and history. It is invented, discovered, and developed by a group to cope with problems of external adaptation and internal integration and is taught to new employees as a correct way to perceive, think, and feel in relation to those problems. Culture consists of observable features (i.e. artifacts, espoused beliefs, and values) and unobservable features (basic underlying assumption). It is perceived as inter-subjectivity and represents social regularity. Organizational culture has an important influence on knowledge exchange, transfer, and translation. Specifically, in healthcare settings, numerous subcultures exist across and within teams, and these cultures must be understood if innovations are to be developed, implemented, and sustained. There are four types of culture to include clan culture, adhocracy culture, hierarchy culture, and market culture.

- **Knowledge** is a subjective entity related to knowledge exchange, transfer, and translation. Knowledge might be explicit or tacit. It might be influenced by individual wisdom, beliefs, personal experiences, self-efficacy, and outcome expectations. Socialization and externalization are mechanisms that might influence working knowledge. Organizations with high absorptive capacity, that is, organizations that are systematically able to identify, exchange, transfer and translate new tacit knowledge; to connect it to its own knowledge base and put it to appropriate use will be better able to assimilate innovations.
- **Attitude** is the subjective judgement and interpretation of information (knowledge). Attitude refers to the evaluative disposition towards the innovation based on affective reactions, cognition, behavioural intentions, and past behaviour. Work attitudes play an essential role that affects implementation and outcomes of evidence-based practices. Mechanisms that influence work attitudes are organizational commitment and job satisfaction. Work attitudes affect implementation and outcomes of evidence-based practices.
- **Self-efficacy** is a subjective entity that refers to individual belief about their own capabilities to exercise control to achieve implementation goals. Self-efficacy is established through a dynamic process of animated influences within a system of triadic reciprocal causation. According to the model of reciprocal causation, cognitive, personal, and environmental factors, influence self-efficacy.

III. Study Rationale

A. Reasons for the Study

The need to conduct a collective (multiple) case study of evidence-informed chronic disease prevention programs and policies in Ontario rural PHUs has been identified in the introduction. Among these reasons for conducting this study are as follows:

- the burden of chronic disease in rural areas;
- growing demands on public health resources and a general culture of accountability and transparency, there have been greater political and societal pressures to demonstrate the integration of EIPH practice in optimizing public health outcomes. Failure to implement EIPH practice contributes to health inequities, inefficient use of resources, poor health outcomes, and low public confidence in public health services;
- recognition that there has been great progress in the development of new evidence for chronic disease prevention, and that there is a gap of EIPH in rural areas. Therefore, bridging the gap between research and practice can be understood by identifying factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural areas;
- acknowledging that the implementation of evidence-informed chronic disease prevention programs and policies in rural areas is complex and that there is a plethora of characteristics that can affect implementation of evidence-informed chronic disease prevention programs mandated under the modernized OPHS; and
- to generate new knowledge and transfer knowledge among public health professionals of the positive ‘capacities’ (i.e. assets, lessons learned etc.) to minimize barriers and maximize assets to implement evidence-informed chronic disease prevention programs and policies in rural areas.

B. Three Inter-Related Purposes

This study has three-inter-related purposes. It is anticipated that this study would:

- develop a realist understanding of EIPH practice in chronic disease prevention in rural areas, through the identification of the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural areas;
- make a practical contribution to improve the performance of public health through a better understanding of these factors and how rural public health professionals can be better supported by policy, strategies for knowledge translation, evaluation and research, and funding etc. to minimize barriers and maximize assets related to implementation; and
- make a contribution to public health implementation research in rural areas.

C. Research Questions

While the primary interest is to understand evidence-informed practice in Ontario PHUs, essentially a realistic account of factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in Ontario PHUs in rural areas, it was helpful to identify a few questions that were used to guide the overall data gathering and synthesis of the information collected and explain this social phenomena. The research questions that were addressed were as follows:

1. Overarching research question

- How do public health professionals as implementation agents describe and understand the factors that facilitate and impede implementation of evidence-informed chronic disease prevention programs and policies mandated under the OPHS in their own rural PHUs (i.e. through which mechanisms and in which contextual factors influence this)?

2. Specific research questions

- How do Ontario rural PHUs operationalize the Chronic Disease Prevention and Well-Being Standard within the OPHS? How are evidence-informed chronic disease prevention programs and policies being implemented in Ontario rural PHUs? What are their priority populations?

- Who are the key “agents” that influence implementation of evidence-informed chronic disease programs and policies in Ontario rural PHUs? What roles do they assume (e.g. lead, follow, let happen [get out of the way], block/confront/impede)? What are the aspects and underlying mechanisms of their decision, commitment, and action process that affect their roles as agents within complex open systems of public health practice?
- How the inner setting, outer setting, intervention characteristics, and implementation process, affect implementation of evidence-informed chronic disease prevention programs and policies in Ontario rural PHUs?
- What inner and outer contextual factors (including their types, and stated constructs) facilitate or impede implementation (e.g. structural characteristics, networks and communication, culture, implementation climate, population needs and resources, cosmopolitanism, peer pressure, external policies and procedures, intervention source, evidence strength and quality, relative advantage, adaptability, trialability, complexity, design quality and packaging, cost, planning, engaging, executing, reflecting, and evaluating) of evidence-informed chronic disease prevention programs and policies in Ontario PHUs? And how?
- What are the lessons learned (i.e. facilitating factors) in a rural public health setting regarding implementation of CDP programs and policies?
- How can public health professionals in rural PHUs be better supported by policy, strategies for knowledge translation, evaluation and research, and funding etc. to maximize assets and minimize barriers related to implementation?
- What advice do public health professionals have to offer the Ontario Ministry of Health and Long-Term Care (MOHLTC), Public Health Ontario (PHO), and other levels of the system (local, provincial, national) to enhance rural public health practice?

IV. Methods

A. Overview

This study sought to understand how public health professionals conceptualized factors that facilitated and impeded the implementation of evidence-informed chronic disease prevention programs and policies mandated under the OPHS in Ontario rural PHUs, through a collective (multiple) case design based on focus groups, and in-depth semi-structured qualitative interviews supplemented with other data sources (i.e. field, reflective notes, and administrative documents).

The study perspective was based on a critical realist ontology (i.e. characterized by stratified ontology (empirical, actual, and real) comprising events, mechanisms, structures, and experiences; an open systems perspective (complex, temporal, and changing); emergent powers dependent upon but not reducible lower-level powers; denial of epistemic fallacy; and complex notions of causation (Sayer, 1992; Bhaskar 1975, 1997). The ontological (“what we think we know”) dimension of critical realism is the ‘reality of being’ (Archer, Bhaskar, Collier, Lawson, & Norrie, 1998). Specifically, critical realist ontology draws upon the notion of underlying power structures that are independent of human conception and perception (Bhaskar, 1978). For critical realists, the social world can be stratified into three levels of reality: 1) empirical – observable by human beings; 2) the actual – events existing in time and space; and 3) real or ‘deep’ – powers that are often unobserved yet casually efficacious (Bhaskar, 1978). In terms of ‘deep’, it may reflect structures of the world that do not depend upon cognitive structures of humans and could exist independent of human thought (Margolis, 1986). Archer’s notion of *morphogenesis* provides a theoretical framework to understand the operation of ‘deep’ structures (Archer, 1995). In short, Archer (1995) suggests that there is an interplay between agency and structure whereby ‘agents’ may or may not be aware of existing structures but through their ongoing action are able to sustain (morphostasis) or elaborate and even change (morphogenesis) such deep structures.

Epistemologically the orientation of this study was based on a constructivist epistemology (Stake, 1995). This involved categorical or thematic analysis across multiple cases of key generative mechanisms and contexts from data gathered. The primary method that was used was qualitative collective case study (multiple) analysis, in conceiving the most credible interpretation of knowledge of the reality of implementation of evidence-informed chronic disease prevention programs and policies in rural areas. However, this was supplemented by a review of the domains and constructs outlined in the CFIR, literature on implementation and rural health, and a variety of propositions

derived from the literature *a priori*, but as expected another level or reality or knowledge was revealed through data gathering and the initial analysis phase. Therefore, it was necessary for *a priori* assumptions and knowledge to be “set aside” (but not abandoned) during discussions with participants with the analytic goal of being fully immersed in the participants’ ‘reality’ of implementation with an open mind.

The primary data source was in-depth, intensive, semi-structured qualitative interviews with the MOH and the CDP Manager/Executive Director, as well as focus groups with public health unit staff in the area of chronic disease prevention in rural Ontario PHUs. Other supplementary data sources were also reviewed (i.e. field notes, reflective notes, relevant documentation) to further understand the phenomena of interest. The rationale for using qualitative collective (multiple) case study design follows.

B. Qualitative Collective (Multiple) Case Study Design Rationale

In the current proposed study, the researcher employed a qualitative study using a holistic,⁶ collective case (multiple case) study design. Qualitative methods are characterized as inductive, constructed, non-determinism, descriptive, naturalistic⁷, flexible, interpretative, reflective, and inquisitive (Creswell, 2014). A qualitative approach was deemed suitable since it is considered a pragmatic approach that explains “how” public health professionals as implementation agents conceptualize factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies mandated under the OPHS in Ontario rural PHUs (through which mechanisms and in which contexts?).

However, there is recognition that public health has followed a predominately positivist approach (i.e. deductive, confirmatory, theory/hypothesis tested, explanatory, predicted, standardized, and objective) based on the core discipline of epidemiology (Baum, 1995; Rapkin & Trickett, 2005). Biomedicine, statistical analysis and operationalization, experimental designs, large-scale surveys, and core data sets of biostatistics have been the dominant methodological approaches in public health practice (Faltermayer, 1997). However, this “shoe-leather epidemiology” does not address ‘how’

⁶ Yin refers to a holistic design as the examination of a “global nature of an organization of a program” (whole program) (Yin, 2014, p. 55).

⁷ Naturalistic inquiry refers to the ability for the research study to unfold naturally and openly, without a predetermined focus (Patton, 1990; Patton, 2002).

factors affect implementation of evidence-informed chronic disease prevention programs and policies in rural areas. Case-study designs are becoming an increasingly popular tradition of inquiry in various disciplines, including sociology, health sciences, education, and psychology (Harrison, Birks, Franklin, & Mills, 2017). The methodology's appeal lies in its ability to accommodate epistemological diversity, investigate complex phenomena, and draws upon multiple paradigms (quantitative and qualitative) (Harrison, Birks, Franklin, & Mills, 2017). Although there were several approaches to consider (Yin, 2014; Stake, 1995; Merriam, 1998), Stake's approach was deemed most appropriate for this study.

The qualitative cases study approach described by Stake (1995) falls within the social constructivist and existentialism (non-determinism) paradigm. From a Stakian viewpoint, the epistemologies that inform qualitative research should be constructed, and non-determinant since "most contemporary qualitative researchers nourish the belief that knowledge is constructed rather than discovered" (Stake, 1995, p. 99). His orientation further emphasizes the correlation between constructivist and existentialism, as:

Common accompanists to an expectation that phenomena are intricately related through many coincidental actions and that understanding them requires looking at a wide sweep of contexts: temporal and spatial, historical, political, economic, cultural, social, and personal (Stake, 1995, p. 43).

This illuminates social reality as being generated and constructed through multiple versions of knowledge in real-life complex systems between the "knower" and the "known". However, in the same vein, Stake (1995) further suggests that "since there are multiple perspectives or views of a case that need to be represented [...] there is no way to establish, beyond contention, the best view" (p. 108). Therefore, since knowledge of the factors that affect implementation is seen as complex and socially constructed, this study is epistemologically similar to Stake (1995). Therefore, the method developed and applied here is qualitative (i.e. interviews, focus groups, documentation), which demonstrated an exemplary collective (multiple) case study.

Stake (1995) describes a case as a "specific, complex, and functioning thing" (p. 2). Stake (1995) further suggests that "a case is a bounded system drawing attention to it as an object rather than a process" in an integrated system, "thus people and programs clearly are prospective cases" (p. 2). Moreover, Stake describes three types of case studies. These are as follows: (1) *intrinsic case study* – exploration of one particular case to learn about a unique phenomenon; (2) *instrumental case* –

involves using a case to gain a general understanding of an issue or phenomena; and 3) *collective case* – involves using multiple cases, each of which is an instrumental study linked by coordination between individual studies (Stake, 1995). For Stake (1995) qualitative case study research can be described as holistic (contextual – including cultural, historical, and societal local contexts); case-orientated (bounded system); resists reductionism and elementalism (i.e. small number of variables); empirical (observable, naturalistic, field-oriented); interpretive (researcher – subject interaction); and empathetic (attends to actors intentionality) (Stake, 1995). Rather than understanding implementation on the basis of a single case, a collective case or multiple case study designed was deemed most appropriate for this study. Therefore, the data taken together was analyzed through formal aggregation of categorical data within and across cases (PHUs) to establish themes or assertions of implementation across the cases to understand evidence-informed practice in Ontario PHUs in rural areas through a constructionist orientation.

Therefore, through the use of a collective (multiple) case study design, at the outset it was anticipated that this study would meet the overall objectives of this study in three areas: (i) make a practical contribution to public health system performance through a better understanding of the factors that facilitate and impede the implementation of chronic disease prevention programs and policies in rural areas and how they can be best supported by policies (i.e. OPHS), strategies for knowledge translation (e.g. participate in LDCPs, establish working relationships with academic institutions, centralized data, analytic services and supports, tailored or targeting networking and communication, communities of practice, services of a knowledge broker etc.), evaluation and research at the individual, organization, and system level, and funding to address the unique needs of rural Ontario PHUs; ii) an understanding of implementation factors focusing on the social construction of knowledge and the program/policy reality of chronic disease prevention at the local level in rural areas; and iii) demonstration of a method of social inquiry that may have application in other areas of implementation research in rural areas (e.g. secondary and tertiary healthcare, non-profit organizations).

C. Ethics Approval

Ethics approval from the University of Waterloo, Human Research Ethics Committee (HREC), was sought and received prior to data collection. Final ethics approval was given on February 28, 2018 (ORE #22791). Prior to data collection, informed consents were obtained by the individual health units and the participants. This included permission for the following: participation in the interviews

and focus groups, audio recording and transcription of interviews and focus groups, taking field notes, use of non-identifiable direct quotations in future reports, and member checks. The information and consent forms are included in Appendix B, C, and D.

D. Sampling

1. Selection criteria

The study was based on a holistic, collective (multiple) case study (Stake, 1995). In this instance, as the focus of the study was to identify and study the complex and variable factors operating in the implementation of chronic disease prevention in rural Ontario PHUs, adopting a collective case study design provided a structure to gain insight into the gestalt implementation within and across a variety of cases (PHUs) and these insights were used to understand implementation that was empirically supported (Stake, 1995). It was necessary that the data taken together from six PHUs demonstrated differences and similarities amongst the cases to provide insights into the underlying generative mechanisms and contexts that affect implementation. Therefore, a stratified cluster purposeful sampling was employed to produce the desired number of cases that enabled comparisons across cases (Stake, 1995). Further, Creswell (2014) addressed the fundamental question, “what is the ideal sample size for case study design?” He notes, “sample size depends on the qualitative design being used [...], and case studies include about four or five” (p. 189).

First, bounded by two distinct geographical locations (rural AND rural and urban mix) and time (2018), three PHUs were purposefully selected from a rural cluster, and three PHUs were selected from a rural and urban mix cluster. Although the study did include both rural and urban populations, it might be said, that it was beyond the scope of this study to compare rural and urban populations.

Using Statistics Canada’s peer groupings, two PHUs in Ontario from Peer Group D were selected to represent mainly rural regions in the province, one health unit from Peer Group E was selected to represent mainly rural Eastern Ontario health regions (Total 11 PHUs from Peer Group D and E), while three PHUs were selected from Peer Group C (Total 11 PHUs from Peer Group C) to represent rural and urban mix health regions. The principle characteristics for each Peer Group were as follows:

➤ Peer Group C

- Population centres and rural mix from coast to coast;
- Average percentage of visible minority population; and

- High percentage of Indigenous population.
- Peer Group D
 - Mainly rural regions in Quebec, Ontario, and the Prairies;
 - Low percentage of visible minority populations; and
 - Average percentage of Indigenous populations.
- Peer Group E
 - Mainly rural Eastern regions;
 - Low percentage of visible minority; and
 - Low employment rate (Statistics Canada, 2015b).

Secondly, within each peer group identified purposeful sampling was conducted. The judgement to purposefully sample the population of interest was to identify and select information-rich cases relevant to evidence-informed public health practice for chronic disease prevention in rural PHUs within each peer grouping for the most effective use with limited resources (Patton, 2002). The criteria for purposeful sampling was based on the researchers' prior knowledge about the PHUs availability, researchers' capacity (i.e. long distance to travel), willingness to participate, (i.e. Association for Public Health Epidemiologists Capacity Building for Small, Rural, Northern Health Units Working Group committee member), identify themselves as rural or remote, prior experience participating in research projects with a rural focus, and representation of PHU geographic boundaries in Ontario (i.e. Northwestern, Northeastern, Southwestern, Central Western, Central Eastern, and Eastern). However, one health unit was excluded from the sample selection, as the researcher – having been employed at this health unit for thirteen years – had apparent substantial personal experience and biases, which could affect the overall credibility of the study. Overall, the selection criteria yield a reasonable representation of rural Ontario PHUs that suggest transferrable findings and interpretations (See Selection and Sample Characteristics).

2. Sample recruitment

A RulPHS Study Protocol was developed to guide recruitment and consent procedures for this study (see Appendix E). Since, the MOH is the Executive Officer of the BOH and is responsible to the Board for the management of public health programs, it was critical to have support and buy-in from the MOH to conduct this study (Ontario Ministry of Health and Long-Term Care, 2017). Therefore, the MOH was considered the initial contact for each PHU for this study. At the outset of the study, the researcher obtained a listing of the current contact information for the MOH and their designated

PHU through the alPHa website, since they were assigned the role as the “gatekeeper” between the researcher and the CDP Manager/Executive Director, to initiate discussion about the study on behalf of the researcher (Creswell, 1998). The contact information for the MOH was obtained from the Association of Local Public Health Agencies (alPHa) website (cf. <http://www.alphaweb.org/?page=PHU>) Rather than speaking with the MOH directly, contact was made initially with the MOH Executive Administrative Assistant by phone. In this instance, it was standard practice in a public health setting for phone calls to be forwarded to the MOH’s Executive Administrative Assistant. The researcher developed a telephone script to recruit participants (see Appendix F). During the initial contact, the researcher sought verbal permission to send a RulPHS Orientation Package (i.e. introduction/recruitment letter, study information, and health unit consent forms) to the MOH (via Executive Administrative Assistant) (see Appendix B and Appendix G). After verbal consent was obtained, the researcher e-mailed the orientation package to the MOH along with an e-mail correspondence indicating a date to confirm participation in the study (via Administration Assistant). After receiving confirmation of participation, the researcher then followed up with the MOH and mailed a RulPHS Welcome Package (i.e. letter of appreciation, study information and consent forms for health unit and interview participants) to the participating health unit (see Appendix H, Appendix B, and Appendix C). Participation was confirmed by the researcher when the health unit consent letter was signed by both the MOH and the CDP Manager/Executive Director and returned by the participating health unit to indicate agreement to participate. Also, during the same time, the health unit provided the names, contact information, and signed consent forms of the interview participants. Immediately after receiving confirmation, a RulPHS Focus Group Information Package was sent to the participating health units that contained information about the focus group, consent forms, and RulPHS Frequently Asked Questions (FAQs) (See Appendix D and Appendix I).

Subsequently, contact was made to the primary contact (i.e. CDP Manager/Executive Director, Administrative Assistant or designate) that outlined information about the focus groups and requested additional information regarding the following: a) proposed dates, time, and location of focus group, and interviews; b) health unit healthy food policy (i.e. information about healthy food choices - focus groups); c) logistics (i.e. parking, travel, and access to building); d) number and list of focus group participants; e) permission to use flip chart paper (self-adhesive); and f) status and information about internal Health Unit Research Ethics Board (REB). To assist PHUs with scheduling, the researcher provided a table with a list of proposed dates and offered to conduct face-to-face interviews and focus groups on-site at each health unit for 2 consecutive days. Furthermore,

in a separate correspondence (i.e. e-mail), the researcher also requested unobtrusive documentation from the primary contact including planning documents, annual reports, strategic plans, health status reports (health indicators), logic models, and organizational records (i.e. number of full-time equivalent (FTE's) employees, organizational charts) and other documentation that were deemed relevant to the health units in relation to the research question. After all documents were received by the researcher, and there was a mutually agreed upon date to conduct the research study on-site at the health unit, the researcher provided each health unit with a detailed agenda of the daily events (i.e. research activities, lunch, etc.) to avoid ambiguity.

E. Data Collection

A hallmark of case study research is the use of multiple sources of data (Stake, 1995; Yin, 2014). Stake (1995) suggests that multiple sources and methods of data collection can increase confidence in the data to achieve desired triangulation and therefore, convergence across diverse cases. Stake (1995) further suggests that with multiple approaches within a single study, “are likely to illuminate or nullify extraneous influences” (p. 114). He suggests three types of preferred and dominant methods of data collection that include interviews, observation, and document review, that can be used in the discovery and generation of new knowledge about the phenomena of interest in a sensitive and skeptic manner (Stake, 1995).

To adequately explore implementation of evidence-informed chronic disease prevention programs and policies in rural areas, interviews, focus-groups, and document review were the data collection methods employed for this study. Specifically, face-to-face, semi-structured, in-depth interviews were conducted with the CDP Manager/Executive Director and the MOH. In addition, semi-structured focus groups were conducted with chronic disease prevention staff, including public health nurses, health promoters/health educators, dietitians/nutritionists, support staff, and other staff that were deemed appropriate by the CDP Manager/Executive Director within each health unit. Interview and focus group data was also supplemented by unobtrusive sources. Specifically, the CDP Manager/Executive Director and the MOH were also asked to share key documents relevant to public health practices for chronic disease prevention. These included organizational charts, planning documents, health status reports, logic models, annual reports, and other documentation that were deemed relevant. These documents formed the secondary data source. Field notes (direct observation) and reflective notes were also used to explore aspects of the interviews and focus groups. Stake (1995) also recognized the importance of effectively storing large amounts of data to

categorize and edit the information. Therefore, NVivo (N12) was the primary computer-assisted to store and analyze the data. A description of each method of data collection follows.

1. Interviews

First, intensive, face-to-face, semi-structured interviews was the first method of data collection for this study. Interviews are a common method in case study research and is considered “the main road to multiple realities, discovering and portraying multiple views of a case” (Stake, 1995, p.64). Patton (2002) has commented on the purpose of interviews and suggests that:

We interview people to find out from them those things we cannot directly observe [...]. We cannot observe feelings, thoughts, and intentions [...]. We have to ask people about those things [...]. The purpose of interviewing, then, is to allow us to enter into the other person’s perspective (p. 340-341).

Stake (1995) also suggests that interviews are targeted and chartered in advance. Therefore, Appendix J presents an interview guide based on sensitizing concepts, *a priori* propositions, and the basic realist model that was used during the interviews. A description of the interview procedures follows.

A. Interview Procedures

a. Explicit consent

Upon arrival, consent forms were signed by the interview participants (See Appendix C). These consent forms essentially acknowledged the following: invitation to participate and purpose of the study, responsibility as a participant, benefits and risks associated with the study, confidentiality and voluntary nature of the study, ethics clearance information, contact information, request for permission to use anonymous quotes, audio recording for transcription and analysis purposes, and to be contacted in the future as needed. If consent forms were not signed upon arrival (i.e. tardiness), then the researcher provided each participant with a consent form to review and sign before each interview. Consent was confirmed when the consent forms were signed by the eligible interview participant and witnessed by the researcher.

b. Interview protocol

In preparation for each interview, the researcher reviewed the interview guide, sensitizing concepts, the CFIR, *a priori* propositions, and the basic realist model that was initially suggested for exploration. All face-to-face interviews were conducted by the Student Investigator in a confidential

location and were approximately 90 minutes in length on-site at each health unit. Specifically, all interviews occurred in either a private board room, meeting room, or the participant's office. Stake (1995) also recommends recording the interviews to provide a more accurate rendition of the interviews and take field notes during and immediately following the interviews. Therefore, with permission from the interviewees, all interviews were audio-recorded using a digital recording device, stored on secure servers, and then were transcribed by an external transcription service in accordance with University of Waterloo policies regarding non-disclosure, transcription, and confidentiality guidelines (See Appendix K, Appendix L, and Appendix M). With permission from the participants, field notes were also taken during and after the interviews. Reflective notes were also taken immediately following the interviews. After the interviews, the researcher asked each participant to evaluate the interview (i.e. overall impression, liked or did not like about the interview, etc.), thanked them for their time and honesty, answered any questions, and discussed the next steps of the research project (i.e. timelines, next steps etc.).

c. Field and reflective notes for interviews

Field notes were taken during the interviews. The researcher sought and obtained permission to figuratively put pen to paper, and frantically took field notes while the participant was talking (i.e. key phrases, ideas, body language, observations, interpretations, and possible emerging themes) to develop a deeper understanding of EIPH practice in CDP in a rural public health setting (Creswell, 1998). Additionally, reflective notes (i.e. feelings, speculation, ideas, problems, prejudices, hunches, impressions) were used to explore aspects of the interview once the interview was completed (Bogdan & Biklen, 1992). Reflections were documented in the following areas: (a) What was I thinking and feeling throughout the interviews? (b) How did my experiences, personal background, and culture affect my interpretation of the responses from the participants? (c) What influence might my preconceived notions about the outcome of the study results have on the findings from the interviews? (d) Did the questions generate the responses that I had expected? (e) Are the responses from the participants based on socially desired responses? (f) Could the questions be posed in a different way that would reduce socially desirable responses, and (g) What was going well, what was not going well, and why? The following responses are summarized from post field and reflective notes:

What was I thinking and feeling throughout the interviews?

Generally, the interview participants were very open, willing, and eager to discuss the factors that facilitated and impeded the implementation of CDP programs and policies in rural Ontario PHUs. I noticed that in each interview, once I asked the primary research question, the participants began to “lead” and take ownership of the interview and as the interview progressed, they became even more enthusiastic (i.e. identified more challenges, assets, and solutions, expressed excitement “this is fun”, leaned in towards me, rescheduled next meeting to allow for extra time for the interview). Perhaps, this exchange gave them an opportunity to tell their story for the purpose of making a positive impact in rural public health practice for CDP in Ontario. Therefore, as indicated in the methodology section, all *a priori* assumptions and knowledge were “set aside” (but not abandoned) during the interviews with the analytic goal of being fully immersed in the participants’ ‘reality’ with an open mind. Active listening was a technique that I employed to increase the depth and length of the participant’s responses by probing, responding empathetically, and paraphrasing when necessary. Interestingly, the domains and constructs that were included in the interview guide were discussed by the participants in a non-linear manner.

How did my experiences, personal background, and culture affect my interpretation of the responses from the participants?

As a former Public Health Epidemiologist and Acting Public Health Manager (13 years), I was able to better understand and relate to the participants’ experience working in a rural public health setting. At the outset of each interview, I formally introduced myself and informed the participant of my background. After I introduced myself, I noticed that the majority of the participants became more engaged in the interview process, and the research study (i.e. meaningfully engaged in dialogue – “what health unit did you work at?”; change in body language, and facial expressions – looking towards me, writing notes, raised eyebrows to show interest, open towards previous interviews – i.e. shared previous negative account of being interviewed with students with “no background in public health”; and sought advice in the area of epidemiology). Also, during the interview, the participants used a lot of acronyms to describe rural public health practice. I was able to identify and interpret the acronyms correctly to shape the story as it continued to unfold, which I believe built confidence in the research study among the interview participants. To validate my observation, a participant noted during the closing remarks: “I think telling you’re a public health professional is really nice [...], that’s great, [...] I love that!”

What influence might my preconceived notions about the outcome of the study results have on the findings from the interviews? Do the questions generate the responses that I had expected? Are the responses from the participants based on socially desired responses?

The three questions were addressed in the opening remarks before each interview. Specifically, before each interview, I stressed that I had no expectations and reaffirmed that there were no right or wrong answers. Generally, the interview participants were very much at ease during the interview and gave honest and direct responses, rather than socially desirable responses. The conversations flowed naturally, in a back-and-forth exchange. Some participants reported that they appreciated this style of interaction (i.e. conversational), typically described as active listening (i.e. paraphrasing, open-ended questions, reflection), rather than forced, prescriptive questions, which could have elicited biased responses (i.e. subject bias, research bias). Specifically, some of the participants described the interviews as very “conversational” and “easy”. As one participant put it: “It was really easy to talk to you [...]. You didn’t put words in my mouth. It made me reflect on certain things.”

Particularly, during one interview, the participant was very opinionated and gave very straightforward and honest answers, that might be considered “out of the box” thinking in public health. I felt very humbled that he/she would confide in me, and I did not expect some of the responses that he/she gave. Interestingly, while reflecting on the interview, I realized that he/she provided some valuable insight into public health practice. As I began to “peel back the onion,” I started to develop some knowledge and understanding of some of the deep mechanisms (i.e. core of the onion), in rural Ontario public health practice, that I did not anticipate at the outset of the interview. In the same vein, some of his/her answers could be considered ‘outliers’ and were coded to reflect this (i.e. Game of Thrones, marriage, etc.).

Could the questions be posed in a different way that would reduce socially desirable responses?

There were no obvious non-verbal or verbal cues to suggest that participants provided socially desirable responses, therefore I would not change the questions (i.e. order, wording, prompts, open-ended etc.).

What was going well, what was not going well and why?

During the closing remarks, I asked each participant to provide a general impression of the interview, and most participants reported that they had a positive experience. A participant noted, “I think it

went really well.” Further, I noticed and recalled throughout the interviews that the participants really appreciated the interview style (i.e. conversational) and felt that this method was able to effectively capture the multiple realities in a rural public health setting for CDP. As described by one participant: “We are going to benefit from this, [...] we can learn a lot from this, [...] learn from where we are failing and where we can step it up.”

However, in retrospect, since the last question was most important (What advice do you have to offer to the Ontario Ministry of Health (MOH), Public Health Ontario (PHO), the Local Health Integration Network (LHIN), and other levels of the system (local, provincial, national) that will enhance rural health practice in Ontario public health units for CDP?), I think that I would have given the participants more time to answer this question. This would have given the participants an increased opportunity to address challenges in rural Ontario PHUs for CDP through innovation, adaptation, discovery, and reinvention at the local, provincial, and federal levels of government.

2. Focus Groups

Secondly, focus groups was another method of data collection for this study. Focus groups with public health unit staff in the area of CDP (i.e. public health nurses, health promoters/health educators, dietitians/nutritionists, support staff, students, among others) further elicited the discovery of new information of implementation factors from different perspectives in a relatively homogenous group, which could be used to further explain this social phenomena. Morgan (1997) suggests that:

Focus groups is a research technique that collects data through group interaction on a topic determined by the researcher. In essence, it is the researchers’ interest that provide the focus, whereas the data themselves come from group interaction (p.7).

The advantages of a focus group – examination of shared understanding of everyday life, number of different perspectives to consider, identification of solutions, and gained insights into group dynamics – is an appropriate method of data collection to understand the complex factors that facilitate and impede EIPH practice for CDP (Litosseliti, 2003). The focus group questions are presented in Appendix N.

However, some methodological limitations were considered. These were as follows: (1) eliciting socially desirable responses; (2) generating false consensus; and (3) difficulty in distinguishing “individual reality” vs. the “reality of the group” (Litosseliti, 2003). Therefore, throughout the focus groups, the researcher employed moderating techniques to mitigate these limitations (i.e. explaining

and reiterating the importance of the study, encouraging honest and direct responses, and full participation (i.e. all participants to speak). A description of the focus group procedure follows.

A. Focus Group Procedures

a. Initial contact and explicit consent

Before the focus group sessions, CDP staff were given the RulPHS Focus Group Information Package by their manager about the session, to make an informed choice about participation. The package included study information and consent forms for focus group participants and RulPHS Frequently Asked Questions for Focus Group Participants (FAQs) (See Appendix D and Appendix I).

At the outset of the focus group sessions, the researcher tabled and described the study consent procedures. Consent forms were signed by each participant after the researcher described the study however, some participants signed the consent forms upon arrival. The consent forms essentially acknowledged the same consent procedures as the interviews, but in addition emphasized the following: a) importance of anonymity and confidentiality, given the group format of the sessions could potentially identify a participant and his/her comments b) permission to use flip chart paper; and; c) compensation (i.e. refreshments) for participating in the focus group discussion (see Appendix D). Consent was confirmed when the consent forms were signed by the eligible focus group participants and witnessed by the researcher. It is important to note that at the outset of one focus group session, a participant was asked to leave the room because he/she was under 18 years of age (i.e. exclusion criteria).

b. Focus group protocol

In preparation for each focus group, the researcher reviewed all relevant background documents (i.e. focus group questions, sensitising concepts, CFIR, *a priori* propositions, basic realist model) and arrived approximately 1 hour early to set up the room (i.e. circulate focus group packages (i.e. consent forms, FAQs, study information), name tags, main research questions), tape flip chart paper on the walls to record the discussion, and place three audio recording devices strategically in the room to effectively capture the conversation. Refreshments were also provided during the focus group session. Most health units offered to provide and coordinate the purchasing and delivery of the refreshments to the focus group session. Except for one health unit, where it was the responsibility of the researcher to provide the refreshments. Overall, it was evident that the health units were generally very accommodating and hospitable.

At the outset of the focus group, the researcher greeted each participant as they arrived and asked their name in order to cross-reference it on a participants list provided by the Health Unit's primary contact, then asked them to review the focus group package (i.e. already provided to them prior to the session by their manager), and write their name on the name tag provided. After all the participants arrived, the researcher verbally described the purpose, method, and consent procedures, and permission was sought verbally and in writing to participate in the study. Consent forms were signed before each focus group. After consent was obtained, the researcher stressed the importance of respect, open discussion, and confidentiality, while affirming there were no expectations. The researcher then started the conversation with a round-robin exercise to encourage discussion and gathered information about the focus group participant demographics. Specifically, the participants were asked, "Can we please go around the table and state your name, role/title, discipline, number of years in your current role, and number of years in public health?"

All face-to-face focus groups were conducted by the Student Investigator (SI) in a confidential location and were approximately 90 minutes in length on-site, at a public health unit. Some participants attended the focus groups remotely (i.e. teleconference). All focus groups occurred in either a private board room or meeting room. In each instance, both locations were appropriate for privacy and free from distractions (i.e. closed door). As a result, participants felt inclined to speak. With permission from the focus group participants, all focus groups discussions were audio-recorded using a digital recording device, recorded on flip chart paper, stored on secure servers, and transcribed by an external transcription service, in accordance with the University of Waterloo policies regarding non-disclosure, transcription and confidentiality guidelines (See Appendix K, Appendix L and Appendix M). Following the focus group session, closing remarks were made. Specifically, the researcher asked the participants to evaluate the session, (i.e. overall impression, liked or did not like about the focus group etc.), thanked them for their time and honesty, answer any questions, and discussed next step of the research project (i.e. timelines, next steps).

c. Field and reflective notes for focus groups

Field and reflective notes were taken during and immediately following the focus group sessions. The questions are noted in the previous section (See Field and Reflective Notes for Interviews). A summary of the paraphrased reflective/field notes was made:

What was I thinking and feeling throughout the focus groups?

The focus group participants were very open, willing, and eager to discuss rural public health systems. Interestingly, I observed two recurrent themes regarding the group dynamics/interaction and structure of the conversation.

First, a key aspect of the focus group session was that the group interaction/dynamics were influenced by knowledge, experiences, and organizational role of each focus group participant. Typically, within each focus group, most participants who had a leadership staff role, and/or were passionate about rural health (i.e. lived experience, directly involved with program/policy/committee with a rural focus) were very proactive in directing and actively engaged in the conversation. Conversely, some participants were very quiet and refrained or withheld feedback/input. This could have been attributed to several reasons that would require further investigation and is beyond the scope of this study (i.e. organizational, behavioural, psychological etc.).

Secondly, structurally, there was a natural flow to the “conversation” throughout the sessions. The structure of the conversation was as follows: (i) beginning of the focus group sessions, the pace of the conversation was slow (i.e. treaded delicately, longer pauses, talked slower). This could be attributed to the participants’ familiarizing themselves with the questions and carefully constructing a response. A participant explained the interaction between the researcher and focus group participants in reference to the outset of the session:

I did like that you took your time and, you didn’t rush us. [...]. There [were] lots of pauses of silence [to] let us just think and sit with it for a bit and not move to the next question. Because it was quiet [...], there was still conversation that came from that silence. And I appreciate that you just let it [the conversation] take that pace.

(ii) middle to end of the focus group, the sessions progressively built to an enthusiastic energy (i.e. increased engagement, talked faster, paused naturally, increased laughter, conversation gained momentum, increased surrounding talk (collaborated with peers); and, (iii) end of the focus group, the pace of the conversation was once again slow, with natural pauses in the dialogue. This most likely was the result of the lack of new information, which increased the researcher’s confidence and satisfaction that theme saturation was reached.

How did my experiences, personal background, and culture affect my interpretation of the responses from the participants?

Like the interviews, at each focus group session, I had informed the focus group participants of my background in public health. I believe, my knowledge in public health has afforded me the ability to develop a good research question (i.e. novel, feasible, interesting, ethical, relevant), strong methodology (i.e. instruments – clear, simple, neutral, concise etc.), and the ability to accurately understand and interpret the responses from the focus group participants. A focus group participant noted: “I appreciate the syncness of your questions. Because [...] sometimes in research interviews, there is sometimes [...] 15 questions, so that was great, to be very focused.” Also, at the end of each focus group, I summarized each session to probe for new relevant information and further comments. The following reflective notes were made regarding the summaries after the focus groups were completed:

Overall, during the focus group sessions, the focus group participants seemed impressed that I was able to recall and interpret their responses accurately. I was humbled by this. I think that it is my breadth and depth of knowledge in public health and epidemiology, that I have a deep understanding and appreciation of their experiences.

What influence might my preconceived notions about the outcome of the study results have on the findings from the interviews? Do the questions generate the responses that I had expected? Are the responses from the participants based on socially desired responses?

The three questions were addressed in the opening remarks before each focus group session. As already noted, these remarks were – (i) stress there is no expectation of the researcher; and (ii) explain that there are no right or wrong answers. Specifically, before each focus group, I stressed that I had no expectations and reaffirmed that there were no right or wrong answers. Overall, there were no obvious problems to suggest that the focus groups were based on social desirability. This observation was based on the body language of the participants (posture), enthusiastic energy (engagement and participatory), and honest responses (unscripted responses). Also, I have reason to believe that I successfully interjected prompts and paraphrased when necessary, in order to encourage group dialogue and interaction without leading and directing the conversation based on my own biases and preconceived notions.

A participant noted:

I liked your questions, [that you] ask[ed] us. If we said a term, or if we said something quickly, you were very good at asking us, could you elaborate? You were not leading in any way. Could you just elaborate? What do you mean by that?

Therefore, I would not change the questions in any way.

What was going well, what was not going well, and why?

Overall, the focus groups were well received by focus group participants. As expressed by one participant: “I love that you are doing this. It is fantastic.” The following are paraphrased from selected post focus group notes:

- During the initial focus group sessions, it was suggested that a handout of the primary research questions could be used as a reference throughout the session. Therefore, in subsequent focus group sessions, a handout was included in the RulPHS Focus Group Package.
- Participant demographic data (number of years in current role AND number of years in public health) was collected during introductions (i.e. round robin). For future focus groups, to ensure credible evidence, gathering this information also using a short Participant Demographic’s Questionnaire (i.e. indicators, indicator definitions etc.) would have strengthened the validity and reliability of these results.
- Generally, focus group participants were all very accommodating, hospitable, open, and very good hosts.
- During one focus group session, the focus group session was interrupted for an extended period, resulting from a retirement party. They invited me to this event, and I was very appreciative of this. At the retirement party, she/he presented a PowerPoint presentation on the evolution of public health throughout his/her work history. She/he worked at the health unit for over 40 years. After the focus group resumed, the participants reflected on the retirement party in relation to organizational culture.
- Some focus group participants were very passionate about the research topic. After the focus groups, some focus group participants “continued the conversation” and e-mailed me some further insights to inform the recommendations of this study.

3. Documentation

Third, documentation, a secondary data source, was used in this study. With respect to documentation, Stake (1995), suggests that “almost every study finds some need for examining newspapers, annual reports, correspondence, minutes of meetings, and the like” (p. 68). Therefore, interview and focus group data were supplemented by documentation to gain a deeper understanding of this phenomenon of interest. The advantages of documentation – stable, specific, and broad – were highlighted by Yin (2014). Examples of documentation include administrative documents (i.e. proposals, internal records), personal documents (i.e. e-mails, memoranda), written reports (i.e. agendas, minutes of meetings), formal studies or evaluations, and media communication (i.e. news clippings) (Yin, 2014). However, for this study only unobtrusive information including planning documents (HEIA), annual reports, strategic plans, health status reports (health indicators), logic models, and organizational records (i.e. number of full-time equivalent (FTE’s) employees, organizational charts), and other documentation that were deemed relevant were informally requested (via e-mail, in-person) from the CDP Manager/Executive Director and the MOH and reviewed. Documentation had three purposes at the outset of this study. They were as follows: 1) verify findings or corroborate evidence from other sources (i.e. health indicators); 2) provide valuable background information about the cases to develop the case descriptions (i.e. # of FTE’s, organizational characteristics etc.); 3) impart insights about the cases prior to data collection that might suggest some questions that need to be asked or situations that need to be observed as part of the research (i.e. restructuring); and 4) yield additional information about the cases. As noted previously, reflective and field notes were also considered personal documentation that were appropriate for this study (See Field and Reflective Notes for Interviews and Focus Groups). It is important to note, that since documentation was a secondary data source in this study, a detailed document analysis plan was unjustified (i.e. documents collected were not considered “data”).

F. Data Analysis

Stake (1995) defines analysis as, “a matter of giving meaning to first impressions as well as final compilations. Analysis essentially means taking something apart” (p. 71). Stake’s (1995) view on data analysis is that the analysis process should be flexible since important modifications and adjustments may arise throughout the process that may confirm or dispute the researchers’ first impressions of the data (Stake, 1995). However, Stake (1995) postulates two analytic strategies to include categorical aggregation and direct observation to understand correspondence and patterns from the data, but in the same vein suggests that, “each researcher needs, through experience and

reflection, to find the forms of analysis that work for him or her” (p. 77). Since there is little guidance from Stake (1995) on a prescriptive analytic strategy, at the outset, the researcher used casual inference (Danermark, Ekström, Jakobsen, & Karlsson, 2002). Danermark, Ekström, Jakobsen, & Karlsson (2002) define inference as “a way of reasoning towards an answer to questions such as: What does it mean? What follows this? What must exist for this to be possible?” (p. 79). Realists distinguish between four different modes of inference: deductive, inductive, abductive, and retroductive methods (Danermark, Ekström, Jakobsen, & Karlsson, 2002). Danermark, Ekström, Jakobsen, & Karlsson (2002) definition of each modes of inference and application of the research results (i.e. examples) are presented below. They are as follows:

Induction – “From a number of observations to draw universally valid conclusions about a whole population. To see similarities in a number of observations and draw the conclusions that these similarities also apply to non-studied cases. From observed co-variants to draw conclusions about law-like relations” (Danermark, Ekström, Jakobsen, & Karlsson, 2002, p. 80). Using inductive reasoning in this study, the researcher collected and analyzed the data, then developed categories (i.e. themes) to explain the findings.

Deduction – “To derive logically valid conclusions from given premises. To derive knowledge of individual phenomena from universal laws” (Danermark, Ekström, Jakobsen, & Karlsson, 2002, p. 80). Using deductive reasoning in this study, the researcher tested whether the sensitizing concepts, *a priori* propositions, and the realist model was supported by the evidence.

Abduction – “To interpret and recontextualize individual phenomena within a conceptual framework or a set of ideas. To be able to understand something in a new way by observing and interpreting this something in a new conceptual framework” (Danermark, Ekström, Jakobsen, & Karlsson, 2002, p. 80). Described in this way, abductive inference (“theoretical redescription”) in this study, was the process of associating data with ideas in the development of a realist model

Retroduction – “From a description and analysis of concrete phenomena to reconstruct the basic conditions for these phenomena to be what they are. By way of thought operations and counterfactual thinking to argue towards transfactual conditions” (Danermark, Ekström, Jakobsen, & Karlsson, 2002, p. 80). Using retroductive inference (retro – going backwards) in this study involved building mechanisms (i.e. patterns) that were assumed to produce empirical phenomena by working back from the data to a possible explanation of implementation in rural PHUs.

Based on a critical realist philosophy and methodology, application of all four modes of inference provided a central form of reasoning (Danermark, Ekström, Jakobsen, & Karlsson, 2002). It explained how the research process moved, from the concrete (description) to the abstract (i.e. abduction, retroduction,) and then back to the concrete (i.e. explanation of events and processes) to explain the study conclusions (Danermark, Ekström, Jakobsen, & Karlsson, 2002). Moreover, abduction and retroduction inference further enhanced the qualitative analysis. Specifically, these underexposed forms of reasoning, were beneficial to explain events and social processes that caused events in rural Ontario PHUs, in relation to implementation (i.e. describing and conceptualizing mechanisms and re-description and re-contextualization – realist model) (Meyer, & Lunnay, 2013). A description of inferential techniques and data analysis procedures follows.

1. Inferential techniques

Data analysis procedures involved the application of four inferential techniques: (1) inductive; (2) deductive; (3) abductive; and (4) retroductive. First, a cross-case analysis involved an inductive approach in which the data itself contributed to the emergence of major categories (i.e. domains) and subcategories (i.e. themes, subthemes, factors, and solutions). Second, the deductive process was used to interpret the data in light of the *a priori* propositions (i.e. the analyst's expectations about what might be said about the categories). This inferential technique helped to refine the major categories and subcategories to determine which *a priori* assumptions held. Moreover, in the deductive analysis phase, the (hypothetical) major categories and subcategories from *a priori* propositions, sensitizing concepts, and the basic realist model were reviewed to determine if the original categories needed to be expanded, reorganized, or changed. Third, abductive and retroductive reasoning were applied in the interpretative analysis. Specifically, abductive reasoning (i.e. post hoc analysis) was applied to discover circumstances and structures that fell outside the initial theoretical premise to inform a new evidence-informed realist model of context-mechanism-outcome configurations in rural Ontario PHUs that was supported by the data. Further, retroductive reasoning (i.e. inference to the best possible explanation or “new reality”) was utilized to provide a deeper understanding of the mechanisms that facilitated and impeded implementation of EIPH practices, such as human thought and perception, cultural drivers, and structural factors that may be operating across all rural PHUs.

2. Data analysis procedures

At the outset, the procedure to conduct within and cross-case analysis was as follows: (1) reviewed and interpreted the data (i.e. interview, focus group) and unobtrusive documents (inductive); (2) examined and coded the data in NVivo (N12) into major themes, subthemes, factors, and solutions that facilitated and impeded implementation in NVivo (N12) (deductive); (3) reviewed, expanded, integrated, and/or changed major themes, subthemes, and factors that facilitated and impeded implementation, based on *a priori* propositions, sensitizing concepts, and the basic realist model using NVivo (N12) (deductive); (4) developed a description of the aggregated cases (findings section in dissertation) (inductive); (5) adapted the existing realist model that was developed *a priori* based on additional insights about themes, subthemes, and factors that facilitated and impeded implementation (abduction); (6) confirmed the themes (via model) through a limited number of member checks to confirm validity of the analysis and made any necessary revisions (additional interviews were considered and deemed not necessary) (i.e. confirmation through deductive inference); and; (7) interpretation of the depth mechanisms that have been operating (retroduction). It is anticipated that this analytical strategy established a credible understanding of EIPH practice in chronic disease prevention in rural areas that were produced by empirically based findings.

G. Study Resources

This study was conducted by Deanna Elizabeth White (SI) to satisfy the necessary PhD requirements in the Public Health and Health Systems program at the University of Waterloo. The researcher is an experienced public health professional who worked in a rural public health setting for thirteen years as a Public Health Epidemiologist, Manager, and Acting Manager of a health unit. The PhD thesis committee was comprised of Dr. John Garcia (Supervisor), Dr. Samantha Meyer, Dr. Martin Cooke, and Dr. Leia Minaker (Internal/External member). The researcher was responsible for the funding and direction of this study. Specifically, the researcher used the money from the Graduate Research Assistance (GRA) to fund the study. Further, the researcher was held accountable for ethics approval, data collection, transcription, coding, analysis, writing, presentation, and defence of the final dissertation. The costs associated with this study was minimal (\approx \$6500.00) and included travel (car), accommodations, meals, resource materials (i.e. audio recording devices, flip chart paper, markers, paper), postage, and transcription services. NVivo 12 was the qualitative software program that was used for the study and was provided by the University of Waterloo.

V. Findings

A. Sample

1. Selection and sample characteristics of the cases

As described in the methods sections, this study was based on a holistic, collective (multiple) case study (Stake, 1995). Stratified cluster purposeful sampling method was employed to produce the desired number of cases that enabled comparisons across cases, bounded by two distinct geographical locations (rural AND rural and urban mix) based on the Statistics Canada's peer groupings, geographic location, and time (2018) (N=6). Health Units were recruited until the desired number of cases within each cluster (i.e. stratified cluster) agreed to participate. Overall, eight health units were recruited to participate in RulPHS. The response was as follows: (i) yes (n=5); (ii) no, stating low capacity to participate in research activities (n=1); (iii) late response, stating willingness to participate in RulPHS, therefore the researcher included the health unit in the research study (n=1); and; (iv) very late response, stating that the information about the research study got lost in translation, therefore, the health unit was excluded from the sample (n=1). Therefore, 6 PHUs (cases) participated in the study. The sample was as follows: initial stratification (phase 1) (3 PHUs from Peer Group C; 2 from Peer Group D; and 1 from Peer Group E), cluster purposeful sampling (phase 2) (2 North East, 2 South West, 1 Central East, and 1 from Eastern Ontario). Therefore, the basic characteristics of the cases (i.e. PHU's) are presented in Table 1.

Table 1

Basic Characteristics of PHUs, by Peer Group and Geography, 2018

Public Health Unit	Peer Group	Peer Group Principal Characteristics	Geography
Health Unit A	Peer Group C	- Population centres and rural mix from coast to coast; - Average percentage of visible minority population; and - High percentage of Indigenous population.	North East Ontario
Health Unit B	Peer Group C	- Population centres and rural mix from coast to coast; - Average percentage of visible minority population; and	Central East Ontario

Public Health Unit	Peer Group	Peer Group Principal Characteristics	Geography
		- High percentage of Indigenous population.	
Health Unit C	Peer Group C	- Population centres and rural mix from coast to coast; - Average percentage of visible minority population; and - High percentage of Indigenous population.	North East Ontario
Health Unit D	Peer Group D	- Mainly rural regions in Quebec, Ontario and the Prairies; - Low percentage of visible minority populations; and - Average percentage of Indigenous populations.	Eastern Ontario
Health Unit E	Peer Group D	- Mainly rural regions in Quebec, Ontario and the Prairies; - Low percentage of visible minority populations; and - Average percentage of Indigenous populations.	South West Ontario
Health Unit F	Peer Group E	-Mainly rural Eastern regions; -Low percentage of visible minority; and -Low employment rate	South West Ontario

Note. From Statistics Canada. (2015b). *Health regions and peer groups*. Retrieved from <https://www150.statcan.gc.ca/n1/pub/82-402-x/2015001/regions/tbl/tbl8-eng.htm>

Other basic characteristics of the PHUs related to organizational characteristics, geography, and population is also provided to demonstrate reasonable representativeness and a solid well-grounded understanding of the cases, but in a confidential manner (i.e. ethical considerations) to protect and

respect the health unit's identity (please note, some numbers were purposefully rounded - crudely). A description of the selected characteristics is presented below:

- Organizational characteristics – On average, there were 9.5 FTE (7.5–13 FTE) in the CDP program (missing data from 1 PHU); and 3 offices at each PHU (1–6 offices).
- Geography and population – Based on the 2016 census, the average values for selected geographic and population indicators for all participating health units were as follows: population density 21.8km² (2 km² – 41km²); land in square kilometres 7,870.10 (2,000 – 17,000); population 104, 281 (Statistics Canada, 2017).

2. Participant demographics

Public health practitioners including the MOH, CDP Manager/Executive Director, and public health staff in the area of CDP (i.e. public health nurses, health promoters/health educators, dietitians/nutritionists, support staff, etc.), from six public health units representing rural and rural and urban mix settings, participated in the study. Overall, sixty-five (N=65) public health practitioners participated in the study (15 interview and 50 focus group participants – see interview and focus group sample). The inclusion and exclusion criteria were as follows:

Inclusion Criteria: The list of criteria for eligibility to participate in this study included: 1) public health units in Ontario; 2) public health units in a rural setting; 3) chronic disease prevention staff including public health nurses, health promoters, dietitians, support staff and other staff that were deemed appropriate by the CDP Manager/Executive Director ; 4) the CDP Manager/Executive Director; and the 5) MOH.

Exclusion Criteria: Any persons under 18 years of age (classified as children and/or minors) were excluded from the study (i.e. students).

A description of the interview and focus group sample follows.

a. Interview demographics

A total of 13 interviews were conducted throughout May-July 2018 (MOH, Management/Director interviews). A total of 15 individuals participated in the interviews from six health units. Of the interview participants, there were, 10 (66.7%) CDP Managers/Directors, and 5(50%) MOHs that participated in the study (see Table 2). Two participants requested to be interviewed together, and one interview occurred over the phone due to a scheduling conflict. It is interesting to note, that one

MOH declined to participate because he/she was an acting MOH for a brief period (i.e. Health Unit C).

Table 2

Health Unit Interview Sample, by Executive Staff

Health Unit	*MOH (n)	**CDP Manager/Director (n)	Total (N)
A	1	3	4
B	1	2	3
C	0	2	2
D	1	1	2
E	1	1	2
F	1	1	2
Total (N)	5(33.3%)	10(66.7%)	15 (100%)

Data Notes: *Some MOH job titles also included Executive Officer. **The interview participants had various job titles in the area of CDP.

b. Focus group demographics

A total of 7 focus groups were conducted throughout May-July 2018. At the request from Health Unit A, 2 focus groups were conducted to accommodate staff schedules. A total of 50 individuals participated in the focus groups. Of the total proportion of focus group participants, there were 26 (52%) health promoters/public health educators; 9 (18%) public health nurses; 9 (18%) dietitians/nutritionists; 4(8%) students; 1 (2%) epidemiologist; and 1(2%) administrative assistant (see Table 3). Based on sample size specifications offered by Krueger (1988) ideally, each focus group should have seven to 10 participants, with representation from each discipline (i.e. nursing, health promotion, nutrition, and administration) which would allow for sufficient variation and contrasting opinions within and across cases (i.e. 42-60 participants). Therefore, based on Kreuger’s (1988) specifications, the focus group sample was deemed a representative sample for this study.

Table 3

Health Unit Focus Group Sample, by Public Health Staff, in the Area of CDP

Job Title	HU A (n)	HU B (n)	HU C (n)	HU D (n)	HU E (n)	HU F (n)	Total (N) %
Health Promoter/Public Health Educator	10	3	3	2	3	5	26 (52%)
Dietitian/Nutritionist	2	1	2	2	0	2	9 (18%)
Public Health Nurse	1	1	0	4	1	2	9 (18%)
Student	1	0	0	0	3	0	4 (8%)
Epidemiologist	0	0	1	0	0	0	1 (2%)
Administrative Assistant	0	0	0	1	0	0	1 (2%)
Total (N)	14	5	6	9	7	9	50 (100%)

B. Analysis

1. Phase 1 analysis – initial coding (induction techniques)

Phase 1 analysis involved an inductive approach, in which the data itself contributed to the emergence of categories, themes, subthemes, factors, and solutions. Strauss and Corbin (1988) description of inductive analysis as follows: “The researcher begins with an area of study and allows the theory to emerge from the data” (p. 12). Danermark, Ekström, Jakobsen, & Karlsson (1997), further suggests, “we start from something known and given and draw conclusions which reach beyond this” (p. 85). In this study, induction was a rather straightforward procedure, which involved a detailed reading of the interviews, focus group transcripts, and unobtrusive documents to initially derive categories, themes, subthemes, factors, and solutions through the interpretation of the raw data using within and across case analysis. Given that this study was based on a critical realist ontology, the researcher also identified mechanisms (i.e. factors identified from focus groups and interviews). Outcomes were also identified in the realist model and in the findings section (i.e. when interpretations produced outcomes). All transcripts were reviewed to select the initial categories. At this stage, *a priori* propositions, the CFIR, sensitizing concepts, and the proposed basic realist model was set aside (but not abandoned). However, these documents were periodically reviewed when a reference was made in the qualitative data that established a clear link between the raw data and themes.

2. Phase 2 analysis – refine categories (deductive techniques)

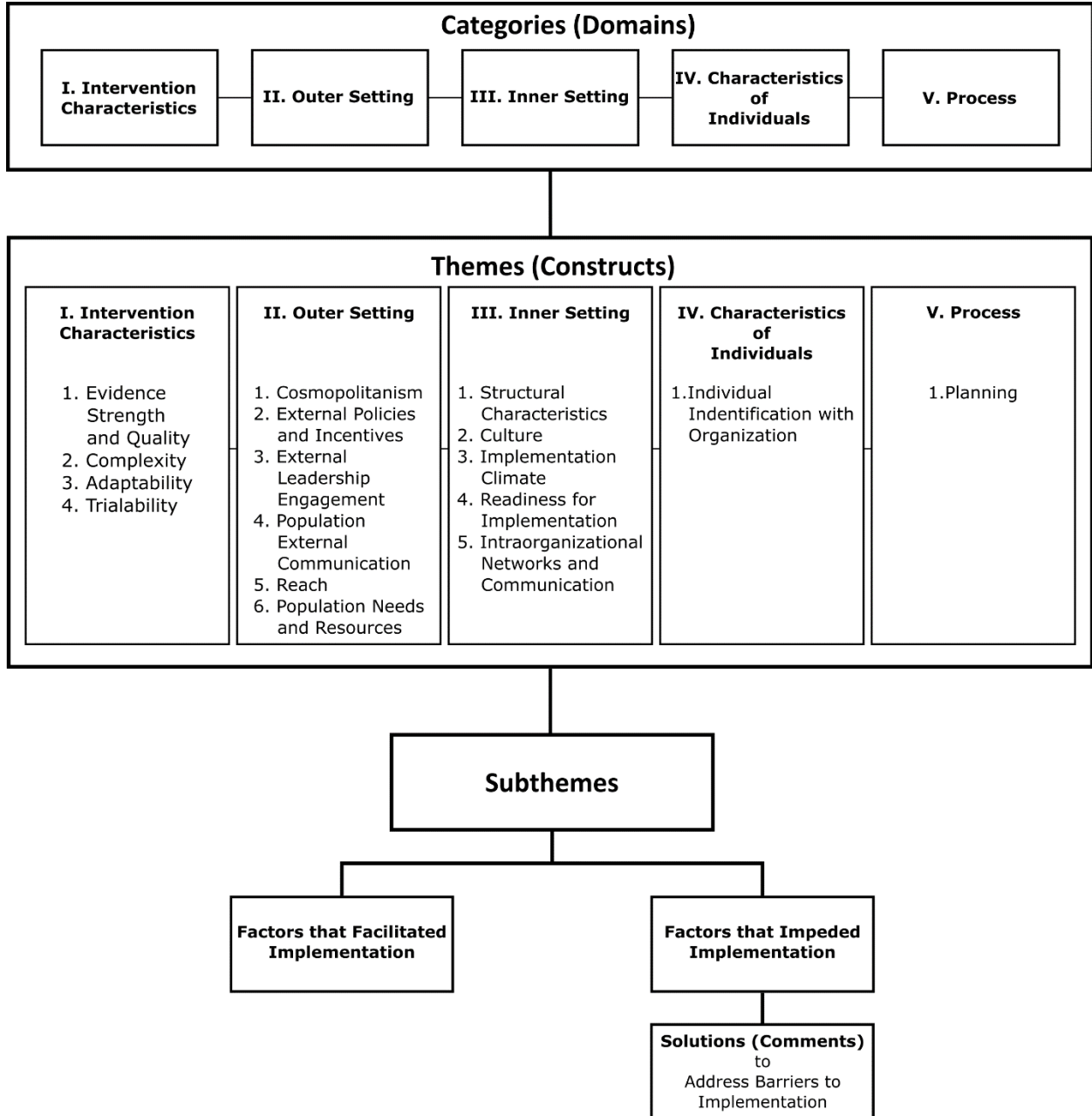
Phase 2 involved a deductive approach. Deductive analysis requires that the researcher compare the data to *a priori* theoretical propositions derived from the review of the literature (Pearse, 2019; Meyer & Lunnay, 2012). Danermark, Ekström, Jakobsen, & Karlsson (1997) suggest that, “deductive logic [...] is used to test the logical validity of the conclusions we draw, given that the statements are correct” (p. 82). Therefore, at this stage, the researcher reviewed original propositions, the CFIR, proposed basic realist model, and reviewed documentation provided by the participants relevant to rural public health practice for chronic disease prevention. These included organizational charts, planning documents, health status reports, logic models, annual reports, strategic plans, government documents, and other documentation that were deemed relevant. During this time, the researcher, also collapsed, reorganized, and expanded categories, themes, subthemes, factors, and solutions, through formal aggregation of data within and across cases (PHUs). Sensitizing concepts that were developed *a priori* were also reviewed and generally reflected the practice of evidence-informed

CDP programs and policies in rural areas and successfully provided a general suggestion about what to look for in an empirical instance. Indicator definitions were also developed to further refine the themes to avoid overlapping and non-exclusivity. Following the review, the researcher created a high-level data structure hierarchy guided by the CFIR. It is important to note, that the CFIR was modified to reflect the participants 'reality' in a rural public health setting for CDP (See Discussion-Implications for CFIR for Rural Public Health System). The final data structure hierarchy is presented in Figure 2. This structure is as follows:

- Categories (Domains). The first level of the hierarchy structure were categories (domains). In this study, the categories that were used were based on the domains in the CFIR (Damschroder et al., 2009). The categories were as follows: Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process
- Themes (Constructs). The second level of the hierarchy structure were major themes (constructs). The major themes aligned very closely with many of the constructs in Damschroder and colleagues CFIR (2009). A list of themes was as follows:
 - I. Intervention Characteristics - 1. Evidence Strength and Quality, 2. Complexity, 3. Adaptability 4. Trialability;
 - II. Outer Setting - 1. Cosmopolitanism, 2. External Policies and Incentives, 3. External Leadership Engagement, 4. Population External Communication, 5. Reach, and 6. Population Needs and Resources;
 - III. Inner Setting - 1. Structural Characteristics, 2. Culture, 3. Implementation Climate, 4. Readiness for Implementation, and 5. Intraorganizational Networks and Communication
 - IV. Characteristics of Individuals - 1. Individual Identification with Organization; and
 - V. Process -1. Planning.
- Subthemes. The third level of the hierarchy structure were subthemes. Please note, not all themes were further subdivided into subthemes.
- Factors that Facilitated and Impeded Implementation. The fourth level of the hierarchy structure were factors that either facilitated (assets) or impeded (barriers) implementation.
- Solutions (Comments). The fifth level of the hierarchy structure were solutions in the form of comments that addressed the barriers to implementations. The solutions were also categorized in the discussion chapter (See Implications for Rural Public Health Practice)

A detailed data structure categorization scheme reflected in the analysis is presented in Appendix O. Overall, there were five (5) categories, seventeen (17) themes, twenty-one (21) subthemes and eighty-one (81) factors that facilitated or impeded implementation of CDP programs and policies in rural Ontario PHUs. There were also several solutions in the form of comments that were made by participants to minimize barriers related to implementation.

Figure 2: Data Structure Hierarchy for Implementation for EIPH CDP Programs and Policies in Rural Ontario PHUs



3. Phase 3 analysis – develop a description of the aggregated cases (inductive techniques)

At this stage, the researcher provided a rich description of the six aggregated cases (i.e. inductive technique). This involved accurately describing and interpreting “the main road to multiple realities, discovering and portraying multiple views of a case” among the participants (public health agents) (Stake, 1995, p.64). Therefore, at this point, the analyst sought to represent the major categories (i.e. intervention characteristics, outer setting, inner setting, characteristics of individuals, and process). by describing themes, subthemes, factors that facilitated and impeded implementation, and solutions to minimize barriers to implementation within them, to yield a narrative that revealed the participants’ experience and reality in a rural public health setting. Further, verbatim quotes were used to capture their voice and explain the phenomena of interest and add depth and credibility to the findings. It is important to note that verbatim quotes were slightly modified for ease of readability (i.e. omission of duplicate words, run-on sentences, filler words, irrelevant information, and use of punctuation – i.e. period). However, it is believed with confidence that the integrity of the original quotation was maintained. Therefore, a description of intervention characteristics, outer setting, inner setting, characteristics of individuals, and process follows.

I. Intervention Characteristics

The category, “Intervention Characteristics” refers to characteristics of an intervention as identified by Damschroder and her colleagues as a key category for implementation in the CFIR (Damschroder et al., 2009). Intervention characteristics was further subdivided into four themes: “Evidence Strength and Quality”, “Complexity”, “Adaptability”, and “Triability”. A description of each theme follows.

Theme #1: Evidence Strength and Quality

This overarching theme refers to the “stakeholders’ perception of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes” (Damschroder et al., 2009, p. 6). “Evidence Strength and Quality” was further subdivided into two subthemes: “Types of Evidence” and “Use of Evidence”. A description of each subtheme follows.

a. Types of Evidence

“Types of Evidence” was the first subtheme within “Evidence Strength and Quality” that facilitated implementation. Evidence to inform the decision-making process came from a variety of sources. Therefore the “Types of Evidence” subcategory were further subdivided into three noteworthy factors that supported implementation of CDP programs and policies in rural PHUs to include:

“Primary data sources”, “Secondary data sources”, and “Multiple data sources (mixed methods)”. A discussion follows.

First, participants obtained data from primary data sources. Primary data sources included both quantitative and qualitative methods. The key primary data sources that were identified in the interviews and focus groups were needs assessments (i.e. respond to local needs, priorities, and contexts); evaluation studies; local data, stakeholder’s perspectives and opinions; lived experience; and professional knowledge and expertise. Secondly, participants also obtained data from a variety of secondary data sources. The key secondary data sources that participants identified were provincial and federal data sources (e.g. Canadian Community Health Survey (CCHS), census); published scientific literature (i.e. best practices, peer review, and published literature); grey literature (e.g. health status reports); and evidence reviews and guidelines (e.g. National Collaborating Centre for Methods and Tools (NCCMT)). Thirdly, multiple data sources were also used to bridge the knowledge gap. All three types of evidence were used to inform CDP implementation in rural areas.

b. Use of Evidence

The second subtheme was “Use of Evidence”. “Use of Evidence” to inform CDP programs was further subdivided into factors that facilitated and impeded evidence-use in rural areas for CDP programs and policies in rural Ontario PHUs. Factors that facilitated implementation included the following: “Appraise and interpret the evidence (i.e. evidence source)”, “Evaluate the effectiveness of implementation efforts (i.e. use of evidence)”, “Demonstrate impact” and “Translate the evidence (knowledge translation)”. Factors that impeded implementation included the following: “Lack of local data”, “Small area analysis”, “Lack of centralized data and evidence-based repository and supports” (e.g. dashboards), and “Dearth of rural research”. A description of each factor follows.

Use of Evidence - Factors that Facilitate implementation

Factor #1: Appraise and interpret the evidence. Some participants indicated that they critically “Appraised the evidence” to make an informed assessment of the source, based on evidentiary strength. As a participant noted: “When we’re going to really promote something, there better be a strong research evidence for it.” Based on the interpretation of the quality of evidence for public health practice, evidence was used to justify a practice decision (i.e. implement the adapted evidence into practice or policy). As one participant put it: “The way we justify it is [...] by [...] looking at the evidence.”

Factor #2: Evaluate the effectiveness of implementation efforts (i.e. use of evidence). Some health units also reported that they used the evidence to “Evaluate the effectiveness of implementation efforts” as part of an ongoing process. Once evidence-informed CDP programs and policies were implemented, they were routinely monitored and evaluated. Specifically, subsequent evidence was also used by health units to provide program/policy direction and further course of action (i.e. stop, modify, or continue program/policy). A participant described the process this way: “Goes back to that strategy piece [...]. The research and evidence [...] help[s] in directing decisions.” Another participant further explained: “The evidence says this program isn’t effective, so we are going to stop running it.”

Factor #3: Demonstrate impact. Participants also reported that they used evidence to “Demonstrate the impact” of CDP programs and policies in rural Ontario PHUs. Process and outcome indicators were used to measure intended outcomes (i.e. program activities and outputs and expected effects). Evidence to inform process and outcome evaluations came from a variety of informal and formal data sources (e.g. count the number of training sessions, program evaluations, needs/situational assessments, health indicators from provincial and federal data sources etc.). One participant described their health unit’s evaluation process this way: “We count things, of course, like the number of training sessions that we do. We have tried to reach a little beyond with evaluation forms.”

Factor #4: Translate the evidence (i.e. knowledge translation). Evidence that supported effective public health practice was then translated to bridge the gap between research and real-world practice settings, to improve rural health. Specifically, “Knowledge translation” refers to the application or integration of scientific knowledge to practice (Graham et al., 2006).

Participants reported that they used evidence (new knowledge) to translate/adapt a program to their local context using a realist lens (what worked, with whom, under what circumstances). As described by a participant: “So they are going to look at how do you take the evidence of what worked some place and apply it to our situation.” Another participant supported this view: “It’s looking at all those [...] pieces of evidence, and [...] thinking about the transferability, applicability, and [the] ability to use evidence-based interventions in the local context, to address the public health issue.”

Some participants also reported that they also used knowledge transfer of empirical evidence to leverage and mobilize partnerships. A participant explained: “I would say it’s, [...] an enticer [evidence] [...]. It’s about enticing people to come into a space.” They also commented that

knowledge translation strategies were used within a variety of practice settings and circumstances to build capacity “to use research evidence, and [...] make evidence-informed decisions.” One example is the NCCMT Knowledge Broker Mentoring Program. A participant described the Knowledge Broker Mentoring Program this way:

Our health unit participated in the NCCMT knowledge broker mentoring program, which was amazing. And I think really was a great design for helping build our capacity, to use research evidence [...], [and] to make evidence-informed decisions [...]. We are now exploring ways to get better at using some of the knowledge.

Use of Evidence – Factors that Impede Implementation

Factor #1: Lack of local data. “Lack of local data” was a factor that negatively influenced the use of evidence in rural areas. Participants in most health units expressed the lack of dedicated resources for collection, collation, analysis, and reporting of local data. Specifically, participants indicated a lack of funding and low human capacity for local population assessment, research, program evaluation, and surveillance. For example, some participants described their difficulty in participating in a local surveillance program called Rapid Risk Factor Surveillance System (RRFSS), resulting from inadequate funding and low human capacity (i.e. 1 Epidemiologist). A participant explained:

RRFSS, which is very applicable to chronic disease, we have not been able to partake in, because we haven’t had the funding to be able to sustain RRFSS, and we haven’t had the epidemiology support. We have one epidemiologist for the entire local public health agency.

As a result, rural public health units were dependent on external resources (i.e. grants, LHIN) to provide research and evaluation supports in order to obtain data at the local level. A participant noted this dependency: “We’re only getting into RRFSS now, through the support of our LHIN.”

Some health units also reported that the strength of local evidence was weak (i.e. small sample sizes, rely on process indicators). As a result, this negatively affected access to “strong local data”. As one participant put it: “Our challenge [...] having [...] strong, strong data at the local level.”

In response to the lack of local data, some health units suggested innovative/creative solutions. Some of these solutions were as follows: 1) invest in the Local Driven Collaborative Driven Projects (LDCP) with a rural focus; 2) utilize multiple sources of data to inform planning and decision-making; 3) increase dedicated resources for research and evaluation – i.e. human and funding;

4) collaborate with partnerships to obtain local data by building capacity; 5) advocate for the best available local evidence; 6) promote data sharing among the LHIN's; 7) use alternative data sources (i.e. provincial data); and 8) modify existing analytic approaches (e.g. combine/pool data sets) to bridge the knowledge gap to better understand local priorities, needs, and contexts.

Factor #2: Small sample sizes. “Small sample sizes” was another factor that affected the use of evidence. Participants reported failure to stratify local data according to low levels of geography (i.e. dissemination area, neighbourhood level, rural areas) and subgroups (i.e. priority populations), resulting from low population in rural areas. As a result, they had to suppress local data. A participant explained:

Our units of measurement are so large, the postal units are so large [...], there isn't a lot of specificity [...] to be able to say [...] we know this about your community [...]. The opposite is true when we have such small numbers that when we do know something about a community, we often have to suppress it because it's [...] less than 5 in a cell. We can't use it, so we wouldn't be able to look at neighbourhoods.

Some solutions that were identified were oversampling, pooling data sets, and promote data sharing among partners.

Factor #3: Lack of centralized data and evidence-based repository and supports (e.g. dashboards).

Participants also reported a “Lack of a comprehensive central repository for evidence” negatively impacted the implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. Although health units acknowledged that PHO did provide snapshots, a collection of interactive map-based dashboards, showing both temporal and geographic temporal trends for key public health indicators, they did indicate, “that they wanted more”. As described by one participant:

[We are] able to manipulate the data [Public Health Ontario Snapshots] and [...] download the data, [...] is amazing, right? But more, we want more [...]. We want to [...] break it down [...]. Can we please have city county data?

Participants also expressed the value of a comprehensive central repository for evidence (i.e. best practices, tools, data, research) that would be led provincially (i.e. PHO, MOHLTC). Some participants reported that centralization would decrease duplication of services, facilitate efficient and effective utilization of resources, ensure standardization across the provinces, increase capacity

for research and evaluation, and strengthen coordination and collaboration of services between public health and the provincial government. A participant explained:

The Ministry just expects all 36 public health units to make up their own [evidence-informed CDP programs], whereas it should be provincially led [...]. We don't all have the ability to make up these programs, and [...] have all of the solutions, and [...] the ability to evaluate them to see if they are any good. This needs to occur; I think centrally [...]. They are wasting a huge amount of money [...] Make it a priority [central repository] and let Public Health Ontario lead it [...]. To really help improve collaboration among health units so that we can share resources and knowledge in what's working, what's not, but it has to be provincially led.

Factor #4: Dearth of rural research. Health units also reported that the “Dearth of rural research” affected the use of evidence for CDP programs and policies in rural Ontario PHUs. As one participant noted: “A lot of the research [...] is on bigger populations or, [...] urban settings.” As a result, participants indicated that urban and northern research was non-transferable in a rural setting, because of the perceived difficulty of adaptability, reflected by barriers unique to rural settings. As one participant explained:

It so different working in a rural area than an urban area, having worked 10 years in [city]. [...] We [...] know that it's important to promote physical activity, because [...] all of the good things that it does. How [do] we do that here? There's not a lot of research around rural areas. And they are very, very, very different. So, [...] it's way more important to do the situational assessment [rural communities].

Theme #2: Complexity

The theme “Complexity” refers to the “perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness” (Damschroder et al., 2009, p. 6). Complexity was spoken about as a factor that impeded implementation from most health units.

A significant factor that affected complexity was “Duration” (i.e. long distance to travel). The factor applied here – aligns with Damschroder’s et al. (2009) definition (i.e. specifically uses the term duration) which refers to how long something lasts, from beginning to end, which can affect perceived difficulty of implementation (Damschroder et al., 2009; Merriam-Webster, 2019). Specifically, participants spoke about travel times (i.e. long distance to travel to locations) that resulted from large geographic distances to branch offices, program locations, meetings (i.e. Toronto), academic institutions etc. As one participant put it: “The [...] distances and the travel, like it’s really hard.”

Some of the challenges associated with duration (i.e. long distance to travel) expressed by some health units included increased workload (i.e. impacted daily work); logistical barriers (i.e. large geography, inclement weather) that required formal planning; negative impact on work-life balance; and lack of dedicated time and resources to travel long distances. One participant explained the earlier issue (i.e. impacted daily work) as follows:

I know we did discuss time and distance to get to places. But [...] it’s at least 2 hours to get to some areas within our district. So, if you are travelling there and back, it eats up a lot of your day.

Some solutions for duration were provided. These included the use of technology (i.e. webinars, on-line presentations etc.); engaging and sharing of information with professional organizations and networks (i.e. Ontario Dietitians in Public Health (ODPH) etc.); and providing programs centrally (i.e. health unit main office). For example, one participant explained how the use of technology supported information sharing (i.e. communication) among health units this way: “Technology helps with communication [...]. If we can’t go up to a meeting in Toronto or somewhere, [...] just being able to connect that way is a huge help.” Another participant stated: “The tape-recorded sessions are helpful too [...], if we can’t get up to Toronto [...], because it’s a three-hour train ride.”

Theme #3: Adaptability

The theme “Adaptability” refers to the “degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs” (Damschroder et al., 2009, p. 6). “Adaptability” is associated with both factors that facilitated and impeded implementation. Factors that facilitated implementation for “Adaptability” were further divided into two subthemes: “Adaptability to address local needs, priorities, and contexts in a rural setting”; and “Rural health innovation”. Factors that impeded implementation were further divided into two subthemes: “High complexity” and “Lost in translation”. A description of each factor follows.

Adaptability – Factors that Facilitate Implementation

Factor #1: Adaptability to address local needs, priorities, and contexts in a rural setting. The ability to “Adapt a policy or program to address the local needs, priorities, and contexts” of rural populations was reported to be important by most health units. This was done by allowing flexibility in practice to address heterogeneity within rural areas. As one participant puts it: “Being adaptive and responsive to the needs of our community [...] we do really try to be flexible.”

Another participant discussed adaptation of programs to local circumstances and contexts in rural areas:

We’ve done a lot of work in rural communities, and they understand the difference. They understand that when they go to [a rural community], the people in [that rural community] are different. The needs in [that rural community] are different, and when we try and apply one lens across our, [...] area, it doesn’t work.

Participants also reported that they were more likely to adapt a policy/program if they perceive it compatible with existing health unit policies and programs. A participant explained this in relation to the OPHS:

One of the great things for us, [was] that there [were], kind of three areas that came up in the standards, that really line[d] with what we were doing, and what we saw, sort of saw coming [...], augmenting our work [...]. So, the first part was around mental health. And we had started [...], developing a mental health program prior to the standards [...]. So, that lent itself well [...], into that type of work.

Factor #2: Rural health innovation. “Rural health innovation” was another factor that influenced adaptability. Rural health innovation was seen by some as being able to be creative, flexible, and unconventional. As expressed by one participant: “Innovation and adaptation [...] we require that.” Other participants described rural health innovation as a core value in organization culture. One participant explained: “Our core values around what we [...] culturally want in this organization and rural innovation is one, because [...] that makes the difference.” Of interest, one health unit indicated that they were celebrating rural innovation next month.

Adaptability – Factors that Impede Implementation

Factor #1: High complexity. In some health units, “High complexity” impeded adaptability of evidence-informed CDP programs and policies in rural Ontario PHUs. Although the term “complexity” applies to urban areas in the literature (Stevenson & Gleeson, 2018), the topic of complexity, was seen by many as a factor that also impeded implementation in rural areas. For example, participants indicated that lack of resources (e.g. funding, human), lack of management support, logistical barriers (e.g. transportation), and weather (e.g. inclement weather) were some barriers that negatively impacted adaptability of CDP programs in rural areas.

To illustrate this, a participant spoke about an opportunity to enhance access to public health services by virtue of a mobile health bus. However, because of the perceived difficulty (i.e. low demand, high cost, scheduling conflicts/issues) this innovation, “evaporated”. The participant explained: “It [mobile health bus] just became really complex [...]. It became too difficult. And then we didn’t have buy-in. And I think people [...] couldn’t see the [...] the dream. And, so it kind of just evaporated.”

Some solutions for complexity were provided. These included the use of social media (i.e. Facebook) to increase reach in “the winter months”, and provide programs in an urban core or a central location to address logistical barriers. One participant described an earlier solution (i.e. use of social media in winter months) in relation to high complexity as follows: “We might do a live Facebook Q&A in a winter month, but we wouldn’t necessarily do it in the summer months, just because we’re out. We tend to be out more in the summer months.”

Factor #2: Lost in translation. Another factor that negatively affected adaptability was the “Inability for the innovation to be effectively translated to a rural setting”. For example, some participants

reported that urban and northern programs were “untranslated” in a rural setting resulting from significant variations that exist between rural and urban and northern populations (i.e. geography, population, health inequities etc.). As one participant put it: “What it takes to be healthy in a rural environment may be very different than what it takes to be healthy in an urban environment”.

Another participant noted: “I find a lot happens around nutrition in the north, like northern Ontario, there’s a lot of research. But [...] how do you transfer that to the [...] south region?”

Fidelity was also discussed as a factor that affected translation. Some participants expressed concerns that adapted programs may have lower levels of implementation fidelity in rural areas. One participant put it: “Often times programs and initiatives get modified or aren’t followed as intended”. Complaints ranged from the lack of a fidelity criteria to ensure that the adapted intervention adhered to the original program or policy (“I think that’s where we struggle [fidelity] [...] to determine those evaluation criteria”), to the lack of knowledge and skills in fidelity evaluation among staff (“I did mention the importance of our skills in supporting [...] implementation fidelity”) in rural health units. Therefore, identification of appropriate fidelity criteria specific to rural areas, and professional training and development in program fidelity evaluation is important to evaluation practice in rural public health units.

Heterogeneity across and within rural populations was another factor that negatively affected translation of CDP programs in a rural setting. Variations in local needs, priorities, and contexts made it difficult to translate a one size “fits all” program/policy to every rural area (i.e. municipality). As one participant put it: “Offering tobacco cessation in every community might not be what those individual community needs are.”

Theme #4: Trialability

The theme “Trialability” refers to “the ability to test the intervention on a small scale in the organization, and to be able to reverse course (undo implementation) if warranted” (Damschroder et al., 2009, p. 6). Piloting innovations increase the likelihood of adoption (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Some participants indicated that the ability to pilot programs in rural areas facilitated implementation. Many examples of piloted programs were provided in the area of guaranteed income, active transportation, food security, and food literacy etc. Overall, the participants reported that they piloted programs in rural areas to determine program effectiveness before a decision was made to “scale-up” the program. A participant explained:

We try, [...] we pilot things. So, then if something is new, or we are not sure whether it will be successful here [...], if all of the other factors line up, but we are not sure about the rurality, for example, we will pilot it, and evaluate it, and then make some decisions about scaling up.

II. Outer Setting

The category, “Outer Setting” refers to characteristics outside the organization that affect implementation (Damschroder et al., 2009). The “Outer Setting” was identified by Damschroder and her colleagues as a major category for implementation in the CFIR (Damschroder et al., 2009).

“Outer Setting” was further subdivided into six themes (constructs): “Cosmopolitanism”, “External Policies and Incentives”, “External Leadership Engagement” “Population External Communication”, “Reach”, and “Population Needs and Resources”. A description of each theme follows.

Theme #1: Cosmopolitanism

The theme “Cosmopolitanism” refers to “the degree to which an organization is networked with other external organizations” (Damschroder et al., 2009, p. 7). It is either subjectively held or it is objective (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). An organization is more likely to be deemed a ‘cosmopolitan’ organization if there are strong social connections both within and outside the organization that support the innovation. (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). “Cosmopolitanism” was further subdivided into four subthemes to include “Community Partnership Engagement and Collaboration”, “Boundary Spanners”, “Horizontal Networks”, and “Bonding Social Capital Between Public Health and Community Partners”. A description of each subtheme follows.

a. Community Partnership Engagement and Collaboration

The first subtheme was “Community Partnership Engagement and Collaboration. “Community Partnership Engagement and Collaboration” was a key implementation facilitator that supported the implementation of evidence-informed CDP programs and policies in rural Ontario PHUs.

Damschroder et al., (2009) defined engagement as “attracting and involving appropriate individuals in the implementation” (p.11). Health units engaged and collaborated with multiple sectors, community partners, priority populations, and citizens. Community partners included schools and school boards; community and social service agencies (e.g. YMCA, United Way etc.); committees, networks, coalitions, and professional organizations (e.g. Ontario Dietitians in Public Health (ODPH), Northern Injury Prevention Practitioner Network etc.); priority populations (e.g. Indigenous

communities, francophone, farmers etc.); business and workplaces; media; academic institutions; healthcare providers (e.g. family physicians, hospitals); and others. A key implementation factor was partnership engagement and collaboration throughout the planning process (i.e. assessment to implementation), and networks and communication.

Therefore, community partnership engagement and collaboration consisted of four factors relevant to planning, networking, and communication that facilitated implementation. They were as follows: “Assessment phase: Seek and use partnership input during the assessment phase (i.e. social, epidemiological, and ecological assessment); “Planning phase: Involve partners in the planning phase”; “Implementation phase: Coordinated and integrated approach to implementation among partners and public health”, and “Partnership networks and communications”. A description of each factor follows.

Community Partnership Engagement and Collaboration –Factors that Facilitate Implementation

Factor #1: Assessment phase: Seek and use partnership input during the assessment phase.

During the assessment phase (i.e. social, epidemiological, and ecological assessment) participants discussed the importance of actively engaging and “Seeking input from multiple key stakeholders” (i.e. priority populations, citizens, and others), sharing information, and using input from key stakeholders in the planning and decision-making process. As one participant put it:

One of the things that we tried [...] is to go to the community when possible, to figure out where [...] are they, where [...] these groups congregated [...], so that we can go to them, and get their [...] voice.

During the assessment phase, participants emphasized the importance of mutuality. Mutuality comes from a place of mutual respect, sharing, understand, and responsibility. Participants placed high value on the following: (a) acknowledge the community; (b) recognize, support, and respect, partnership needs and issues, partnership diversity, and variability of local needs, priorities, and contexts within and across rural areas; and (c) focus on shared local needs, priorities, values, and contexts (e.g. SDOH). A participant described mutuality:

I think that’s where the communities can be very different [...] In each community, the role [...] we play in public health has been slightly different, based on who is at the table and what their skills are, and [...] what their abilities are. So, we [...] fill in

the gaps, and support [them], where needed. So, [...] we might support more with media with others; we might do more facilitation.

Overall, participants reported that engagement and collaboration during the assessment phase promoted meaningful engagement. It was suggested that partnership reach, cooperation, mobilization, connectivity, and meaningful relationships were positively impacted by meaningful engagement.

Factor #2: Planning phase: Involve partners in the planning phase. During the planning phase, participants discussed the importance of “Involving partners in the planning phase” from multiple settings and subgroups (i.e. multiple sectors, community partners, priority populations, and citizens). Respondents also described three outcomes resulting from a collaborative and integrated approach to planning between partners and CDP public health professionals. These were as follows: capacity building, community asset mapping, and policy planning and development.

The first is related to capacity building. Respondents expressed the value in building partnership capacity in rural areas during the planning phase. For example, some participants explained how the identification of community resources during the planning phase (i.e. physical spaces – share spaces); external human resources; external dedicated and ongoing funding; external educational resource materials, and other external material assets etc.) could effectively facilitate community capacity building for CDP programs and policies in rural areas. As one participant put it: “Through partnerships, public health can effectively increase resources.”

The second factor is related to community asset mapping. Respondents noted that asset mapping was a “strength-based” approach that could be used during the planning phase to identify and maximize community assets and minimize barriers in rural areas. A participant noted: “Where we tend to get creative is [...] using that strength-based approach, sometimes makes you look at things differently.”

The last factor is related to policy planning and development with external stakeholders. Some participants spoke of partnership agreements (i.e. schools) and working with urban/community planners in planning and design elements that contribute to healthy living in rural areas (i.e. built environment). A participant explained:

I am super excited about that [working with urban planners] [...]. We've always reviewed site plans from a CDP perspective, so, for shade and walkability, and active transportation [...] So, we have always worked well with [...] the planning department.

Factor #3: Implementation phase: Coordinated and integrated approach to implementation among partners and CDP public health professionals. During the implementation phase, some health units suggested a “Coordinated and integrated approach to implementation among partners and CDP public health professionals”. Specifically, they spoke about increased implementation capacity (i.e. capacity building through partnerships), asset-based community development, and a reciprocal (mutual) benefit between public health and partnerships. A discussion of each follows.

First, the critical role that partners play as stewards of resources (i.e. shared physical spaces; external built capacity for human resources; external dedicated and ongoing funding; and shared, promoted, and pooled community resources) increased implementation capacity. One participant described how shared spaces strengthened capacity:

They already have a clinic space [...]. We can go in there and provide [...] smoking cessation [...]. I think that's been one way that we have been able to do that, is working with our partners and partnership, has been a big, a big thing here for sure.

Secondly, asset-based community development was another factor that was influenced by a coordinated and integrated approach to implementation. Some comments highlighted asset-based approaches in rural areas, particularly related to tangible assets and intangible assets. Tangible assets pertained to physical space or capital (i.e. schools, community gardens, grocery stores, etc.), and intangible assets pertained to individual assets (i.e. talents, skills, abilities, capacities, etc.). One participant spoke about using partnership assets to mobilize the community to influence change in the area of food security. The participant stated:

We have a gleaning program where we work with our local farmers. [...]. Any extra produce they have will [...] get into our foodbanks. [Name of individual] at the Salvation Army has been instrumental in getting that food to [her/her] shelves.

Thirdly, a coordination and integration approach to implementation in rural areas led to reciprocal (mutual) benefit between CDP staff and partnerships and had a positive impact as a result (i.e. program, population). Many examples were provided that involved collaboration between CDP staff

and partnerships (i.e. student nutrition programs, healthy community initiatives etc.). This mutual benefit was further enhanced when CDP staff were visible in rural areas. A participant explained: “I go down physically to be at the meetings [...]. Having a physical presence [...], I think adds [...], to us being involved and integrated into that community.”

Factor #4: Formal and informal partnership networks and communication. “Partnership networks and communication” was another factor that influenced CDP implementation in rural areas. Both formal and informal networking and communication methods among partnerships were encouraged. Formal “knowledge” networks to increase capacity, community support, and mobilization were described by participants. These included the following: Partnership train the trainer sessions, workshops, meetings, teleconferences, and planning tables. A partnership train-the-trainer session was described by one participant:

We have three dietitians at the health unit here, and there is no way we have the capacity to go and deliver [...] cooking classes. So, we are starting a new program, which will be a train the trainer [...]. For example, who work [...] in a library, [...] how to teach cooking skills, to a variety of the population [...]. Because we have a strong partnership [...]. For example [...], we can work with the people who already work there [library], and who already have lots of skills, so we may just help them redirect a skill, or tweak a skill, such that they can then deliver it, to their program participants.

Informal networks among partnerships were also encouraged. Participants described informal networks as flexible, adaptable, unofficial, and low intensity. Examples included informal face-to-face contact and impromptu phone conversations. A participant described an informal networking opportunity at an event with a partner: “At a cycling event, we will also chat about the comments I made [...] [about the] municipal alcohol policy [...]. That’s [...], the most effective way to get things done, is to just build on those informal connections.” Another participant described the advantages of impromptu phone conversations in a rural area:

Partners are more approachable, and I can actually phone and have a conversation, and get somebody. Whereas, [in], larger centers it’s like, “oh my God”, how do I contact them? [...]. How do I get to the person I need?

Some of the benefits of informal networking between partnerships and public health staff had also been realized. The participants reported that informal networking could provide an opportunity to leverage existing relationships (i.e. gatekeeper) to increase reach. As noted by one participant:

Usually, someone has a friend or a family member that [...] we can just shoot them a text and ask them [...]. Or I am sure they will let us into a meeting. Let's just ask them because we have so many ins.

Community Partnership Engagement and Collaboration – Factors that Impede Implementation

The topic of “Community Partnership Engagement and Collaboration” was also reported to impede implementation. This subtheme consisted of three factors that influenced implementation to include: “Lack of compatibility between partnerships and public health”, “Knowledge translation barriers between public health and partnerships”, and “Low partnership capacity in rural areas”. Each factor will be described as follows.

Factor #1: Lack of compatibility between partnerships and public health. In some health units, “Lack of compatibility between partnerships and public health” was a barrier of implementation. Specifically, participants indicated that public health and some partnerships (i.e. appropriate organizations) did not share values, priorities, mandates, and perceived needs. As one participant put it: “But it can be a struggle, because the mandates may be very different, and to [...] collaborate [...] can be really, really tough.” This sometimes resulted in conflicting mandates and approaches to implementation of evidence-informed CDP programs and policies in rural areas. For example, although public health work is focused on upstream approaches, some partnerships focus on downstream approaches. A participant explained:

We are always trying to get the conversation to go upstream [...]. We've got obligations in both areas [upstream and downstream]. But we really want to be thinking upstream, in terms [...] of building [...] supportive environments, legislation, health, and public policy [...]. So, another barrier.

Some solutions were identified that addressed incompatibility. Examples included community development skill building among staff to effectively translate knowledge to partners (i.e. upstream approaches); and to harness the power of the MOH or Director/Manager of public health to build

public health support among partners by, “figure [ing] out where they’re [are] [...], how they can all kind of work together.”

Another factor negatively affecting compatibility was low public health visibility (i.e. low priority) in rural areas. As one participant put it: “To actually provide service to those rural, rural areas, even the more remote ones, you have to have a connection, and a presence, and we don’t have that.” Some participants struggled with this because “organizations [...] [don’t] feel like we’re doing enough in that area.” They also expressed that this could negatively impact partnership relationships. A participant explained: “We need to build relationships. They need to see our faces.”

Factor #2: Knowledge translation barriers between public health and partnerships. “Knowledge translation barriers between public health and partnerships” in some health units was reported. The first knowledge gap among partners pertained to the lack of partners existing knowledge and skill base towards evidence-informed practice. Therefore, given this knowledge gap, some participants discussed the importance of assisting partners with evaluation to ensure that programs and policies were based on good sound evidence. A participant explained: “How do we help our partners [...], monitor and evaluate the outcomes?”

The second knowledge gap among partners was related to planning. To ensure that knowledge (i.e. evidence) was being implemented as intended throughout the planning process, public health utilized formal planning policies, procedures, and processes. However, some partners used informal approaches to planning (e.g. “fast” and unmethodical). As one participant put it:

[Partnerships] tend to go, we need to do this, we are going to do it like fast [planning] [...]. Because they [partners] are so eager, and they don’t have a lot of resources, they just want to do it as fast as they can.

Factor #3: Low partnership capacity in rural areas. Another barrier to implementation was “Low partnership capacity in rural areas”. To build capacity in rural areas, participants spoke about excessive partnership involvement to fill the gap and identified likely consequences of excessive demands of time among partnerships. Specifically, role overload based on competing demands, (e.g. multiple roles) among partnerships was frequently cited. A participant explained: “Fewer partners

and partnerships to work with, and then the partners that we do have [...] are often stretched as well, many competing priorities.”

Some solutions were identified that addressed low partnership capacity”. They were as follows: a) use partnerships more effectively and efficiently – “connect with our partners in the most useful way”; b) combine or pool partnerships to expand reach – “when we combine to do something, our reach is far greater”; and c) share partnership resources to build capacity – “share them [partnership resources] around it’s a lot less work for them too.”

b. Boundary Spanner

The second subtheme was “Boundary Spanner”. “Boundary Spanner”, refers to people who are key spanners or link to the organization (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). They have both significant ties both inside and outside an organization (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). The role of boundary spanner was spoken about as a facilitator of implementation in rural areas. Specifically, the role of the “Partner champion”, expressed by some health units, was to leverage and mobilize other community partners (e.g., connect, influence, and collaborate) to promote CDP programs and policies in rural areas. As two participants put it: “Same community partners, like we use them [...] often.” “The champions.” Another participant described the role of the partner champion. As described by the participant:

Sometimes they’re a formal leader [...], but also a leader of an organization, or [...]a politician [...], but also they can be an individual, who [...] has passion, and who has the right connections, and the ability to influence their peers.

c. Horizontal Networks

The third subtheme was “Horizontal Networks”. “Horizontal Networks” (e.g. peer groups) was another factor that supported implementation. “Horizontal Networks” refers to spreading peer influence within the same level of an organizational hierarchy (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Some health units described the value of working with “Homophilous networks” that had similar characteristics to support public health work in the area of CDP (i.e. colleagues from the same discipline, peer groups from similar health regions). For example, some participants reported that horizontal sharing was a mechanism that facilitated learning. As one participant put it: “Sure, there’s lots of partnerships [...] we definitely share [...] learn [...] exchange information and knowledge with other health units on a regular basis.”

d. Bonding Social Capital Between CDP Public Health Professionals and Community Partners

The fourth subtheme within “Cosmopolitanism” was “Bonding Social Capital Between CDP Public Health Professionals and Community Partners”. Social capital refers to features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit (Putnam, 1995). Social capital is described as a collective value of social connections and includes civil society, community, social networks, participation, volunteering, trust, reciprocity, social exclusion/inclusion and equity, and local opportunity structures (Putnam, 1995). Organizations that have a strong stock of social capital are more likely to support implementation (Damschroder et al., 2009). Specifically, external bonding social capital (active connections) between public health and community partners were identified as a powerful influence on implementation.

Two terms commonly used in the literature to describe social capital are “bridging” and “bonding” (Narayan, 1999; Putnam & Goss, 2002). Bridging social capital refers to connecting people who are unlike one another while bonding social capital refers to connecting people who are like one another in important respects (Narayan, 1999; Putnam, 2002). Although these classifications allow for two distinct heterogeneous categories, bonding social capital, was considered to be most appropriate to describe the relationship between public health and partnerships, given that they live in the same geographic location (i.e. rural area) and were provided an opportunity to advance rural public health practice in the area of CDP. There were three notable types of social capital that facilitated implementation. They were as follows: “Structural social capital”, “Cognitive social capital”, and “Relational social capital”. A description of each factor follows.

Bonding Social Capital Between CDP Public Health Professionals and Community Partners – Factors that Facilitate Implementation

Factor #1: Structural social capital. A factor supporting implementation was a high stock of “Structural social capital”. Structural social capital is a dimension of social capital that refers to the network or relations and properties of a social system (Nahapiet & Ghoshal, 1998). Respondents noted that informal network ties and configurations influenced implementation. Specifically, some participants indicated that they could broker connections with partnerships because “everyone knows each other” and “public health staff live in the area.” Participants expressed the value of knowing everyone by “leveraging [...] personal experiences and bringing that forward when needed.” – “I feel like that’s definitely more unique to [...] rural.” – “Everyone knowing everyone or being related to

someone.” – “Knows somebody that knows somebody.” Another participant spoke about the benefits of living in the area: “A lot of people (public health practitioners and partners) [...] live in the community, or directly around the community.” It was reported by some health units that informal network ties and configurations could positively impact the nature and quality of professional and personal relationships (e.g. higher connectivity, build meaningful relationships). A participant explained:

We get to build those partnerships; we work very closely, we know the people involved, we can phone them up and ask them for something. And I mean we can be much [...] nimbler, when it comes to making those connections because the connections are so strong. That’s very different.

Factor #2: Cognitive social capital. A high stock of “Cognitive social capital” was another factor that supported implementation. Cognitive social capital is a dimension of social capital that refers to the shared systems, interpretations, and representations among groups (Nahapiet & Ghoshal, 1998). Some health units expressed the importance of shared values, attitudes, and beliefs towards an innovation (i.e. organizational values adopted among partnerships). For example, a health unit spoke about how a shared vision among a community partner (i.e. municipality) strengthened their relationship and positively impacted population health (i.e. health promotion activities):

Our work with the municipalities has been going on for quite a number of years, in promoting a healthy vision for a healthy community. So [CDP staff member] has [a] very strong relationship with the municipalities, so we have been promoting physical activity and healthy eating for a long time.

Factor #3: Relational social capital. A high stock of “Relational social capital” was another key factor that influenced implementation of CDP programs in rural areas. Relational social capital is a dimension of social capital that refers to the qualities of a personal relationship such as respect, trust, friendship, and obligations (Nahapiet & Ghoshal, 1998). The nature and quality of partnership relationships were discussed. The participants clearly recognized that relationship-building among partnerships was “hugely” important. As one participant puts it: “The relationships [...] are so important here [...]. I don’t think I can stress that enough.” Relationships among partnerships in rural areas were based on mutual trust and respect. A participant explained how they were open with community partners: “We will openly give [...] [partners] all the information we have. We don’t use

our knowledge as power against one another, that we try to leverage it [...]. We're pretty open with each other." Some health unit participants also reported that they felt "connected" with partners outside of public health. As one participant put it: "Because we're small and rural, we are really well connected to our community partners."

Theme #2: External Policies and Incentives

The theme "External Policies and Incentives", refers to external strategies that spread interventions (i.e. external mandates, policies, regulations) (Damschroder et al., 2009). Factors for "External Policies and Incentives" was further categorized into the subtheme "Modernization of the Ontario Public Health Standards (OPHS)". A description of the "Modernization of the Ontario Public Health Standards" (OPHS) follows.

a. Modernization of the Ontario Public Health Standards (OPHS)

The OPHS provides guidelines and protocols for core functions of PHUs public health units that are to be continually revised as part of an evergreen process (Ontario Ministry of Health and Long-Term Care, 2017). The OPHS was released in October 2008 and came into effect in January 2009, and continues to be updated, with the most recent version published in January 2018 (Ontario Ministry of Health and Long-Term Care, 2008, 2018a). In general, participants had mix opinions in relation to the "Modernization of the OPHS".

Factors that facilitated implementation of the modernized OPHS included the following: "Aligned with current mandate", "Non-prescriptive", and "Inclusion of new standards". On the other hand, factors that impeded implementation of the modernized policy included "External push to implement modernized OPHS", "Non-prescriptive", and "Lack of adequate and dedicated funding and resources to implement modernized OPHS". Interestingly, there were differences in perspectives about the prescriptiveness of the policy supporting implementation. Each factor will be described as follows.

Modernization of the Ontario Public Health Standards (OPHS) – Factors that Facilitate Implementation:

Factor #1: Aligned with current mandate. Respondents indicated that the modernized OPHS policy "Aligned well with their current mandate" and therefore was perceived more readily adaptable to their existing mandate. As one participant put it, "One of the great things for us, is that there's kind of three areas that came up in the standards that really line with what we were doing." Another

participant explained, “We [...] identified health equity as one of our priority areas that we have been specifically planning for, [...] the last two years. So, that lent itself well.”

Factor #2: Non-prescriptive. Another benefit to the modernized policy was its “Non-prescriptiveness”, particularly in relation to the CDP program in rural areas. The ability to be flexible in responding to the local needs in rural areas was a great advantage among participants. As one participant put it: “So back to the standards, I think that we really do have a lot of flexibility, to [...] look at [...] our local needs.”

Factor #3: Inclusion of new standards (i.e. stand alone). The “Inclusion of new standards” (i.e. stand alone) in the OPHS policy was another factor that supported implementation. Specifically, participants indicated that the inclusion of the Health Equity Standard was an opportunity to bridge the knowledge to practice gap that health equity was inherently rooted in all public health work and to apply a “health equity lens” to inform mandatory public health programs and policies. As one participant put it: “Having it threaded through everything, without us having to [...] champion it on our own, it’s [...] mandated, instead of an afterthought.”

Modernization of the Ontario Public Health Standards (OPHS) – Factors that Impede Implementation

Factor #1: External push to implement OPHS. Some health units indicated that the “External push” by the MOHLTC to implement the OPHS, but not their capacity in rural health units (i.e. revenue neutral), was a barrier of implementation. A participant explained some of the challenges that would negatively affect implementation of the OPHS in a rural setting compared to an urban setting:

The latest iteration of the [...] public health standards they [MOHLTC] think this is a wonderful idea, to say health units shall ensure that this service is provided [...]. Urban health units always have those services being provided by somebody else. [In] rural health units, there’s never anybody to provide those services. [...]. We have disproportionately higher costs to run our health units not only because of transportation, and serving outlying areas, but because we have to do everything ourselves.

In response to this, some of the health units felt pressured to restructure or reorganize the health unit to better implement the modernized standards. As one participant puts it: “I mean it’s got to the point

now, where every time there's an iteration of the public health standards, everyone restructures their health unit."

Factor #2: Non-prescriptive. While some participants spoke about the benefits of the "Non-prescriptiveness" of the modernized policy, some participants also felt that this impeded implementation, particularly in relation to the CDP program. Some participants indicated that they lacked appropriate strategic direction, guidance, and supportive tools to operationalize the "very broad" Chronic Disease Prevention and Well-Being Standard from the MOHLTC. As one participant put it: "The Public Health Standards from the Ministry of Health, sometimes, they don't specifically meet rural needs of health units. [They are] very broad in general."

Some participants also felt that health promotion was relegated a lower priority ("hidden threat") compared to health protection, since health protection programs (i.e. Healthy Environment etc.) were more protocol-driven compared to health promotion programs. As one participant put it: "I think in our particular organization, because of the limits in resources, the [...] protocol driven programs and standards [...], have been given kind of first priority."

Factor #3: Lack of adequate and dedicated funding and resources to implement OPHS. Some health units also indicated that there was a "Lack of adequate and dedicated funding and resources to implement the modernized policy". Specifically, lack of staffing, resources, and funding (i.e. revenue neutral), negatively affected the operationalization of the modernized policy. One staff member described under-staffing as a barrier to implement the policy:

Our staffing is very small [...], and it takes time to implement [the] [...] OPHS. So, I feel like [...] because of the number of municipalities, compared to the number of staff, and the amount of time that we have to actually do it [...] it's a challenge.

Another participant described the lack of resources to implement the modernized standards: "We [...] sometimes [have] limited resources, and we're still expected to deliver the same standards, as [...] larger public health units."

Lack of funding was another barrier that affected policy implementation. Specifically, municipal economics was discussed as a factor that affected policy implementation. Currently, the province funds 75% of public health, while the municipality funds the remaining 25%. A participant described the impact of low municipal tax base in rural areas on the operationalization of the OPHS:

If [...] provincial resources are not sufficient [...]. We [...] don't have regional, wealthy regional, suburban [...] governments, that have lots of [...] strong tax base, that can help to fill the gap [...]. I think our rural communities are much more dependent on provincial funding.

Some solutions were identified that address the negative influence on modernization of the OPHS. These were as follows:

- a) advocate for adequate funding (i.e. budget level) to implement the Chronic Disease Prevention and Well-Being protocol in the OPHS - “competing at the budget level for adequate resources, to [...] prioritize CDP work”;
- b) identification of public health priorities with appropriate funding allocations – “identify things as priorities, we need to identify funding processes as well”; and
- c) inclusion of a rural health standard – “there isn't anything in the standards right now, that [...] requires us to apply that rural lens.”

Theme #3: External Leadership Engagement

In relation to Damschroder's and colleague's definition of “Leadership Engagement”, “External Leadership Engagement”, refers to the external accountability, commitment, and involvement of appointed leaders with the implementation (Damschroder et al., 2009). This theme was further subdivided into two subthemes: “Appointed External Leaders” (Transformational Leadership Styles) and “Appointed External Leaders” (Dysfunctional Leadership Styles). A description of each subtheme follows.

a. Appointed External Leaders (Transformational Leadership Styles)

The first subtheme was “Appointed External Leaders (Transformational Leadership Styles)”. “Appointed External Leadership” was a factor that facilitated implementation. Participants spoke about transformational leadership styles that supported implementation among external leaders. Generally, transformational leadership styles can be summarized into seven behaviours to include: 1) communicate a vision (e.g. creates a vision and communicate it to staff; 2) staff development (e.g. facilitate and encourage professional development by delegating tasks and responsibilities; 3) supportive leadership (e.g. positive feedback, and recognition); 4) empowerment (e.g. create climate of respect, collaboration, open communication, and trust; 5) innovative or lateral thinking (e.g.

encourages innovative thinking); 6) lead by example (e.g. role modelling); and 7) charismatic leadership (e.g. perceived as trustworthy, competent, and respected) (Carless, Wearing, & Mann, 2000).

Some participants identified that “Municipalities/Districts” and “Public Health Ontario” demonstrated transformational leadership behaviour that supported implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. It is interesting to note that participants had mixed views in relation to PHO leadership approaches (See Appointed External Leadership – Destructive Leadership Style). These external leader factors (i.e. Municipalities/Districts and PHO) will be discussed in the following section.

Appointed External Leaders (Transformational Leadership Styles) – Factors that Facilitate Implementation

Factor #1: Municipalities/Districts. Some participants reported that “Municipalities/Districts” supported the implementation of evidence-informed CDP programs and policies in rural Ontario PHUs areas by demonstrating effective leadership (i.e. engagement). Specifically, some health units described the value of a multi-sectorial collaborative approach between municipalities/districts and public health in the area of policy development (i.e. urban planning) to promote health in the area of CDP. A participant explained: “So we are working with planners to look at planning, around [...] sidewalk use [...], creating bike-friendly, and walk-friendly communities [...]. Our main focus is on creating, [and] enabling people through a supportive environment.”

Factor #2: Public Health Ontario (PHO). “Public Health Ontario (PHO)” also supported implementation by demonstrating transformational leadership behaviour (i.e. supportive). Specifically, some participants reported that PHO provided access to supported tools and resources in the area of research, evidence, and best practice. Examples included the LDCP and PHO Snapshots. As one participant put it: “I consider Public Health Ontario to be just an awesome organization, in what they have done in the short time. They have provided us with tremendous evidence-based decision-making ability, because [...] how they support us.”

b. Appointed External Leaders (Dysfunctional Leadership Styles)

The second subtheme was “Appointed External Leaders (Dysfunctional Leadership Styles)”. The topic of external leadership engagement was also spoken about as a barrier to implementation.

Specifically, a significant factor that influenced implementation was destructive leadership styles. According to Shaw, Erickson, & Harvey (2011), destructive leadership can be categorized into eleven major categories: 1) autocratic behaviour; 2) poor communication; 3) unable to effectively deal with subordinates; 4) poor ethics/integrity; 5) inability to use technology; 6) inconsistent/erratic behaviour; 7) poor interpersonal behavior; 8) micromanagement; 9) poor personal behaviour; 10) excessive political behaviour; and 11) lack of strategic skills. Some health units reported that the “Board of Health (BOH)”, the “Ontario Ministry of Health and Long-Term Care (MOHLTC)”, the “Local Health Integration Network (LHIN)”, and “Public Health Ontario (PHO)” engaged in behaviors associated with destructive leadership. A description of each external leadership factor (i.e. local and provincial government agencies) that impeded implementation follows.

Factors that Impede Implementation: External Leadership Engagement

Factor #1: Board of Health (BOH). The “Board of Health (BOH)” which is largely made up of elected officials from the local municipal councils, influenced implementation. The topic of the BOH was spoken about as a barrier of implementation from some health units. Specifically, BOH structure and destructive leadership approaches had a negative impact on implementation. Complaints ranged from underrepresentation of elected officials from rural areas (i.e. structure); autocratic behaviour (e.g. political power negatively influenced decisions); excessive political behaviour (e.g. implementation aligned with voters’ priorities); and making decisions based on inadequate information (e.g. political directive was biased and guided by weak evidence). One staff member described the earlier issue (i.e. structure – underrepresentation of elected officials in rural areas) and the negative impact it had on rural public health practice as follows:

We have municipal representatives [...] on the Board of Health. [...] There’s only so many people that can be on the board, and so many seats are saved [...]. [...] Our board has a huge job of trying to advocate for all of those smaller rural communities [...] that’s difficult. So, is that voice really there?

Some solutions were identified to increase the BOH support on implementation. These were as follows: a) develop the role of a public health political advocate (public health ambassador) to act as a liaison between the BOH and health units; b) obtain buy-in “before you go for approval”; and c) physically locate a staffing position (i.e. Health Promoter) within government offices to better collaborate with other departments in the municipality with a “public health lens” – “able to kind of bring that health lens in, but also try to have an idea of what’s going on all the time.”).

Factor #2: Ministry of Health and Long-Term Care (MOHLTC). Some participants indicated that the “Ministry of Health and Long-Term Care (MOHLTC)” engaged in destructive leadership approaches that negatively impacted implementation of CDP programs and policies in rural areas. Some participants reported feeling unsupported and disempowered. Complaints ranged from autocratic behaviour (i.e. over-controlling); poor communication (i.e. lack of transparency); making decisions based on inadequate information (i.e. lack of understanding of CDP and rural public health systems); and excessive political behaviour (i.e. conflicting public policies to gain power and influence that misalign with the core functions of public health – i.e. Ontario alcohol policy). Some participants described the topic of making decisions based on inadequate information (i.e. lack of understanding of the negative impact in rural Ontario PHUs) in reference to the decommissioning of the resource centres in 2018. (i.e. PTCC, OTRU). One participant described the loss of resource centres and the negative impact it had on rural public health units this way:

We need our resource centers back! [...] They were all defunded last year, so that has a huge impact on small rural health units [...] [We] relied on them to do all kinds of evaluation work, that was beyond our capacity. All kinds of training, like we [...] really took advantage of them. They were in almost every single activity, [in] our workplan for [...] tobacco and [...] then they were just all disappeared.

Other participants described the latter issue (conflicting public policies) as follows:

“We’re [MOHLTC] going to make alcohol, alcohol accessible every place”

“Yeah, and at the grocery store, you know?”

“Don’t do things to counteract”

Some solutions were identified that addressed dysfunctional leadership approaches discussed above. These were as follows:

- a) poor communication – provide “timely”, “open”, and “transparent” communication (“more feedback, positive, or otherwise [...] timely feedback [...] on what they like, and don’t like, what we are doing, would be helpful”);
- b) making decisions based on inadequate information (i.e. lack of awareness of the negative impact of decommissioning resource centres in rural areas) – reinstate the resource centres; develop a rural health community of practice; and conduct a needs assessment at each health unit (“it would be nice

if the Ministry did an in-depth needs assessment of the variety of health units, to look at things like information delivery, scope of programs”); and

c) excessive political power (i.e. conflicting public policies) - develop “Health for All Policies” that integrate public health and MOHLTC mandates (“health and all policies [...] just listen to public health and integrate what we say, and all of the other Ministry work”).

Factor #3: Local Health Integration Network (LHIN). The “Local Health Integration Network (LHIN)” also engaged in destructive leadership approaches that negatively affected implementation. Some health units said that they felt disempowered, resulting from the poor integration and linkages between the LHIN and public health. Specifically, some participants felt that the LHIN was unsupportive and unreceptive towards public health, and they lacked a coordinated approach in the area of evidence-informed public health practice. One participant explained the earlier issue (i.e. unreceptive towards public health) as follows: “As far as listening to public health, as far as that goes, I would say that it’s [...] almost like a tick box. And it’s not [...] meaningful planning, they are not open to a more preventive approach [CDP].”

Another participant described the latter issue (i.e. lacked a coordinated approach in the area of evidence) in relation to data sharing as follows: “Hopefully, there will be some more data sharing, or [...] stuff that they collect, that we don’t have [...], [like] different kinds of data.”

Some solutions were identified that addressed dysfunctional leadership approaches discussed above. These were as follows:

a) become a member on a LHIN sub-region planning table to advocate for rural public health systems – “I think we need to be at the table [...], as part of the sub-regions [...]. To listen to our voice.”; and

b) define LHINs roles and responsibilities in relation to public health to promote better collaboration and integration of services to avoid role ambiguity and duplication of services – “working out who is responsible for what and having that role definition.”

Factor #4: Public Health Ontario (PHO). “Public Health Ontario (PHO)” also engaged in destructive leadership approaches that negatively affected implementation. Some participants indicated that they felt unsupported in the area of research, evaluation, evidence, and best practices. Some complaints ranged from the lack of personalized support in planning and evaluation, lack of access to central analytics (i.e. Public Health Snapshots), and lack of research and evaluation

centralized support services (i.e. PHRED – library services). One participant described the earlier issue (i.e. lack of personalized program support in program planning and evaluation) as follows:

For Public Health Ontario [...], I think they need [...] to [...] continue to provide, for example, [...] program evaluation support and program planning [...]. They have the tools up, but are no longer providing sort of personalized service, which is very helpful in a rural setting, because sometimes our needs are slightly different.

One staff member described the latter issue (e.g. lack of research and evaluation centralized support services) in reference to PHRED, and the negative impact it had on rural public health units:

When the PHRED pieces transferred to Public Health Ontario, we were very excited because [...] there [were] centralized library services, which [...] worked very well. So, we [had] quick access to library pieces, literature searches, etc. With the recent funding cuts, well, it's more, I shouldn't say funding cuts, I think they have a [...] set budget, there's been a reallocation of resources within Public Health Ontario [...]. We used to get support for [...] program planning tools and materials [...]. They even [gave] us sort of individualized support, but that service is now gone, because they have withdrawn the funding from that. So, that centralized support was very helpful.

Some solutions were identified that addressed dysfunctional leadership approaches discussed above. These were as follows:

- a) increase funding to support effective public health practice for each public health unit;
- b) provide funding for consultative services – “I know [...] in the past, where they have actually paid people from across Ontario to come to a meeting or come to a training”;
- c) increase access to a central repository for evidence, best practices, tools, data etc.;
- d) develop a health unit evaluation mentorship or exchange program to build evaluation capacity in rural Ontario PHUs– “inter-health unit mentorship or exchanges [...]. I think maybe PHO is thinking about trying to do that [...], where you only have one evaluator”;
- e) PHO facilitates information sharing within and across PHUs – “more sharing amongst the health units as well [...]. I think PHO should be stepping in and facilitating that”;

f) conduct literature reviews for health units – “doing literature reviews [...], [is] hugely helpful, because it’s hard for us to do [...] everything”; and

g) to invest in LDCP that are rural focus – “investing in Locally Driven Collaborative Projects, that have a basis in rural areas.”

Theme #4: Population External Communication

In relation to Damschroder and colleague’s definition of “Networks and Communication”, the theme, “Population External Communication” refers to the nature of formal and informal communications channels used to spread information about an innovation outside the organization (Damschroder et al., 2009). “Population External Communication” is associated with factors that facilitated and impeded implementation.

Factors that facilitated implementation were further categorized into “Formal communication methods”, and “Informal communication methods”, while factors that impeded implementation were further categorized into “Formal communication barriers” and “Technological barriers”.

Interestingly, there were mixed views about formal communication methods, specifically social media. While some participants suggested that social media could be a resource for public health in rural areas, while others reported low satisfaction resulting from its limited reach (lack of access to internet in remote areas etc.). A description of each factor follows.

Population External Communication – Factors that Facilitate Implementation

Factor #1: Formal communication methods. CDP programs in rural areas were frequently communicated to the public through “Formal communication methods”. This was done through both traditional (i.e. print, broadcast) and internet-based (i.e. social media) communication methods. Examples of print included billboards, flyers, posters, and print ads. Print media appeared to be highly valued with regards to public relations. For example, a participant described a situation in which high school students distributed flyers to increase awareness of a CDP program in a rural area. This was shared by one participant:

High school kids were handing them out [flyers]. We had huge uptake from that [...]. It was because [...] lot of people [...] know each other. [...]. So, if you get the word out to enough people, they will share the word [...]. spread happens.

Further, examples of broadcast included TV and radio. The importance of the “good old fashion” local radio station was identified by some participants as an effective communication modality to

reach rural residents and foster relationships with partner organizations (i.e. radio stations). A participant explained:

We have a really good relationship with our radio stations [...]. And people listen to the radio [...]. They're a partner in our Healthy Kids Community Challenge so, often you will hear our little ads and [...] kind of PSAs [...]. And I feel like we use the radio, maybe a bit more than some other places [...]. Because, it does have such a good reach, and people do listen to the radio here, and we have [a] good relationship with them [radio stations].

Participants also reported that they used Facebook and websites to expand the reach and increase access to CDP programs in rural areas. A participant explained how they used Facebook to expand reach during the opioid crisis at a town hall meeting.

Last year, with the opioid crisis [...] the mayor [...] was able to put [...] the conversation [i.e. from town hall meeting about the opioid crisis] between the OPP, schools, health unit, and himself [...] on Facebook, and [...] reach over 1500 people. [...] As opposed to [...] having one event [town hall meeting] again, just to reiterate your access piece.

Factor #2: Informal communication methods. “Informal communication methods” was another factor that supported implementation. Specifically, word of mouth appeared to be the most critical informal method of communication to reach rural populations. As one participant explained: “You have to find external ways to reach those neighbourhood networks, and small-town communities [...], word of mouth can be the biggest.” Another participant stated that word of mouth “helps [...] for health promotion.”

Factors that Impede Implementation: Population External Communication Barriers

Factor # 1: Formal communication barriers. “Formal communication barriers” was another factor that impeded implementation. Particularly, several participants reported challenges associated with traditional media and internet-based communication in rural areas.

First, the topic of traditional media was spoken about as a barrier in some health units. For example, they expressed the lack of access to the local newspaper, stating that, “It’s challenging because sometimes they don’t have a newspaper, it’s once a week.” Others said that low capacity (e.g. time

and cost to develop and disseminate print media); and administrative bureaucracy (“jump through hoops”) were also seen as challenges associated with traditional media in rural areas.

Secondly, participants also described internet-based communication barriers. Some respondents felt that social media (e.g. Facebook) was being underutilized in rural areas due to technological barriers. (i.e. See Technological barriers) Therefore, the effectiveness of internet-based communication methods was questioned in a rural setting. As one participant put it: “Maybe Facebook is not the way.”

Factor #2: Technological barriers. Communication to the public was most frequently communicated through formal means. A noteworthy barrier to implementation was “Technological barriers” in rural areas. As one participant put it: “An issue is [...] technology [...]. We often don’t have coverage of our communities.” In most health units participants indicated that lack of access to the internet (e.g. dial-up internet, internet connectivity issues in outlying areas, lack of access to a computer) and lack of access to cell phones (e.g. no cell phone towers or coverage) negatively affected access to public health programs and services. As one participant puts it: “This is a huge barrier for us [...]. The inability to [...] even to reach people [...], through communications.”

Some solutions were identified for population external communication barriers. These were as follows:

- a) provide internet access at libraries and community centres in rural areas – “most people have either a community center, or a library, or a somewhere where they can [...] access, like Wifi”;
- b) collaborate with partners to effectively access populations – “we need to really meet people where they are at [...], using our partners [...], to try and really get the information”; and
- c) use of innovative and creative communication methods to transfer knowledge – “open to some of those different ways of sharing [...], that takes some creativity.”

Theme #5: Reach

The theme “Reach” refers to the size and representativeness of persons who receive or is affected by a policy or program (Glasgow, Vogt, & Boles, 1999). Reach was associated with factors that impeded implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. Factors that impeded implementation was further categorized into “Low reach in rural and outlying areas”, and “Program impact is based on high reach”. A description of each factor follows.

Reach – Factors that Impede Implementation

Factor #1: Low reach in rural and outlying areas. “Low reach in rural and outlying areas” was a factor that influenced implementation in rural areas. As one participant puts it, “43% of the population is significant [rural], and how do we best reach out to them.” The topic of “Low reach” was spoken about as a barrier of implementation in most health units. Some of the challenges related to participation included lack of access to transportation, distance, and inconvenience (e.g. time of program). One participant explained the transportation issue in relation to reach as follows:

Transportation [...] definitely [...]. It doesn't matter what committee you sit on or what project you are trying to do, transportation always comes up as a barrier, if you don't have any public transportation system. So, as a result, it means, a lot of times [...] people that need our services, are not able to reach those services for many different reasons.

Some concerns identified that CDP programs failed to meet the needs of priority populations in rural and outlying areas (e.g. youth, Indigenous communities). As one staff member puts it: “We look at our priority populations [...]. We have a hard time reaching them.”

In response to this, several solutions were identified to expand reach to provide equitable services within and across rural populations. These were as follows:

- a) build community capacity opportunities to expand reach – “when we combine to do something our reach is far greater, so our community is actually very, very good, at working together”;
- b) increase access to programs and services (e.g. evening programs, centralized programs, provide transportation, and “going to the people, instead of them having to come to you”);
- c) use effective communication methods (e.g. phone consultations, word of mouth, radio, multiple communication methods, on-line courses, and social media (e.g. inclement weather); and
- d) capitalize on community assets to expand reach (e.g. use partner locations to implement programs).

Factor #2: Program impact is based on high reach. Participants described that “Program impact was based on high reach” (high participation rates). Some participants struggled with this evaluation approach because of low CDP program participation rates in rural areas. Complaints ranged from feeling unsupported, trying to justify the program decisions (e.g. start and/or sustain programs with

low participation rates), and overall effectiveness. One participant described the earlier issue (e.g. justify program) as follows:

Coming back to [...] the evidence and evaluation. Unless we have big numbers, it's hard to have that rationale for continuing something, to go out somewhere to reach 5 people. But in a rural community, that might be what's realistic.

Another participant described the latter issue (e.g. overall effectiveness) as follows:

The impact [...] goes back to [...] reach. Okay, so you might only have 5 people out of 7 people [...] that might be considered a good turn out for that small community [...]. But in terms of [...] meaningful impact. Is it?

In response to this, a participant noted:

Our expectations [...] of who, how many people [...] should be involved, or [...] what you consider would be a [...] good use of [...] services and resources [...], have to be adjusted in a rural setting versus an urban setting.

Theme #6: Population Needs and Resources

Damschroder's and colleague's definition of "Patient Needs and Resources", refers to the factors that affect the health and the well-being of individuals and populations (Damschroder et al., 2009). The theme of "Population Needs and Resources" was spoken about as a key theme that negatively impeded evidence-informed CDP programs and policies in Rural Ontario PHUs (please note the term "patient" was changed to "population" to reflect a population health orientation). "Population Needs and Resources" were further subdivided into three subthemes "Environment" "Population Characteristics" and "Behaviour and Health". A description of each subtheme follows.

a. Environment

The first subtheme was the "Environment". Environment factors were further categorized into three factors: "Built environment barriers", "Natural environment barriers", and "Social environmental barriers". A description of each factor follows.

Environment – Factors that Impede Implementation

Factor #1: Built environment barriers. The "Built environment" "comprises urban design, land use, and the transportation system and encompasses patterns of human activity" (Handy, Boarnet, Ewing,

& Killingsworth, 2002, p. 65). The topic of the built environment was spoken about as a barrier of implementation in rural areas. Specifically, there were three notable barriers to implementation of CDP programs and policies in relation to the built environment in rural areas.

The first was related to limited availability and access to public health programs and services. Specifically, the participants felt that the proximity to public health programs was the main challenge among the public (i.e. long geographic and travel distances). As one participant put it: “They are very rural [...]. They probably would be the most marginalized in terms of services, [and] in terms of access to CD programming.”

The second was limited availability and access to public transportation in rural areas. Participants indicated that they either did not have a public transportation bus system (e.g. “transportation always comes up as a barrier, if you don’t have any public transportation system”) in their area or that they had a very limited public transportation system (e.g. “we don’t have a bus [...] system [...], out in the rural areas”). As a result, this negatively impacted reach and equitable access to public health programs and services. A participant explained:

Our transportation is horrible. So, either we have to do smaller programs, in the centers knowing that we may only have two or three people attend [...]. Or, do we just do it in the larger center [...], [and] focus only on the people that can get there? And know that we’re missing out on a whole bunch of other people, who aren’t getting into the larger centers, because they don’t have transportation?

The third was low or no connectivity in rural areas (i.e. streets and sidewalks). Challenges ranged from safety concerns, active transportation barriers, and poor walkable communities. A participant described the latter issue (i.e. poor walkable community). “What they often are lacking are sidewalks [...] The walkability. Being able to walk anywhere.” This negatively impacted physical activity and health outcomes. The participant further explained the impact of urban sprawl in rural communities: “Urban sprawl is a problem as far as healthy outcomes, healthy lifestyles, and [...] healthy environments that actually contribute to lifestyle.”

Some solutions were identified to address built environmental factors in rural areas. These were as follows: a) collaborate with partners to develop volunteer transportation initiatives – “volunteer transportation initiatives to, to help people get to programs”; b) implement a mobile health unit – “travelling health unit like a mobile health unit”; c) provide taxi vouchers to participants – “maybe

provide like taxi vouchers”; d) use evidence to increase funding for transportation initiatives – “used the evidence and had funding support [...], we’re able to address those barriers like [...] transportation”; e) use technology (i.e. online courses); f) use existing community infrastructure – “use the space of our community partners”; g) provide programs centrally; and h) develop walkable rural hubs (“create these [...] rural hubs [...] that are walkable”).

Factor #2: Natural environment barriers. The “Natural environment” refers to the natural world untouched by human influence (i.e. weather, geography). A key barrier to implementation was the weather. Specifically, inclement weather conditions during the winter months negatively impeded implementation. Participants mainly spoke about how poor winter driving conditions from heavy snowfall resulted in road closures, and unplowed roads negatively impacted their travel times (i.e. longer). As one participant noted an earlier issue (i.e. road closures): “Your programming [...] becomes much more susceptible [...], if bad weather is an issue and roads get closed.”

Another key barrier to implementation was low population density and large geography. As one participant put it: “Geography [...], probably [the] biggest things, and I would say.” Participants indicated that rural areas were characterized as having a “very large geographic area with not a lot of people.” As a result, low reach was noted as a key challenge among participants.

Some solutions were identified to address natural environmental factors that influenced implementation. These were as follows:

- a) use technology during the winter months to network with public health practitioners and professionals external to the organization and promote CDP (i.e. teleconference, social media);
- b) avoid health unit wide planning initiatives (i.e. strategic planning) in December, January, and February – “don’t plan winter hardcore meetings like [...] strategic meetings [...] in December, January, or February”);
- c) build and foster relationships with partnerships – “so we really try and do a really great job at really building and fostering those partnerships”;
- d) pool resources to build capacity – “we can [...] pool resources [...] and work differently together”;
- e) share information and development knowledge amongst PHUs through LDCP – “we can learn a lot from the other health units, [...], those LDCPs are very helpful in that”); and

f) modify programs based on local needs, priorities, and “geography”, provide “collaborative shared services” based on health unit peer groupings, and provide regional programming).

Factor #3: Social environmental barriers. “Social environmental” factors refer to social aspects such as neighbourhood connectedness and safety (Leyden, 2003; Morrison, Thomson, & Petticrew, 2004). Another factor that affected access to public health services was geographic isolation. Challenges related to geographic isolation ranged from the degree of rurality, weather, lack of access to programs, services, and lack of access to transportation. One participant explained the earlier issue (degree of rurality) in reference to geographic isolation as follows:

They live [...] very far, in the midst of a rural setting, off a road [...]. I [...] probably would never drive down unless I knew personally, I was going to somebody’s house that invited me there [...]. Social isolation might exist in our rural communities.

As a result, participants identified some potential impacts of geographic isolation, including low connectivity, inequitable access to CDP programs and services, low reach, and negative impacts on mental health. A participant explained the latter outcome (affect on mental health) as follows:

Social [...] huge, huge determinant of health. Do they have the social supports, or are they stuck out in an isolated farm and [...], never see neighbours, or get to neighbours [...]? It has a tremendous effect on mental health.

b. Population Characteristics

“Population Characteristics” was the second subtheme. “Population Characteristics” was categorized into three factors: “Population diversity and low density”, “Health inequities among priority populations”, and “Social environment and health barriers”. A description of each factor follows.

Population Characteristics – Factors that Impede Implementation

Factor #1: Population diversity and low density. Health units reported that “Population diversity and low density” negatively influenced implementation in rural areas. Some participants explained that there was considerable heterogeneity across and within rural neighbourhoods (e.g. local needs, priorities, contexts). They spoke about the relationship between heterogeneity, low population density, and urban sprawl. For example, heterogeneity was described by one participant as a “big geographic area, and in that geographic area, there’s huge variation” (i.e. “little towns”, “hamlets”, “small towns”, “municipalities”). Another participant explained: “There’s so many different

municipalities. And so many different [...] towns here, and all of the needs are so different [...]. I think that's huge.”

This was seen as a challenge because of their inability to adapt CDP programs and policies in multiple settings across a large geography. A participant described this challenge: “We have [...] a lot of municipalities, and [...] it takes a lot of time if you have to do it 22 times [programming]. So, time is always [a] challenge.”

Factor #2: Health inequities among priority populations. “Health inequities among priority populations” was reported as a barrier in rural areas. Specifically, Indigenous communities (inclusive of First Nations [Status and Non-Status], Métis, Inuit, and those who self-identify as Indigenous) (Ontario Ministry of Health and Long-Term Care, 2018a, p. 6) were identified as a key priority population in rural areas. As one participant put it: “a priority population[s] [...], I just want to make sure that we get that Indigenous piece in.” Some participants spoke about the topic of Indigenous community engagement. As another participant put it, “We look at [...] the Indigenous engagement components. [This] is a good example to talk about when we do work in rural communities.” Challenges of Indigenous community engagement ranged from building relationships (e.g. jurisdictional issues, language barriers); lack of resources (e.g. lack of funding); and use of health information (e.g. lack of credible data for Indigenous populations, unwilling to share data). One participant described the latter challenge (unwilling to share data) as follows:

For Indigenous people in Canada, we [...] need better data. [...] And that data needs to be owned and controlled by Indigenous populations, [...] who are then willing to share it with us. We have a long way to go. [...]. There's still lots of work that needs to happen there.

Factor #3: Social environment and health barriers. “Socio-economic disparities” that negatively affect healthy lifestyle behaviour, access to healthcare services, and health status were also reported. Specifically, some participants reported that rural areas had a high prevalence of low income and poverty, low education, and food insecurity. As one participant put it: “Income and, [...] education are, two of the huge pieces, like poverty [...], food security.” Generally, participants reported that social inequities had a negative impact on the social determinants of health. As explained by four participants: “Because it's the rural areas that have even less access, less money [...], their money has to be spent differently.” – “Limited job opportunities.” – “Yeah, all that.” – “Education, and [...] low income.”

Some solutions were identified to address socio-economic disparities. These were as follows: (a) low income and poverty – collaborate with community developers on a poverty reduction strategy to identify at risk neighbourhoods; and obtain external funding (e.g. grant funds via United Way); (b) low education – increase access to education in rural areas; and (c) food insecurity (support innovative community food security initiatives – i.e. access to healthy food at a retail business such as at a hardware store).

c. Behaviour and Health

The third subtheme is “Behaviour and Health”. “Behaviour and Health” refers to “Modifiable risk factors for chronic diseases in rural areas”. Some health units reported a high prevalence of risk factors such as physical inactivity, tobacco use, lack of fruit and vegetable consumption, and alcohol use in their area. Participants knew that behavioural risk factors for chronic non-communicable diseases contributed to health inequities experienced by rural populations. As one participant put it: “We know rural groups have [...] greater [...] health inequities [...]. I mean the big four risk factors for chronic disease, it’s [...] alcohol, tobacco, nutrition, [and] physical activity.”

Some solutions were identified to decrease the prevalence the modifiable risk factors in rural areas. These were as follows:

a) physical inactivity

- creation of supportive environments through collaboration with planners, municipalities, partnerships; and community coalitions to promote physical activity (e.g. walkable communities);
- building capacity by collaborating with schools in the development of physical activity modules (“we would work with teachers to build modules that they could deliver and maybe that happens everywhere but it’s especially important to [...] increase our reach”); and
- maximize community assets to promote physical activity (“increasing physical activity and in our rural communities, [...] it’s more looking [...] what assets they have [...] within their community”).

b) tobacco use

- adequately fund NRT across the health unit (i.e. family health team) (“there are some family health teams who do not have access to NRT, they weren’t part of the stock program”); and
- cross collaboration across and within teams to promote smoking cessation (i.e. “their health promoter organizing a walking group, for their cessation clients”).

- c) lack of fruit and vegetable consumption
 - increase access to fruits and vegetables targeting food deserts in rural areas (i.e. “fill a bus with [...] fresh vegetables and fruits”);
 - provincial funding allocation for healthy eating programs;
 - provincially led situational assessment of nutrition services in rural and urban areas; and
 - collection of neighbourhood level data to better understand the factors that affect fruit and vegetable consumption at the local level (“we do not eat our fruits and vegetables here. {Laughter} So, it’s like why [...] aren’t those things happening? Really trying to kind of get more of that neighbourhood level information, to really kind of look at what some of those bigger issues are at that level”).
- d) alcohol use
 - modify Ontario’s alcohol policy that currently contradicts public health practice (“one of the number one causes of [...] chronic disease is alcohol. I get so angry [...] what do these [...] politicians [do], they [give] it more access [alcohol]”)

Of particular interest, a participant noted that an effective approach to decrease risk factor prevalence might be to focus “across topics” rather than on “buckets of topics”. As explained by the participant:

We have higher rates of heart disease compared to the provincial average. Well, physical activity contributes to that; stress contributes to that, not eating [...] contributes to that [...]. Instead of us just trying to kind of put the band-aids on at the lower level, how do we kind of bring that up a bit further, and really kind of look intersectoral and [...] across topics too?

III. Inner Setting

The category, “Inner Setting”, refers to characteristics inside the organization that affect implementation (Damschroder et al., 2009). The “Inner Setting” was identified by Damschroder and her colleagues as a key category for implementation in the CFIR (Damschroder et al., 2009). “Inner Setting” was further subdivided into five themes: “Structural Characteristics”, “Culture”, “Implementation Climate”, “Readiness for Implementation”, and “Intraorganizational Networks and Communications”. A description of each theme follows.

Theme #1: Structural Characteristics

The theme, “Structural Characteristics”, is a mechanism established to influence practice (Damanpour, 1991). Structures either can support or hinder decision-making in the organization

(Damanpour,1991). Structures may generate a learning organization (Damanpour, 1991). They might capture, share, and create new knowledge (Damanpour, 1991).

This was a theme that included both factors that facilitated and impeded implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. Factors that facilitated implementation were further categorized into “Decentralization” and “Informal structural characteristics”, while factors that impeded implementation were further categorized into “Organizational complexity (i.e. role specialization)”. A discussion follows. Please note the “size” of the organization (i.e. small) was interwoven throughout all the factors and was therefore not separately summarized in this section.

Structural Characteristics – Factors that Facilitate Implementation

Factor #1: Decentralization. “Decentralization” refers to a learning culture that focuses on individuals, group processes, and organizational systems (Rycroft-Malone, 2004). This suggests that implementation is successful when the decision-making authority is distributed throughout a larger group (Damanpour, 1991). Decentralization was a key implementation factor that influenced implementation. As one participant put it: “I would say it’s decentralized for sure [....]. [It] is very different than the work I did in [the city] where it is more centralized [and] administrative driven.” First, decentralization enhanced greater autonomy among employees. One participant described the importance of autonomy in a rural health unit from a management perspective:

Frontline, managers, director, GM [...] it’s very, very flat. So, in terms of like process, to get things approved [...], our director, and GM, has a very similar kind of style to me, in terms of [...] autonomy, and giving that decision-making to me, as a manager, to really kind of decide how [...] we kind of go about our programs and services, and they’re not [...] in the weeds of all of that, at all [...]. Where I think, because of our rural setting and our small health unit [...], and because we have a small population, relatively speaking, [...] autonomy is so important, and I don’t think we would be able to do the work we did, if we didn’t have [...] autonomy.

Another participant described the importance of autonomy from a staff perspective:

So, from staff [...] they are happy that they have the trust in us, and they have built trust that [they] can run with. [...]. But I think from our point of view, like it’s helped us as staff grow so much more, because we have learned so much more, and [have] more [...] autonomy.

Secondly, decentralization created an opportunity for cross-collaboration across and within teams (e.g. decision-making was dispersed across and within teams to build capacity). Participants commented that they collaborated with other teams with a focus on assessment and surveillance, health promotion, health protection, policy development, and emergency management to build capacity. As one participant noted: “It’s very encouraged [...] to have collaboration across teams and programs.”

Factor #2: Informal structural characteristics. Formalization refers to the rules and procedures in conducting organizational activities (Damanpour, 1991). Some participants indicated that the size (i.e. small) of the organization affected formalization. As one participant noted: “I think it’s just because we are smaller, we can afford to be less formal. In a larger center, a larger agency, you need those things in place.” Specifically, participants noted that smaller health units required less administrative intensity. As described by one participant: “I have to say is very different than the work I did in [the city], where it is more [...] administrative driven.” Some participants described “informal” approaches, as timely, less bureaucratic, flexible, and simple. One participant described the latter example (i.e. simple) as follows:

I remember when I was doing some work [...]. I think it was to do with [...] visual material [...]. And [...] because we are a small health unit [...] I walked by and [said], hey [administrative assistant] can you do this for me? And within 2 hours [...] it [was] done. While for other health units, I know it’s a process, you have to submit [i.e. paperwork] [...]. That means that you have to think things through a little bit better and take more time to do things, while here it’s more like let’s go.

Structural Characteristics – Factors that Impede Implementation

Factor #1: Organizational Complexity (i.e. role specialization). Organizational complexity refers to role specialization, functional differentiation, and professionalism (Damanpour, 1991). In this instance, participants identified the generalist role (i.e. less specialized), as a factor affecting implementation. Participants explained that in small rural PHUs they wore, “a lot of hats”. As described by a participant: “People are almost forced to be a jack of all trades.” Challenges ranged from competing demands to focusing on multiple CDP topic areas. One participant commented on competing demands:

Sometimes, it's challenging [competing demands] [...] depending on the time of the year. For example, now we are focusing on two things, but then two other things [...] are left behind, or things that you really want to do, you don't get to do it.

Another participant commented on juggling multiple areas, compared to urban PHUs: "When I talk to other health units, and I say, "Well, what's your portfolio?" And they say, "Cannabis" [...]. "You just do cannabis {Laughter}?" "Really?" In response to this, local, regional, and provincial networking was encouraged "to bounce ideas off" on a variety of topic areas. A participant indicated that networking "builds a better [...] program if you can network and chat." On the other hand, some participants indicated that the generalist role played an important role in rural PHUs (See Internal Leadership Engagement - CDP team champions).

Theme #2: Culture

The theme "Culture" refers to norms, values, and basic assumptions of a given organization" (Damschroder et al., 2009, p.8). Damschroder et al., (2009) systematic review yield that organizational culture is the most important influence on knowledge exchange, transfer, and translation. Specifically, in healthcare settings, numerous subcultures exist across and within teams, and these cultures must be understood if innovations are to be developed, implemented, and sustained (Damschroder et al., 2009; Urquhart, Sargeant, & Grunfeld, 2013). The topic of "Culture" was spoken about as a facilitator of implementation by participants. Factors that facilitated implementation was further subdivided into the subtheme "Clan Culture" (i.e. collaborative). A description of "Clan Culture" follows:

a. Clan Culture

A "Clan Culture" (i.e. collaborative) refers to a culture with less focus on structure and control and greater concern for flexibility where people are driven through shared goals, vision, outputs, and outcomes (Quinn & Rohrbaugh, 1983; Cameron & Quinn, 1999). "Clan Culture" is a quadrant from the Competing Values Framework (CVF), conceptual model in healthcare settings used to describe different types of organizational culture that was developed by Quinn and Rohrbaugh (Quinn & Rohrbaugh, 1983; Cameron & Quinn, 1999).

There were characteristics of a clan culture that were apparent in the interviews and focus groups that facilitated implementation. Specifically, there were four clan cultural factors that facilitated implementation. These were as follows: "Dominant organizational characteristics (i.e. a very

personal place like a family)”, “Leadership style (i.e. mentoring and nurturing leadership style)”, “Management of employees (i.e. emphasize teamwork, consensus, and participation)”, and “Organizational glue (i.e. loyalty and mutual trust)”. A description of each factor follows.

Clan Culture – Factors that Facilitate Implementation

Factor #1: Dominant organizational characteristics (i.e. a very personal place like a family). Some participants indicated that rural public health units had “Dominant organizational characteristics” (i.e. family). Specifically, they spoke about organization culture as being a very personal place like a family. As one participant put it:

Appear to be a bit like a family environment, [...]. A lot of us keep in touch outside of work as well. A lot of friendships established here too, which I don’t think would happen in an urban setting. I think that’s unique to the rural setting.

Other participants also saw the “family” extend beyond the organization. One participant explained: “Our culture is great. It’s very friendly and supportive, and I used the word family a moment ago because it really [...] feels that way you know.”

Factor #2: Leadership style (mentoring and nurturing leadership style). In a few health units, the role of “Leadership style was described as “Mentoring (i.e. lead by example) and nurturing” (i.e. supportive). Examples of a good mentor was a leader who was seen as positive, accepting fallibility, solution-orientated, motivated, passionate, approachable, sensitive to culture, and understanding the focus of public health. As described by a participant: “If you have a [...] very positive [...] leadership, that is [...] very sensitive to culture, and [...] living it, and doing it by example, you have a much better chance of making that pervasive throughout the organization.”

Leadership was seen by many as being nurturing (i.e. supportive). Some examples of leadership support were related to work-life balance initiatives (flexible hours), and employee health and wellness programs and services. As described by two participants:

Another big component is the work life balance. Leadership definitely stresses that you [...] try and incorporate breaks every day. And I feel like they are fairly flexible, like returning from mat leaves.

“ Huge flexibility [...], we have a really good wellness culture.”

Factor #3: Management of employees (i.e. emphasize teamwork, consensus, and participation).

Some participants indicated that “Management emphasized teamwork, consensus, and participation.” Participants identified that intraorganizational collaboration was reflected upon shared values, norms, attitudes, and beliefs about the organization. As one participant put it: “I mean organizational culture to me I think of [...] our vision, our mission, our values.” Another participant explained:

I could read you our values, and our mission statement [...] and say that [...] exemplifies our culture. I [...] truly, truly believe I feel that we do live our values [...]. I know that not everybody will share my opinion [...]. But I would say that from management down to frontline staff, the overwhelming majority live our values. And I believe that that translates to the CD work that we do, and when we interact with clients, and community [...] as well.

Factor #4: Organizational glue (i.e. loyalty and mutual trust). The topic of “Organizational glue” was spoken about as a facilitator by some participants. A factor affecting organizational glue was mutual trust among staff and leaders. Staff were seen as public health experts. As one staff member stated: “I think [...] the other piece that is really important in terms of our organizational culture, is that our employees are public health experts, and we value their expertise and experience, and knowledge of both their local community.”

This created a culture of empowerment. A culture of empowerment was seen by many as open, flexible, trusting, respectful, supportive, innovative, accessible, and autonomous. As one participant put it:

If you have to go back and check with your manager all the time [...], I don’t know is that a rural thing [...], or is that just [...] a culture [...] we’ve created here, but we really believe.

Theme #3: Implementation Climate

The theme, “Implementation Climate”, refers to “the absorptive capacity for change, shared receptivity of involved individuals to an intervention and the extent to which use of that intervention will be rewarded, supported, and expected within their organization (Damschroder et al., 2009, p. 8). The topic of “Implementation Climate” was spoken about as a factor that impeded implementation by some participants. This theme was further subdivided into the subtheme “Tension for Change”. A description of “Tension for Change” follows.

a. Tension for Change

“Tension for Change” refers to “the degree to which stakeholders perceive the current situation as intolerable or needing change” (Damschroder et al., 2009, p. 8). An innovation is more likely to be implemented successfully if the present situation is perceived as intolerable (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). The topic of tension for change was spoken about as a barrier of implementation by some participants. The factor that was frequently cited was “Health unit restructuring”. A discussion of health unit restructuring follows.

Tension for Change –Factors that Impede Implementation

Factor #1: Health unit restructuring. Some participants reported that health units felt the need to “reorganize every two to three years”. In some cases, this tension to restructure was a result of the modernization of the standards. A participant explained: “We’re [reorganizing] because of the change in the standards, and this is just a huge stressful thing, and here it’s been very non-impactful.” Other participants described how some health units closed their branch offices in rural areas or substantially reduced the number of FTE staff, “for the purpose of efficiencies.” Complaints ranged from maintaining partnership relationships, meeting the needs of local needs, priorities, and contexts to maintaining a visible presence in rural communities.

Theme #4: Readiness for Implementation

The theme, “Readiness for Implementation” refers to “tangible and immediate indicators of organizational commitment to a decision to implement an intervention” (Damschroder et al., 2009, p. 9). This is a broad theme that includes factors that facilitated and impeded implementation of evidence-informed CDP programs and policies. “Readiness for Implementation” was further subdivided into three subthemes: “Internal Leadership Engagement”, Access to Knowledge and Information (i.e. share new knowledge), and “Available Resources”. A description of each subtheme follows.

a. Internal Leadership Engagement

The first subtheme was “Internal Leadership Engagement”. “Internal Leadership Engagement”, refers to the internal accountability, commitment, and involvement of appointed leaders with the implementation (Damschroder et al., 2009). This subtheme included factors that facilitated and impeded implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. Factors that facilitated implementation refer to transformational leadership approaches, while factors

that impeded implementation refer to dysfunctional leadership approaches (see External Leadership Engagement). Transformational leadership approaches were further categorized into “Internal CDP team champions”, “Management transformational leadership style (management and staff perspective)”, and “MOH transformational leadership style”. Destructive leadership approaches were further categorized into “Management destructive leadership style (staff perspective)” and “MOH destructive leadership style”. A description of each factor follows.

Internal Leadership Engagement – Factors that Facilitate Implementation

Factor #1: CDP team champions. Damschroder et al., (2009) defined champions as “individuals who dedicate themselves to supporting, marketing, and driving through an [implementation]” (p.11). Team leaders or champions play a critical role in successful implementation. Specifically, several researchers (Backer & Rogers, 1998; Markham, 1998; Meyer & Goes, 1988; Schon, 1963) found that the adoption of an innovation by individuals in an organization is more likely if there are champions who support the innovation. Shea & Belden (2016) review on champions found that champion personality characteristics (i.e. achievement, persuasiveness, persistence, innovativeness etc.), organizational role (unofficial and official leadership roles), experience and training, and influence tactics (i.e. presenting rational arguments etc.), management support for the champion (i.e. recognizing and rewarding champions etc.), and champion impact (i.e. implementation process, organizational level-innovativeness) affect implementation.

“CDP team champions” were a significant factor that influenced implementation of CDP programs and policies in rural areas. As one participant put it: “I said we are all public health champions [...] as public health, as public health staff, we are all champions for public health.” Champion personality characteristics, organizational role, and influence tactics were characteristics that positively influenced implementation in rural PHUs. CDP team champions were seen as innovative, persistence, and persuasive. A participant provided a practical example that demonstrated persistence:

So, to give a practical example, we [...] coordinate a [...] food skills program [...]. Our partners [...] struggle in finding the money that they need to put the program into place. So [...] that means that we have to do extra work, to try to get [...] funding from [...] [other] partners.

Participants indicated that the champions held generalist roles. Although this was seen as a barrier by some participants, they explained this provided them the opportunity to have a breadth of knowledge in various topic areas, and as a result, they felt they could provide support to various teams.

Participants also reported that they used influence tactics to support implementation. Influence tactics included pulling together a diverse group of professionals (i.e. collaboration and engagement with community partners) and appealing to a higher authority (e.g. municipality, management). Three participants described the latter tactic as follows (i.e. appealing to a higher authority): “Municipalities tend to want to say [...] we can’t.” “Without really [knowing] [...] the right approach.” “Where that champion may have a really respected, and loud voice, and know how to make things happen.”

Factor #2: Management transformational leadership style (i.e. management perspective). The topic of leadership among management identified “Transformational leader behaviours” as a factor that influenced implementation. Some managers saw themselves as supportive (i.e. expressed confidence in the abilities of their staff), empowering (i.e. encouraged staff autonomy and decentralized decision-making), innovative (e.g. embrace new ideas, break out of convergent thinking and routines, establish a vision for improvement, and willing to take risks), and a leader by example (i.e. practice what they preach). One manager described a latter transformational behaviour (i.e. willing to take risks) as follows: “But I think sometimes you need to step out a little bit [...] and take a risk, in order to see what the outcome might be, because you might be surprised.”

Factor #3: Management transformational leadership style (i.e. staff perspective). Another factor that influenced implementation was “Transformational leadership” among staff. Specifically, some staff said they felt supported. Participants described leadership behaviours as accessible. As one staff member put it:

There seems to be like a lot of interconnectedness [...]. People are often willing to ask advice of [the] other team members, and [Manager’s name] has an open-door policy [...]. You can pop in, and just run an idea past [her/him], which I think really helps [...] benefit everyone.

Factor #4: MOH transformational leadership style. The topic of the “MOH transformational leadership style” was identified as another factor that influenced implementation. The MOH was described as visionary (i.e. communicates a clear vision and direction for the future), leader by example (i.e. practices what they preach), innovator (i.e. rural health innovator), and charismatic (i.e.

using authority and status to influence implementation). One participant described the latter transformational leader behaviour style (i.e. charismatic) as follows: “When the Medical Officer of Health steps up [...], a lot of community partners listen, and it opens that door.”

Internal Leadership Engagement –Factors that Impede Implementation

Factor #1: Destructive internal leadership style among management (staff perspective).

“Destructive leadership style among management” was another factor that negatively influenced implementation of CDP programs and policies. Staff in some health units said that they felt unsupported. Two participants explained:

If I am going to work like consecutively on a project [...] over like weeks or months, if it was in [a] [urban centre], I think I would be more supported to do so, then if it was in [a][rural community].

“And I think your manager makes a difference [...], on how you put up barriers or not.”

Factor #2: MOH destructive leadership style. Participants also indicated that “Destructive leadership behaviour by the MOH” was another factor that negatively influenced implementation. Specifically, some participants indicated that the MOH autocratic behaviour (i.e. attempts to motivate others by asserting authority) was sometimes reported as a barrier. A participant explained:

But again, it comes down to relationships [...]. I’ve seen the approach of in your face. You are [...] telling the government this does not work [...]. I have seen MOHs do that, unfortunately. It [is] very unprofessional, and it’s always negative, and it just never gets you the desired effect that you need.

One participant shared their solution to address destructive leadership behaviour: “Even when we had bad management [...], the comradery with the staff was still really good [...]. Like, it almost made it more necessary to have really positive relationships among staff. To kind of cope with that situation.”

b. Access to Knowledge and Information

The second subtheme was “Access to Knowledge and Information”. “Access to Knowledge and Information” refers to “ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks” (Damschroder et al., 2009, p.9). Knowledge is a subjective entity related to knowledge exchange, transfer, and translation (Graham et al., 2006). Knowledge is

explicit (i.e. articulated or codified) or tacit (i.e. know – how or personal wisdom) (Polyani, 1983; Nonaka, 1994). Organizations with high absorptive capacity, that is organizations that are systematically able to identify, exchange, transfer, and translate new knowledge; to connect it to its own knowledge base; and put it to appropriate use will be better able to assimilate innovations (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004).

“Access to Knowledge and Information” was further categorized into “Absorptive capacity for new knowledge (i.e. share new knowledge)” which was a factor that both facilitated and impeded implementation. A description follows.

Access to Knowledge and Information – Factors that Facilitate Implementation

Factor #1: Absorptive capacity for new knowledge (i.e. share new knowledge). An implementation facilitator was the organization’s absorptive capacity for new knowledge. Absorptive capacity was directed at sharing new knowledge. Internal organizational learning mechanisms included substantial sharing of information and opportunities for training and professional development. For example, staff regularly participated in an all staff in-service (all-staff meeting), lunch and learns, knowledge exchange days (i.e. guest speakers), and round-robins. One participant described an all-staff meeting as follows:

It’s like an in-service [...] the basic training that we have to do once a year with all staff [...]. So, everybody will come [...]. [It’s] an opportunity [to] connect with [...] who we maybe don’t on a regular basis [...], though we are small. Share some of those chronic disease prevention [...] messages, with other teams in the health unit.

Another participant described a knowledge broker mentoring program to build capacity to use research evidence. As one participant put it:

We did a rapid review through that program [knowledge broker mentoring program]. And then after the program ended, one of the 5 people who was trained through the mentoring program, then mentored another staff person, who hadn’t been part of it [...]. Sort of spreading that knowledge. [...]. Neat process of building capacity among staff who work here.

Access to Knowledge and Information – Factors that Impede Implementation

Factor #1: Low absorptive capacity for new knowledge (i.e. share new knowledge). The topic of an organization's "Absorptive capacity for new knowledge" was a barrier of implementation. Absorptive capacity was mainly directed to sharing new knowledge. Specifically, shared services and partnerships between academic institutions and public health were reported to be important among some health unit staff. However, some participants indicated that their health unit was unaffiliated with an academic institution. As one participant put it: "We don't have formal relationships with the college and the university." Some saw this opportunity for information sharing, decision making, and knowledge-development negatively impacted learning in their organization. One participant explained the latter issue (i.e. knowledge – development) as follows: "They have access to more progressive ideas because they tend to have Universities, right? So, they tend to have larger numbers of people, who will be engaged in their community and [...] push the envelope kind of way." Some challenges included geographic distance; lack of dedication and time to explore academic partnerships; and courses and specialities that misaligned with public health. Another participant described this earlier challenge (distance and time) as follows:

No, we're aren't [affiliated with a University] and, [...], I have been thinking about that recently [...]. Again, trying to carve out time for that, [...], whether that's something we should explore more deliberately, because we [...] don't have [...] someone nearby.

In response to this, a participant described the importance of LDCPs as an effective method to leverage and collaborate with academic researches. A participant explained:

Oftentimes, academic research is focused in cities because of the proximity of the universities. So, [...] the Locally Driven Collaborative Projects [...] are very beneficial to small health units like us [...]. What I find extremely helpful is going to those meetings, sitting with other health units, [...], and academic researchers, and everybody's perspective is brought to the table [...]. So, I am confident that the outcome will address rural needs.

Another participant suggested that PHO collaborate with academic institutions to provide research and evaluation support to rural public health units (i.e. training, tools, webinars, workshops etc.). A participant explained:

It would be nice if [...] there was [...] some partnerships with the academic institutions and Public Health Ontario. To help to come up with some user-friendly applicable tools, [...], some training [...], webinars [...], [and] workshops [...], specific to [...] rural health units.

c. Available Resources

The third subtheme was “Available Resources”. “Available Resources” is conceptually defined resources as, “The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time” (Damschroder et al., p. 9). Damschroder et al., (2009) systematic review yield that researchers (Rabin, Brownson, Haire-Joshu, Kreter, & Weaver, 2008; Denis, Hébert, Langley, Lozeau & Trottier, 2002; Perrin et al., 2006; Leeman, Baernholdt, & Sandelowski, 2007; Pronovost et al., 2006; Meyers, Sivakumar, & Nakata, 1999) revealed that the level of resources dedicated to the innovation was positively associated with implementation. For example, resources might include funding for dedicated tasks, staff with particular expertise, appropriate office space, education and training, and time and commitment from staff and community members (Mendel, Meredith, Schoenbaum, Sherbourne, & Wells, 2008; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004).

In addition, Greenhalgh et al. (2004) cited both strong and moderate evidence that suggests an innovation that starts with a budget and is allocated with adequate and sustained resources is more likely to be assimilated, compared to an innovation that has been allocated with insufficient resources (Gustafson et al., 2003; Rogers, 1995).

Barriers for “Available Resources” were further categorized into four factors affecting implementation: “Lack of dedicated and ongoing funding (i.e. Ministry)”, “Lack of time”, “Low human capacity,” and “Lack or limited program resources”. A description of each factor follows.

Available Resources – Factors that Impede Implementation

Factor #1: Lack of dedicated and ongoing funding (i.e. Ministry). A key implementation factor was “Lack of dedicated and ongoing funding”. As one participant put it. “Funding is a big issue, as well. Funding is a big issue.” Specifically, the lack of ministry funding negatively impacted implementation. Currently, the province funds 75% of public health, while the municipality funds the remaining 25%. A discussion of the MOHLTC funding and program budgets follows.

The MOHLTC allocation of provincial funding for rural public health units negatively impacted implementation in various ways. Concerns included lack of funding for rural public health units (i.e. high costs of implementation); disproportionate allocation of funding towards healthcare compared to public health; lack of public health funding (i.e. program planning, research, evaluation, and evidence-informed decision-making); funding freezes; and the current funding formula (i.e. does not consider rural and urban variability). A participant explained the earlier issue (high cost of implementation) this way:

You have to spend more to service a smaller population certainly per capita, but even sometimes you have to just spend more to run an initiative in [...] your far northern regions of our district. It could be a lot more expensive than just running something here at [the] church downtown.

In reference to the latter issue (i.e. funding formula does not account for rural and urban variability), a participant stated: “I feel like, {Long pause} everybody, everything can’t be painted with one brush.”

Some participants also indicated that there was a lack of dedicated funding for program planning, research, evaluation, and evidence-informed decision-making. As one participant noted:

The budgets still do not allow for the kind of evaluation dollars that we should have, which would allow us to go out in the community a little more and ask [...] evaluation questions, about what their needs would be, or why they didn’t use a particular service [...]. I mean, what’s the rule on evaluation 20%? We do not.

Participants identified some solutions to address lack of dedicated and ongoing funding for CDP programs and policies. They were as follows.

- a) review and modify the current funding formula to reflect contextual factors (rural vs. urban) (“they [MOHLTC] should look at it, again [...], and they should look at what specific challenges we have with our funding because [...], we have trouble accessing people”);
- b) advocate to municipalities to increase funding (“talk your municipalities into giving you more money”);
- c) explore external funding sources (“we are often reliant on small pockets of funding, whether [...] they are small research grants, the LDCP”);

- d) increase funding for public health (“why are we spending so much in the healthcare system, rather than public health or chronic disease prevention”); and;
- e) increase funding for research and evaluation.

Factor #2 Lack of time. “Lack of time” was another important factor that negatively influenced implementation in rural areas. As one participant puts it: “We may not have the time, like the capacity to do that. So, that’s been [...] a barrier for sure.” Participants in some health units expressed that it took more time to implement programs in rural areas because of the greater distance to travel to program and branch office locations to accomplish their work. A participant explained:

Our district [...] from our office to the [rural branch office] is [...] in the winter close to two hours, probably an hour and a half in the nice weather. And so, two hours there, two hours back so [...], there’s 4 hours out of a 7-hour workday that I am just sitting in a car, right?

Factor #3: Low human capacity. Another key implementation barrier was “Low human capacity”. Most health units reported that there were limited human resources to achieve capacity in rural health units. As one staff member put it: “My challenge is, I don’t have enough people to be able to work [...] to move things along.” Participants noted that rural public health units have fewer full-time employees compared to urban counterparts. A participant explained:

I think like internally, it’s our own capacity, [...] we’re a small health unit [...]. When I think about other health units, they have a whole team, a whole tobacco team, that’s consist[s] of like a bunch of health promoters, [...], nursing [...], [and] tobacco enforcement officers. Where I have like one Tobacco Enforcement Officer, one Youth Engagement Coordinator, and one Public Health Nurse, and that’s it in terms of tobacco. And so that’s a challenge in terms of [...] how [...] we [...] spread ourselves enough to meet the needs of our community?

Participants identified some solutions to address low human capacity. They were as follows:

- a) collaborate with partners to increase capacity – “what is our capacity [...]? Who else is doing this locally [...]? Who can we partner with?”;
- b) cross collaboration within and across teams – “we’ve tried to set the team up to encourage them to use each other even though they are not official on that portfolio to brainstorm”;

- c) participate in LDCP – “we can learn a lot from the other health units, and to have that form to come together because we are very geographically spread out, those LDCPs are very helpful in that”;
- d) participation in practice and professional organizations and networks to exchange knowledge “relying [...] on provincial groups”;
- e) implement knowledge translation strategies/approaches to develop capacity through partnerships (i.e. train the trainer);
- f) build partnership relationships;
- g) minimize duplication of services; and
- h) decrease the number of programs and the number of staff assigned to a project – “there’s a need to scale back on how many programs we’re doing”.

Factor #4: Lack or limited program resources. “Lack or limited program resources” was another key factor influencing implementation that was reported as a barrier. As one participant put it, “Because being small, sometimes our resources are really limited.” Some of the challenges related to lack or limited program resources included: failure to implement program/provide resource low reach, and weak sustainability. One participant provided an example of the latter issue (i.e. weak sustainability) as follows: “You know, we can’t do the Iceland model for substance use prevention here without a 20-year horizon. How do you do a 20 year, take on a 20-year project in [...] a rural community that has very limited resources?”

Participants identified some solutions to address the lack or limited program resources. They were as follows.

- a) share resources among partnerships to increase resource capacity – “I think we need to leverage those too [...] because being [...] small, sometimes our resources are really limited, so we need to share what we have”;
- b) use resources more efficiently and effectively by determining community readiness – “using the constellation model of governance”;
- c) use evidence to inform the use of resources;
- d) pool MOHLTC resources to increase capacity – “we have the same number of topic areas to cover as an urban center with less staff, so pulling together resources from the Ministry, like in a rural setting, would be important to increase our capacity”; and

e) network with peers to exchange resources (“networking is really critical because the only way we are going to build off [...] each other”).

Theme #5: Intraorganizational Networks and Communications

“Intraorganizational Networks and Communications” refers to “the nature and quality of social networks and nature and quality of formal and informal communications within the organization” (Damschroder et al., 2009, p. 8). Connections between hierarchies (i.e. staff, management), teams, and individuals may be tangible or intangible, formal or informal, weak, or strong (Damschroder et al., 2009). Networking among peers and across hierarchical levels and communication quality contribute to effective implementation (Damschroder et al., 2009). Factors that facilitated implementation for “Intraorganizational Networks Communications” was further categorized into “Intraorganizational informal networking and communications”. A description follows.

Intraorganizational Informal Networking and Communications – Factors that Facilitate Implementation

Factor #1: Intraorganizational informal networking and communications. “Intraorganizational informal networking and communications” was another factor that influenced implementation. Some staff indicated that informal networking was encouraged in their health unit. Since the size of the health units were small, both informal horizontal (peer) and vertical (leadership) networking contributed to a positive workplace culture. One participant put it: “Our culture is one that is [...] family and very informal and small.” These networks formed informal channels of communication and influence. Specifically, informal communication was seen by some participants as an effective approach to exchange knowledge, decrease administration intensity or bureaucracy, and promote engagement and collaboration. One participant described this latter benefit (i.e. engagement and collaboration) as follows:

Let’s find a solution together. Obviously, there’s situations where there needs to be those formal structures in place, but [...] typically when it comes to [...] programming, if there’s an issue or something that comes up [...], people are open. And we really can have those kind[s] of conversations [...], and kind of work together, and it feels [...] fairly informal.

Another participant provided an example of engagement and collaboration: “It really feels [...] like [an] open door, like let’s have this conversation, let’s solve this problem together.”

IV. Characteristics of Individuals

The category “Characteristics of Individuals” suggest that “the setting and intervention constructs are rooted, ultimately in the actions and behaviours of individuals” (Damschroder et al., 2009b, p.16).

Characteristics of Individuals were further subdivided into the theme “Individual Identification with Organization”. A description follows.

Theme #1: Individual Identification with Organization

The theme “Individual Identification with Organization”, refers to “how individuals perceive the organization and their relationship and degree of commitment with that organization (Damschroder et al., 2009, p. 10). Individual identification within an organization can influence implementation (Damschroder et al., 2009). “Individual Identification with Organization” was further subdivided into the subtheme “Commitment to the Organization” and “Other Personal Attributes”. A description of each subtheme follows.

a. Commitment to the Organization

The first subtheme was “Commitment to the Organization”. “Commitment to the Organization” was reported by all health units. Participants noted that “Employee retention” was an important factor that influenced implementation. As two participants’ put it: “There’s so many people here who are in those careers kind of for life.” “We just listened to a nurse, with 42 ½ years experience.” Participants also indicated that they had multiple job roles in public health. As shared by one participant: “I think I’ve had like 5 or 6 job titles, since I have been here.” Therefore, as a result of their longevity with the health unit, and public health, participants indicated that they accumulated knowledge shaped through social experience, including practice. As another participant put it: “My role is to bring my many years of expertise to the discussions.”

b. Other Personal Attributes

The second subtheme was “Other Personal Attributes”. “Other Personal Attributes includes other personal traits such as motivation, intellectual ability, tolerance of ambiguity, competence, and others (Damschroder et al., 2009). “Other Personal Attributes” was a factor that facilitated implementation. This was further categorized into “Employee passion”. A description of “Employee passion” follows.

Other Personal Attributes – Factors that Facilitate Implementation

Factor #1: Employee passion. “Employee passion” refers to “an individual persistent, emotionally, positive, meaning-based, state of well-being, stemming from reoccurring cognitive and affective appraisals of various job and organizational situations that result in consistent and constructive work intentions” (Zigarmi, Nimon, Houson, Witt, & Diehl, 2009, p. 310). Zigarmi and colleagues (2009) suggest that three grouping of characteristics within the work environment that explain the development of work passion: 1) organizational characteristics (i.e. distributive justice etc.); 2) job characteristics (i.e. meaningful work, job autonomy etc.), and 3) relationship characteristics (i.e. connectedness etc.). Employee passion towards public health, chronic disease prevention, and rural population were reported to be a facilitator of implementation. As one participant put it: “It’s a topic [CDP] that I am really personally passionate about, so that definitely is interjected into the work a lot.”

There were two characteristics that influenced employee passion. The first was related to job characteristics. Some respondents noted that their work was meaningful. They indicated that their job actions were important inside and outside the organization, and had lasting worth for themselves and others, and was mainly developed and shaped through lived experiences. As one participant put it: “I think that the ones that I have seen that have most passionate for rural because [...] they lived there.” Some participants also commented on the psychological antecedents of the work environment. They identified traits that facilitated implementation, to include motivation and self-efficacy. As shared by one participant: “Sometimes, I will make that effort [...], even if it’s just [...] a small impact.”

The second was related to relationship characteristics. Some participants indicated that they had rewarding interpersonal connections with their colleagues and community (i.e. informal interactions). As one person put it: “So our culture is one that is very family [...] very informal and small.” Another participant noted: “To me, it’s a much more interpersonal.”

V. Process

The category “Process” includes activities of the implementation process (i.e. planning, executing, reflecting, and evaluating) (Damschroder et al., 2009). The category was further subdivided into the theme “Planning”, since most discussions focused on planning. It is important to note that the evaluation was discussed in a previous section (See intervention characteristics). A description follows.

Theme #1: Planning

“Planning,” refers to “the degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods (Damschroder et al., 2009, p. 10). This process is pragmatic, complex, interconnected, and non-linear (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). The focus of planning is to design a course of action to promote effective implementation (Damschroder et al., 2009).

This theme included factors that facilitated implementation. Factors that facilitated implementation for “Planning” were further categorized into three subthemes: “Planning Documents”; “Planning Cycle”, and “Planning at the Intervention Level” (i.e. downstream vs upstream approaches). A description of each subtheme follows.

a. Planning Documents

The first subtheme was “Planning Documents”. “Planning Documents” refers to key planning documents relevant to public health practice for chronic disease prevention. Participants reported explicit application of formal planning tools such as organizational charts, planning documents, logic models, strategic plans, operational plans, and any other documentation that were deemed relevant to guide the program planning process. “Planning Documents” were further categorized into “Strategic and operational plans” and “Seminal publications, models, theories, and frameworks”. A description each factor follows.

Planning Documents – Factors that Facilitate Implementation

Factor #1: Strategic and operational plans. “Strategic and operational planning documents” were used throughout the planning process. This positively influenced implementation. A number of participants reported making explicit reference to the strategic planning process. Health unit strategic planning was a mechanism (i.e. tool) that sets 3 to 5-year priorities, directions, and local visions/missions in accordance with the OPHS. As one participant puts it: “Each 3 to 5 years, it’s been more like 5 years [...], the board embarks on its strategic plan.” Some participants also discussed the importance of integrating rural health into the strategic plan (e.g. chartered in advanced). As one participant explained:

If rural health becomes an add on [...], how are we addressing rural health [...]?
That’s never going to work. It needs to be part of that strategic component of how you think [...]. It needs to be [...] a core component of how we think, about what we

do, our plans, and how you work or build from that strategic kind of thinking [...]. If we don't think about rural health in a strategic way, it's not going to be addressed in [an] adequate way through programming.

A plethora of multifaceted strategic directions and priorities based on local contextual needs were also identified. Examples included health equity, rural health, and partnership collaboration and engagement, among others.

Participants also referred to annual operational plans. Annual operational planning was a mechanism that guided thinking, planning, and implementation. Some participants also described the importance of the integration of a rural health component in the operational plan as part of contextualization and evaluation (e.g. process and outcome indicators). One participant described contextualization as follows: "Then a column was added to say [...], [is] this a rural initiative or not? So that we could capture how many activities, or programs, were in the rural communities?"

Factor #2: Seminal publications, models, theories, operational lens, and frameworks. "Seminal publications, models, theories, operational lens, and frameworks" were generally used by health units during the planning processes to influence implementation (e.g. logic models, The Ottawa Charter for Health Promotion, Social-Ecological Models etc.). Several participants made explicit reference to the Social Determinants of Health (SDOH) Framework. One participant put it: "I think {Long pause} the holy grail in public health from [...] my perspective is how do you change behaviours? That's a small part of it, but it [...] is important." Another participant supported their view: "But what's even more important, I think, is all of those social determinants."

Health Units used the SDOH to promote change at both the organization and population level. Public health focus to addressing the SDOH to reduce population health inequities was prominent within the health units planning processes. A participant described the process this way:

There's been a lot more focus on social determinants, well, social determinants of health. And that's through the planning and evaluation team because that's where we decided to put our two SDOH nurses [...]. Our health unit got SDOH funding, and it had to be nursing positions, so we've put [...] two in planning and evaluation, and that was strategic, in terms of trying to build capacity, and understanding internally around SDOH work.

Some participants also said that they used Health Equity Impact Assessments (HEIA) to guide planning and implementation. A participant described the tool this way:

I think another thing that helps is that we have another research analyst, who does the health equity portfolio, and so [he/she] has come up with the tools [HEIA]. So, when you are doing a program [...], you are supposed to go through the tool, to make sure that [...] it's equitable [...]. It is a good tool [...] to reflect upon.

Others described the planning process as having a health “equity lens”. Specifically, participants indicated that public health work focused on health inequities, and this was integrated within their planning processes. As one participant put it, “We have 6 priority areas [...]. We actually identified health equity as one of our priority areas, that we have been specifically planning [...] for, the last two years.” Some participants explained that they engage many stakeholders including teams and community partners with a health equity lens, to better understand the impact of various social constructs within rural areas, plan CDP programs to address health inequities in rural areas, and share knowledge (e.g. Health Equity Committees, Health Equity Advisory Committees etc.). One participant explained the latter benefit as follows (e.g. shared knowledge):

We sit on food collaboratives, and we think about food [...], food security [...], and those larger equity issues from a public health lens, even though some of our partners at those tables, may have a different lens in their programs.

b. Planning Cycle

The second subtheme was the “Planning Cycle”. The topic of the planning cycle was spoken about by some participants. Specifically, participants noted the importance of “Incorporating evidence into each stage of the planning cycle” (i.e. from epidemiological diagnosis to outcome evaluation). As one participant put it: “We have a process in place to integrate evidence into our work [...], it's our health units program cycle.” Participants expressed the value of routinely monitoring program activities and services, including periodic reporting of process and outcome indicators. One participant said:

Our program cycle has a process where, that prompts us to identify process indicators [...] As we're going through our year, we can check in on how we're doing, rather than just talking. Right now, we just sort of talk about how did it go, did you do what you said you would do in your plan, and we have conversations quarterly. But we are

trying to make that a little bit more rigorous, and come up with some actual indicators, that [...] maybe we can even roll up/out.

c. Planning at the Intervention Level (i.e. downstream vs upstream approaches)

The third subtheme was “Planning at the Intervention Level”. Much of the discussion described “Upstream approaches”, a priority and focus of activity that guided planning and implementation. Their work closely aligned to the modernization of OPHS. As one participant put it. “So, when we talk about the changing standards and what we are seeing happening with the kind of more upstream movement.” Another participant identified the “upstream movement”, stating, “How we have transitioned or evolved over the years to try to do more upstream work.” A factor that influenced implementation of upstream approaches was leadership and staff support. One manager described the importance of leadership support as follows: “So, having that [...] leadership piece to help you [...] understand [...] the importance of investing in upstream interventions, and [...] working together and aligning our efforts, is really key” A staff member supported this perception from leadership: “I would like the focus to go a little further upstream. I’d like to see more community health promoter kind of work.” Overall, some participants indicated that upstream approaches were more impactful compared to midstream and downstream interventions in rural areas. As explained by one participant: “So it’s moved us upstream, and it’s moved us to having more impactful work, so I think that’s important to note.”

Summary of the Description of the Aggregated Cases

The results were organized into five broad categories (intervention characteristics, outer setting, inner setting, characteristics of individuals, and process), which were further subdivided into seventeen major themes within them that influenced implementation of CDP programs and policies in rural Ontario PHUs. Major theme were as follows: evidence strength and quality, complexity, adaptability, trialability, cosmopolitanism, external policies and incentives, external leadership engagement, population external communication, reach, population needs and resources, structural characteristics, culture, implementation climate, readiness for implementation, intraorganizational networks and communications, individual identification with organization, and planning.

The study also highlighted the importance of the factors that influenced implementation within each category. A summary of these factors follows.

The factors that influenced implementation of CDP programs and policies in rural PHUs related to the characteristics of the intervention included the importance of local evidence, adaptability, simplicity, and trialability. Those related to the outer setting included the importance of community partnership engagement and collaboration, boundary spanners, horizontal networks, social capital, compatible and policy capacity, external transformational leadership styles, addressing local needs, priorities, and contexts (i.e. built environment barriers, behavioural risk factors, priority populations etc.), and reaching rural populations.

Within the inner setting of rural PHUs, decentralization and informal structural characteristics, clan culture, internal transformational leadership engagement, champions, available resources (i.e. funding, time, human, resources etc.), access to knowledge and information, and networking and communication (i.e. informal and formal) were important factors that facilitated implementation of CDP programs and policies.

The study also highlighted the importance of individual characteristics, specifically employee retention, work attitude (i.e. employee passion) and formal planning in rural PHUs. A summary of the conceptual ordering of categories, themes, and factors is also presented in Table 4. A detailed structure categorization scheme reflected in this analysis (i.e. findings) is also presented in Appendix O.

Table 4

Summary of Conceptual Ordering of Categories and Themes for Implementation of EIPH CDP Programs and Policies in Rural Ontario PHUs

Category	Theme	Subtheme	Factors that Facilitate Implementation	Factors that Impede Implementation
I. Intervention Characteristics	Evidence Strength and Quality	Types of Evidence	<ul style="list-style-type: none"> ➤ Primary data sources ➤ Secondary data sources ➤ Multiple data sources 	N/A
		Use of Evidence	<ul style="list-style-type: none"> ➤ Appraise and interpret the evidence (i.e. evidence source) ➤ Evaluate the effectiveness of implementation efforts (i.e. use of evidence) ➤ Demonstrate impact ➤ Translate the evidence (i.e. knowledge translation) 	<ul style="list-style-type: none"> ➤ Lack of local data ➤ Small sample sizes ➤ Lack of centralized data and evidence-based repository and supports ➤ Dearth of rural research
	Complexity	N/A	N/A	<ul style="list-style-type: none"> ➤ Duration
	Adaptability	N/A	<ul style="list-style-type: none"> ➤ Adaptability to address local needs, priorities, and contexts in a rural setting ➤ Rural health innovation 	<ul style="list-style-type: none"> ➤ High complexity ➤ Lost in translation
	Trialability	N/A	<ul style="list-style-type: none"> ➤ Piloted programs and policies 	N/A
II. Outer Setting	Cosmopolitanism	Community Partnership Engagement and Collaboration	<ul style="list-style-type: none"> ➤ Assessment phase: Seek and use partnership input during the assessment phase (i.e. social, epidemiological, and ecological assessment) ➤ Planning Phase: Involve partners in the planning phase ➤ Implementation phase: Coordinated and integrated approach to 	<ul style="list-style-type: none"> ➤ Lack of compatibility between partnerships and public health ➤ Knowledge translation barriers between public health and partnerships ➤ Low partnership capacity in rural areas

Category	Theme	Subtheme	Factors that Facilitate Implementation	Factors that Impede Implementation	
			<ul style="list-style-type: none"> implementation among partners and CDP public health professionals ➤ Formal and informal partnership networks and communications 		
		Boundary Spanners	➤ Partner champion	N/A	
		Horizontal Networks	➤ Homophilous networks	N/A	
		Bonding Social Capital Between CDP Public Health Professionals and Community Partners	<ul style="list-style-type: none"> ➤ Structural social capital ➤ Cognitive social capital ➤ Relational social capital 	N/A	
	External Policies and Incentives	Modernization of Ontario Public Health Standards (OPHS)	<ul style="list-style-type: none"> ➤ Aligned with current mandate ➤ *Non-prescriptive ➤ Inclusion of new standards 	<ul style="list-style-type: none"> ➤ External push to implement OPHS ➤ *Non-prescriptive ➤ Lack of adequate and dedicated funding and resources to implement OPHS 	
	External Leadership Engagement	Appointed External Leadership Style	<ul style="list-style-type: none"> ➤ Municipalities/Districts ➤ *Public Health Ontario (PHO) 	<ul style="list-style-type: none"> ➤ Board of Health (BOH) ➤ Ministry of Health and Long-Term Care (MOHLTC) ➤ Local Health Integration Network (LHIN) ➤ *Public Health Ontario (PHO) 	
	Population External Communication	N/A	<ul style="list-style-type: none"> ➤ *Formal communication methods ➤ Informal communication methods 	<ul style="list-style-type: none"> ➤ *Formal communication barriers ➤ Technological barriers 	
	Reach	N/A	N/A	<ul style="list-style-type: none"> ➤ Low reach in rural and outlying areas ➤ Program impact is based on high reach (i.e. large participation rates) 	
	Population Needs and Resources	Environment	N/A		Environment <ul style="list-style-type: none"> ➤ Built environment barriers ➤ Natural environment barriers ➤ Social environmental barriers
		Population Characteristics			
Behaviour and Health					

Category	Theme	Subtheme	Factors that Facilitate Implementation	Factors that Impede Implementation
				<p>Population Characteristics</p> <ul style="list-style-type: none"> ➤ Population diversity and low density ➤ Health inequities among priority populations ➤ Social environmental and health barriers <p>Behaviour and Health</p> <ul style="list-style-type: none"> ➤ Modifiable risk factors for chronic diseases in rural areas (i.e. high prevalence in rural areas)
III. Inner Setting	Structural Characteristics	N/A	<ul style="list-style-type: none"> ➤ Decentralization ➤ Informal structural characteristics 	<ul style="list-style-type: none"> ➤ Organizational complexity (i.e. role specialization i.e.*generalist role)
	Culture	Clan Culture	<ul style="list-style-type: none"> ➤ Dominant organizational characteristics (i.e. a very personal place like a family) ➤ Leadership style (i.e. mentoring and nurturing leadership style) ➤ Management of employees (i.e. emphasize teamwork, consensus, and participation) ➤ Organizational glue (i.e. loyalty and mutual trust) 	N/A
	Implementation Climate	Tension for Change	N/A	<ul style="list-style-type: none"> ➤ Health unit restructuring
	Readiness for Implementation	Internal Leadership Engagement	<ul style="list-style-type: none"> ➤ CDP team champions (i.e. *generalists) ➤ Management transformational leadership style (i.e. management perspective) ➤ *Management transformational leadership style (i.e. staff perspective) 	<ul style="list-style-type: none"> ➤ *Destructive internal leadership style among management (i.e. staff perspective) ➤ *MOH destructive leadership style (e.g. attempts to motivate others by asserting authority)

Category	Theme	Subtheme	Factors that Facilitate Implementation	Factors that Impede Implementation
			➤ *MOH transformational leadership style	
		Access to Knowledge and Information (i.e. share new knowledge)	➤ *Absorptive capacity for new knowledge (i.e. share new knowledge)	➤ *Low absorptive capacity for new knowledge (i.e. share new knowledge)
		Available Resources	N/A	<ul style="list-style-type: none"> ➤ Lack of dedicated and ongoing funding (i.e. Ministry) ➤ Lack of time ➤ Low human capacity ➤ Lack or limited program resources
	Intraorganizational Networks and Communications	N/A	➤ Intraorganizational informal networking and communications	N/A
IV. Characteristics of Individuals	Individual Identification with Organization	Commitment to the Organization	➤ Employee retention	N/A
		Other Personal Attributes	➤ Employee passion	N/A
V. Process	Planning	Planning Documents	<ul style="list-style-type: none"> ➤ Strategic and operational plans ➤ Seminal publications, models, theories, operational lens (i.e. health equity lens), and frameworks 	N/A
		Program Planning Cycle	➤ Incorporate evidence-informed decision-making throughout the planning cycle	N/A
		Planning at the Intervention Level (i.e. downstream vs upstream approaches)	➤ Upstream approaches	N/A

Note. Some components adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.

*Factors that facilitate and impede implementation

4. Phase 4 analysis – adapt the existing realist model that was developed *a priori* based on additional insights about categories and their properties (abduction).

The fourth phase involved abductive inference. Abduction refers to “interpreting the data and redescribing different components/aspects from hypothetical frameworks and theories” (Meyer & Lunnay, p. 5). Therefore, recontextualization and redescription are a central element of abduction (Danermark, Ekström, Jakobsen, & Karlsson, 1997). In brief, abductive analysis involved setting aside the realist model that was developed *a priori* (but not abandoned) as a means of identifying data that went beyond the initial theoretical premise (i.e. proposed model) to reveal a more comprehensive understanding (i.e. actual and real) of evidence-informed practice in rural PHUs.

As a result of abductive inference, the final evidence-informed realist model was developed to reflect the complex interplay of individual characteristics (public health agents); mechanisms inherent in implementation (i.e. factors affecting implementation within the inner setting, outer setting, intervention characteristics, and process); and contexts, circumstances and conditions from the data gathered (i.e. rural public health units) that influenced implementation (outcome) of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs (see Figure 3).

Guided by the CFIR, the major components of the realist model and description pertaining to agency and structure (i.e. reference to agency and structure – please see Methods Chapter) *a priori* did not change based on the findings of this study. However, after carefully reviewing the data, the realist model evolved that identified evidence-informed context-mechanism-outcome (CMO) configurations that were found to influence implementation (impeded, or facilitated implementation, as specified) that emerged from this study within each component (i.e. characteristics of individuals (public health agents), inner/outer setting characteristics, intervention characteristics, and implementation process) and their potential impact on rural public health systems as a result (see Table 5). A complete description of the model is included in Appendix P.

Overall, the realist model, provided a pragmatic structure for approaching multiple, complex, related, and temporal factors that facilitated and impeded the implementation of evidence-informed CDP programs and policies in rural public health units. The model drew attention to the importance of successful implementation. Failure to implement evidence-informed practice may contribute to health inequities, inefficient use of resources, poor health outcomes, and low public confidence in public health services (Canadian Public Health Association, 2016; Graham et al., 2006; Berwick,

2003). These impacts are especially important in rural Ontario public health units. The results of the study demonstrate that some of these factors impeded implementation of evidence-informed CDP programs and policies in rural PHU, and this may worsen with increased rurality. Therefore, the model can be used to guide implementation within and across multiple rural public health settings to minimize barriers to implementation.

Table 5

Evidence-Informed Context-Mechanism-Outcome (CMO) Configurations in Rural Ontario PHUs

Category	Context	Mechanism	Outcome
I. Intervention Characteristics	Evidence Strength and Quality	Using primary, secondary, and multiple data sources to inform planning and decision making to socially construct, assess, and translate knowledge; and demonstrate impact	Facilitated Implementation
		Emphasizing the lack of local data, small sample sizes, lack of centralized data and evidence-based repository and supports, and the dearth of rural research in rural PHUs	Impeded Implementation
	Complexity	Perceived difficulty of implementation resulting from long distance to travel to locations	Impeded Implementation
	Adaptability	Adapting programs and policies to meet local needs, priorities, and contexts by fostering flexibility, creativity (innovativeness), and compatibility	Facilitated Implementation
		Highly complex and unadaptable (“lost in translation”) programs/policies	Impeded Implementation

Category	Context	Mechanism	Outcome
	Trialability	The ability to test and “scale up” a program/policy	Facilitated Implementation
II. Outer Setting	Cosmopolitanism	Community partnership engagement and collaboration that enabled partnership input, mutuality, networking and communication, mobilization, and relationship building (social capital)	Facilitated Implementation
		Incompatibility between public health and partnerships, lack of partnership knowledge and skill base towards evidence-informed practice, and low partnership capacity	Impeded Implementation
	External Policies and Incentives	Compatibility with the current policy (i.e. OPHS), non-prescriptiveness, and inclusion of new standards (i.e. health equity)	Facilitated Implementation
		External push to implement new standards, but not public health capacity, non-prescriptiveness, and lack of adequate and dedicated funding	Impeded Implementation
	External Leadership Engagement	Transformational leadership styles/approaches (empowering and supportive)	Facilitated Implementation
		Dysfunctional leadership (autocratic; excessive political behaviour; making decisions based on inadequate, biased, and weak information;	Impeded Implementation

Category	Context	Mechanism	Outcome
		unsupportive and disempowered; poor communication; and poor integration and linkages between governments)	
	Population External Communication Methods	Print, broadcast, social media, and word of mouth spread innovations	Facilitated Implementation
		Technological barriers (i.e. lack of access to traditional communication modalities, low capacity, administrative bureaucracy, lack of access to social media)	Impeded Implementation
	Reach	Evaluating reach is a mechanism to justify program needs and ensure impact	Impeded Implementation
	Population Needs and Resources	Environmental barriers (i.e. built, natural, social), population characteristics (i.e. diversity, low density, health inequities, socio-economic barriers), and modifiable risk factors for chronic disease	Impeded Implementation
III. Inner Setting	Structural Characteristics	Decentralized decision-making, cross-collaboration across and within teams, and informal structures	Facilitated Implementation
		Organizational complexity (i.e. role specialization – generalist role)	Impeded Implementation
	Culture	Clan culture (i.e. perceived family; mentoring and nurturing leadership style; teamwork; loyalty and mutual trust).	Facilitated Implementation

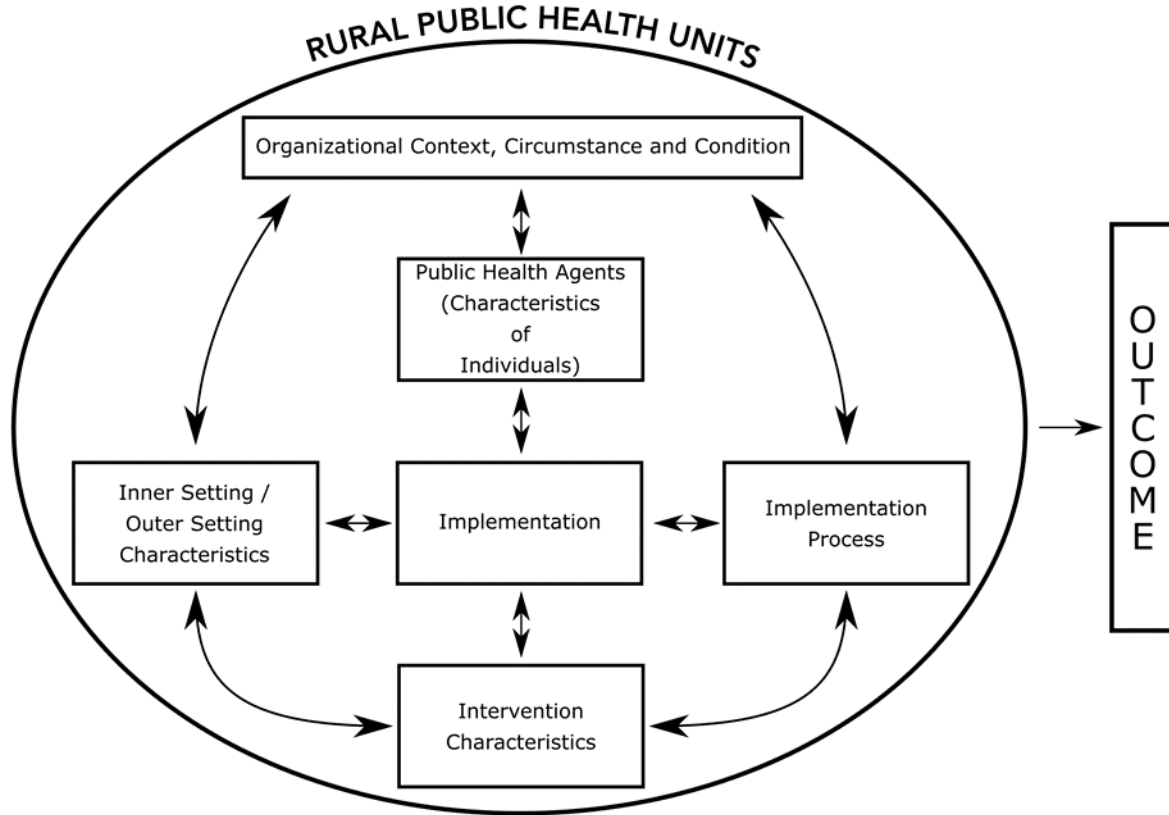
Category	Context	Mechanism	Outcome
	Implementation Climate	Perceived tension for change, particularly health unit restructuring	Impeded Implementation
	Readiness for Implementation	Transformational leadership styles/approaches (i.e. supportive, empowering, visionary, leader, innovative, charismatic); champions (i.e. innovative, persistence, persuasive, influencers, and generalists); and learning opportunities that included substantial sharing of information and opportunities for training and professional development	Facilitated Implementation
		Dysfunctional leadership approaches (i.e. unsupportive, autocratic); a perceived lack of dedicated resources (i.e. time, funding, capacity, and resources); and perceived low absorptive for new knowledge due to non-affiliation with an academic institution	Impeded Implementation
	Intraorganizational Networks and Communications	Perceived informal communication mechanisms (i.e. open-door policy)	Facilitated Implementation
IV. Characteristics of Individuals (Public Health Agents)	Individual Identification with Organization	Commitment to the Organization (demonstrating dedication, multiple roles, and accumulated knowledge shaped through social experience)	Facilitated Implementation

Category	Context	Mechanism	Outcome
		Other Personal Attributes (establishing employee passion - i.e. meaningful work, connectedness, and other psychological antecedents)	
V. Process	Planning	Planning documents and the planning process (i.e. program planning cycle, planning at the intervention level etc.)	Facilitated Implementation

Note. Some components adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.

Figure 3

Evidence-Informed Realist Model of Context-Mechanism-Outcome (CMO) Configurations in Rural Ontario PHUs



Note. Domains adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.

5. Phase 5 analysis - confirm the model through a limited number of member checks (i.e. confirmation through deductive inference)

To confirm the validity of the findings, member checks were performed. Lincoln and Guba's seminal texts in the early 1980s recommend member checking to ensure the trustworthiness of the data to enhance rigor (Guba & Lincoln, 1981, 1989; Lincoln & Guba, 1985). Therefore, according to Stake (1995), the actor is requested to "review the material for accuracy and palatability" (p. 115).

Therefore, at the time of validation of the cases, the researcher sought input from three participating health units (i.e. 1 PHU from Peer Group C; 1 from Peer Group D; and 1 from Peer Group E). A decision was made not to contact a non-participating health unit, since they were not part of the original sample. All participants who agreed to be contacted and who provided a valid health unit e-mail address were invited to participate in the member checking process (n=33). This decision was based on the researcher's previous experience working at a health unit and the results of the study (i.e. clan culture). A member checking information sheet (see Appendix Q) and synthesized analyzed data in the form of a table were provided to all the participants to make an informed choice of participation in this next phase of the research study.

From an epistemological stance, participants had the opportunity to comment on synthesized analyzed data (i.e. table). The table included the conceptual ordering of categories, themes, and solutions (i.e. comments) for implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario public health units. The purpose of the type of member checking was to explore whether the results resonate with the participants' experience (objectivism) (Birt, Scott, Cavers, Campbell, & Walter, 2016). Upon request, participants were also given the opportunity to request a description for any of the themes and ask any additional questions related to the study. Questions were also given participants to guide them through the member checking process. These were as follows:

- Do the findings resonate with you? Do they accurately reflect the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention and policies in rural Ontario public health units?
- Is there anything missing that was not captured? If so, please identify and describe.
- Upon reflection, are there any additional solutions that you would have included? Are there any that do not belong?

- Do the overall recommendations from the study accurately reflect possible system changes (local, provincial, national) that will enhance rural public in Ontario public health units for chronic disease prevention?
- Do you have any additional comments, advice, or feedback that you would like to share about this study?

Overall, 12 individuals indicated that they had participated in the member checking process by reviewing the table (5 from Peer Group C; 6 from Peer Group D; and 1 from Peer Group E). In all cases, the category structure was seen to be credible, reflecting the participants understanding of the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario public health units. Therefore, there were no changes to the final category structure (i.e. categories, themes, subthemes, and factors) and related descriptions, as well as the realist model (see Figure 3) following the member checks. Comments about the credibility of this study are presented below.

As one participant put it:

The findings do indeed resonate and accurately reflect the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention and policies in rural Ontario public health units. Overall, I think you have done an excellent job capturing the many facets of rural health pertaining to themes, impediments, and solutions for the implementation of evidence-informed chronic disease prevention programs and policies in rural health units.

Another participant stated:

As promised, I have reviewed your results and can see that you've done an incredible job consolidating the findings into meaningful and readable data. Using the reflective question, I can tell you that the table indeed resonates with many of the discussion we've had at our Health Unit and my lived experience trying to deliver programs to rural areas. I don't see anything that is missing and have no new ideas to add to the results.

Another participant supported the validation of the findings:

Overall, I believe this summary of findings accurately reflects our conversation and the situation in implementing evidence-informed chronic disease prevention programming for the [health unit]. The summary does a great job of highlighting the issues facing smaller health units who are serving largely rural populations.

Yet another said:

I read through the attached documents and my feedback is that it does seem to reflect the discussion I remember having during the focus group. I don't think anything is missing or needs to be removed.

This was very encouraging that the results were confirmed. Furthermore, using this method, participants were also given the opportunity to critically examine in detail the synthesized analyzed data in the table to validate the results (objectivism) and add data (constructivism) (Birt, Scott, Cavers, Campbell, & Walter, 2016). Overall, it was found that participants elaborated, validated, sought clarification, and prioritized themes that facilitated and impeded implementation. Appendix R presents the results of the member checking process (i.e. illustrative quotes).

Moreover, the solutions in the form of individual comments, provided participants an opportunity for further reflection from a realist perspective (i.e. what works, to whom, and under what circumstances). Interestingly, participants had mixed opinions in relation to some of the solutions (i.e. comments) that that were identified in the focus groups and interviews (see Appendix R). This confirmed that the solutions require a more in-depth discussion at each individual PHU to target local needs, priorities, and contexts. Furthermore, some solutions were no longer irrelevant (i.e. implementation changes after the point of data collection - 2018). For example, as one participant put it: "LDCPs have been defunded, so a recommendation to participate in one is irrelevant now." (see Appendix R).

Participants also suggested that this study will be valuable to rural Ontario public health practice in the future, "given the current discussions regarding public health transformation in Ontario".

Comments about the contribution and relevance of this study are as follows:

As one participant put it:

I think that the findings of your research will be particularly useful as we head into transformation in public health. It would be helpful for decision makers to utilize your results to inform the process.

Another person stated:

Further, I am very appreciative of the research being done in this area, and this information, is timely given the current discussions regarding public health transformation in Ontario. This research highlights the need for a greater understanding of the complexities of providing public health services in rural areas. It provides a good understanding of the issues that need to be considered during transformation to ensure public health in rural areas remains an effective system.

Another participant supported the valuable contribution of the study:

Also, thank you so much for the important work you've undertaken that will help us improve the health of our rural communities.

Yet another said:

Thank you for sharing your research with me. I enjoyed talking with you, I think this chart/table will be a useful tool for rural public health practice.

6. Phase 6 analysis – interpretation of the depth mechanisms that have been operating (retroduction)

The sixth phase of analysis involved retroductive inference. Danermark, Ekström, Jakobsen, & Karlsson (1997) define retroduction as a means to, “seek to clarify the basic prerequisites or conditions for social relationships, people’s action, reasoning and knowledge. The term ‘conditions’ here means the circumstances without which something can’t exist” (p. 96). The core of this transcendental argument goes beyond what is empirically observable (i.e. depth mechanisms) (Danermark, Ekström, Jakobsen, & Karlsson, 1997; Meyer & Lunnay, 2012). They further suggest five strategies to facilitate retroductive inference to include the following: counterfactual thinking, social experiments, studies of extreme cases, social experiments, studies of pathological cases, and comparative cases (Danermark Ekström, Jakobsen, & Karlsson, 1997). Suffice it to say, comparative case studies was a methodological strategy that was employed to provide a more comprehensive understanding of the actual and real conditions which facilitated and impeded implementation of chronic disease prevention programs and policies in rural Ontario PHUs. Comparative case study design was defined as, “a number a cases which are all assumed to manifest the structure she wishes to describe, but which are very different in other aspects” (Danermark, Ekström, Jakobsen, & Karlsson, 1997, p. 105). This method appeared to be quite applicable to this study since this study was based on a collective (multiple) case study design that focused on heterogenous rural PHUs. During this phase, retroductive analysis involved addressing the following questions to explore “deeper” contexts, mechanisms, and possible outcomes across rural PHUs (i.e. summary) that were outlined in the realist model (See Figure 3):

- What were the conditions and contexts (structures) in which implementation of CDP programs and policies did occur across all rural PHUs? What made implementation of CDP programs and policies possible across all rural PHUs (mechanisms - facilitated implementation), and what were the outcomes produced (outcomes), if any?
- What were the conditions and contexts (structures) in which implementation of CDP programs and policies did not occur across all rural PHUs? What made implementation of CDP programs and policies impossible across all rural PHUs (mechanisms -impeded implementation), and what were the outcomes produced (outcomes), if any?

Retroductive analysis demonstrated that there was a complex, dynamic, and interplay between the mechanisms (M) associated with the program and policy, the conditions and contexts (C) under

which the mechanism operated, and the patterns of outcomes (O) produced in rural Ontario public health systems. This complex interplay was both observable (i.e. external policies-OPHS) and non-observable (i.e. employee passion).

The findings also suggested that rural Ontario public health units were similar. Specifically, the factors that facilitated and impeded the implementation of evidence-informed CDP programs and policies in rural Ontario public health units were similar across cases. Public health practitioners were considered public health ambassadors, or social change agents, who demonstrated a deep passion for rural health. They had meaningful relationships and connections (i.e. like a family) with colleagues, friends, family, and community partners, which gave them strength to minimize or overcome challenges that impeded implementation in rural areas, They wanted to make a positive impact in their lives and in their communities by having in-depth knowledge of the local context within which they operate. Most dedicated their life to public health (i.e. over 42 years), because they were committed and passionate towards improving rural public health practice. They were insightful and understood the factors that facilitated and impeded implementation, because most lived in the area, and identified innovative solutions to minimize those challenges when possible. Each public health unit was thoughtful and had a strong desire to enhance rural Ontario public health practice. They were key agents in the implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario public health units.

C. Reflexive Commentary on Positionality

Research positionality has been a focus in qualitative research (Dwyer & Buckle, 2009; Berger, 2015). Specifically, Maykut and Morehouse (1994) describe insider and outsider positionality. They state:

The qualitative researcher's perspective is perhaps a paradoxical one: it is to be acutely tuned-in to the experiences and meaning systems of others – to indwell – and at the same time to be aware of how one's own biases and preconceptions may be influencing what one is trying to understand (p. 123).

Therefore, the focus on insider and outsider positionality is how the researchers view themselves during the research process (Berger, 2015; Dwyer & Buckle, 2009). Reflexivity has been increasingly recognized as an effective method for monitoring researcher biases', as a means to enhance rigor of the study (Berger, 2015). Questions about the researcher's positionality were developed before the research process to guide the study and maintain the integrity of the study results. They were as follows:

- a. Are you an insider, outsider, or inbetween? How have your professional experiences (i.e. former public health epidemiologist/acting public health manager) affected your research positioning?
- b. What strategies did you use to maintain reflexivity? (i.e. collection and analysis)

A summary of the paraphrased reflective notes was made:

- a. Are you an insider, outsider, or inbetween? How have your professional experiences (i.e. former public health epidemiologist) affected your research positioning?

According to Maykut and Morehouse (1994), they describe the researcher's role on a continuum ranging from complete participation (i.e. complete insider status) to complete observer (complete outsider status). In this study, it became apparent that I was a "member" of the group (i.e. PHU) since I was a former public health professional. Perhaps, because of my background in public health, I think that being an "insider" may have positively impacted the research study. Benefits identified during the study included the following:

- Increase access to the field (i.e. former public health professional).

Participants may have been more willing to share their experiences, with whom they perceived to be more understanding about their experiences, that otherwise might have been closed to “outsiders”. This was demonstrated by a favourable response rate.

- Previous background in public health.

Since, I shared a common language (i.e. skills, identity, knowledge, interests, and experiences) with the participants, this might have increased my credibility as a researcher in the area of public health. As a result, participants were more accepted and open, and this may have contributed to a greater depth and breadth of the data gathered. This was demonstrated through a realist understanding of evidence-informed practice in rural public health practice (i.e. application of 4 realist inferential techniques).

- b. What strategies did you use to maintain reflexivity? (i.e. collection and analysis)

Although, the “insider” role is very beneficial as it affords access and a common ground, it can also impede the research study. Therefore, strategies for maintaining reflexivity throughout the research study were important to avoid research bias (i.e. social desirability bias). Strategies for maintaining reflexivity included member checking, methodological triangulation, an “audit trail” of the researcher’s reasoning (i.e. reflections made at interpretation stage based on *a priori* propositions, sensitizing concepts, and a realist model etc.), and “self-supervision” to assure quality (i.e. ensuring researcher’s comprehension of and engagement with the role in assuring quality – accurately and adequately representing participants’ experience by reading the transcripts on multiple occasions etc.). Reflections of the interviews and focus groups were described in chapter IV (See Data Collection).

VI. Discussion

A. Introduction

The purpose of the study was to describe and understand the factors that facilitated and impeded implementation of evidence-informed chronic disease prevention programs and policies in Ontario rural public health units. This chapter is organized based on the primary objectives that were posed at the outset of the study. The primary objectives were as follows: (i) develop an understanding of EIPH practices in CDP in rural areas; (ii) make a practical contribution to improve the performance of public health; and (iii) make a contribution to public health implementation research in rural areas. As previously stated, it is important to note that this study did not compare urban and rural communities. A discussion follows.

1. Primary Objective #1: Develop an Understanding of EIPH Practices in CDP in Rural Areas

The first primary objective that was used to guide this study was as follows: To develop an understanding of EIPH practice in chronic disease prevention in rural areas – through the identification of the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural areas. Therefore, this section discusses substantive and methodological aspects of the study. A discussion of the major findings related to the literature, summary of the major findings, and strengths and limitations of the study follows.

a. Discussion of the Major Findings Related to the Literature

At the outset of the study, the overarching research question that was used to guide the development of evidence-informed practice for CDP in rural Ontario PHUs was as follows: How do public health professionals as implementation agents describe and understand the factors that facilitate and impede implementation of evidence-informed chronic disease prevention programs and policies mandated under the OPHS in their own rural PHUs (i.e. through which mechanisms and in which contextual factors influence this)?

The most obvious answer is that implementation is complex, and there is a plethora of related factors that facilitate and impede implementation of evidence-informed chronic disease prevention programs and policies in Ontario rural PHUs that occur over time (i.e. modernization of OPHS). The factors were similar across cases. Some of these factors aligned closely with Damschroder et al. (2009) CFIR, which was used to guide the discussion and analysis. Factors that facilitated or impeded implementation were summarized under five broad categories (intervention characteristics, outer

setting, inner setting, characteristics of individuals, and process) and a further seventeen major themes within them. A discussion of each category follows.

I. Intervention Characteristics

Intervention characteristics is an important category in the CFIR that influenced implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs (Damschroder et al., 2009). There were four notable themes that aligned with intervention characteristics in the CFIR to include evidence strength and quality, complexity, adaptability, and trialability. A discussion of each theme follows.

Theme #1: Evidence Strength and Quality

The first theme within intervention characteristics was evidence strength and quality. Participants identified that they used evidence to rationalize or justify a program decision, translate evidence to the local context, share evidence among key stakeholders, leverage and mobilize partnerships, inform knowledge translation strategies for specific practice settings and circumstances, make informed decisions based on the scientific rigour of the study, inform program direction and course of action (i.e. stop, modify, or continue a program), and measure and monitoring program effectiveness (e.g. process and outcome indicators). Therefore, these findings highlight the need to use evidence-informed decision-making especially in a rural public health setting with limited capacity (financial, human, resources, research) to build capacity. However, factors that impeded the use of evidence were also reported. Most participants felt the lack of local data, small sample sizes, lack of centralized data and evidence-based repository and supports (e.g. dashboards), and a dearth of rural research, negatively impeded implementation. Repeatedly, it was felt that the inability to use local evidence was a key barrier to implement evidence-informed CDP programs and policies in rural Ontario PHUs to reflect local needs, priorities, and contexts. As a result, participants were concerned that local needs could not be met because of a lack of local evidence, especially when participants were clearly aware that evidence was used to inform and influence public health practice to reduce the burden of chronic diseases in rural areas. Therefore, this study emphasized the importance of local evidence to inform implementation in rural PHUs. To address this concern, some participants provided innovative solutions (i.e. partnership collaboration, data sharing, oversampling etc.) to minimize these barriers.

Theme #2: Complexity

The second theme within intervention characteristics was complexity. Complexity was spoken about as a factor that impeded implementation for most health units. A significant factor that affected complexity was duration (i.e. long distance). Specifically, participants spoke about travel times (i.e. long distance to travel to locations), that resulted from large geographic distances to branch offices, program locations, meetings (i.e. Toronto), academic institutions etc. Travel distance was also cited in the literature as a barrier in rural areas (Pong et al., 2012; Romanow, 2002). Greenhalgh and colleagues (2004) noted that innovations that were simple (i.e. few response barriers, practical, manageable, and adopted incrementally) were more easily adopted. Therefore, this is particularly important in a rural setting, since there are unique barriers in a rural setting, compared to urban counterparts that would increase complexity during implementation (i.e. inclement weather etc.).

Theme #3: Adaptability

The third theme within intervention characteristics was adaptability. Participants indicated that adaptability both positively and negatively affected implementation in rural areas. As discussed earlier, flexibility and innovation in programming to address heterogeneity within rural areas based on local needs, priorities, and contexts were found to positively influence implementation. Greenhalgh and colleagues (2004) also drew in strong indirect and moderate direct evidence from work by Gustafson et al. (2003); ØVretveit et al. (2002); and Rogers (1995). They showed that innovations were more likely to be successfully implemented if they are adopted to the local context. Moreover, Damschroder et al. (2009) noted the importance of flexibility across multiple contexts. However, participants also noted that high complexity (i.e. weather, low capacity etc.), and the inability to translate programs with high fidelity impeded evidence-informed CDP programs and policies in rural Ontario PHUs. Therefore, key lessons learned included the importance of program/policy flexibility, compatibility, innovation, simplicity, and high fidelity across and within rural areas.

Theme #4: Trialability

The fourth theme within intervention characteristics was trialability. Some participants indicated that piloting a program was useful to determine program effectiveness before a decision was made to “scale-up” the intervention. Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) cites strong and moderate evidence that suggest that innovations that can be piloted on a limited basis are

positively associated with implementation. Based on the evidence, pilot testing allows individuals and groups to reflect upon, build experience and expertise, test the innovation, and discern whether to adopt, modify, or reverse the implementation process if warranted (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Grilli & Lomas, 1994; Plsek, Solberg, & Grol, 2003; Rogers, 1995; Yetton, Sharma, & Southon, 1999). Therefore, a key lesson learned was the importance of pilot testing in a rural public health setting, especially when low capacity (i.e. human, funding, resources) had a significant influence on implementation, in order to make the best use of available resources.

II. Outer Setting

The outer setting is an important category in the CFIR that influenced implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs (Damschroder et al., 2009). There were three themes that aligned with the outer setting of the CFIR. They were as follows: cosmopolitanism, external policies and incentives, and population (patient) needs and resources. Themes that showed relevance to some aspects of the framework based on participants experiences included external leadership engagement, population external communication, whereas “reach” was missing in the CFIR, but showed to influence implementation in rural Ontario PHUs. (Please see Appendix S for application of the CFIR relevant to rural public health settings). A discussion of each theme follows.

Theme #1: Cosmopolitanism

The first theme within the outer setting was cosmopolitanism. Cosmopolitanism was shown to positively and negatively influence implementation. In this study, cosmopolitanism was further subdivided into community partnership engagement and collaboration, boundary spanner, horizontal networks, and bonding social capital between public health and community partners. A discussion of each subtheme follows.

First, community partnership engagement and collaboration was identified as a powerful influence that both facilitated and impeded implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. Health units often described the value of collaborating and engaging with multiple sectors, community partners, priority populations, and citizens. This was especially important during the planning process (i.e. assessment to implementation) to support their public health work. Related to the planning process, they identified the importance of partnership input; mutuality (i.e. acknowledge the community with a focus on shared local needs, priorities, values, and

contexts); capacity planning and building; community asset mapping and community development; policy planning and development; and reciprocity (i.e. mutual benefit between public health and partnerships). Therefore, strong engagement and collaboration with partnerships appeared to be critical for successful CDP programs and policies in rural PHUs. In addition, partnership networks and communications were identified as a factor that influenced partnership engagement and collaboration. Specifically, participants indicated that they used both formal (i.e. train the trainer sessions, workshops, meetings, teleconferences, and planning tables) and informal networking and communication methods (i.e. face-to-face contact and impromptu phone conversations) among partnerships to increase capacity, community support, mobilization, and to leverage existing partnerships. This meant that partnerships played an essential role in rural areas with limited resources. Similarly, Beatty, Harris, & Barnes (2010) reported that the role of interorganizational partnerships in health services among rural local health departments, also acted as a partial mediator between resources and service provisions, and as a result, emphasis should be placed on cultivating partnership relationships in rural areas.

On the other hand, some participants felt that community partnership engagement and collaboration impeded implementation. They identified that public health values, priorities, mandates, and perceived needs were incompatible with partnership organizations. For example, although public health work was focused on upstream approaches, some partnerships work was focused on downstream approaches. Damschroder et al. (2009) and Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) also note that implementation is more effective if there is a tangible fit between the values and meaning attached to an intervention; and there is an alignment with individuals and existing workflows and systems. Therefore, in rural PHUs, partnerships who perceive a CDP program or policy incompatible with their own organization norms, values, and ways of working are more likely to impede implementation. Moreover, other participants felt some partnerships lacked existing knowledge and skill base towards planning (i.e. fast and unmethodical) and evaluation. As a result, they were concerned that this could negatively impact the strength and quality of EIPH practice. Additionally, low partnership capacity in rural areas was viewed as a significant barrier in rural areas. Specifically, the study drew attention to partnership role overload based on competing partnership demands, making implementation difficult at times. Similarly, Strasser et al. (2018) suggests that role overload can negatively affect community engagement, suggesting that local community needs could not also be met (Strasser et al., 2018).

Secondly, boundary spanners, or people who have significant ties both inside and outside the organization, can positively influence implementation (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). In this study, participants referred to boundary spanners as partner champions. Partner champions were found to leverage and mobilize other community partners (e.g. connect, influence, and collaborate), for CDP programs and policies, which was particularly important to advance implementation in rural areas (i.e. strong connections in rural areas – “everyone knows each other”). Similarly, Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) noted that an organization was more likely to adopt an innovation if boundary spanners have significant ties both inside and outside the organization, and can engage individuals both within and outside the organization in relation to a program. Similarly, the CFIR highlights of the role of the boundary spanner in relation to implementation (Damschroder et al., 2009). Further, the Ryan & O’Malley (2016) study of the role of the boundary spanner in bringing about innovation in a cross-sector partnership noted three key boundary spanning roles, of which two generally matched the partnership boundary roles in this study. In this regard, the two key boundary spanning roles included network builder and facilitator/mediator (Ryan & O’Malley, 2016). Therefore, a key lesson learned was that the boundary spanner role was important in a rural public health setting.

Thirdly, horizontal networks of peers, aimed at sharing ideas and knowledge construction is a key mechanism within organizations (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Specifically, some health units described the value of working with interorganizational networks or homophilous networks that had similar characteristics to support public health work in the area of CDP (i.e. colleagues from the same discipline; peer groups from similar health regions). Due to the limited number of staff in rural PHUs, horizontal networks are particularly important for spreading peer influence to build capacity (i.e. knowledge capacity). Practical examples of homophilous networks include Association of Epidemiologists of Small, Rural, and Northern Health Units (APHEO SRNHU working group), Tobacco Control Area Network (TCAN), Ontario Dietitians in Public Health (ODPH), Ontario Society of Physical Activity Promoters in Public Health (OSPAPPH), and Eastern Ontario Active Transportation Network (EOATN). In addition, Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) drew on strong evidence from work by Fennell & Warnecke (1988); Fitzgerald, Ferlie, Wood, & Hawkins (2002); and West, Barron, Dowsett, & Newton (1999). They suggested that adoption of programs was more likely if peer groups were homophilous. Further, Damschroder et al. (2009) noted that individuals were more likely to adopt an intervention, if leaders and early users were homophilous. Therefore, a key lesson

learned was that horizontal networks, specifically homophilous networks were important in a rural public health setting.

Fourthly, bonding social capital between CDP public health professionals and community partners was also shown to positively influence implementation. Although there are many definitions of social capital from prominent social scientists (Coleman, 1990; Bourdieu, 1986, Putman, 1993, 1995), it is Putman's (Putman, 1993, 1995) definition of social capital that has received the most attention amongst health researchers (Campbell & Gillies, 2001). Specifically, Putnam (1995) defined social capital as "features of social organization such networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (p. 67). Putman suggests that 'social capital' is one term used to describe the collective value of social connections (Putnam, 1995). Dimensions of social capital include civil society, community, social networks, participation, volunteering, trust, reciprocity, social exclusion/inclusion, equity, and local opportunity structures (Baum & Ziersch, 2003). Narayan (1999) distinguishes between two types of social capital: bonding social capital and bridging social capital. Bonding social capital refers to the relationship between individuals or groups that share similar demographic characteristics (i.e. same age, race, religion, etc.). In comparison, bridging social capital refers to the relationships among individuals or groups that cut across different communities (i.e. people that support an innovation from another community) (Narayan, 1999). Although these classifications allow for two distinct heterogeneous categories, bonding social capital was considered to be most appropriate to describe the relationship between public health and partnerships, given that they live in the same geographic location (i.e. rural area), and was provided an opportunity to advance rural public health practice in the area of CDP. When participants ascribed the meaning of social capital, they often described social capital in terms of structural social capital (i.e. informal network ties and configurations); cognitive social capital (i.e. shared values, attitudes, and beliefs); and relational social capital (i.e. nature and quality of partnership relationships) (Damschroder et al., 2009). Bourke, Humphreys, Wakerman, & Taylor (2010), also suggests that social capital may also be stronger in rural areas. For example, low population density, low levels of public services, and isolation in rural areas were found to promote connectivity in rural areas (Ziersch, Baum, Darmawan, Kavanagh, & Bentley, 2009). Furthermore, this coincides with the work by Damschroder et. al. (2009), who also suggests that social capital is critical to implementation. Therefore, this study strongly draws attention to the importance of maintaining and building strong social networks and relationships among partnerships by fostering and building social capital in rural areas to facilitate implementation. Although, it is recognized that relational and material aspects

(trusts, networks) of social capital are important in rural areas, political aspects are often underrecognized (Hawe & Shiell, 2000). Therefore, future exploration of the influence of political social capital in relation to implementation may also be warranted.

Theme #2: External Policies and Incentives

The second theme within the outer setting was external policies and incentives. In this study, most health units provided input into the modernization of the OPHS. The analysis demonstrated mixed views about the modernization of the OPHS. Participants indicated that there were factors that both facilitated and impeded implementation of the policy. As noted earlier, the three factors that facilitated implementation were alignment with the current mandate, non-prescriptiveness, and inclusion of the new standards (i.e. health equity). On the other hand, this study drew attention to the importance of ensuring capacity (human, resources, and funding); and MOHLTC strategic direction, guidance, and supportive tools; to support successful implementation of the policy especially in rural PHUs (i.e. policy capacity). Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) noted that external policy mandates (i.e. OPHS) increase an organization's predisposition, but not necessarily its capacity to adopt a policy. Therefore, these "political must dos" may divert activity away from locally generated ideas or priorities (Greenhalgh et al., p. 610). Further, participants indicated that the policy itself in the area of health promotion was relegated a lower priority compared to health protection. Specifically, they suggested that protocol driven programs in health protection were sometimes considered more important than non-protocol programs in health promotion. Perhaps, an implication for future policy implementation is to identify mechanisms that create a supportive culture (i.e. health promotion and health protection) related to the policy.

Theme #3: External Leadership Engagement

The third theme within the outer setting was external leadership engagement. In the study, the role of appointed external leaders both facilitated and impeded implementation. The appointed leaders that were discussed were as follows: a) Municipalities or Districts, b) PHO, c) BOH, d) MOHLTC, and e) LHIN. Participants had varying opinions on the style of leadership approaches and were categorized into either transformational leadership styles/approaches (i.e. facilitated implementation) (Carless, Wearing, & Mann, 2000) or dysfunctional leadership styles/approaches (i.e. impeded implementation) (Shaw, Erickson, & Harvey, 2011). Participants identified transformational leadership styles among Municipalities/Districts and PHO. For example, Municipalities/Districts engaged CDP staff in the area of policy development (i.e. urban planning) and PHO supported

evidence-based practice by providing access to tools and resources in the area of research, evidence, and best practice (i.e. LDCP and PHO Snapshots). In general, Greenhalgh and colleagues (2004) suggested that human relations should be supportive and positive, and this was particularly important in rural areas, since this study revealed that relationships were “hugely important” and had a great influence on implementation (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). On the other hand, participants also reported destructive leadership styles among external leadership. Some health units reported that there were four external appointed leaders that engaged in behaviors associated with destructive leadership that impeded implementation.

The first was PHO. Although PHO was seen to positively influence implementation in the area of research, evidence, and best practice, some participants stated that they “wanted more”. Specifically, some participants were concerned about the lack of personalized support in planning and evaluation, the lack of access to central analytics (i.e. Public Health Snapshots), and the lack of research and evaluation centralized support services (i.e. Public Health Research, Education and Development (PHRED) – library services).

The second was the BOH. The study also showed that the topic of the BOH was spoken about as a barrier of implementation for some health units. Specifically, BOH structure and destructive leadership approaches had a negative impact on implementation. Complaints ranged from underrepresentation of elected officials from rural areas (i.e. structure); autocratic behaviour (e.g. political power negatively influenced decisions); excessive political behaviour (e.g. implementation aligned with voters’ priorities); and making decisions based on inadequate information (e.g. political directives were biased and guided by weak evidence).

The third was the MOHLTC. Some participants indicated that the MOHLTC engaged in destructive leadership approaches that negatively impacted implementation of CDP programs and policies in rural areas. Some participants reported feeling unsupported and disempowered. Complaints ranged from autocratic behaviour (i.e. over-controlling); poor communication (i.e. lack of transparency); making decisions based on inadequate information (i.e. lack of understanding of CDP and rural public health systems, which was demonstrated by the decommissioning of the resource centres); and excessive political behaviour (i.e. conflicting public policies to gain power and influence that misaligned with the core functions of public health – i.e. Ontario’s alcohol policy).

The fourth was the LHIN. The LHIN also engaged in destructive leadership approaches that negatively affected implementation. Some health units said that they felt disempowered, resulting

from poor integration and linkages between the LHIN and public health. Specifically, some participants felt that the LHIN was unsupportive and unreceptive towards public health, and they lacked a coordinated approach in the area of evidence-informed public health practice.

There was clear recognition that destructive leadership approaches impeded implementation of CDP programs and policies in rural Ontario PHUs. Generally, the role that they assumed, “blocked” implementation and this appeared to be frustrating for staff and management, given that they had limited resources (i.e. human, funding, and resources). Therefore, this study draws attention to the importance of transformational leadership approaches in a rural public health setting. At the practical level, in response to destructive leadership approaches, participants identified a plethora of solutions to make improvements (See description across the cases). Future research might be warranted to examine destructive leadership approaches in-depth in relation to implementation of EIPH practice in rural Ontario PHUs.

Theme #4: Population External Communication

The fourth theme within the outer setting was population external communication. There were mixed views about population external communication methods. In general, participants reported that CDP programs and policies were communicated to the public through formal (print media, broadcast, social media) and informal communication methods (word of mouth). Similarly, Rogers, categorized communication channels as either mass media such as newspaper, TV, radio, and interpersonal channels that consists of two-way communication between two or more individuals (Rogers, 1983, 2003). Rogers claimed that diffusion is a specific kind of communication and that these two types of communication channels, “play different roles in creating knowledge or in persuading individuals to change their attitude toward an innovation” (Rogers, 1983, p.199). Specifically, Rogers (2003) suggested that interpersonal channels (i.e. word of mouth) were more effective in forming and changing attitudes towards a new idea, whereas mass media channels (i.e. print, broadcast, and social media) were more effective in the development of new knowledge towards an innovation. Therefore, these findings suggested that both methods of communication were important for successful implementation of EIPH practice for CDP programs and policies in rural Ontario PHUs. However, it was clear that there were barriers to communication in rural areas. This was primarily due to the lack of access to local newspaper (i.e. once a week); low capacity to communicate to the public; administrative bureaucracy associated with traditional media (“jump through hoops”); and technological barriers (i.e. dial-up internet, internet connectivity issues in outlying areas, lack of

access to a computer, and lack of access to cell phones). Therefore, these findings also highlight the need to address communication barriers in rural areas (i.e. policy, planning, and evaluation) to support successful implementation.

Theme #5: Reach

The fourth theme within the outer setting was reach. Participants reported several challenges in relation to reach which included the following: a) low reach in rural and outlying areas (e.g. participation barriers – transportation, distance, inconvenience); b) difficulty reaching priority populations (e.g. youth, Indigenous communities); c) program impact was based on high reach (i.e. low participation rates making it difficult to justify program decisions); and; d) overall effectiveness.

In terms of reach, Damschroder et al. (2009) noted that the RE-AIM framework can be useful to “guide comprehensive evaluation of interventions in terms of Reach, Effectiveness, Adoption, Implementation, and Maintenance (sustainability)” (p. 12). Specifically, the RE-AIM by Glasgow and colleagues is the most notable evaluation framework in healthcare that is used to assess population impact of interventions and more recently policies (Glasgow, Vogt, & Boles, 1999; Nilsen, 2015; Tabak, Khoong, Chambers, & Brownson, 2013; Gaglio, Shoup, & Glasgow, 2013). The framework explicitly draws attention to the problem of translating evidence-informed public health (EIPH) practice to real world settings (Glasgow, Vogt, & Boles, 1999).

While it is encouraging that traditional science generates findings relevant to EIPH practice, it is also discouraging that these findings are often produced in very controlled environments, using highly standardized protocols and homogenous individuals (Glasgow, Vogt, & Boles, 1999). In response to this, the overall goal of this framework is to recognize the interplay of complex, socio-ecological, multi-level external factors, as well as internal factors that can be translated into broader healthcare use (Glasgow, Vogt, & Boles, 1999; Gaglio, Shoup, & Glasgow, 2013).

Therefore, the RE-AIM can be used in planning and evaluation of healthcare interventions and policies, which highlight the need not only to just understand ‘what works’ but from ‘whom’, ‘under what circumstances’, and ‘why’? (Glasgow, Vogt, & Boles, 1999; Moore, de Silva-Sanigorski, & Moore, 2013; Gaglio, Shoup, & Glasgow, 2013). Perhaps, application of this framework can improve the implementation of effective and generalized CDP programs and policies in rural Ontario PHUs with a realist lens (Gaglio, Shoup, & Glasgow, 2013). Therefore, this study highlights the importance of reaching rural populations (i.e. priority populations, outlying areas).

Theme #6: Population Needs and Resources

The fifth theme within the outer setting was population needs and resources. The theme (i.e. construct in CFIR) was slightly modified to reflect “populations” rather than “patients” to better represent public health practice (i.e. “patient” is a clinical term) (see Appendix S). The topic of population needs, and resources was spoken about as a key theme that negatively impeded evidence-informed CDP programs and policies in rural Ontario PHUs. Factors that impeded implementation for population needs and resources were further subdivided into the following subthemes: a) environment; b) population characteristics; and c) behaviour and health. A discussion of each subtheme follows.

The first subtheme was the environment. Respondents noted that features of the built environment, natural environment, and social environment impeded implementation. Some staff members identified several challenges including the following: limited availability and access to public health programs and services; limited availability and access to public transportation systems; low or no connectivity (i.e. sidewalks, streets); extreme weather (i.e. winter); low population density and large geography; and geographic isolation.

Similarly, Brundisini et al. (2013) systematic review and qualitative meta-synthesis of chronic disease patients’ experiences with accessing health care in rural and remote areas also found that participants (i.e. chronic disease patients) reported limited availability of health care services; lack of access to transportation systems; large geographic distance from services affecting access to services; poor weather conditions; and geographic isolation in rural areas. Brundisini et al. (2013) has argued that these barriers can contribute to health vulnerabilities among people with chronic diseases in rural areas. Therefore, this study highlighted the impact of the built environment (i.e. access), weather, and geography that influence implementation in rural areas.

The second subtheme was population characteristics. Health units described heterogeneity across municipalities and within neighbourhoods regarding local needs, priorities, and contexts. Specifically, they spoke about the relationship between heterogeneity (i.e. huge variation – little towns, hamlets, small towns, municipalities), low population density, and urban sprawl (i.e. large geographic area). This was seen as a challenge because of their inability to adapt CDP programs and policies in multiple settings across a large geography. Similarly, Terashima, Guernsey, & Andreou, (2014) and the Canadian Institute for Health Information (2006) noted heterogeneity within rural areas and the differential influence heterogeneity has on health.

Health inequities that exist among priority populations, particularly among Indigenous communities (inclusive of First Nations [Status and Non-Status], Métis, Inuit, and those who self-identify as Indigenous (Ontario Ministry of Health and Long-Term Care, 2018a, p. 6) was identified as another factor that impeded implementation in rural areas. Health unit staff spoke about the challenges related to Indigenous engagement to include the following: a) building relationships (e.g. jurisdictional issues, language barriers); b) lack of resources (e.g. lack of funding); and c) use of health information (e.g. lack of access and credible data for Indigenous communities) (Ontario Ministry of Health and Long-Term Care, 2008). Despite modest improvements in the socio-economic status of Canadian Indigenous communities, over recent decades, health inequities still exist (Indian and Northern Affairs Canada, 2009). Specifically, Indigenous communities have increase rates of food insecurity, poverty, higher rates of unemployment, lower levels of education, and poorer living conditions than Non-Indigenous communities (POWER UP! Coalition Linking Action and Science for Prevention, 2008; Wilson, & MacDonald, 2010; Moyser, 2017; Leach, 2010; Gionet & Roshanafshar, 2015; Pal, Haman, & Robidoux, 2013). These disparities are largely influenced by social (i.e. policies, media), political, and cultural factors (i.e. colonisation, assimilation policies, and dispossession of lands), and have all have contributed to inequities and poorer health among Canadian Indigenous communities (Canadian Rural Revitalization Foundation, 2015). Therefore, this study draws attention to the importance of Indigenous community engagement in rural areas.

In relation to the social environment and health, some participants reported that rural areas have higher rates of low income, poverty, low levels of education, and higher rates of food insecurity compared to urban counterparts. It is not surprising, since rural areas have socio-economic and demographic disparities compared to urban areas (Moazzami, n.d). According to Mozaaami (n.d) report on strengthening rural Canada, rural residents were found to be less educated, and have lower earnings than urban residents. Generally, income and levels of education decline as the degree of rurality increases (Moazzami, n.d). These socio-economic characteristics can negatively affect healthy lifestyle behaviours, access to healthcare services, and social and economic opportunities (Phelan, Link, & Tehranifar, 2010; Nord, 1998). Food insecurity was another socio-economic disparity in this study. Of particular interest, Buck-McFadyen (2015) conducted an ethnographic study to explore the experiences of food insecurity in a rural area of southern Ontario. Study participants identified both facilitators and barriers that rurality had on food insecurity. A strong sense of social cohesion and a culture of trust were identified as positive aspects of rural living that influenced food insecurity, whereas no public transportation and employment opportunities were

identified as negative aspects of rural living that influenced food insecurity (Buck-McFadyen, 2015). From a broad social determinants of health perspective, Buck-McFadyen (2015) concluded that: “prevention of food insecurity through initiatives like access to rural employment opportunities, quality childcare, drug benefits, a livable wage, and income programs, the health, and well-being of rural families can be improved” (p. 145). Therefore, the social environment demonstrated a powerful influence on implementation in rural areas these and these influences deserve more exploration.

The third subtheme was behaviour and health. Many staff members identified that rural areas have a high prevalence of tobacco use (smoking), physical inactivity, lack of fruit and vegetable consumption, and alcohol consumption, which may have contributed to health inequities experienced by rural populations. Similarly, some of these elevated health-related factors have also been reported in the literature in rural areas (Canadian Institute for Health Information, 2006; Statistics Canada, 2018). Since the study revealed that staff spoke to the importance of health-related factors in rural areas, each risk factor will be briefly discussed in relation to the literature. A discussion follows.

The first is related to smoking. Although there is a dearth of published information examining urban/rural variation in smoking rates in Canada, studies have also shown that smoking prevalence was higher in rural areas compared to urban areas (Mitura & Bollman, 2003; Li, Robson, Ashbury, Hatcher, & Bryant, 2009; Statistics Canada, 2015c). The landmark report, “*How Healthy Are Rural Canadians? An Assessment of Health Status and Health Determinants*” also found that the proportion of smokers was found to be higher in rural areas compared to their urban counterparts, and generally increased with increasing rurality (Canadian Institute for Health Information, 2006). The predictors in increasing the risk of smoking (daily or occasional smoker) included in their analysis included: being less than 45 years of age, identify as Indigenous, regularly consuming alcohol, lower education and income, increase stress levels, having poor or fair self-rated health, and being physically inactive (Canadian Institute for Health Information, 2006).

The second is related to physical inactivity. Similarly, the Canadian Institute for Health Information (2006) observed rural and urban differences for physical activity. Specifically, Canadians living in a Moderate Metropolitan Influenced Zone (MIZ) areas were less active compared to their urban counterparts (Canadian Institute for Health Information, 2006). There is little research on the factors that influence physical activity in rural areas in Canada. However, it is generally recognized that the lack of physical activity is a multifactorial issue, that is influenced by several factors including the environment, socio-economic status, lifestyle behaviours, genetics, social, and cultural factors

(Bauman, Sallis, Dzewaltowski, & Owen 2002; Sallis & Owen, 1999; Trost, Owen, Bauman, Sallis, & Brown, 2002). Specifically, education level, perceived health status, proportion of friends who exercise in the past, injury from previous activity causing mobility limitations, and the natural, built, and physical environment are some of the factors that have been found to be associated with physical activity (Plotnikoff, Mayhew, Birkett, Loucaides, & Fodor, 2004; Public Health Agency of Canada, 2016).

The third is related to lack of fruit and vegetable consumption. Similarly, the Canadian Institute for Health Information (2006) observed that a lower proportion of Canadians living in No MIZ areas consumed the recommended daily allowance of fruits and vegetables compared to other areas. There is little research on the factors that influence healthy eating in rural areas in Canada. The factors that influence healthy eating are complex and multifactorial that may be influenced by population, individual, and geographical variation.

While individual behaviour is important, recent emphasis has been placed on the environment to improve healthy eating, including access to fruits and vegetables (Egger & Swinburn, 1997; Townsend & Foster, 2013; Golden & Earp, 2012). Food environments have been found to be associated with the consumption of fruits and vegetables (Kamphuis et al., 2006). Therefore, health promotion interventions may be more effective when healthy choices are facilitated by enhanced accessibility, affordability, and availability to fruits and vegetables in rural areas, with a common understanding of some of the challenges that rural communities may face. Specifically, rural areas are sometimes considered food deserts with poor access and availability of fresh produce (Liese, Weis, Pluto, Smith, & Lawson, 2007). For example, rural areas may be constrained with fewer resources (i.e. grocery stores), long distances to their primary food store, and reasonably priced and quality nutritionally dense food (Black, 2015). Interestingly, in response to this, participants suggested filling a bus with fruits and vegetables targeting food deserts. Food environments in rural areas might have an implication for future practice and policy implications, in rural Ontario PHUs.

The last noteworthy health-related risk factor was alcohol. Similarly, Slaunwhite & Macdonald (2015) noted increased rates of alcohol consumption and alcohol-related harms in rural areas. Some participants felt that Ontario's alcohol policy from the Ministry contradicted public health practice and had a great impact on population health, especially chronic non-communicable diseases. In response to this, some participants suggested modifying Ontario's alcohol policy to align with public health practice.

Overall, the study drew attention to elevated health-related risk factors in rural areas. An implication for future research, policy, and practice is to examine barriers and facilitators to implementation of evidence-informed CDP programs and policies in rural Ontario PHUs for each risk factor, to better understand and inform future developments in rural Ontario PHUs.

III. Inner Setting

The inner setting is an important category in the CFIR that influenced implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs (Damschroder et al., 2009). Participants identified five themes that aligned within the inner setting of the CFIR to include structural characteristics, culture, implementation climate, readiness for implementation, and interorganizational networks and communication that influenced implementation of EIPH practice in rural areas. A discussion of each theme follows.

Theme #1: Structural Characteristics

The first theme within the inner setting was structural characteristics. In this study, structural characteristics, or mechanisms established to influence practice, both facilitated and impeded implementation of evidence-informed CDP programs and policies in rural Ontario PHUs (Damanpour, 1991; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). For example, decentralization and informal structure characteristics were identified as powerful influences of implementation.

Health unit staff described that decentralized decision-making (e.g. staff autonomy), cross collaboration across and within teams to build capacity, and low administrative intensity (e.g. flexibility, less bureaucracy, simple) supported implementation. Similarly, Damanpour (1991) reviewed 13 potential structural determinants of innovation based on 23 studies outside the healthcare system, which included centralization and formalization. Damanpour (1991) meta-analysis found that there was a negative relationship between innovation and centralization. These results suggest that an innovation is successful when the decision-making authority is distributed throughout a larger group (Damanpour, 1991). Such a context is referred to as a ‘decentralized organization’ (Damanpour, 1991). Damanpour (1991) further states that decentralization creates a learning culture that focuses on individuals, group processes, and organizational systems. Therefore, in this study, decentralization in rural PHUs was critical in supporting implementation efforts of evidence-informed CDP programs and policies. On the other hand, Damanpour (1991) meta-analysis found no

significant association between formalization and organizational innovativeness. Therefore, future research is warranted in the area of formalization and implementation of innovations (programs, policies), specifically in rural organizations. Key lessons learned from this study included the importance of decentralization and informal approaches within rural PHUs.

Participants also identified the generalist role as a factor that negatively affected implementation. Participants explained that in a small rural organization they wear, “a lot of hats”. Challenges ranged from competing demands to focusing on multiple CDP topic areas. Of particular interest, Damanpour (1991) meta-analysis also found that the number of an organization’s specialities were significantly and positively associated with organizational innovativeness. However, it is important to note that the generalist role was also seen as a factor that supported implementation (See CDP Team Champions - organization role). Hence, based on these findings, the role of generalists warrants further exploration in rural PHUs.

Theme #2 Culture

The second theme within the inner setting was culture. Culture was shown to positively influence implementation. Health unit participants referred to their organizational culture as a “clan culture”. A clan culture (i.e. collaborative) is a culture with less focus on structure and control and has greater concern for flexibility, where people are driven through shared goals, vision, outputs, and outcomes (Quinn & Rohrbaugh, 1983). Clan culture is a quadrant from the Competing Values Framework (CVF), conceptual model in healthcare settings used to describe different types of organizational culture that was developed by Quinn and Rohrbaugh (Quinn & Rohrbaugh, 1983; Cameron & Quinn, 1999).

Similarly, some staff identified the characteristics of a clan culture that facilitated implementation. These were as follows: a) a very personal place (organization) like a family; b) mentoring and nurturing leadership style; c) management style that emphasized teamwork, consensus, and participation; and d) organizational glue that consisted of loyalty and mutual trust (Quinn & Rohrbaugh, 1983; Cameron & Quinn, 1999). Damschroder et al. (2009) systematic review yield that organizational culture is the most important influence on knowledge exchange, transfer, and translation. Specifically, in healthcare settings, numerous subcultures exist across and within teams, and these cultures must be understood if innovations are to be developed, implemented, and sustained (Damschroder et al., 2009; Urquhart, Sargeant, & Grunfeld, 2013). Therefore, this study draws attention to the importance of clan culture to support successful implementation in rural PHUs.

Theme #3: Implementation Climate

The third theme within the inner setting was implementation climate. In this study, implementation climate was spoken about as a barrier to implementation and was further subdivided into the subtheme, tension for change. Tension for change was also another important construct in the framework within implementation climate. A discussion of the subtheme follows.

The major factor that was frequently cited was health unit restructuring. Specifically, some participants reported that health units felt the need to “reorganize every two to three years”. In some cases, this tension to restructure was a result of the modernization of the standards. Challenges ranged from maintaining partnership relationships, meeting the needs of local needs, priorities, and contexts, to maintaining a visible presence in rural communities. Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) drew moderate direct evidence from work by Gustafson et al. (2003). Gustafson and colleagues showed that if the current situation was intolerable or needing change, a potential innovation (i.e. restructuring) was more likely to be successfully assimilated, regardless if an organization was ready or willing to assimilate an innovation (i.e. restructuring). An implication for implementation climate is to further investigate the mechanisms related to health unit restructuring.

Theme #4: Readiness for Implementation

The fourth theme within the inner setting was readiness for implementation. This is a broad category that included factors that facilitated and impeded implementation. In this study, readiness for implementation was further subdivided into internal leadership engagement, access to knowledge and information (i.e. share new knowledge), and available resources. Each subtheme (construct) was included in the CFIR which was shown to influence implementation (Damschroder et al., 2009). A discussion of each subtheme follows.

As previously stated, the CFIR includes the construct leadership engagement as critical to implementation in the inner setting. In the study, the role of internal leaders both facilitated (i.e. transformational leadership styles) and impeded implementation (i.e. destructive leadership styles). There were three notable internal leaders, including CDP team champions, management, and the MOH. A discussion of each internal leader follows.

The first was CDP team champions. CDP team champions were a significant factor that facilitated implementation of evidence-informed CDP programs and policies in rural areas. Champions is also

another important construct in the CFIR (Damschroder et al., 2009). Damschroder et al. (2009) defined champions as “individuals who dedicate themselves to supporting, marketing, and driving through an [implementation]” (p.11). Health Unit participants described their personality characteristics (e.g. innovative, persistent, and persuasive), organizational role (i.e. generalists), and influence tactics (i.e. pulling together a diverse group of professionals and appealing to a higher authority). Backer & Rogers (1998); Markham (1998); Meyer & Goes (1988); and Schon (1963) found that the adoption of an innovation by individuals in an organization was more likely if there are champions who support the innovation. Similarly, Shea & Belden (2016) review on champions also found that champion personality characteristics (i.e. achievement, persuasiveness, persistence, innovativeness etc.), organizational role (i.e. unofficial and official leadership roles), experience and training, and influence tactics (i.e. presenting rational arguments etc.), management support for the champion (i.e. recognizing and rewarding champions etc.), and champion impact. (i.e. implementation process, organizational level-innovativeness, organizational-level innovativeness) affect implementation. Of particular interest, Damschroder et al. (2009) noted, “there is the old adage that an intervention ‘either finds a champion or dies’” (p. 11). This study draws attention to the importance of the role of champions to support successful implementation in rural Ontario PHUs especially in a rural setting where there is greater collaboration and partnership building.

The second was management. Participants had mixed opinions in relation to leadership approaches among management. Some participants felt that management demonstrated transformational leadership styles (i.e. supportive, leader, innovative, and empowered), and this facilitated implementation. Similarly, a study by Klein, Conn, Smith, & Sorra (2001), found that managers who supported an innovation were more likely to develop high quality implementation policies and procedures, and provide the necessary resources to ensure an internal culture conducive to successful implementation, compared to managers who were non-supportive (Klein, Conn, Smith, & Sorra, 2001; Damanpour, 1991; Damschroder et al., 2009; and Urquhart, Sargeant, & Grunfeld, 2013). Hence, leaders can enhance rural public health practice by being “leaders in rural health” to overcome barriers by cultivating rural innovation, empowering, and supporting staff.

On the other hand, some participants felt that management demonstrated dysfunctional leadership approaches (i.e. unsupportive) and this impeded implementation. However, how management styles negatively influenced implementation was not clear and may warrant further exploration.

The third was the MOH. MOH's were seen as having a positive influence on implementation of evidence-informed CDP programs and policies in rural Ontario PHUs. MOH were described as supportive, visionary, innovative, charismatic, and a leader. However, they were also described as autocratic, which negatively impeded implementation (i.e. attempt to motivate others by asserting authority). However, this leadership approach was not surprising, given their leadership role in public health. Perhaps, how autocratic styles influenced implementation in public health among senior leadership (i.e. MOH) also warrants further investigation. Overall, the importance of transformational leadership styles (i.e. PHU Managers and Senior Management), in rural PHUs to support implementation, is a key lesson learned as a result of this study.

Access to knowledge and information was also noted to be very important by most health units. Specifically, this study revealed that rural PHUs had a high absorptive capacity for new knowledge, which positively influenced implementation. Specifically, absorptive capacity was directed at sharing new knowledge. Participants described internal organizational learning mechanisms that included sharing of information and opportunities for training and professional development among staff and management (e.g. staff in-service, lunch and learns, knowledge exchange days (i.e. guest speakers) and round robins). In relation to knowledge, Polyani (1983) argued that knowledge is explicit or tacit. Explicit (i.e. formal) knowledge is codified knowledge that can be found in a guideline, manual, or protocol (Nonaka, 1994; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Whereas tacit (i.e. informal) knowledge is described as the know-how or practical wisdom of an individual or organization (i.e. personal experience) (Nonaka, 1994). Generally, knowledge is considered explicit if it is articulated or codified and tacit if it is not communicated or formalized (Nonaka, 1994). Both co-exist together. Nonaka (1994) suggests that this "synergetic dialogue" drives knowledge creation at the organizational level. Greenhalgh and colleagues (2004) noted that organizations with high absorptive capacity, that is organizations that are systematically able to identify, exchange, transfer, and translate new knowledge, to connect it to its own knowledge base, and put it to appropriate use will be better able to assimilate innovations (Greenhalgh et al., 2004). Furthermore, Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) also suggested that an organization's tacit knowledge, learning culture, and supportive leadership approach directed towards sharing knowledge are perquisites for absorptive capacity. Therefore, the study showed the importance of organizational learning mechanisms (i.e. informal networking and communication, formal internal training and professional development opportunities (e.g. in-services, lunch and

learns etc.), and transformational leadership styles) to build capacity in rural PHUs, by capitalizing on knowledge sharing opportunities.

However, participants also spoke about the topic of absorptive capacity for new knowledge as a barrier of implementation. Specifically, some staff identified that the lack of affiliation with academic institutions in rural areas negatively impacted information sharing, decision-making, and knowledge development, which is important for organizational learning. Therefore, the study draws attention to the importance of identifying opportunities to establish working relationships and interests with academic researchers through interprofessional collaboration (i.e. build learning/educational opportunities) to inform rural PHU practice in the area of CDP.

The importance of available resources in a rural public health setting was also discussed by participants. Participants noted that the lack of dedicated and ongoing funding (i.e. Ministry funding), lack of time (i.e. distance and geography (i.e. weather) impacted staff time to implement programs in branch offices and rural areas), low human capacity (i.e. lower number of FTE's – 1 Epidemiologist), and lack or limited program resources because of their small size had a negative influence on implementation of EIPH practice in rural areas. This is not surprising given that the practical reality in providing public health services in rural areas requires a different approach (i.e. high complexity), compared to urban counterparts. Therefore, the study draws attention to the unique needs of rural PHUs and the importance of available resources that support successful implementation, particularly in public health settings with highly constrained resources (i.e. remote areas). Similarly, Damschroder et al. (2009) systematic review yield that researchers (Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008; Denis, Hébert, Langley, Lozeau & Trottier, 2002; Perrin et al., 2006; Leeman, Baernholdt, & Sandelowski, 2007; Pronovost et al., 2006; Meyers, Sivakumar, & Nakata, 1999) revealed that the level of resources dedicated to the innovation was positively associated with implementation. In addition, Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) cited strong indirect evidence from work by Gustafson et al. (2003) and moderate direct evidence from Rogers (1995) that suggested that an innovation that started with a budget and is allocated with adequate and sustained resources was more likely to be assimilated, compared to an innovation that has been allocated with insufficient resources.

Theme #5: Intraorganizational Networks and Communications

The fourth theme within the inner setting was intraorganizational networks and communications. Intraorganizational networks and communications is another theme that facilitated implementation

(Damschroder et al., 2009). Participants identified that informal networking was encouraged by their health unit. Since the size of the health units were small, both informal horizontal (peer) and vertical (leadership) networking contributed to a positive workplace culture. The study revealed that informal communications was an effective approach to exchange knowledge, decrease administration intensity or bureaucracy, and promoted engagement and collaboration in rural PHUs.

Valente (1996), defines social networks as, “a pattern of friendship, advice, communication or support which exists among members of a social system” (p. 70). These networks take many forms in an organization, including personal contact networks, teams, units, and individuals, and their communication with one another may be formal or informal, tangible or intangible, and strong or weak (Damschroder et al., 2009). Drawing from Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) review, they revealed that social networks are a dominant mechanism for diffusion and implementation. Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou (2004) cited strong and moderate evidence that suggested that the adoption of interventions is powerfully influenced by the structure and quality of social networks. Therefore, this study draws attention to the importance of informal networking in rural PHUs to facilitate implementation.

IV. Characteristics of Individuals

Characteristics of individuals was another important category in the CFIR that influenced implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs (Damschroder et al., 2009). As noted earlier, the theme, individual identification with organization aligned with the CFIR by facilitating implementation. A discussion follows.

Theme #1: Individual Identification with Organization

The first theme within characteristics of individuals was individual identification with the organization. Commitment to the organization was reported by all health units. This was demonstrated by employee retention. The study showed that staff stay at the health unit for decades (i.e. 42 ½ years) and took on multiple public roles. This was particularly important in rural PHUs since long-term relationships with community partners appeared to be important to implementation. As a result of employee retention, participants also indicated that they accumulate knowledge shaped through social experience, including practice. Damschroder et al. (2009) noted that organizational commitment may affect staff’s willingness to fully engage in implementation or use a

program/policy. Therefore, a key lesson learned from this study was the importance of employee retention in rural PHUs.

The study also showed that employee passion was noted as a great influence on implementation. Specifically, job characteristics (i.e. meaningful work, motivation, self-efficacy), and relationship characteristics (i.e. rewarding interpersonal connections with colleagues and community) were factors that contributed to employee work passion in rural PHUs. This is important, especially in rural PHUs, because they were committed and passionate towards improving rural public health practice and to minimize or overcome challenges related to implementation when possible.

Similarly, the Thibault-Landry, Egan, Crevier-Braud, Manganelli, & Forest (2018) study of employee work passion appraisal model using self-determination theory, noted that job characteristics and relationship characteristics were associated with employee work passion, and this resulted in positive individual and organizational outcomes.

Of particular interest, Cane, O'Connor, & Michie (2012) recognized that psychological explanations of behavior change was the next critical step in advancing implementation research in public health. They suggested that behaviour change was the key to improving public health and health outcomes (Michie et al., 2005; Cane, O'Connor, & Michie, 2012). Cane, O'Connor, & Michie (2012) clearly articulated the importance of using behaviour change in implementation research by stating:

Designing interventions on the basis of the practitioner or researcher intuition rather than theory precludes the possibility of understanding the behaviour change process that underlies effective interventions and of applying this knowledge to inform the design of future interventions (p.2).

Cane, O'Connor, & Michie (2012) made an important contribution to the field of implementation science and public health by developing the Theoretical Domains Framework (TDF). The TDF is an integrative and comprehensive framework of 14 theoretical domains and 128 component constructs, from 33 behaviour change theories, including many social cognitive theories (Cane, O'Connor, & Michie, 2012). It was developed using a validation and expert consensus process to identify an agreed set of theoretical domains and constructs to facilitate implementation interventions and explain implementation problems (Cane, O'Connor, & Michie, 2012). Given the central role of behavior, it is not surprising that the TDF also fits well with the Behaviour Change Wheel (BCW) (Michie, van Stralen, & West, 2011). The BCW targets behaviour in terms of capability

(psychological and physical capability), opportunity (social and physical opportunity), and motivation (reflective and automatic motivation) (Michie, van Stralen, & West, 2011). Therefore, the future application of TDF and the BCW, to understand the social and cognitive psychology of individual traits on implementation, may be warranted in rural Ontario PHUs. Overall, the importance of work attitude (i.e. employee passion) in rural PHUs was highlighted.

V. Process

Theme #1: Planning

The theme within the process category was planning. Planning was identified as a factor that facilitated implementation of EIPH practice in rural Ontario PHUs. The study showed that implementation was integrated into the health unit planning processes. Many staff members reported making explicit reference to strategic; operational planning documents; and seminal publications, models, theories, operational lens (i.e. health equity lens), and frameworks (e.g. logic models, The Ottawa Charter for Health Promotion, Social-Ecological Model, SDOH, etc.) throughout the planning process. They also discussed the importance of incorporating evidence-informed decision-making throughout the planning cycle and planning at the intervention level (i.e. upstream approaches). Another important consideration in rural PHUs, was the need to modify CDP programs and policies to local needs, priorities, and contexts in heterogenous rural areas to accommodate greater variability and decrease health inequities. Although, the study did discuss standardized planning mechanisms (i.e. operational planning documents), it does raise the issue of having specialized planning mechanisms (i.e. healthy rural communities tool kits, rural operational planning documents etc.) that can support implementation of evidence-informed CDP programs and policies in rural Ontario PHUs.

Damschroder et al. (2009) also identified planning as a key construct in their CFIR. Specifically, they discussed the importance of incorporating models and theories, monitoring and evaluation, and contextual factors (i.e. upstream approaches in public health) to promote effective implementation (Damschroder et al., 2009). Therefore, the study draws attention to the importance of a formal planning process (i.e. operational, strategic) in a rural public health setting, given rural PHUs have limited human and financial capacity.

b. Summary of the Major Findings

Overall, the results of this study showed that implementation of CDP programs and policies in rural Ontario public health units are complex (i.e. theoretical, multi-layered, multi-factorial), related (i.e. wide-array of constructs related to the intervention itself, individual characteristics, inner and outer setting, and process), multiple (i.e. several categories (domains) and themes (constructs), subthemes, and factors), and temporal (i.e. over time).

Factors that facilitated or impeded implementation were summarized under five broad categories (intervention characteristics, outer setting, inner setting, characteristics of individuals, and process) and a further seventeen major themes within them. Major themes were as follows: evidence strength and quality, complexity, adaptability, trialability, cosmopolitanism, external policies and incentives, external leadership engagement, population external communication, reach, population needs and resources, structural characteristics, culture, implementation climate, readiness for implementation, intraorganizational networks and communications, individual identification with organization, and planning.

Key lessons learned across rural PHUs include the importance of local evidence; program/policy adaptability, simplicity, trialability; boundary spanners; horizontal networks; partnership engagement and collaboration; social capital; compatible and policy capacity; transformational leadership styles; addressing local needs, priorities, and contexts; reaching rural populations; decentralization and informal approaches; clan culture; champions; available resources (i.e. funding, time, human, resources etc.); access to knowledge and information; networking and communication (i.e. informal and formal); employee retention; work attitude (i.e. passion); and formal planning when implementing evidence-informed CDP programs and policies in rural Ontario PHUs.

c. Strengths and Limitations

The study represented a novel approach to explaining implementation of evidence-informed chronic disease programs and policies in rural Ontario rural PHUs. This study had several strengths that should be illuminated. Therefore, some of the methodological strengths were as follows: 1) the data gathering approach (i.e. stable, unobtrusive, specific, targeted, and insightful); 2) strengths pertaining to collective (multiple) case study design – constructive and non-determinism; empirical, interpretive, empathetic; honouring multiple realities (i.e. 6 different health units based on different contexts); investigation of complex issues that resulted in a holistic and rich account of the implementation factors across case analysis though formal aggregation of categorical data; the use

four inferential techniques (i.e. inductive, deductive, abductive, and retroductive); and description across cases); and 3) the credibility of the findings including application of member checks; analytic strategy; documentation of field and reflective notes; and use of triangulation to increase the validity of findings and minimize bias.

However, some limitations of the study should also be noted. These methodological limitations were as follows: 1) the data gathering approach – underrepresentation from public health disciplines (i.e. health promoters, dietitians etc.); other program areas (i.e. health protection); public health authorities (i.e. BOH); and northwestern Ontario PHUs could have provided different perspectives of the factors that influenced implementation; 2) potential response bias (i.e. focus groups) resulting from social desirable responses); 3) issues pertaining to collective (multiple) case study design (i.e. staged analytic strategy *a priori*; conformity role of propositions stated *a priori*; and time consuming (i.e. several years to conduct study); and 4) limitations of collective (multiple) cases studies at a single point in time (i.e. implementation changes over time – restructuring; modernization of OPHS, public health transformation in Ontario etc.). For example, dynamic systems can evolve and rapidly change over time. After data collection, the LDCP were defunded, and therefore decommissioned; and 14 LHIN's and 6 health agencies were starting to be consolidated into a new super agency called Ontario Health which could impact rural Ontario PHUs (Jones, 2019). Although, they were some methodological limits of the study, the study did explain how public health professionals as implementation agents conceptualized factors that facilitated and impeded implementation of evidence-informed chronic disease prevention programs and policies mandated under the OPHS in Ontario rural PHUs (through which mechanisms and in which contexts).

2. Primary Objective #2: Make a Practical Contribution to Improve the Performance of Public Health

The second objective that was used to guide this study was as follows: To make a practical contribution to improve the performance of public health through a better understanding of these factors and how rural public health professionals can be better supported by policy, strategies for knowledge translation, evaluation and research, and funding etc. to minimize barriers and maximize assets related to implementation. This section discusses practical and philosophical (i.e. ontological and epistemological perspective) aspects of the study. A description of the implications for rural public health practice and the epistemological and ontological perspective are discussed as follows.

a. Implications for Rural Public Health Practice

Given the data was developed from interviews, focus groups, and unobtrusive documents from rural Ontario PHUs, one might have reasonable confidence that the results are generalizable to other rural Ontario PHUs. This new insight into these factors can affect implementation of evidence-informed chronic disease prevention programs by minimizing barriers and maximizing assets (strength-based approach) based on local needs, priorities, and contexts. Therefore, one might suggest that these factors can serve as key aspects of information that can be used for planning and decision-making, but additional insights of the data may be warranted since it is believed that we have only begun to scratch the surface of these implementation factors. Further investigation on each of these factors would provide a deeper understanding of these factors that are at play.

At the macro systems level, since, rural PHU operate differently than urban PHUs, it is believed that the results of this study support the inclusion of a Rural Health Standard and supported protocols and guidelines in the OPHS (i.e. Health Equity) to better support rural public health practice in Ontario, considering 60% (n=21) of PHUs are currently considered rural or rural/urban mix in Ontario (as of November, 2019). Please note, two health units merged following data collection. The study also draws attention to the importance of knowledge translation strategies (i.e. research and evaluation centralized support services, CoP, Knowledge Broker Mentoring Programs, LDCP, informal networking and communication strategies, community partnership engagement and collaboration, working relationships with academic researchers etc.); evaluation and research (i.e. use of evidence to evaluate the effectiveness of implementation efforts; demonstrate impact and translate evidence to the local context; leverage and mobile partnerships; and translate knowledge within specific practice settings and circumstances to build capacity); and dedicated and ongoing funding (i.e. lack of adequate funding from the MOHLTC resulting from high cost of implementation in rural settings compared to urban counterparts etc.).

In addition, PHUs provided a plethora of solutions to address the barriers of implementation. In all PHUs, there was a clear recognition of the need to consider the evidence and other sources of information in a local context, engage and collaborate with multiple stakeholders, build capacity (i.e. human, financial, knowledge, resources, evidence-informed, structural etc.), maximize community assets, and be innovative. However, the researcher is aware that the solutions need further discussion and elaboration, since they are not all equally relevant or applicable (i.e. contextual factors, current landscape of public health and healthcare – e.g. possible restructure of public health in Ontario (see below), decommission of LDCP, consolidation of 14 LHIN's and 6 health agencies into a new

agency called Ontario Health) to rural public health practice in Ontario. Nonetheless, since the study was grounded in the data at a point in time (i.e. 2018), the solutions might provide a starting point for a high-level discussion among public health practitioners (as validated by member checks) (see Table 7).

b. Epistemological and ontological perspective

In addition, this study perspective was based on a critical realist ontology (i.e. epistemologically fallible, ontologically realist, yet judgmentally rational) and a constructivism and existentialism epistemology using a qualitative collective (multiple) case study (Bhaskar, 1998; Stake, 1995). From this viewpoint, the empirical findings of the study contribute to understanding implementation in rural areas, that can be used to understand and explain “how” and “why” implementation of evidence-informed chronic disease programs and policies succeed or fail, through the identification of contexts and mechanisms that affect implementation that can be theoretically transferable in different rural contexts (i.e. rural secondary and tertiary healthcare settings, rural non-profit organizations etc.) and among different stakeholders in rural areas. Therefore, given the potential impact on implementation in rural areas, this realist approach disentangled the complex interplay between the mechanisms (M) associated with the program and policy, the conditions and contexts (C), under which the generative mechanisms operated (i.e. depth mechanisms) and the patterns of outcomes (O) produced. In this instance, a modest contribution of the philosophical aspects of the study was made, through the development of the realist model of evidence-informed CDP programs and policies in rural Ontario PHUs, that can be used by PHUs in planning in decision-making (see Figure 3).

3. Primary Objective #3: Make a Contribution to Public Health Implementation Research in Rural Areas

The third objective that was used to guide this study was as follows: To make a contribution to public health implementation research in rural areas. This section discusses the implications of the CFIR for rural public health systems, implications for future studies, and the current landscape of public health in Ontario. A discussion follows.

a. Implications for the Consolidated Framework for Implementation Research (CFIR) for Rural Public Health Systems

Despite this complex dynamic system, implementation science seeks to understand how to systematically facilitate the utilization of evidence (Tabak, Khoong, Chambers, & Brownson, 2012).

Implementation frameworks and models have been developed and described in the literature to enhance efforts to spread evidence-based interventions (Tabak, Khoong, Chambers, & Brownson, 2012). Given that the study was guided by Damschroder et al. (2009) CFIR, the study provided empirical support that factors influencing implementation closely aligned with the CFIR five broad domains, and several constructs within them. Most notably, the factors that closely aligned with the constructs within the CFIR include the following (1) intervention characteristics – evidence strength and quality, complexity, adaptability, trialability; (2) outer setting cosmopolitanism, external policies and incentives; population (patient) needs and resources (3) inner setting – structural characteristics, culture, implementation climate, tension for change, readiness for implementation; intraorganizational networks and communications; internal leadership engagement; access to knowledge and information; available resources (4) characteristics of individuals – individual identification with organization; and (5) process – planning.

The results also demonstrated that some factors including external leadership engagement and population external communication showed relevance to some aspects to the framework, based on participant’s experiences in rural areas.

Further, the results suggests that two additional components be considered – reach and social capital (currently embedded within cosmopolitanism) as an influence on implementation in rural Ontario PHUs. Moreover, the results also suggest that the term “patients” be changed to “populations” since “public health work is grounded in a population health approach” (Ontario Ministry of Health and Long-Term Care, 2018a, p. 5). Therefore, the author suggests that the CFIR might be enhanced, with attention to these specific rural factors presented here. See Appendix S for a comparison of RulPHS study results (i.e. domains and constructs) compared to the CFIR. Overall, these factors are important for implementing evidence-informed CDP programs and policies in rural Ontario PHUs.

b. Implications for future studies and the current landscape of public health in Ontario

A future study would benefit from a multiple case study design assessing particular roles within the chronic disease prevention team in Ontario rural PHUs (i.e. health promoters, dietitians, public health nurses, administration), the associated mechanisms and their contextual conditions in which they are working that would impact implementation, guided by the CFIR. This would involve examining individual roles and characteristics, relationships within and between teams, and contexts under which mechanisms operate. Another potential study would be conducting a survey of the prevalence of the various CDP implementation factors in Ontario rural PHUs (i.e. barriers and facilitators) that

were identified from the study. Through the identification of the prevalence of the various barriers and facilitators of implementation, program planners could effectively maximize assets, and identify and prioritize solutions to minimize barriers to implementation. It is expected that these types of future studies will further contribute to our understanding of implementation in rural areas for chronic disease prevention to better support rural public health practice.

Also, noteworthy, during this study, there were proposed changes in the province of Ontario, which included a plan to restructure public health in Ontario, reducing the number of PHUs from 35 to 10 (Ministry of Finance, 2019). This new structure would include the following proposed boundary changes: a) merging health units in Waterloo Region, Halton Region, Wellington-Dufferin-Guelph, and Peel Region – this merger will serve more than 2.7 people resulting in the province’s largest PHU; b) combining five existing PHUs from Woodstock to Windsor into one regional health office – Chatham-Kent Health Unit, Windsor-Essex County Health Units, Lambton Health Unit, Southwestern public health; c) Combining Ottawa’s Health Unit – include the areas of Prescott-Russell, Stormont, Dundas and Glengarry, Renfrew, Lanark, Leeds and Grenville, Lennox and Addington, Frontenac, Kingston, and Cornwall. This health unit would cover approximately 29,000 square km and include more than 1.6 million people; and d) merging Hamilton’s Health Unit with health units in Haldimand-Norfolk, Brant, and Niagara (AMCTO, 2019).

This new public health structure would reduce the public health budget by 200 million dollars annually (Ministry of Finance, 2019). In addition, the province of Ontario, proposes to change the cost-sharing between the province and the larger jurisdictions from 75% -25% funding split to 70%-30% or 60%-40% (Gray, 2019). Whereas, Toronto would receive a cost-sharing ration of 50-50 (Gray, 2019). Based on the critiques in the media, public health practitioners from rural PHUs expressed concerns towards amalgamation. Some comments included: “the local voice gets lost once you start moving towards larger entities and bigger organizations”, “many residents have limited access to family doctors so public health fills a gap in primary care” and “our fear is that our municipalities are going to be stuck with paying more, which they can’t afford [...] and at the same time, we’ll lose the ability to have localized flavour to deliver our services” (Jeffords, 2019; Isai, 2019).

However, the impact of the proposed structure on rural PHUs is beyond the scope of this research project. Therefore, this would warrant further exploration that could also inform areas of needed future research in rural public health systems in Ontario. Given the results of the study it is also not

unreasonable to also suggest that if the new structure is implemented, that the MOHLTC appoint the new role of “Rural Public Health Ambassador” to represent rural areas in Northern and Southern Ontario (i.e. oversee the administration of the core functions of public health from a rural public health lens), given that implementation is complex, heterogenous (i.e. geographic variability in northern and southern rural areas) and there are many factors to consider that are unique in rural areas to ensure application of EIPH practice.

The researcher of this study would also like to acknowledge that the valuable information from this study will be shared with PHUs (i.e. presentations and other key stakeholders (i.e. MOHLTC, PHO, hospitals, voluntary organizations, universities etc.), and submitted for publication (i.e. Journal of Implementation Science, The Journal of Rural Health, Journal of Public Health etc.) to increase the understanding of the factors that facilitate and impede the implementation of evidence-informed CDP programs and policies in rural Ontario PHUs.

B. Conclusion

In conclusion, the findings of this study may contribute to an understanding that implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs. Overall, the results of this study showed that implementation of CDP programs and policies in rural Ontario public health units are complex (i.e. theoretical, multi-layered, multi-factorial,), related (i.e. wide-array of constructs related to the intervention itself, individual characteristics, inner and outer setting, and process), multiple (i.e. several categories (domains), themes (constructs), subthemes, and factors), and temporal (i.e. over time).

Factors that facilitated or impeded implementation were summarized under five broad categories and a further seventeen major themes within them. Major themes were as follows: evidence strength and quality, complexity, adaptability, trialability, cosmopolitanism, external policies and incentives, external leadership engagement, population external communication, reach, population needs and resources, structural characteristics, culture, implementation climate, readiness for implementation, intraorganizational networks and communications, individual identification with organization, and planning.

The study results may reduce health inequities, and contribute to the efficient use of resources, better health outcomes and increase public confidence in Ontario public health units in rural areas. By bridging the gap between knowledge and practice communicated through the use of rich description of the factors that facilitated and impeded the implementation of evidence-informed CDP programs

and policies in rural Ontario PHUs, this study has successfully made a contribution in three areas: 1) a better understanding of practice-based evidence in chronic disease prevention in rural areas – through the identification of the factors that facilitated and impeded the implementation of evidence-informed chronic disease prevention programs and policies in rural areas; 2) a practical contribution to improving the performance of public health through a better understanding of these factors and how rural public health professionals can be better supported by policy, strategies for knowledge translation, evaluation and research, funding, community engagement, networking, communication, etc. to minimize barriers and maximize assets related to implementation; and 3) a contribution to public health implementation research in rural areas.

Key lessons learned across rural PHUs included the importance of local evidence; program/policy adaptability, simplicity, trialability; boundary spanners; horizontal networks; partnership engagement and collaboration; social capital; compatible and policy capacity; transformational leadership styles; addressing local needs (modifiable risk factors etc.), priorities (i.e. priority populations – Indigenous communities etc.), and contexts (built environment barriers etc.), reaching rural populations; decentralization and informal approaches; clan culture; champions; available resources (i.e. funding, time, human, resources etc.); access to knowledge and information; networking and communication (i.e. informal and formal); employee retention; work attitude (i.e. passion); and formal planning when implementing evidence-informed CDP programs and policies in rural Ontario PHUs.

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Appendix A - A Priori Propositions

This document presents a set of *a priori* propositions. Consistent with the basic model (Figure 1), these relate to major categories that was originally suggested for exploration, about the public health reality of implementing evidence-informed chronic disease programs and policies in rural areas and context-mechanism-outcome (CMO) configurations that might emerge from this study. The list of hypothetical propositions was developed based on a literature review of implementation and rural health and is guided by the CFIR.

A. Inner Setting Implementation Factors and Intervention Characteristics

- Public health organizations in rural settings, as multilevel systems, have a plethora of factors that can facilitate and impede implementation of evidence-informed chronic disease prevention programs and policies at the organization level. These include:
 - Intervention characteristics – intervention source, evidence strength and quality, relative advantage, adaptability, trialability, compatibility, complexity, design quality and packaging, and cost; and,
 - Inner setting – structural characteristics, networks and communications, culture, implementation climate, social capital, and readiness for implementation.
- Implementation in rural public health units is a highly non-linear process, typically characterised by shocks and setbacks. Critical factors that facilitate implementation include appropriate change model (balance between “make it happen” and “let it emerge”); good project management; autonomy of frontline teams; human resource factors, especially the selection, retention, continuity, and training of staff; alignment between new and old routines; clear benefits and cost-effectiveness (i.e. economic terms, social prestige, convenience, satisfaction); compatibility with the needs at the team and organizational level; positive interpersonal influence (i.e. champions, opinion leaders, peer social networks); intervention fits with existing values, norms, strategies, goals, skill mix, and supporting technologies; a climate conducive to experimentation and risk taking; relevance to local needs; appropriate evaluative systems; sympathetic culture (i.e. learning and people centred); strong stock of social capital; and dedicated time and resources to implement the intervention.

- There are challenges related to implementation at the organization level in a rural public health setting. Some of these factors include:
 - available human and financial resources (i.e. limited staff, under-resourced, high turnover, lack of financial resources);
 - small in size;
 - lack of slack resources;
 - centralized decision-making;
 - less functional differentiation;
 - evidence-informed chronic disease programs and policies are predominately developed using urban-focused approaches and have to be modified to address the unique needs of rural populations;
 - lack of access to new knowledge and information;
 - challenges to recruit, train, and retain rural public health staff;
 - lack of effective and sustained rural health promotion programs;
 - paucity of rural health literature to guide evidence-informed decision-making;
 - elusive rural definition which can negatively impact funding; and
 - lack of readiness for implementation.

B. Outer Setting Implementation Factors

- Organizational environmental factors (outer setting) affect implementation of evidence-informed chronic disease programs and policies in rural public health units. This includes population needs and resources, cosmopolitanism, peer pressure, and external policy and incentives
- Implementation in rural public health units is more probable when there is a conducive socio-political climate (i.e. galvanized support and multi-sectorial collaborative partnerships with elected officials (BOH), community leaders, health professionals and administrators) and specific incentives and mandates at national level are present (i.e. OPHS, accountability agreements, financial reports, balanced scorecard (strategic plans), BOH reports etc.)
- Some of the challenges related to implementation at the organizational environment level in rural public health units include the following:

- Demographic challenges (i.e. aging population, low socio-economic status, out-migration of youth, lower level of human capital, the inability to attract or retain immigrants, large Indigenous population, and declining rural populations);
- Indigenous populations are disproportionately affected by rural health inequities and report some unique factors for health behaviours that are associated with the social determinants of health (i.e. low socio-economic status, lack of access to quality and affordable dense food, decreased participation in traditional activities such as hunting resulting from adoption of Western values and acculturation, negative school environment, lack of access to physical activity amenities, cultural and jurisdictional issues on reserves, the effect of environmental and climate change that affect access to traditional foods, and increase tobacco availability and accessibility);
- Geographic challenges (i.e. inclement weather, climate change, remoteness, isolation, and low population density);
- Poor built environment (i.e. long distance to travel to programs, services, and facilities, poor walkable communities, and poor infrastructure for health promoting behaviours);
- Lack of access to health care services and shortage of health care providers, resources and services;
- Low help-seeking behaviour (i.e. cost, social and environmental context, lack of necessary referrals, lack of transportation, inconvenience) and lack of confidentiality and anonymity;
- Physical environment challenges (i.e. safety issues with walking and cycling attributed to busy roads, loose dogs, wild animals, crime, presence of hunters during hunting season and poor street safety features busy roads);
- People living in rural areas tended to have poorer health status compared to their urban counterparts, with some health measures worsening with rurality;
- Rural residents have higher mortality rates for circulatory diseases, cervical cancer, respiratory diseases, injury and poisonings and suicide compared to urban counterparts. Health-related behaviours such as overweight and obesity, unhealthy diet, smoking, alcohol use, physical inactivity, non-medical use of prescription and poor sun protection behaviours are elevated in rural areas;
- Environmental challenges (i.e. respiratory hazards in agriculture and manufacturing, poor indoor air quality and household crowding on farms);

- Professional isolation resulting from large geographical distances that separate them from their peer support networks and learning environments;
- Expectations of others for execution of external policies and incentives (i.e. OPHS, accountability agreements, financial reports, balanced scorecard, BOH reports);
- Expectation to respond to mass media (print, electronic); and
- Poor linkages and exchange efforts with larger urban centres.

C. Individual Characteristics Implementation Factors

- Individual factors among public health professionals that affect implementation of evidence-informed chronic disease programs and policies in rural public health units. These include:
 - Individual characteristics – knowledge, self-efficacy, individual stage of change, individual identification with organization, attitude, leadership engagement, and other personal attributes (ambiguity, intellectual ability, values, capacity, learning style, and competence)
- Individual characteristics that affect implementation is a complex phenomenon and public health professionals are key agents of implementation. Public health units in rural areas are better able to implement intervention if they have visionary staff in key positions, positively influenced by psychological antecedents (i.e. values and goals, conducive learning style, motivation, and confidence), strong leadership, absorptive capacity for new knowledge among staff, appropriate skills to monitor and evaluate the impact of the intervention, strategically placed, physical capability, exhibit passion towards rural residents, understand rural ‘realities, and able to identify the type of adopter (innovators, early adopters, early majority, late majority, and laggards)
- Some of the factors that may impede implementation at the organizational environment level in rural public health units may include the following:
 - lack of access to new knowledge and information (i.e. training, resources, data, products of evaluations, continuing professional development, conferences, professional organizations and networks) and lack of appropriate and highly skilled health professionals;
 - heavy workload;
 - multiple roles;
 - professional isolation and separation from learning environments and professional organizations;
 - inability to find, interpret, recodify, and integrate new knowledge;

- psychological antecedents (i.e. lack values and goals, conducive learning style, motivation, attitude, confidence); and
- physical limitations.

D. Implementation Process

- With respect to the implementation process, the implementation process consists of planning, engaging, executing, and reflecting and evaluating. This process is pragmatic, complex, interconnected, non-linear and situated and is influenced by the plethora of factors outlined above that may impact the delivery of the OPHS.
- Implementing evidence-informed chronic disease prevention programs and policies in rural areas involve external change agents, champions, boundary spanners, opinion leaders, formally appointed internal implementation leaders (i.e. public health staff, manager of public health, manager of chronic disease prevention, executive committee, MOH, and senior leadership); evaluation and reflection of the effectiveness of the intervention (i.e. developmental evaluation (i.e. logic models construction and incorporating relevant evaluation into programs); process evaluation (i.e. decentralized evaluation approaches); and products of evaluation (i.e. health status reports, presentations, webinars etc.).

Appendix B - Study Information Letter and Consent Form for Health Units

Title of the Study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

Student Investigator/Faculty Supervisor: The research is being conducted by Deanna Elizabeth White, BA (Hons), MA, PhD(c), a PhD student at the University of Waterloo in the Public Health and Health Systems Program and Public Health Epidemiologist, under the advisement of Dr. John Garcia (Supervisor). Deanna Elizabeth White can be reached at (personal phone number provided) or d8white@uwaterloo.ca. Dr. John Garcia can be reached at the University of Waterloo, 200 University Avenue West, Waterloo Ontario, Canada, N2L 3G1. Ph: (519) 888-4567 ext. 35516 or john.garcia@uwaterloo.ca.

Your health unit is being asked to participate in this research study. To help you make an informed decision regarding your participation, this letter will explain what the study is about, the possible risks and benefits, and your rights as a research participant. If you do not understand something in the letter, please ask the Student Investigator or Dr. John Garcia prior to consenting to the study. You will be provided with a copy of the information and consent form if you choose to participate in the study.

Invitation to Participate and Purpose of the Study

Your health unit has been invited to participate in this research study to understand what helps or hinders public health efforts in the delivery of chronic disease prevention (CDP) programs and policies in rural Ontario public health units (PHUs). Interviews, focus groups, and document review will be conducted. The results from this study will make a practical contribution to public health practice in rural Ontario public health units through a better understanding of what efforts worked or not, why and how for CDP. Findings can help to inform the delivery of rural CDP programs and policies in Ontario rural PHUs. The purpose of this study is also to satisfy the requirements for the Doctor of Philosophy (PhD) degree in the Department of Public Health and Health Systems at the University of Waterloo.

I. Your Responsibilities as a Participant

What does participation involve?

The primary method of data collection will be in-depth, intensive, semi-structured qualitative interviews with the Medical Officer of Health (MOH) and the Director/Manager of Chronic Disease Prevention, as well as focus groups with chronic disease prevention staff within five rural public health units in Ontario.

The Student Investigator will also request informal permission to obtain unobtrusive information including, planning documents, annual reports, strategic plans, budgets, health status reports (health indicators), logic models, and organizational records (i.e. number of FTE's, organizational charts), and other documentation that are deemed relevant for this study via e-mail or in-person. The collected information will be shared with policy-makers, researchers, decision-makers, public health practitioners, community members, through published research, academic presentations and other knowledge translation (KT) strategies. A description of the study procedures for the interviews and focus groups is as follows.

Interviews: The semi-structured, face-to face interview will be conducted by the Student Investigator with the MOH and the Director/Manager of Chronic Disease Prevention at the public health unit. Each interview will take approximately sixty to ninety minutes to complete on a mutual agreed upon date in April or May 2018.

It will take place in a location that is appropriate for conversation, privacy, and away from other people and distractions, but may occur over the phone due to geographical distance, inclement weather, and scheduling conflicts. With the permission from the interviewees, the interview will be audio-recorded to facilitate collection of information, and later transcribed for analysis. All audio-recordings will be stored on secure servers by an external transcription service and destroyed after five years. Only the Student Investigator, advisor, dissertation committee members, and a transcriber will have access to the data. With permission from the interviewees field notes will be taken during and immediately following the interviews. In addition, permission will be sought for non-attributed quotations to be used in future reports.

The questions will predominately focus on organizational, external, individual, programmatic, and process factors that facilitate or impede implementation of evidence-informed chronic disease programs in rural public health settings. There is no financial cost to the health unit to participate in

this study. However, salaries will still be paid during the interviews, since they are taken place during office hours. Shortly after the interview has been completed, the Student Investigator will send a copy of the transcript to the interviewees to provide them an opportunity to confirm the accuracy of the conversation and verify, clarify, and edit the data. In addition, permission will be sought to follow-up with the interviewees to determine if the findings resonate with them and to ask them any additional questions the Student Investigator may have. Participation will be confirmed by the Student Investigator when the consent letter is signed and returned by the interviewee to indicate agreement to participate.

Focus Groups: The face-to face focus group will be conducted by the Student Investigator with the chronic disease prevention team (excludes management) at the public health unit. The focus group will take approximately 60 to 90 minutes to complete during one session. The Director/Manager of Chronic Disease Prevention will be responsible for assisting with participant recruitment by circulating any relevant documents and correspondence about the study to their staff prior to the focus groups, and making the necessary arrangements to conduct the focus group at a time that best limits disruptions among staff and a location that is free from distractions, so participants feel relaxed and inclined to speak. Ideally, each focus group will have seven to 10 participants, with representation from each discipline (i.e. dietitian, health promoters, public health nurses, and support staff).

Before the focus group session, the information form about the focus group session will be distributed to the chronic disease prevention staff by their manager, so that staff can make an informed choice of participation prior to attending the session. At the outset of the focus group session consent forms will be distributed to participants. Participation will be confirmed by the Student Investigator when the consent letter is signed and returned by the participant to indicate agreement to participate. With the permission from the focus groups participants the focus groups will be audio-recorded to facilitate collection of information, and later transcribed for analysis. The audio-recorded focus groups will be completed by an external transcription service and stored on their secure servers and then destroyed after five years. Only the Student Investigator, advisor, the dissertation committee members, and a transcriber will have access to the data. With permission from the focus group participants, field notes will be taken during and immediately following the interviews and the discussion will be recorded on flip chart paper. In addition, permission will be sought for non-attributed quotations to be used in future reports. The questions will predominately focus on organizational, external, individual, programmatic, and process factors that facilitate and

impede implementation of evidence-informed chronic disease prevention programs and policies in rural public health settings. There is no financial cost to the participant to participate in this research study. However, salaries will still be paid during the focus groups since they are taken place during office hours. Given the group format of the session the participants will be ask you to keep in confidence information that identifies or could potentially identify a participant and/or his/her comments and explicitly agree to this on the consent form.

Who may participate in the study?

The list of criteria for eligibility to participate in this study includes: 1) public health units in Ontario; 2) public health units in a rural setting; 3) chronic disease prevention staff including public health nurses, health promoters, dietitians, support staff, and other staff that are deemed appropriate by the Director/Manager of Chronic Disease Prevention; and 4) the Director/Manager of Chronic Disease Prevention and MOH. The exclusion criteria consist of any participants under 18 years of age.

What happens if new information arises during the conduct of the research which may affect my decision to provide consent?

To date, the Student Investigator anticipates no new information that might affect your health units willingness to take part in this study, however if new information has potential impact (or lack thereof), on your participation, you will be informed of this new information and given the opportunity to confirm your decision to continue participation.

II. Your Rights as a Participants

Is participation in this study completely voluntary?

Participation in this study is completely voluntary and the participant has the right to withdraw from the study at any time by communicating this to the Student Investigator. The participant may refuse to answer any questions without repercussions, penalty, or reason and this will not affect the relationship that you have with the Student Investigator. The participant can request your data be removed from the study up until May 2018 as it is not possible to remove your data from the study once collected because (e.g., data is anonymous, all identifying information is removed from the data immediately). Participation will be confirmed by the Student Investigator when the consent letter is signed and returned by the participant to indicate agreement to participate.

Will I receive anything for participating in the study?

The interview participant will receive no compensation for participating in this study, however the Student Investigator will be providing refreshments during the focus groups in alignment with your health unit's healthy food policy.

What are the possible benefits of the study?

Participation in this study may not provide any personal benefit to the participant. However, the study will explain the factors that affect the implementation of evidence-informed chronic disease prevention programs and policies through the identification of challenges, opportunities, and solutions unique to rural public health settings. As a result, the findings from this study may reduce health inequities, and contribute to the efficient use of resources, better health outcomes and increase public confidence in Ontario public health units in rural areas. By bridging the gap between knowledge and practice communicated through health professionals can be better supported by policy (i.e. OPHS) strategies for knowledge translation, evaluation and research, and funding etc. to minimize the challenges and maximize assets related to implementation.

What is the risk associated with this study?

There are no economic or physical risks associated with this study. However, there is always a minimal risk (i.e. individuals might identify participants if they are familiar with the individual or PHU) and/or potential discomfort that may result from participation. The Student Investigator will try to minimize these risks by making sure that the consent process effectively communicates what the study involves to help the participants make an informed decision, providing participants with preliminary findings, using non-attributed quotes, assigning pseudonym names, and taking every reasonable effort to make sure that in that the participants confidentiality is respected and maintain.

However, it is acknowledged that focus groups require an additional layer of privacy protection, because the Student Investigator cannot guarantee that the participants of the group will not reveal each other's contribution to the group discussion once it has ended. Therefore, loss of privacy is a potential risk. Therefore, additional measures will be taken to protect each participants' privacy. The Student Investigator will begin the focus group by reminding participants to keep information discussed in the group confidential and then ask each participant to explicitly agree to maintain confidentiality on the consent form.

Will my identity be known?

Every reasonable effort will be made to ensure anonymity of interview and focus group participants. Specifically, the interview participants and the health unit will be given a pseudonym name to protect the identity of the participants and organization and non-attributed quotes will be used. Further, participants will not be identified in any publications without explicit permission.

However, the Student Investigator will know what the participants said. Particularly, given that the focus group is a group setting, participant anonymity cannot be guaranteed. Therefore, the Student Investigator will ask the participants to respect their fellow colleagues by keeping all information that identifies or could potentially identify a participant and/or his/her comments confidential and obtain explicit consent from focus group participants to maintain confidentiality.

Will my information be kept confidential?

The information that the participants share will be kept confidential. All identifiable information will be stored in a locked research office, on a password protected computer and then deleted from the dataset so that individual participant's anonymity will be protected. The de-identified data will be accessible by the study investigators as well as the broader scientific community. All information collected will be aggregated so that there will be no identifying individual results.

Research data will be retained for a minimum of five years at which time it will be destroyed. Only the Student Investigator, advisor, dissertation committee, and transcriber will have access to the study data. Given the format of the focus group session the Student Investigator will ask participants to respect their fellow colleagues by keeping all information that identifies or could potentially identify a participant and/or his/her comments confidential.

III. Questions, Comments, or Concerns**Who is sponsoring/funding this study?**

The Student Investigator has received no funding for this study.

Has the study received ethics clearance?

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you or the participant has any questions for the

Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

Who should I contact if I have questions regarding my participation in the study?

If you or the participant have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please contact Deanna White at (personal phone number provided) or by email at (d8white@uwaterloo.ca)

Health Unit Consent Form

By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

Title of the study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

I have read the information presented in the information letter about a study conducted by Deanna Elizabeth White, under the supervision of Dr. John Garcia at the University of Waterloo in the Public Health and Health Systems Program.

I have had the opportunity to ask questions related to the study and have received satisfactory answers to my questions and any additional details.

I am knowledgeable that if new information arises during the conduct of the study that has potential impact (or lack thereof), on my organization's participation, that we will be provided with an opportunity to consider this new information and confirm our decision to continue participation.

We were informed that this organization may withdraw from the study at any time. We were also informed that the study participants may withdraw from participation at any time without penalty by advising the researcher.

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

Questions we have about the study may be directed to Deanna White at (personal phone number provided) or by email at d8white@uwaterloo.ca and Dr. John Garcia at (519) 888-4567, ext. 35516 or by email at john.garcia@uwaterloo.ca.

We were informed that if we have any comments or concerns within this study, we may also contact the Director, Office of Research Ethics at (519) 888-4567 ext. 36005. For all other questions contact Deanna E. White at d8white@uwaterloo.ca.

I request your permission (on behalf of the organization) for the following:

- We agree to help the Student Investigator recruit participants (i.e. chronic disease prevention staff within your health unit).
- We agree to the use of a pseudonym name to protect the identity of the organization.
- We are aware that consent options will be available for the participants that include the audio-recording, taking of field notes, use of non-attributed quotations in future reports, maintaining confidentiality (focus groups only), and follow-up as necessary.

I agree of my own free will to participate in the study (on behalf of the organization).

Medical Officers of Health name: _____ (please print)

Medical Officer of Health (MOH) signature: _____

Date (yy/mm/dd): _____

I agree of my own free will to participate in the study (on behalf of the organization).

Director/Manager of Chronic Disease Prevention name _____ (please print)

Director/Manager of Chronic Disease Prevention signature: _____

Date (yy/mm/dd): _____

Witness Name: _____ (please print)

Witness Signature: _____ Date(yy/mm/dd) _____

Appendix C - Study Information Letter and Consent Form for Interview Participants

(on University of Waterloo letterhead)

Title of the Study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

Student Investigator/Faculty Supervisor: The research is being conducted by Deanna Elizabeth White, BA (Hons), MA, PhD(c) (Student Investigator (SI)), a PhD student at the University of Waterloo in the Public Health and Health Systems Program and Public Health Epidemiologist under the advisement of Dr. John Garcia (Supervisor). Deanna Elizabeth White can be reached at (personal phone number provided) or d8white@uwaterloo.ca . Dr. John Garcia can be reached at the University of Waterloo, 200 University Avenue West, Waterloo Ontario, Canada, N2L 3G1. Ph: (519) 888-4567 ext. 35516 or john.garcia@uwaterloo.ca.

You have been asked to participate in this research study. To help you make an informed decision regarding your participation, this letter will explain what the study is about, the possible risks and benefits, and your rights as a research participant. If you do not understand something in the letter, please ask Deanna White (SI) or Dr. John Garcia prior to consenting to the study. You will be provided with a copy of the information and consent form if you choose to participate in the study.

Invitation to Participate and Purpose of the Study

Your health unit has been invited to participate in this research study to understand what helps or hinders public health efforts in the delivery of chronic disease prevention (CDP) programs and policies in rural Ontario public health units (PHUs). Interviews, focus groups, and document review will be conducted. The results from this study will make a practical contribution to public health practice in rural Ontario public health units through a better understanding of what efforts worked or not, why and how for CDP. Findings can help to inform the delivery of rural CDP programs and policies in Ontario rural PHUs. The purpose of this study is also to satisfy the requirements for the Doctor of Philosophy (PhD) degree in the Department of Public Health and Health Systems at the University of Waterloo.

I. Your Responsibilities as a Participant

What does participation involve?

The primary method of data collection will be in-depth, intensive, semi-structured qualitative interviews with the Medical Officer of Health (MOH) and the Director/Manager of Chronic Disease Prevention, as well as focus groups with chronic disease prevention staff within five rural public health units in Ontario.

The Student Investigator will also request your permission to obtain unobtrusive information including, planning documents, annual reports, strategic plans, budgets, health status reports (health indicators), logic models, and organizational records (i.e. number of FTE's, organizational charts), and other documentation that are deemed relevant for this study informally (e-mail, in-person). The collected information will be shared with policy-makers, researchers, decision-makers, public health practitioners, community members, through published research, academic presentations and other knowledge translation (KT) strategies. A description of the study procedures for the interviews is as follows.

Interviews: Each interview during one session will take approximately sixty to ninety minutes to complete on a mutual agreed upon date in April or May 2018. It will take place in a location that is appropriate for conversation, privacy, and away from other people and distractions, but may occur over the phone due to geographical distance, inclement weather, and scheduling conflicts. With your permission the interview will be audio-recorded to facilitate collection of information, and later transcribed for analysis. The audio-recorded focus groups will be completed by an external transcription service and stored on secure servers and then destroyed after five years. Only the Student Investigator, advisor, dissertation committee members, and a transcriber will have access to the data. Field notes will be taken during and immediately following the interviews with your permission. In addition, I am requesting your consent to use non-attributed quotations in future reports.

The questions will predominately focus on organizational, external, individual, programmatic, and process factors that facilitate and impede implementation of evidence-informed chronic disease prevention programs and policies in rural public health settings. There is no financial cost to you to participate in this study. However, salaries will still be paid during the interviews, since they are taken place during office hours. Shortly, after the interview has been completed, the Student

Investigator will send you a copy of the transcript to provide you an opportunity to confirm the accuracy of the conversation and verify, clarify, and edit the data. In addition, I would like to follow-up with you at a later date to determine if the findings resonate with them and to ask them any additional questions the Student Investigator may have.

Who may participate in the study?

The list of criteria for eligibility to participate in this study includes: 1) public health units in Ontario; 2) public health units in a rural setting; 3) chronic disease prevention staff including public health nurses, health promoters, dietitians, support staff, and other staff that are deemed appropriate by the Director/Manager of Chronic Disease Prevention; and 4) the Director/Manager of Chronic Disease Prevention and MOH. The exclusion criteria consist of any participants under 18 years of age.

What happens if new information arises during the conduct of the research which may affect my decision to provide consent?

To date, the Student Investigator anticipates no new information that might affect your willingness to take part in this study, however if new information has potential impact (or lack thereof), on your participation, you will be informed of this new information and given the opportunity to confirm your decision to continue participation.

II. Your Rights as a Participants

Is participation in this study completely voluntary?

Participation in this study is completely voluntary and you have the right to withdraw from the study at any time by communicating this to the Student Investigator. You may refuse to answer any questions without repercussions, penalty, or reason and this will not affect the relationship that you have with the Student Investigator. You can request your data be removed from the study up until May 2018 as it is not possible to remove your data from the study once collected because (e.g., data is anonymous, all identifying information is removed from the data immediately). If you decide to participate in this study, please sign the consent form and e-mail or mail it to the Student Investigator. Participation will be confirmed by the Student Investigator when the consent letter is signed and returned by the participant to indicate agreement to participate.

Will I receive anything for participating in the study?

You will receive no compensation for your participation in the study.

What are the possible benefits of the study?

Participation in this study may not provide any personal benefit to you. However, the study will explain the factors that affect the implementation of evidence-informed chronic disease prevention programs and policies through the identification of challenges, opportunities, and solutions unique to rural public health settings. As a result, the findings from this study may reduce health inequities, and contribute to the efficient use of resources, better health outcomes and increase public confidence in Ontario public health units in rural areas. By bridging the gap between knowledge and practice communicated through health professionals can be better supported by policy (i.e. OPHS) strategies for knowledge translation, evaluation and research, and funding etc. to minimize the challenges and maximize assets related to implementation

What are the risks associated with this study?

There are no economic or physical risks associated with this study. However, there is always minimal risks (i.e. individuals might identify participants if they are familiar with the individual or PHU) and/or potential discomfort that may result from participation. The Student Investigator will try to minimize these risks by making sure that the consent process effectively communicates what the study involves to help you make an informed decision, providing you with the preliminary findings, using non-attributed quotes, and taking every reasonable effort to make sure that in that your confidentiality is respected and maintain.

Will my identity be known?

Every reasonable effort will be made to ensure your anonymity. All identifiable information is removed from the data immediately. Further, a pseudonym name will be given to protect the identity of your health unit. However, the Student Investigator will know what you said.

Will my information be kept confidential?

The information that the participants share will be kept confidential. All identifiable information will be stored in a locked research office, on a password protected computer and then deleted from the dataset so that individual participant's anonymity will be protected. The de-identified data will be accessible by the study investigators as well as the broader scientific community. All information collected will be aggregated so that there will be no identifying individual results. Research data will be retained for a minimum of five years at which time it will be destroyed. Only the Student Investigator, advisor, dissertation committee, and transcriber will have access to the study data.

III. Questions, Comments, or Concerns

Who is sponsoring/funding this study?

The Student Investigator has received no funding for this study.

Has the study received ethics clearance?

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca

Who should I contact if I have questions regarding my participation in the study?

If you or the participant have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please contact Deanna White at (personal phone number provided) or by email at (d8white@uwaterloo.ca).

Interview Participants Consent Form (MOH)

By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities

Title of the study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

I have read the information presented in the information letter about a study conducted by Deanna Elizabeth White, under the supervision of Dr. John Garcia at the University of Waterloo in the Public Health and Health Systems Program.

I have had the opportunity to ask questions related to the study and have received satisfactory answers to my questions and any additional details.

I am knowledgeable that if new information arises during the conduct of the study that has potential impact (or lack thereof), on my participation, that I will be provided with an opportunity to consider this new information and confirm my decision to continue participation.

I was informed that participation in the study is voluntary and that I can withdraw this consent by informing the researcher without penalty.

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. Questions we have about the study may be directed to Deanna White at (personal phone number provided) or by email at d8white@uwaterloo.ca and Dr. John Garcia at (519) 888-4567, ext. 35516 or by email at john.garcia@uwaterloo.ca.

We were informed that if we have any comments or concerns within this study, we may also contact the Director, Office of Research Ethics at (519) 888-4567 ext. 36005. For all other questions contact Deanna E. White at d8white@uwaterloo.ca.

I request your permission for the following:

Use of anonymous quotations:	<input type="checkbox"/> I agree to the use of anonymous quotations in any thesis or publication that comes from this research.
Audio-recording for transcription/analysis purposes only:	<input type="checkbox"/> I agree to my interview being audio-recorded to ensure accurate transcription and analysis.
To be contacted as necessary:	<input type="checkbox"/> I allow the Student Investigator to send a copy of the transcript in order to provide me with an opportunity to confirm the accuracy of the conversation and verify, clarify, and edit the data. In addition, I agree to be contacted by the Student Investigator to see if the findings resonated with me and ask any further questions that are deemed necessary.
To take field notes:	<input type="checkbox"/> I allow the Student Investigator to take field notes during the interviews.

For all other questions contact Deanna White at (personal phone number provided) or d8white@uwaterloo.ca

I agree of my own free will to participate in the study.

Participant's name (please print): _____ **Date(yy/mm/dd):** _____

Participant's signature: _____ **Date(yy/mm/dd):** _____

Student Investigator's /Witness signature: _____ **Date(yy/mm/dd):** _____

Interview Participants Consent Form (CDP Director/Manager)

By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities

Title of the study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

I have read the information presented in the information letter about a study conducted by Deanna Elizabeth White, under the supervision of Dr. John Garcia at the University of Waterloo in the Public Health and Health Systems Program.

I have had the opportunity to ask questions related to the study and have received satisfactory answers to my questions and any additional details.

I am knowledgeable that if new information arises during the conduct of the study that has potential impact (or lack thereof), on my participation, that I will be provided with an opportunity to consider this new information and confirm my decision to continue participation.

I was informed that participation in the study is voluntary and that I can withdraw this consent by informing the researcher without penalty.

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. Questions we have about the study may be directed to Deanna White at (personal phone number provided) or by email at d8white@uwaterloo.ca and Dr. John Garcia at (519) 888-4567, ext. 35516 or by email at john.garcia@uwaterloo.ca.

We were informed that if we have any comments or concerns within this study, we may also contact the Director, Office of Research Ethics at (519) 888-4567 ext. 36005. For all other questions contact Deanna E. White at d8white@uwaterloo.ca.

I request your permission for the following:

Use of anonymous quotations:	<input type="checkbox"/> I agree to the use of anonymous quotations in any thesis or publication that comes from this research.
Audio-recording for transcription/analysis purposes only	<input type="checkbox"/> I agree to my interview being audio-recorded to ensure accurate transcription and analysis.
To be contacted as necessary	<input type="checkbox"/> I allow the Student Investigator to send a copy of the transcript in order to provide me with an opportunity to confirm the accuracy of the conversation and verify, clarify, and edit the data. In addition, I agree to be contacted by the Student Investigator to see if the findings resonated with me and ask any further questions that are deemed necessary.
To take field notes	<input type="checkbox"/> I allow the Student Investigator to take field notes during the interviews.

For all other questions contact Deanna White at (personal phone number provided) or d8white@uwaterloo.ca

I agree of my own free will to participate in the study.

Participant's name (please print) _____ **Date(yy/mm/dd):** _____

Participant's signature: _____ **Date(yy/mm/dd):** _____

Student Investigator's /Witness signature _____ **Date(yy/mm/dd):** _____

Appendix D - Study Information Letter and Consent Form for Focus Group Participants

(on University of Waterloo letterhead)

Title of the Study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

Student Investigator/Faculty Supervisor: The research is being conducted by Deanna Elizabeth White, Hon. BA, MA, PhD(c) (Student Investigator (SI)), a PhD student at the University of Waterloo in the Public Health and Health Systems Program and Public Health Epidemiologist under the advisement of Dr. John Garcia (Supervisor). Deanna Elizabeth White can be reached at at (personal phone number provided) or d8white@uwaterloo.ca . Dr. John Garcia can be reached at the University of Waterloo, 200 University Avenue West, Waterloo Ontario, Canada, N2L 3G1. Ph: (519) 888-4567 ext. 35516.

You have been asked to participate in this research study. To help you make an informed decision regarding your participation, this letter will explain what the study is about, the possible risks and benefits, and your rights as a research participant. If you do not understand something in the letter, please ask Deanna White (SI) or Dr. John Garcia prior to consenting to the study. You will be provided with a copy of the information and consent form if you choose to participate in the study.

Invitation to Participate and Purpose of the Study

You have been invited to participate in this research study to understand what helps or hinders public health efforts in the delivery of chronic disease prevention (CDP) programs and policies in rural Ontario public health units (PHUs). Interviews, focus groups and document review will be conducted. The results from this study will make a practical contribution to public health practice in rural Ontario public health units through a better understanding of what efforts worked or not, why and how for CDP. Findings can help to inform the delivery of rural CDP programs and policies in Ontario rural PHUs. The purpose of this study is also to satisfy the requirements for the Doctor of Philosophy (PhD) degree in the Department of Public Health and Health Systems at the University of Waterloo.

I. Your Responsibilities as a Participant

What does participation involve?

The primary method of data collection will be in-depth, intensive, semi-structured qualitative interviews with the Medical Officer of Health (MOH) and the Director/Manager of Chronic Disease Prevention, as well as focus groups with chronic disease prevention staff within five rural public health units in Ontario. The collected information will be shared with policy-makers, researchers, decision-makers, public health practitioners, community members, through published research, academic presentations and other knowledge translation (KT) strategies. A description of the study procedures for the focus groups is as follows.

Focus Groups: The face-to face focus group will be conducted by the Student Investigator with the chronic disease prevention team (excludes management) at the public health unit. The focus group will take approximately 60 to 90 minutes to complete during one session and will take place in a location that is appropriate for conversation, privacy, and away from other people and distractions. Ideally, each focus group will have seven to 10 participants, with representation from each discipline (i.e. dietitian, health promoters, public health nurses, and support staff).

Before the focus group session, information forms about the focus group session will be distributed to the chronic disease prevention staff by your Manager, so that you can make an informed choice of participation prior to attending the session. However, at the outset of the focus group session a consent form will be distributed to the participants. With your permission the focus groups will be audio recorded to facilitate collection of information, and later transcribed for analysis. The audio-recordings will be completed by an external transcription services and stored on secure servers and then destroyed after five years. Only the Student Investigator, advisor, dissertation committee members, and a transcriber will have access to the data. Also, with your consent, field notes will be taken during and immediately following the focus group and the discussion will be recorded on flip chart paper. In addition, I am requesting your consent to use non-attributed quotations in future reports and be contacted in the future to confirm the accuracy of the data and answer any questions the Student Investigator may have.

The questions will predominately focus on organizational, external, individual, programmatic, and process factors that facilitate and impede implementation of evidence-informed chronic disease

prevention programs and policies in rural public health settings. There is no financial cost for you to participate in this study. However, salaries will still be paid during the focus groups, since they are taken place during office hours. Given the group format of the session you will be ask you to keep in confidence information that identifies or could potentially identify a colleague and/or his/her comments. Your participation will be confirmed by the Student Investigator when the consent letter is signed and returned by the participant to indicate agreement to participate. Only a limited number of participants will be contacted.

Who may participate in the study?

The list of criteria for eligibility to participate in this study includes: 1) public health units in Ontario; 2) public health units in a rural setting; 3) chronic disease prevention staff including public health nurses, health promoters, dietitians, support staff and other staff that are deemed appropriate by the Chronic Disease Prevention Director/Manager; and 4) the Director/Manager of Chronic Disease Prevention and MOH. The exclusion criteria consist of any participants under 18 years of age.

What happens if new information arises during the conduct of the research which may affect my decision to provide consent?

To date, the Student Investigator anticipates no new information that might affect your willingness to take part in this study, however if new information has potential impact (or lack thereof), on your participation, you will be informed of this new information and given the opportunity to confirm your decision to continue participation.

II. Your Rights as a Participants

Is participation in this study completely voluntary?

Participation in this study is completely voluntary and you have the right to withdraw from the study at any time by communicating this to the Student Investigator. You may refuse to answer any questions and contribute to the session in other ways without repercussions, penalty, or reason and this will not affect the relationship that you have with the Student Investigator. If you decide to participate in this study, please sign the consent form and give it to the Student Investigator. Participation will be confirmed by the Student Investigator when the consent letter is signed and returned by the participant to indicate agreement to participate.

Will I receive anything for participating in this study?

As a token of appreciation, I will be providing you with refreshments during the focus group. No other compensation will be provided.

What are the possible benefits of the study?

Participation in this study may not provide any personal benefit to you. However, the study will explain the factors that affect the implementation of evidence-informed chronic disease prevention programs and policies through the identification of challenges, opportunities, and solutions unique to rural public health settings. As a result, the findings from this study may contribute to health equalities, efficient use of resources, better health outcomes and high public confidence in public health services in Ontario public health units in rural areas. By bridging the gap between knowledge and practice communicated through health professionals can be better supported by policy (i.e. OPHS) strategies for knowledge translation, evaluation and research, and funding etc. to minimize the challenges and maximize assets related to implementation.

What are the risks associated with this study?

There is a minimal risk associated with this study. There are no economic or physical risks associated with this study. However, there is always a minimal risk (i.e. individuals might identify participants if they are familiar with the individual or PHU) and/or potential discomfort that may result from participation. The Student Investigator will try to minimize these risks by making sure that the consent process effectively communicates what the study involves to help you make the decision that is best for you. Also, because focus groups include discussion of personal opinions, the Student Investigator will take extra measures to protect your privacy by having each participant explicitly consent to all information that identifies or could potentially identify a participant and/or his/her comments confidential (see consent form). Further, only the Student Investigator, advisor, dissertation committee, and transcriber will have access to the data collected.

Will my identity be known?

Every reasonable effort will be made to ensure your anonymity. All identifiable information is removed from the data immediately. Further, a pseudonym name will be given to protect the identity of your health unit.

However, the Student Investigator and the focus group participants will know what you said, so participants' anonymity cannot be guaranteed in a group setting. Given the format of this session, please respect your fellow colleagues by keeping all information that identifies or could potentially identify a participant and/or his/her comments confidential. You will also be asked for your express consent to maintain confidentiality (see consent form).

Will my information be kept confidential?

The information that the participants share will be kept confidential. All identifiable information will be stored in a locked research office, on a password protected computer and then deleted from the dataset so that individual participant's anonymity will be protected. The de-identified data will be accessible by the study investigators as well as the broader scientific community. All information collected will be aggregated so that there will be no identifying individual results.

Research data will be retained for a minimum of five years at which time it will be destroyed. Only the Student Investigator, advisor, dissertation committee, and transcriber will have access to the study data. Given the format of the focus group session the Student Investigator will ask participants to respect their fellow colleagues by keeping all information that identifies or could potentially identify a participant and/or his/her comments confidential.

III. Questions, Comments, or Concerns

Who is sponsoring/funding this study?

The Student Investigator has received no funding for this study.

Has the study received ethics clearance?

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca

Who should I contact if I have questions regarding my participation in the study?

If you or the participant have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please feel free to discuss with the facilitator, or later by contacting the facilitator, Deanna White at (personal phone number provided) or by email at (d8white@uwaterloo.ca). Further, if you are interested in receiving a copy of the executive summary for the session outcomes, please contact Deanna E. White.

Consent Form

By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities

Title of the study: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Programs and Policies in Rural Ontario Public Health Units

I have read the information presented in the information letter about a study conducted by Deanna Elizabeth White, under the supervision of Dr. John Garcia at the University of Waterloo in the Public Health and Health Systems Program.

I have had the opportunity to ask questions related to the study and have received satisfactory answers to my questions and any additional details.

I am knowledgeable that if new information arises during the conduct of the study that has potential impact (or lack thereof), on my participation, that I will be provided with an opportunity to consider this new information and confirm my decision to continue participation

I was informed that participation in the study is voluntary and that I can withdraw this consent by informing the facilitator without penalty.

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

Questions we have about the study may be directed to Deanna White at (personal phone number provided) or by email at d8white@uwaterloo.ca and Dr. John Garcia at (519) 888-4567, ext. 35516 or by email at john.garcia@waterloo.ca.

We were informed that if we have any comments or concerns within this study, we may also contact the Director, Office of Research Ethics at (519) 888-4567 ext. 36005. For all other questions contact Deanna E. White at d8white@uwaterloo.ca.

I request your permission for the following:

<p>Use of anonymous quotations:</p>	<p><input type="checkbox"/> I agree to the use of anonymous quotations in any dissertation or publication that comes from this research.</p>
<p>Audio recording for transcription/analysis purposes only:</p>	<p><input type="checkbox"/> I agree to have the focus group audio recorded to ensure accurate transcription and analysis.</p>
<p>To take field notes:</p>	<p><input type="checkbox"/> I allow the Student Investigator to take field notes during the focus group.</p>
<p>To record the conversation on flip chart paper:</p>	<p><input type="checkbox"/> I allow the Student Investigator to record the conversation from the focus group on flip chart paper.</p>
<p>To be contacted as necessary:</p>	<p><input type="checkbox"/> I agree to be contacted by the Student Investigator to see if the findings resonated with me and ask any further questions that are deemed necessary.</p> <p>If Yes, please provide contact information e-mail address: _____ phone#: ()-()-()</p>
<p>To protect confidentiality:</p>	<p><input type="checkbox"/> I agree to keep all information that identifies or could potentially identify a participant and/or his/her comments confidential.</p>

For all other questions contact Deanna White at (personal phone number provided) or d8white@uwaterloo.ca

With full knowledge of all foregoing, I agree of my own free will to participate in this session and to keep in confidence information that could identify specific participants and/or the information they provided.

Participant's name (please print): _____ Date (yy/mm/dd): _____

Participant's signature: _____ Date (yy/mm/dd): _____

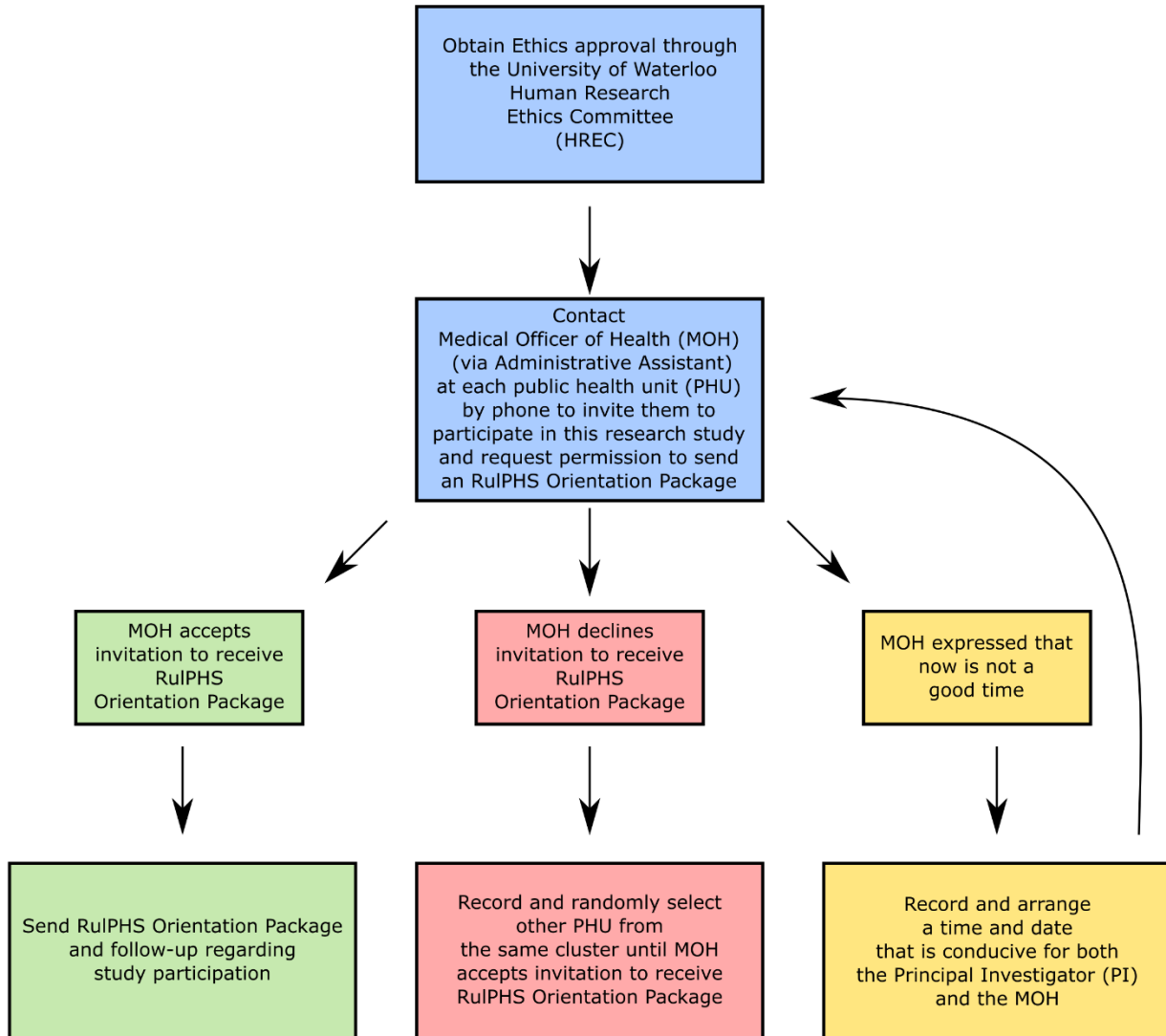
Researcher's/Witness' signature:

_____ **Date (yy/mm/dd): _____**

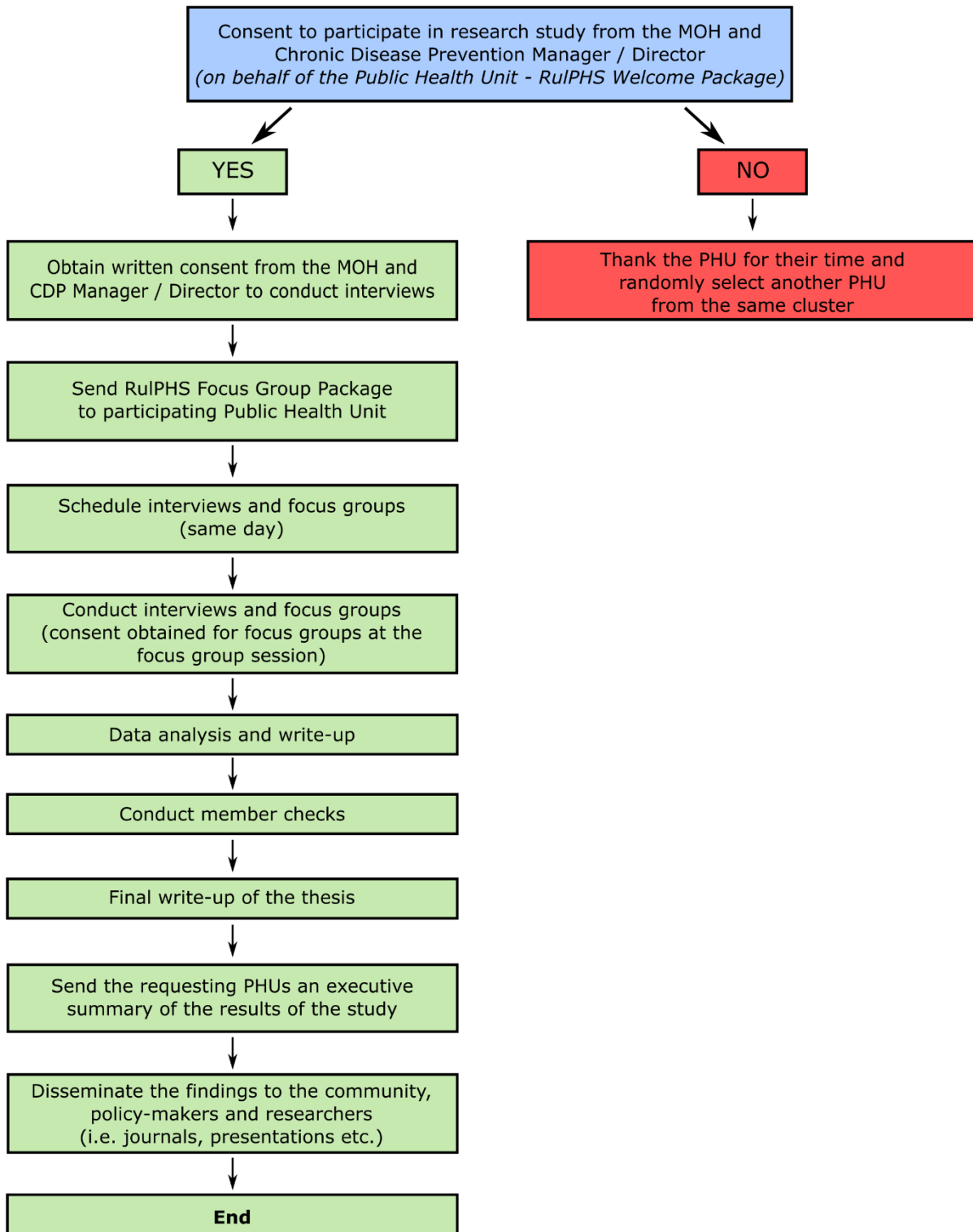


Appendix E - RulPHS Study Protocol Flow Diagram

Phase 1: Study Recruitment Protocol



Phase 2: Consent and Study Protocol



Appendix F- Medical Officer of Health (MOH) Telephone Script

Phase 1: Recruitment Protocol

Initial Contact with MOH Script (via Administrative Assistant)

Hello, my name is Deanna White and I'm calling from the University of Waterloo. I am a PhD student at the University of Waterloo in the Public Health and Health Systems Program and a former Public Health Epidemiologist. Your health unit is being asked to participate in a research study on the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario public health units. The primary method of data collection will be in-depth, intensive, semi structured qualitative interviews with the Medical Officer of Health (MOH) and the CDP Manger/Executive Director, as well as focus groups with chronic disease prevention staff. Basic supplementary unobtrusive information will also be collected. The main purposes of the study are to develop an understanding practice-based evidence in chronic disease prevention in rural areas (what works, to whom, and under what circumstances?). The collected information will be shared with policymakers, researchers, decision-makers, public health practitioners, community members, and used in published research, academic presentations, and other knowledge translation (KT) strategies.

Table 1: Recruitment Protocol Telephone Script

#	Question	Response Options	Go To	Action
1	Can I send you a RulPHS Orientation Package that provides information about the study? (contains recruitment letter, information letter and health unit consent forms)	Yes	#2	
		Yes, but now is not a good time	#3	
		No	#4	
		No answer		<ul style="list-style-type: none"> • Call back in a few days or when indicated on their voice message • After two attempts leave message • If not heard back after one week after leaving a message, send an e-mail

				<ul style="list-style-type: none"> • If not heard back after one week after sending an e-mail change participation response to “No” • Purposefully select another health unit from the same cluster
2	Can I confirm your e-mail address?	(record e-mail address)		<ul style="list-style-type: none"> • Send RulPHS Orientation Package • Follow-up to obtain response from health unit
3	May I call you back later to discuss this study?	Yes (record)		
4	Thank-you for time. Have a nice day	END		<ul style="list-style-type: none"> • Record and purposefully select another health unit from the same cluster

Phase 2: Consent Protocol

#	Deliverable	Response Options	Go To	Action
1	Mail RulPHS Welcome Package and obtain consent to participate in the study	Yes (consent)	#2	
		No (consent)	End	<ul style="list-style-type: none"> • Send an e-mail correspondence thanking them for their time and purposefully select another health unit from the same cluster
2	Send RulPHS Focus Group Package	N/A	#3	
3	Set up interviews and focus groups	N/A	#4	<ul style="list-style-type: none"> • Determine date, time and location of interviews and focus groups, and obtain other relevant information
4	Conduct interviews and focus groups	N/A	END	

Note: Please note, recruitment procedures may slightly change during the study. Please see study details.



Appendix G- Recruitment Letter for Health Units

Date, 2018

Name

Address

City, Province

Dear name

This letter is a request for [*Health Unit's name*] assistance with a project I am conducting as part of my PhD degree in the Department of Public Health and Health Systems at the University of Waterloo, Ontario, under the supervision of Dr. John Garcia. The title of my research project is “*Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units*”. I would like to provide you with more information about this project.

The purpose of this study is to understand implementation of evidence-informed chronic disease prevention practice in Ontario rural public health units. Knowledge and information generated from this study may help to make a practical contribution to improve the performance of public health in rural areas, through a better understanding of factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural areas.

It is my hope to connect with health units in rural areas to invite them to participate in this research project. I believe that health unit staff and management would like to share some of their experiences in relation to the implementation of chronic disease prevention programs and policies in rural areas. During the course of this study, I will be conducting interviews with the Medical Officer of Health (MOH) and a key Manager or Director of Chronic Disease Prevention, as well as focus groups with chronic disease prevention staff, including public health nurses, health promoters, dietitians, support staff, and other staff that are deemed appropriate by the Director/Manager of Chronic Disease Prevention within each health unit.

At the end of this study the publication of this dissertation I will share the knowledge from this study with other researchers, policy-makers, public health practitioners, community-members, and decision-makers (i.e. Ministry of Health and Long-Term Care (MOHLTC), Public Health Ontario (PHO), and the Local Health Integration Network (LHIN)).

Participation of any health unit is completely voluntary. Each health unit will make their own independent decision as to whether or not they would like to be involved. All participants will be informed and reminded of their rights to participate or withdraw before any interview and focus group or at any time in the study. All participants at each health unit will receive an information letter including detailed information about this study, frequently asked questions for focus group participants (FAQs), as well as informed consent forms.

To support the findings of this study, the name of the health unit and participants will not be identifiable. Therefore, pseudonyms will be used to protect the identity of the health unit and participants. Further, names of participants will not appear in the dissertation or publications resulting from this study.

All paper field notes collected will be retained locked in my office and in a secure cabinet in the Student Investigators office. All paper notes will be confidentially destroyed after five years. Further, all electronic data will be stored on a password protected computer with no personal identifiers. Finally, only the Student Investigator, the dissertation committee members in the department of Public Health and Health Systems at the University of Waterloo, and a transcriber will have access to these materials. There is minimal risk to participants associated with this study.

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE # 22791). However, the final decision about participation belongs to the health unit, and the participants.

Please review Appendix A provided in this orientation package to make an informed choice of participation. If you have any questions regarding this study or would like additional information to assist you in reaching a decision about participation, please contact me at (personal phone number provided) or by email at d8white@uwaterloo.ca. You may also contact my supervisor, Dr. John Garcia at (519) 888-4567, ext. 35516 or by email at john.garcia@uwaterloo.ca.

I hope that the results of my study will be beneficial to the health units in rural areas in Ontario, as well as the broader research community. I very much look forward to further speaking with you and thank-you in advance for your assistance with this project.

Deanna White, Hon.BA, MA, PhD(c)

Department of Public Health and Health Systems

University of Waterloo





Appendix H – Appreciation Letter for Health Units

Date, 2018

Name

Address

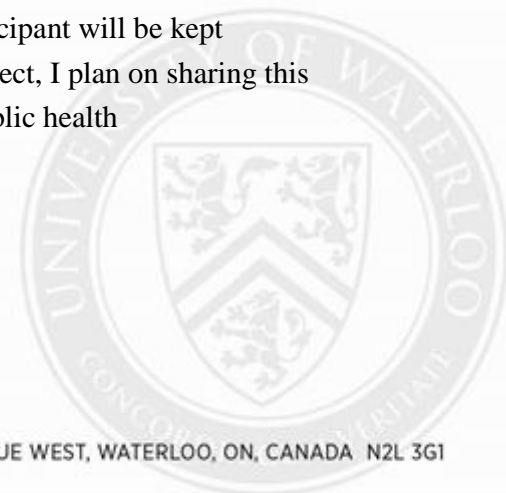
City, Province

I would like to thank you for your participation in this study entitled *“Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units.”* The study has three inter-related purposes. Specifically, It anticipated that this study would: 1) develop an understanding of practice-based evidence in chronic disease prevention in rural areas – through the identification of the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention programs and policies in rural areas; 2) make a practical contribution to improve the performance of public health through a better understanding of these factors and how rural public health professionals can be better supported by policy (i.e. OPHS) strategies for knowledge translation, evaluation and research, and funding etc. to minimize the challenges and maximize assets related to implementation; and 3) make a contribution to public health implementation research in rural areas. As a result, the data collected during the interviews and focus groups might enhance rural public health practice for chronic disease prevention in Ontario.

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the Committee contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca

For all other questions contact Deanna E. White at (personal phone number provided) or by email at (d8white@uwaterloo.ca).

Please remember that any data pertaining to you as an individual participant will be kept confidential. Once all the data are collected and analyzed for this project, I plan on sharing this information with the policy-makers, researchers, decision-makers, public health



practitioners, and community members, through published research, academic presentations and other knowledge translation (KT) strategies.

If you are interested in receiving more information regarding the results of this study, or would like a summary of the results, please let me know, and when the study is completed (anticipated by August, 2018) I will send you the information. In the meantime, if you have any questions about the study, please do not hesitate to contact me.

Yours sincerely,



Deanna White, BA (Hons), MA, PhD(c)

Department of Public Health and Health Systems

University of Waterloo

d8white@uwaterloo.ca.





Appendix I – RulPHS Frequently Asked Questions for Focus Group Participants

1. What is the RulPHS?

The purpose of this research study is to understand implementation of rural public health systems in Ontario for chronic disease prevention.

2. Why are we doing focus groups and interviews?

The Student Investigator (SI) is gathering information to understand the factors that facilitate or impede the implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario public health units. Specifically, some of the questions are as follows: What are some challenges and assets working in a rural health unit? Are they different in a rural setting compared to an urban setting? Who and what influences implementation? How can public health professionals be better supported? **We are inviting public health professionals to have their say, to highlight their current experiences and help us to understand rural public health practice.**

3. What are we going to do with the information?

The information will be shared with policymakers, researchers, decision-makers (i.e. Public Health Ontario (PHO), Local Health Integration Network (LHIN), Ontario Ministry of Health and Long-Term Care (MOHLTC) etc.), government, academic institutions, and community members.

4. How would I find out more information about this study?

Your manager will give you an information letter that you provide you with the details about the study. Please read the information carefully to make an informed choice. If you have any further questions, please contact the SI, Deanna White at (personal phone number provided) or by email at (d8white@uwaterloo.ca).

5. Has this study received ethics clearance?

This study has been reviewed and received ethics clearance through a University of Waterloo, Human Research Ethics Committee (ORE#22791). If you have questions for the University of Waterloo, Human Research Ethics Committee, you can contact the Chief Ethics Officer, Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

6. Are there risks associated with the study?

There is minimal risk associated with this study (please see information form for more details).

7. Is my information confidential and anonymous?

All identifying information is removed from the data immediately. The de-identified data will be accessible by the study investigators as well as the broader scientific community. All information collected will be aggregated so that there will be no identifying individual results.

8. Do I have to participate?

Participation is completely voluntary, and you have the right to withdraw from the study at any time by communicating this to the SI. You may refuse to answer any questions and contribute to the session in other ways without repercussions, penalty, or reason and this will not affect the relationship that you have with the SI.

9. How long are the focus groups?

The focus groups are sixty to ninety minutes in length and the details of the focus group (date/time/location) will be provided by your manager.

10. Will I receive compensation for participating in the focus groups?

As a token of appreciation, we will be providing refreshments during the focus group. No other compensation will be provided.

11. When is consent obtained?

Consent is obtained at onset of the focus group session.

Appendix J – Qualitative Interview Guide

A. Opening remarks and discussion about the purposes and benefits of the study

- Consent will be obtained prior to interviews
- Introduce self and present an overview of the study
- Describe the benefits of the study and application to rural public health practice
- Stress that there is no expectation of the researcher and that they can withdraw for the study and refuse to answer any questions
- Explain that the study is confidential, ask for permission to audio record the interview and inform the participant that the data will be destroyed
- Explain interest in using “non-attributed quotes”, and elucidate that the interview and all identifying information will be stored in completely separate locations and destroyed after five years
- Reaffirm that there are no right or wrong questions
- Ask the participant if they have any questions, answer them, and thank them for their time and begin

B. Background

I would first like to ask you some general questions at the beginning about your role and responsibilities and the CDP program.

1. Would you please state your name, role/title, discipline, number of years in your current role and number of years in public health?

It would be helpful for me to know about what you do and whom do you work with in a bit more detail. Will you tell me who do you work with? In what capacity? And, why?

2. What is your job as related to the CDP here in (public health unit)?

Thank-you for the information, it is helpful. Since my study is about the implementation of CDP policies and programs in Ontario rural health units, I would like to ask you about the CDP program. Is that okay?

3. What are the major areas of CDP activity/action in your health unit? Who are the priority populations? Who’s involved? What are they trying to achieve? How do they operate?

C. Semi-Structured Questions

Thank-you. Now I would like to discuss public health decision making and how it relates to implementation. For a moment, please think about the term “evidence”.

Section 1: Evidence

4. What does the word evidence mean to you?

5. In general, what kinds of evidence is relevant to your decisions about CDP programs and policies? (Prompt: scientific literature, health indicators, grey literature, reflection, and evaluative research)? As it/they relates to a rural setting? Have you encounter any challenges regarding rural evidence?

IF NEEDED ONLY. I want to prompt on evaluative research. What about:

- Developmental evaluation (e.g. logic model construction, systems thinking)?
- Process evaluation (i.e. decentralized or centralized evaluation approaches)?
- Products of evaluation (i.e. health status reports, presentations, webinars)?

6. How is evidence used in your department? (i.e. minor/major program or policy decisions, justification of current practice, inform and educate staff)

Now, just a few questions about decision-making in this health unit as it pertains to CDP.

Section 2: Roles

7. Who influences implementation of CDP programs and policies in your health unit?

8. What is their role (e.g. lead, follow, let happen [get out of the way], block/confront/impede)?

9. What factors affect their decisions, commitments, and actions?

10. How do they operate?

11. Do you have an opinion on their use?

I would also like to know about the implementation for CDP.

Section 3: Implementation Process

12. What is the general process for implementing (planning, engaging, executing, reflecting and evaluating) any CDP programs and policies in your health unit [Prompts: who, what, when, how etc.]?

13. What factors influence the implementation process, if any? [Prompt: facilitators and barriers]?

14. How do you define implementation success and failure of CDP programs/policies?

Now, just a few questions about the factors that positively and negatively affect the implementation of CDP programs and policies within your health unit. I know that this is complex and there many factors come into play when you are trying to implement effective practice. Take a moment and think about how a public health unit in a rural area is different than a public health unit in an urban area.

Section 4: Implementation Factors (i.e. intervention characteristics, inner setting, outer setting, and individual characteristics)

15. What are the major factors that affect implementation of CDP programs and policies in a rural public health setting? How have they positively or negatively affected implementing evidence

practice here? What are some of the solutions that you used to address some these challenges, if any did? [Prompt: challenges and assets working in a rural health unit for CDP?]

16. I want to prompt responses in a number of areas. What about factors relating to:

- Policy or program characteristics?
- Within your health unit?
- Outside your health unit?
- Individual characteristics (i.e. staff and management)

IF NEEDED ONLY – PROMPT RESPONSES IN THE AREAS LISTED BELOW (i.e. Sections a-d)

a. Intervention Characteristics

17. **IF NEEDED ONLY.** What if any, do you believe the following intervention factors affect how CDP programs and policies are developed or introduced in a rural setting? What about?

- Advantage of policy or program (versus an alternative solution based on clear program and cost effectiveness)?
- Adaptability/Compatibility (i.e. whether the program or policy can be refined, tailored, or reinvented to meet local needs/characteristics most easily adopted, and compatible with professional norms, old and new routines, values, goals, skill mix, and technologies)?
- Trialability (piloted)?
- Intervention source (internally or externally developed)?
- Evidence strength and quality (quality and validity of evidence that will have desired outcomes)?
- Complexity (duration, scope, disruptiveness, intricacy, centrality, radicalness, and intricacy)?
- Design quality and packaging (presented, assembled, and bundled)?

b. Inner Setting

PROBE EACH SECTION - IF NEEDED ONLY

a. Structural Characteristics

18. Do you have what you need in terms of staffing, resources (i.e. slack resources), funding, appropriate physical space, technical capacity, time and commitment and organization structure (i.e. decentralization vs centralization) to implement evidence-informed CDP programs and policies in your health unit? If not, why not? What approaches, if any, did you use to address these challenges?

b. Networks and Communications

19. Are there formal networks for CDP within your organization or public health more generally? Who is involved? What is their purpose? What are the biggest challenges and opportunities for

networking in a rural public health setting? Are there other networks (i.e. informal) that influence implementation? If so, please describe?

20. How is new information about a minor/major or new CDP program/policy communicated to you within your health unit? (i.e. webinars, e-mail communications, team meetings)? Are these communication channels effective, or can they be improved? Why or why not? Does a rural setting affect communication?

c. Social Capital

21. How would you describe the relationship with these formal networks (i.e. close, supportive, trustworthy, and reciprocal)? Would you say that there is a “sense of teamness”? In your opinion, does a rural public health setting affect these relationships? If so, how?

d. Organizational Culture

22. How would you describe the culture of your health unit [Prompt: what about shared experiences, general beliefs, values, goals and history and tradition, and doing the right thing internal to the organization]? Where does the information about these things come from?

23. How do you think your health unit’s organization culture affect implementation of CDP programs and policies? What contributions does the organizational culture have in a rural public health setting, if any?

e. Organizational Climate

24. What is the general level of receptivity in your health unit to implement minor/major changes or new CDP policies and programs? [Prompt: rewarded, supported, expected, safe to try new things]. Please provide some examples? How do you justify major program or policy changes? Is the criteria different in a rural public setting, why or why not?

25. Are there organizational activities to support staff (i.e. sufficient training and professional development opportunities, materials, excess resources) to gain the required competencies to implement minor/major changes or new CDP program/policy changes? If so, what are they?

f. Leadership Engagement

26. In your opinion, does your health unit support you with better enabling and implementing evidence-informed practice? If so, how? If not, what support do you think would be helpful, particularly in a rural setting?

IF NEEDED ONLY. How does your work environment support you? Would you say that leaders within your health unit are:

- Committed, involved, and accountable with implementing evidence-informed programs/policies?
- Patient?
- Visionary (vision for improvement)?
- Provide clarity about any program/policy changes?

- Follow through with necessary changes?

g. Readiness for Implementation

27. How do you know if your department is receptive to make major program or policy changes based on the evidence? In your opinion, what criteria do you use to establish “readiness? (i.e. leadership engagement, available resources, new learning opportunities, compatibility, critical appraisal, tension for change, capacity for evaluation)? Are there challenges and opportunities in a rural public health setting that affect readiness? What approaches, if any, did you use to address these challenges?

c. Outer Setting

PROBE EACH SECTION - IF NEEDED ONLY

a. Individual and Population (Population) Needs and Resources

28. What are some of the geographic, demographic, natural (i.e. natural world untouched by human influence), built (i.e. features of the environment influenced by human design such as land development patterns, microscale urban design and transportation systems) and physical environmental (i.e. (objective and perceived characteristics of the physical environment such as urban design, traffic density, speed, crime and safety) factors that affect implementation of CDP programs and policies? (Prompts: challenges, assets). What approaches, if any, did you use to address these challenges? Are there any others?

b. Cosmopolitanism

29. What are the some of the biggest challenges and opportunities networking with external organizations relative to a rural public health setting? (Prompt: with whom, with what effect on implementation)?

IF NEEDED ONLY

- Purpose of these partnerships (collaboration)?
- Partnerships function?
- Information exchange (i.e. evidence-informed program/policy or about your profession)
- Health Unit encourage you to network with colleagues outside your own setting?

c. Social Capital

30. How would you describe your relationships with external organizations? (i.e. close, supportive, trustworthy, reciprocal)? In your opinion, does a rural public health setting affect these relationships? If so, how?

c. Peer Pressure

31. In your opinion, have you ever been pressured from other health units to implement CDP programs and policies? If so, did you have opinion on their use? Did it address a community need? Were there any barriers to implementing evidence?

d. External Policies and Incentives

32. What external policies and incentives including local, provincial, and federal policies, regulations and guidelines that influence your decision-making about implementing CDP programs and policies?

IF NEEDED ONLY

- External policies and incentives guide your practice?
- Any threats of non-compliance?
- Aspects of a rural public health setting help or hinder implementation of external policies?
- Solutions to address some these challenges, if any?

d. Individual Characteristics

PROBE EACH SECTION - IF NEEDED ONLY

a. Knowledge & Beliefs

33. What aspects of your health unit contribute to organizational learning? Are they unique to a rural public health setting?

I want to prompt responses in a number of areas. What about:

- Opportunities for training, professional development, and connections with learning environments and professional organization?
- Leadership?
- Culture? (i.e. shared experiences, general beliefs, values, goals and history and tradition, and doing the right thing internal to the organization)
- Are there any others?

34. How does evidence get translated to staff? What is the process, if any?

b. Attitude/Other Personal Attributes

35. In your opinion, does a rural setting affect the way people think, feel and behave? If so, how and why? Can you provide examples? [Prompts: what about job satisfaction/organizational commitment?]

c. Self-Efficacy

36. What aspects of your health unit might affect an individual's belief in their capabilities to implement CDP programs and policies (i.e. opportunities for professional development, appropriate skills, and competencies)? What if any, are some factors that affect self-efficacy in a rural public health setting?

d. Individual Stage of Change

37. In general, how prepared are you to implement major or new CDP programs/policies in your department? [Prompt: not ready, getting ready, ready to do this within the next 30 days, already doing this (< 6 months OR > 6 months)]?

38. How do you make this decision? What factors affect your decision? [Prompt: affect you personally (i.e. impact on daily work), cost, sufficient information, flexibility, adequate training and skillset]?

39. Do you believe a rural public health setting influences how prepared you are? Please explain?

e. Individual Identification with Organization

40. Overall, what do you think about your department? Do you think your department can be doing a better job? [Prompt: inequities, inefficiencies]. If yes, please describe.

IF NEEDED ONLY *I want to prompt responses in a number of areas. Are you able to:*

- Take risks or try something new to improve your work processes?
- Provide feedback into CDP program/policy decision-making?
- Put in extra effort?

Now, just a few last questions factors, lessons learned, and knowledge translation.

E. General Questions

41. Are there any other factors that affect the implementation of CDP programs and policies in a rural public health setting? If so, please describe? [Prompt: barriers and assets]

42. Can you describe some of the strengths, assets and achievements and lessons learned in a rural public health setting for CDP?

43. How can be public health professionals in rural public health units be better supported by policy (i.e. OPHS), strategies for knowledge translation, evaluation and research, and funding?

There is one last question that I have, I believe to be the most important

44. What advice do you have to offer to the Ministry of Health (MOH), Public Health Ontario (PHO), the Local Health Integration Network (LHIN), and other levels of the system (local, provincial, national) that will enhance rural health practice in Ontario public health units for CDP?

F. Closing Remarks

- Are there any additional insights that you would like to share that I have not addressed?
- Thank-you for your time and honesty throughout the interview
- Would you mind if I call you if I have any additional questions?
- Thank-you, have a great day.

Appendix K - Declaration of Non-Disclosure

Date, 2018

Name

Address

City, Province

Research Project: Factors that Facilitate and Impede the Implementation of Evidence-Informed Chronic Disease Prevention Programs and Policies in Rural Ontario Public Health Units

ORE #: 22791

This Declaration of Non-Disclosure is to be read and understood in conjunction with the University of Waterloo Security Policies (<https://uwaterloo.ca/information-systems-technology/about/policies-standards-and-guidelines/security/information-security-research/https://uwaterloo.ca/research/office-research-ethics/research-human-participants/pre-submission-and-training/human-research-guidelines-and-policies-alphabetical-list/guideline-researchers-securing-research-participants-data./https://uwaterloo.ca/records-management/policies-and-guidelines> . By signing and returning a copy of this document to the Student Investigator, I agree to abide by the policies and procedures outlined in the aforementioned declaration.

I acknowledge that, in my capacity as a member (researcher, evaluator, staff, consultant, etc.) of the University of Waterloo I will have access to certain confidential information. This information includes, but is not limited to the following: files, data books, diagrams, records, studies, protocols, reports, draft publications, interviews, surveys, samples, schedules, appraisals, computer programs, and statistical information. Confidential information may be oral, written, or electronic.

I understand that all members must sign a Declaration of Non-Disclosure when they commence their association with the University of Waterloo. This includes undergraduate and graduate students conducting research within the University of Waterloo and temporary members (i.e., consultants) or visiting faculty from other institutions. Under this declaration, members consent to keep all matters to which they are privy related to all projects being conducted at the University of Waterloo confidential.

I agree that during my association with University of Waterloo and for a period of five years after termination of employment or association with the University of Waterloo, I shall not disclose to any

other person, firm or corporation, any confidential information relating to any projects, other than for the specific purposes required by my duties within the University of Waterloo.

I also understand that I am required to notify my Supervisor at the University of Waterloo or his/her designate immediately of any breach of my obligations or conflict of interest under this agreement which comes to my attention.

By signing and returning a copy of this document to the Student Investigator, I confirm my understanding and acceptance of the above clause and will comply with these clauses. I also agree that my obligation to comply with the above will survive my termination of association with the University of Waterloo for a period of five years.

Signed at _____ this _____ day of _____ 2018

Name and Position of Student Investigator: (name, position title)

Signature of PI: _____

Name and Position of Supervisor: (name, position title)

Signature of Supervisor:





Appendix L –Transcription Guideline

Transcription Codes:

Project Manager/Moderator = Deanna White

U-M = unidentified male / U-F = unidentified female

?? = inaudible (with timestamp) or (ph) for phonetic

Transcription Guidelines: ****Password protect all files****

- Please type as exact as possible to the recording and the moderator/participants' language, using commas, etc. where appropriate. This may mean in some cases that a participant has a manner of speaking/dialect that may look like a typo or may be grammatically incorrect. In these cases, please note using single quotations. When spell checking, you will know then not to change this word/phrase. For example, type 'cause rather than because if that is what they said.
- Please separate all researcher/moderator and research assistant comments from participant comments. **Please bold what is said by the researcher/moderator and the research assistant.** Don't forget to spell check the document at the end.
- Please code as many participants as possible, if their name is said aloud by the moderator. (E.g. Moderator: first we will hear from Steve, then Mike should be "first we will hear from ST2 then MI2"). If the participant is not identified, use U-M or U-F as in the example above. If the participant is identified, use their specific code. Code names using the first two letters of their name plus 1 for female, 2 for male.
- You do not have to capture all of the nuances (ahs, ums, mmmms, etc.). Please use your judgement in noting those most prominent/important. The most obvious ones are what we would like to capture.
- If a person shifts in mid-sentence or mid-thought, please type exactly, using punctuation, such as a comma, where you feel it is fitting. Only use ... if there is a pause/trailing (which may be the case when an interviewer starts to ask a question) With a long pause, please write (pause) in brackets. Unless a person is trailing or pausing, please do not use, as ellipsis points can also mean an omission in text.
- **Please try to keep 'conversation strands' together if you are using U-M or U-F so that we can see if it is the same person who is continuing to speak.** This overrides the previous instruction about keeping participants and moderator separate.
- Use square brackets for missing or replaced data.
- Use round brackets for added words/emphasis/emotions (laughing, crying, sarcasm etc.). Please only include obvious ones.
- If something is said strongly, this can be denoted by underlining the word or phrase.
- The only known abbreviations that may come up include the LHIN (Local Health Integration Network), PHO (Public Health Ontario), MOH (Medical Officer of Health), CDP (Chronic Disease Prevention), OPHS (Ontario Public Health Standards). I do not anticipate a great

deal of other abbreviations or technical terminology but if they come up, we will make every effort to spell it out at least once.

File Titles and Passwords

- *****Please password-protect all files*****
- Please use the following format for the file titles:
 - o For Focus Group with Peer Group C, use “Peer Group C_Focus_Group_” followed by the date. Number them sequentially.
 - o For Focus Group with Peer Group D, use “Peer Group D_Focus_Group_” followed by the date.
 - o For Focus Group with Peer Group E, use “Peer Group E_Focus_Group_” followed by the date.
 - o Within each transcription file, please note at the top:
 - Date and time of the data collection

Schedule of Interviews and Focus Groups

- All interviews and focus groups are expected to last approximately 90 minutes.
- I anticipate up to 5 focus groups and 10 interviews
- I anticipate that all the interviews and focus groups will be completed before the end of May 2018 or shortly thereafter.

Billing information

Please send invoices for this work to:

Deanna White
PhD Student, University of Waterloo
Welland, Ontario
d8white@uwaterloo.ca



Appendix M – Transcriber's Agreement of Confidentiality

Date, 2018

Name

Address

City, Province

Dear:

Title of Project:

Rural Public Health Systems Research Study

Principal Student Investigator: Deanna White
Supervisor: Dr. John Garcia

ORE #: 22791

Security of Data and Agreement of Confidentiality

I agree to:

- Maintain the security and privacy of the tapes, digital audio recordings and transcripts from the “Rural Public Health Systems Research Study” project.
- Keep audio and transcripts in secure (preferably locked) cabinets.
- Never, under any circumstances, leave documents or audio recordings exposed or unattended.
- Work from a temporary folder on the C: drive of my computer until the transcription is completed and then received by the research team. Data should be deleted after confirmation of receipt of transcripts or upon completion of the project. Each transcript will be emailed as completed to the Student Investigator (Deanna White), using password protection.
- Ensure that any tangible materials (paper, tapes, CD-R) are delivered to the Student Investigator (Deanna White) via gum-sealed envelope marked confidential, using a traceable delivery system (e.g. Purolator), and password protected where possible.
- Ensure that names or other obvious identifying information are removed from all transcripts and replaced with transcription codes.
- Not communicate with anyone, except a member of the research team by any means verbal, written, or electronic about the moderator, interview and focus group participants or the contents of the tapes/transcripts.
- Contact a Deanna White if a personal need to talk about the data arises.



Transcriber's Signature

Name (please print): _____

Signature: _____

Date: _____



Appendix N – Focus Group Guide

A. Opening remarks and discussion about the purposes and benefits of the study

- Introduce self and present an overview of the study
- Describe the benefits of the study and application to rural public health practice
- Stress that there is no expectation of the researcher and that they can withdraw from the study and refuse to answer any questions
- Keep all information that identifies or could potentially identify a participant and/or his/her comments confidential
- Ask for permission to audio record the focus groups, explain interest in using “non-attributed quotes, and that the focus group discussion and the identifying information will be stored in completely separate locations and destroyed after five years
- Ask permission to record the discussion on flip chart paper. Explain the purpose of using flip chart paper (to record the discussion) and explain that no identifying information will be recorded on the flip chart paper
- State that it would be helpful if the participants can state their name each time, they answer a question to add to the discussion
- Explain that there are no right or wrong answers
- Explain that everyone’s opinion will be treated with respect and instruct them to raise their hand before they speak
- Ask if participant has any questions, answer them,
- Receive completed consent forms and thank them for their time and begin

B. Icebreaker Exercise

Before we begin I would first like to start off with a short activity that is unrelated to this study. I invite you to answer the question, “If you could choose your age forever, what age would it be and why? Please record your answer on the paper in front of you. After you have recorded your answer, now find out in the room who choose the same decade as you. Organize yourself in groups according to decades. The Student Investigator will then ask the small groups to share the reasons why they choose that particular decade to the entire group.

C. Background

Before we begin, I would first like to ask you some general questions at the beginning about your role and responsibilities and the CDP program. It will be helpful to get some demographic information about each of you.

1. Can we please go around the table and state your name, role/title, discipline, number of years in your current role and number of years in public health?

Thank-you for the information, it is helpful. Since my study is about the implementation of evidence-informed CDP policies and programs in Ontario rural health units, I would like to ask you about the CDP program. Is that okay?

2. What are the major areas of CDP activity/action in your health unit? Who are the priority populations? Who's involved? What are they trying to achieve? How do they operate?

D. Focus Group Questions

Thank-you. Now I would like to discuss public health decision making and how it relates to implementation. For a moment, please think about the term "evidence".

Section 1: Evidence

4. What does the word evidence mean to you?

5. In general, what kinds of evidence is relevant to your decisions about CDP programs and policies? (Prompt: scientific literature, health indicators, grey literature, reflection, and evaluative research)? As it/they relates to a rural setting? Have you encounter any challenges regarding rural evidence?

IF NEEDED ONLY. I want to prompt on evaluative research. What about:

- Developmental evaluation (e.g. logic model construction, systems thinking)?
- Process evaluation (i.e. decentralized or centralized evaluation approaches)?
- Products of evaluation (i.e. health status reports, presentations, webinars)?

6. How is evidence used in your department? (i.e. minor/major program or policy decisions, justification of current practice, inform and educate staff)

Now, just a few questions about decision-making in this health unit as it pertains to CDP.

Section 2: Roles

7. Who influences implementation of CDP programs and policies in your health unit?

8. What is their role (e.g. lead, follow, let happen [get out of the way], block/confront/impede)?

9. What factors affect their decisions, commitments, and actions?

10. How do they operate?

11. Do you have an opinion on their use?

I would also like to know about the implementation for CDP.

Section 3: Implementation Process

12. What is the general process for implementing (planning, engaging, executing, reflecting and evaluating) any CDP programs and policies in your health unit [Prompts: who, what, when, how etc.]?

13. What factors influence the implementation process, if any? [Prompt: facilitators and barriers]?

14. How do you define implementation success and failure of CDP programs/policies?

Now, just a few questions about the factors that positively and negatively affect the implementation of CDP programs and policies within your health unit. I know that this is complex and there many factors come into play when you are trying to implement effective practice. Take a moment and think about how a public health unit in a rural area is different than a public health unit in an urban area.

Section 4: Implementation Factors (i.e. intervention characteristics, inner setting, outer setting, and individual characteristics)

15. What are the major factors that affect implementation of CDP programs and policies in a rural public health setting? How have they positively or negatively affected implementing evidence practice here? What are some of the solutions that you used to address some these challenges, if any did? [Prompt: challenges and assets working in a rural health unit for CDP?]

16. I want to prompt responses in a number of areas. What about factors relating to:

- Policy or program characteristics?
- Within your health unit?
- Outside your health unit?
- Individual characteristics (i.e. staff and management)

IF NEEDED ONLY – PROMPT RESPONSES IN THE AREAS LISTED BELOW (i.e. Sections a-d)

a. Intervention Characteristics

17. **IF NEEDED ONLY.** What if any, do you believe the following intervention factors affect how CDP programs and policies are developed or introduced in a rural setting? What about?

- Advantage of policy or program (versus an alternative solution based on clear program and cost effectiveness)?
- Adaptability/Compatibility (i.e. whether the program or policy can be refined, tailored, or reinvented to meet local needs/characteristics most easily adopted, and compatible with professional norms, old and new routines, values, goals, skill mix, and technologies)?
- Trialability (piloted)?
- Intervention source (internally or externally developed)?
- Evidence strength and quality (quality and validity of evidence that will have desired outcomes)?
- Complexity (duration, scope, disruptiveness, intricacy, centrality, radicalness, and intricacy)?
- Design quality and packaging (presented, assembled, and bundled)?

b. Inner Setting

PROBE EACH SECTION - IF NEEDED ONLY

a. Structural Characteristics

18. Do you have what you need in terms of staffing, resources (i.e. slack resources), funding, appropriate physical space, technical capacity, time and commitment and organization structure (i.e. decentralization vs centralization) to implement evidence-informed CDP programs and policies in your health unit? If not, why not? What approaches, if any, did you use to address these challenges?

b. Networks and Communications

19. Are there formal networks for CDP within your organization or public health more generally? Who is involved? What is their purpose? What are the biggest challenges and opportunities for networking in a rural public health setting? Are there other networks (i.e. informal) that influence implementation? If so, please describe?

20. How is new information about a minor/major or new CDP program/policy communicated to you within your health unit? (i.e. webinars, e-mail communications, team meetings)? Are these communication channels effective, or can they be improved? Why or why not? Does a rural setting affect communication?

c. Social Capital

21. How would you describe the relationship with these formal networks (i.e. close, supportive, trustworthy, and reciprocal)? Would you say that there is a “sense of teamness”? In your opinion, does a rural public health setting affect these relationships? If so, how?

d. Organizational Culture

22. How would you describe the culture of your health unit [Prompt: what about shared experiences, general beliefs, values, goals and history and tradition, and doing the right thing internal to the organization]? Where does the information about these things come from?

23. How do you think your health unit’s organization culture affect implementation of CDP programs and policies? What contributions does the organizational culture have in a rural public health setting, if any?

e. Organizational Climate

24. What is the general level of receptivity in your health unit to implement minor/major changes or new CDP policies and programs? [Prompt: rewarded, supported, expected, safe to try new things]. Please provide some examples. How do you justify major program or policy changes? Is the criteria different in a rural public setting, why or why not?

25. Are there organizational activities to support staff (i.e. sufficient training and professional development opportunities, materials, excess resources) to gain the required competencies to implement minor/major changes or new CDP program/policy changes? If so, what are they?

f. Leadership Engagement

26. In your opinion, does your health unit support you with better enabling and implementing evidence-informed practice? If so, how? If not, what support do you think would be helpful, particularly in a rural setting?

IF NEEDED ONLY. How does your work environment support you? Would you say that leaders within your health unit are:

- Committed, involved, and accountable with implementing evidence-informed programs/policies?
- Patient?
- Visionary (vision for improvement)?
- Provide clarity about any program/policy changes?
- Follow through with necessary changes?

g. Readiness for Implementation

27. How do you know if your department is receptive to make major program or policy changes based on the evidence? In your opinion, what criteria do you use to establish “readiness? (i.e. leadership engagement, available resources, new learning opportunities, compatibility, critical appraisal, tension for change, capacity for evaluation)? Are there challenges and opportunities in rural public health settings that affect readiness? What approaches, if any, did you use to address these challenges?

c. Outer Setting

PROBE EACH SECTION - IF NEEDED ONLY

a. Individual and Population (Population) Needs and Resources

28. What are some of the geographic, demographic, natural (i.e. natural world untouched by human influence), built (i.e. features of the environment influenced by human design such as land development patterns, microscale urban design and transportation systems) and physical environmental (i.e. (objective and perceived characteristics of the physical environment such as urban design, traffic density, speed, crime and safety) factors that affect implementation of CDP programs and policies? (Prompts: challenges, assets). What approaches, if any, did you use to address these challenges? Are there any others?

b. Cosmopolitanism

29. What are the some of the biggest challenges and opportunities networking with external organizations relative to a rural public health setting? (Prompt: with whom, with what effect on implementation)?

IF NEEDED ONLY

- Purpose of these partnerships (collaboration)?

- Partnerships function?
- Information exchange (i.e. evidence-informed program/policy or about your profession)
- Health Unit encourage you to network with colleagues outside your own setting?

c. Social Capital

30. How would you describe your relationships with external organizations? (i.e. close, supportive, trustworthy, reciprocal)? In your opinion, does a rural public health setting affect these relationships? If so, how?

d. Peer Pressure

31. In your opinion, have you ever been pressured from other health units to implement CDP programs and policies? If so, did you have opinion on their use? Did it address a community need? Were there any barriers to implementing evidence?

e. External Policies and Incentives

32. What external policies and incentives including local, provincial, and federal policies, regulations and guidelines that influence your decision-making about implementing CDP programs and policies?

IF NEEDED ONLY

- External policies and incentives guide your practice?
- Any threats of non-compliance?
- Aspects of a rural public health setting help or hinder implementation of external policies?
- Solutions to address some these challenges, if any?

d. Individual Characteristics

PROBE EACH SECTION - IF NEEDED ONLY

a. Knowledge & Beliefs

33. What aspects of your health unit contribute to organizational learning? Are they unique to a rural public health setting?

I want to prompt responses in a number of areas. What about:

- Opportunities for training, professional development, and connections with learning environments and professional organization?
- Leadership?
- Culture? (i.e. shared experiences, general beliefs, values, goals and history and tradition, and doing the right thing internal to the organization)

➤ Are there any others?

34. How does evidence get translated to staff? What is the process, if any?

b. Attitude/Other Personal Attributes

35. In your opinion, does a rural setting affect the way people think, feel and behave? If so, how and why? Can you provide examples? [Prompts: what about job satisfaction/organizational commitment?]

c. Self-Efficacy

36. What aspects of your health unit might affect an individual's belief in their capabilities to implement CDP programs and policies (i.e. opportunities for professional development, appropriate skills, and competencies)? What if any, are some factors that affect self-efficacy in a rural public health setting?

d. Individual Stage of Change

37. In general, how prepared are you to implement major or new CDP programs/policies in your department? [Prompt: not ready, getting ready, ready to do this within the next 30 days, already doing this (< 6 months OR > 6 months)]?

38. How do you make this decision? What factors affect your decision? [Prompt: affect you personally (i.e. impact on daily work), cost, sufficient information, flexibility, adequate training and skillset]?

39. Do you believe a rural public health setting influences how prepared you are? Please explain?

e. Individual Identification with Organization

40. Overall, what do you think about your department? Do you think your department can be doing a better job? [Prompt: inequities, inefficiencies]. If yes, please describe.

IF NEEDED ONLY *I want to prompt responses in a number of areas. Are you able to:*

- Take risks or try something new to improve your work processes?
- Provide feedback into CDP program/policy decision-making?
- Put in extra effort?

Now, just a few last questions factors, lessons learned, and knowledge translation.

E. General Questions

41. Are there any other factors that affect the implementation of CDP programs and policies in a rural public health setting? If so, please describe? [Prompt: barriers and assets]

42. Can you describe some of the strengths, assets and achievements and lessons learned in a rural public health setting for CDP?

43. How can be public health professionals in rural public health units be better supported by policy (i.e. OPHS), strategies for knowledge translation, evaluation and research, and funding?

There is one last question that I have, I believe to be the most important

44. What advice do you have to offer to the Ministry of Health (MOH), Public Health Ontario (PHO), the Local Health Integration Network (LHIN), and other levels of the system (local, provincial, national) that will enhance rural health practice in Ontario public health units for CDP?

F. Closing Remarks

- Are there any additional insights that you would like to share that I have not addressed?
- Thank-you for your time and honesty throughout the focus groups
- Thank-you, have a great day.

TURN OFF THE AUDIO RECORDER, collect flip chart paper and leave.

Appendix O – Detailed Overview of Conceptual Ordering of Categories and Themes

Table 1: Detailed Overview of Conceptual Ordering of Categories and Themes for Implementation of EIPH CDP Programs and Policies in Rural Ontario PHUs

I: Intervention Characteristics			
Theme #1: Evidence Strength and Quality			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Types of Evidence	i. Primary data sources: Quantitative methods: <ul style="list-style-type: none"> ➤ Situational assessments (i.e. respond to local needs, priorities, and contexts) ➤ Local data ➤ Evaluations Qualitative methods: <ul style="list-style-type: none"> ➤ Stakeholders perspectives and opinions ➤ Lived experience ➤ Professional knowledge and expertise 	None	N/A
	ii. Secondary data sources: <ul style="list-style-type: none"> ➤ Provincial and federal data sources (e.g. CCHS, census) ➤ Published scientific literature (i.e. best practices; and peer review and published literature) ➤ Grey literature (e.g. health status reports) ➤ Evidence reviews and guidelines (e.g. NCCMT) 		
	iii. Multiple data sources: <ul style="list-style-type: none"> ➤ Evidence is informed by mixed methods to bridge the knowledge gap 		

b. Use of Evidence	i. Appraise and interpret the evidence (i.e. evidence source): <ul style="list-style-type: none"> ➤ Critical appraisal of the evidence to make an informed assessment of the source (i.e. evidentiary strength) ➤ Interpret to rationalize or justify a practice decision based on the evidence (i.e. implement program/policy) 	i. Lack of local data: <ul style="list-style-type: none"> ➤ Dearth of dedicated resources for collection, collation, analysis, and reporting of local data (i.e. lack of funding and low human capacity – 1 Epi) ➤ Low levels of evidentiary strength (e.g. use of process indicators to demonstrate impact) negatively affected access to “strong local data” 	i. Lack of local data: <ul style="list-style-type: none"> - Investing in Local Driven Collaborative Projects (LDCP) with a rural focus - Utilize multiple sources of data to inform planning and decision-making - Increase dedicated resources for research and evaluation (i.e. human and funding) - Collaborate with partnerships to obtain local data by building capacity - Advocate for the best available local evidence - Promote data sharing among the LHIN’s - Use alternative data sources (i.e. provincial data) - Modify existing analytic approaches (e.g. pool/combine data sets)
	ii. Evaluate the effectiveness of implementation efforts (i.e. use of evidence): <ul style="list-style-type: none"> ➤ Routinely monitor and evaluate to inform practice direction and course of action (i.e. stop, modify, or continue a program/policy) 	ii. Small sample sizes: <ul style="list-style-type: none"> ➤ Small sample sizes in rural areas: (e.g. failure to stratify according to low levels of geography and subgroups) 	ii. Small sample sizes: <ul style="list-style-type: none"> - Oversampling - Pooling data sets - Promote data sharing among partners
	iii. Demonstrate impact: <ul style="list-style-type: none"> ➤ Measure and monitor program effectiveness (e.g. process and outcome indicators) 	iii. Lack of centralized data and evidence-based repository and supports: <p>(e.g. comprehensive central repository for evidence that include best practices, tools, data, and research)</p>	iii. Lack of centralized data and evidence-based repository and supports: <ul style="list-style-type: none"> - Provincially led (PHO or MOHLTC) centralized data and analytic services and supports (i.e. best practices, tools, data, research)

	<p>iv. Translate the evidence (i.e. knowledge translation):</p> <ul style="list-style-type: none"> ➤ New knowledge is translated to the local context and shared among key stakeholders ➤ To leverage and mobilize partnerships ➤ Translate knowledge within specific practice settings and circumstances to build capacity (i.e. NCCMT Knowledge Broker Mentoring Program) 	<p>iv. Dearth of rural research:</p> <ul style="list-style-type: none"> ➤ Urban and northern research non-transferable in a rural setting (e.g. high complexity) 	<p>iv. Dearth of rural research</p> <ul style="list-style-type: none"> - Conduct situational assessments
Theme #2: Complexity			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
None	None	<p>i. Duration:</p> <ul style="list-style-type: none"> ➤ Long distance to travel to locations (e.g. branch office, program location, meetings etc.) 	<p>i. Duration:</p> <ul style="list-style-type: none"> - Utilize technology (i.e. webinars, on-line presentations etc.) - Engaging with and sharing of information with professional organizations and networks - Providing programs centrally (i.e. health unit main office)
Theme #3: Adaptability			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
None	<p>i. Adaptability to address local needs, priorities, and contexts in a rural setting:</p> <ul style="list-style-type: none"> ➤ Flexibility to address heterogeneous rural populations ➤ Compatible (e.g. more readily adapted) with existing health unit policies and programs 	<p>i. High complexity:</p> <ul style="list-style-type: none"> ➤ Perceived difficulty of implementation reflected by its scope, intricacy, and disruptiveness (e.g. weather, low capacity) 	<p>i. High complexity:</p> <ul style="list-style-type: none"> - Use of social media to increase reach in winter months - Provide programs in an urban core or central location to address logistical barriers

	ii. Rural health innovation: (e.g. being able to be creative, flexible, and unconventional in “servicing our communities”)	ii. Lost in translation: (e.g. untranslated urban and northern programs, low fidelity, and spatial heterogeneity – variations within rural areas make it difficult to develop a one size “fits all” program/policy)	ii. Lost in translation: <ul style="list-style-type: none"> - Identify appropriate fidelity criteria specific to rural areas - Create training and professional development opportunities in program fidelity evaluation
Theme #4: Trialability			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
None	i. Piloted programs and policies: (e.g. demonstrated effectiveness to scale up. Examples of piloted programs included active school transportation programs, food security programs and the guaranteed income pilot etc.)	None	N/A
II: Outer Setting			
Theme #1: Cosmopolitanism			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Community Partnership Engagement and Collaboration	i. Assessment phase: Seek and use partnership input during the assessment phase (i.e. social, epidemiological, and ecological assessment): <ul style="list-style-type: none"> ➤ Seek and use community partnership input <ul style="list-style-type: none"> • Engage and collaborate with multiple sectors, community partners, priority populations, and citizens • Shared ideas and knowledge construction (co-learning) 	i. Lack of compatibility between partnerships and public health: <ul style="list-style-type: none"> ➤ Lack of shared values, priorities, mandates, and perceived needs <ul style="list-style-type: none"> • Conflicting mandates and approaches with public health (e.g. downstream approaches) ➤ Low public health visibility in rural areas (e.g. face-to-face contact) <ul style="list-style-type: none"> • Weak community presence in rural areas (e.g. lack of perceived CDP programs in rural areas) 	i. Lack of compatibility between partnerships and public health: <ul style="list-style-type: none"> - Community development skill building among staff to effectively translate knowledge to partners (i.e. upstream approaches) - Harness the power of the MOH or Director/Manager of public health to build public health support among partners

	<ul style="list-style-type: none"> ➤ Acknowledge the community (mutuality) <ul style="list-style-type: none"> • Recognize, support, and respect partnership needs and issues (i.e. partnership diversity; and variability of local needs, priorities, and contexts within and across rural areas) ➤ Focus on shared local needs, priorities, values, and contexts (e.g. SDOH) 		
	<p>ii. Planning Phase: Involve partners in the planning phase:</p> <ul style="list-style-type: none"> ➤ Engage and collaborate with multiple sectors, community partners, priority populations, and citizens during the planning phase ➤ Capacity planning: Capacity building through partnerships <ul style="list-style-type: none"> • Community resource identification (e.g. physical space, human, funding, materials etc.) ➤ Community asset mapping (e.g. strength-based approach) ➤ Policy planning and development: Development of external policies and incentives to support implementation between partnerships and public health (e.g. partnership agreements, urban planners) 	<p>ii. Knowledge translation barriers between public health and partnerships:</p> <p>(e.g. lack of existing knowledge and skill base towards evidence-informed practice and lack of formalized program planning processes—fast and unmethodical amongst partnerships)</p>	<p>ii. Knowledge translation barriers between public health and partnerships:</p> <ul style="list-style-type: none"> - Community development skill building among staff to effectively translate knowledge to partners (i.e. upstream approaches) - Harness the power of the MOH or Director/Manager of public health to build public health support among partners - Assist partnerships with evaluation

	<p>iii. Implementation phase: Coordinated and integrated approach to implementation among partners and CDP public health professionals:</p> <ul style="list-style-type: none"> ➤ Engage and collaborate with multiple sectors, community partners, priority populations, and citizens during implementation ➤ Implementation capacity: Capacity building through partnerships (e.g. increase resources) ➤ Asset-based community development ➤ Reciprocity (i.e. mutual benefit between public health and partnerships) <ul style="list-style-type: none"> • Mutual community involvement (i.e. physical presence and visibility of public health promote collaboration between partnerships and public health in rural areas); and • Meaningful collaboration and coordination between public health and partnerships in the implementation of CDP programs and policies in rural areas 	<p>iii. Low partnership capacity in rural areas:</p> <ul style="list-style-type: none"> ➤ Role overload among partners <ul style="list-style-type: none"> • Partnership competing demands (e.g. multiple roles) 	<p>iii. Low partnership capacity in rural areas:</p> <ul style="list-style-type: none"> - Use partnerships more effectively and efficiently - Combine or pool partnerships to expand reach - Share partnership resources to build capacity
	<p>iv. Formal and informal partnership networks and communications:</p> <ul style="list-style-type: none"> ➤ Formal networks and communication <ul style="list-style-type: none"> • Formal knowledge networks among partnerships (e.g. train the trainer, workshops, meetings, 		

	<p>teleconferences, and planning tables)</p> <ul style="list-style-type: none"> ➤ Informal networks and communication <ul style="list-style-type: none"> • Informal network among partnerships (i.e. flexible, adaptable, and low intensity partnership linkages) • Informal communication strategies (i.e. unofficial face-to-face communication, impromptu phone conversations) 		
b. Boundary Spanners	<p>i. Partner champion:</p> <ul style="list-style-type: none"> ➤ Leverage and mobilize community partners (e.g. connect, influence, and collaborate) 	None	N/A
c. Horizontal Networks	<p>i. Homophilous networks:</p> <ul style="list-style-type: none"> ➤ Networking with colleagues from the same discipline ➤ Networking with peer groups from similar health regions (i.e. rural, rural and urban mix) (e.g. share knowledge) 	None	N/A
d. Bonding Social Capital Between CDP Public Health Professionals and Community Partners	<p>i. Structural social capital:</p> <ul style="list-style-type: none"> ➤ Informal network ties and configurations with partnerships ➤ Everyone knows each other <ul style="list-style-type: none"> ○ Lived experience (i.e. public health staff live in the area) 	None	N/A

	<p>ii. Cognitive social capital:</p> <ul style="list-style-type: none"> ➤ Shared values, attitudes, and beliefs towards an innovation facilitate implementation (e.g. working with municipalities to promote healthy communities) 		
	<p>iii. Relational social capital:</p> <ul style="list-style-type: none"> ➤ “Hugely important” ➤ Nature and quality of partnership relationships were based on the following: <ul style="list-style-type: none"> • Relationship building • Mutual trust and respect • Identification with others (i.e. integrated and well connected with partners) 		
Theme #2: External Policies and Incentives			
Subtheme	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
<p>a. Modernization of the Ontario Public Health Standards (OPHS)</p>	<p>i. Aligned with current mandate:</p> <ul style="list-style-type: none"> ➤ Perceived as more readily adopted (perceived readiness) to existing mandate 	<p>i. External push to implement OPHS:</p> <ul style="list-style-type: none"> ➤ External push to implement new standards but not public health capacity 	<p>None</p>
	<p>ii. *Non-prescriptive:</p> <ul style="list-style-type: none"> ➤ Flexible to respond to local needs in rural areas 	<p>ii. *Non-prescriptive:</p> <ul style="list-style-type: none"> ➤ Lack strategic direction, guidance, and supportive tools from MOHLTC to implement the policy (i.e. Chronic Disease Prevention and Well Being Standard) that is non-prescriptive 	<p>ii. *Non-prescriptive:</p> <ul style="list-style-type: none"> - Identification of public health priorities with appropriate funding allocations

		<ul style="list-style-type: none"> ➤ Health promotion relegated to a lower priority compared to health protection (e.g. health protection standards are protocol- driven) 	
	iii. Inclusion of new standards: <ul style="list-style-type: none"> ➤ Health Equity 	iii. Lack of adequate and dedicated funding and resources to implement OPHS: <ul style="list-style-type: none"> ➤ Low capacity to implement OPHS (e.g. human, resources, funding) 	iii. Lack of adequate and dedicated funding and resources to implement OPHS: <ul style="list-style-type: none"> - Advocate for adequate funding (i.e. budget level) to implement Chronic Disease Prevention and Well-Being protocol in the OPHS - Inclusion of a rural health standard
Theme #3: External Leadership Engagement			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Appointed External Leadership Style - Transformational	i. Municipalities/Districts: <ul style="list-style-type: none"> ➤ Transformational leadership style (Empowerment) <ul style="list-style-type: none"> • Multi-sectorial collaboration with municipalities and townships (i.e. collaboration with municipal planners in the area of policy development to promote health (e.g. built environment) 	N/A	N/A
	ii. *Public Health Ontario (PHO): <ul style="list-style-type: none"> ➤ Transformational leadership style (Supportive) <ul style="list-style-type: none"> • Access to supportive tools and resources in the area of research, evidence, and best practice (e.g. LDCCP, PHO Snapshots) 		
	N/A	i. Board of Health (BOH):	i. Board of Health (BOH):

b. Appointed External Leadership Style - Dysfunctional	<ul style="list-style-type: none"> ➤ Structure- made up of elected representatives from municipal councillors (e.g. underrepresentation of elected officials from rural areas) ➤ Destructive leadership style (e.g. autocratic - political power negatively influenced implementation; excessive political behaviour -implementation aligned with voters’ priorities; and making decisions based on inadequate information - political directive were biased and guided by weak evidence) 	<ul style="list-style-type: none"> - Develop the role of a public health political advocate (public health ambassador) to act as a liaison between the BOH and health units - Obtain buy-in, “before you go for approval” - Physically locate a staffing position (i.e. Health Promoter) within government offices to better collaborate with other departments in the municipality with a “public health lens”
	ii. Ministry of Health and Long-Term Care (MOHLTC): <ul style="list-style-type: none"> ➤ Destructive leadership style (i.e. unsupported and disempowered) <ul style="list-style-type: none"> • Excessive political behaviour (i.e. creating conflicting public policies to gain power and influence that misaligned with the core functions of public health (e.g. alcohol policy) • Autocratic behaviour (i.e. overcontrolling-behaviour) • Poor communication (i.e. demonstrated lack of transparency and lack of direction) • Making decisions based on inadequate information (i.e. lack of understanding of CDP programs and rural public health systems – decommission CoP) 	ii. Ministry of Health and Long-Term Care (MOHLTC): <ul style="list-style-type: none"> - Poor communication (provide “timely”, “open”, and “transparent” communication) - Making decisions based on inadequate information (reinstate resource centres, develop a rural health community of practice, and conduct a needs assessment at each health unit) - Excessive political power -conflicting public policies (develop “Health for All Policies” that integrate public health and MOHLTC mandates)
	iii. Local Health Integration Network (LHIN):	iii. Local Health Integration Network (LHIN):

		<ul style="list-style-type: none"> ➤ Destructive leadership style (i.e. disempowered) <ul style="list-style-type: none"> • Poor integration and linkages between LHIN and public health (i.e. unsupportive and unreceptive towards public health; and lack of a coordinated approach in the area of evidence-informed public health practice) 	<ul style="list-style-type: none"> - Build partnerships to share evidence (i.e. Epidemiologist and LHIN) - Become a member on a LHIN sub-region planning table to advocate for rural public health systems - Define LHINs roles and responsibilities in relation to public health to promote better collaboration and integration of services; and avoid role ambiguity and duplication of services
		<p>iv. *Public Health Ontario (PHO):</p> <ul style="list-style-type: none"> ➤ Destructive leadership style (i.e. unsupportive) (e.g. lack of adequate support in the area of research, evidence, and best practice (“we want more”)) 	<p>iv. *Public Health Ontario (PHO):</p> <ul style="list-style-type: none"> - Increase funding to support effective public health practice for each public health unit - Increase access to a central repository for evidence, best practices, tools, data etc. - Develop evaluation mentorship or exchange programs to build evaluation capacity in rural Ontario PHUs - Provide funding for consultative services - Facilitate information sharing within and across PHUs - Conduct literature reviews for health units - Invest in LDCCP that are rural focus

Theme #4: Population External Communication			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
None	i. *Formal communication methods: <ul style="list-style-type: none"> ➤ Traditional communication methods (e.g. print and broadcast) ➤ Internet Based Communication <ul style="list-style-type: none"> • Social Media (i.e. Facebook, websites) 	i. *Formal communication barriers: <ul style="list-style-type: none"> ➤ Traditional communication barriers (e.g. lack of access to traditional communication modalities, low capacity, administrative bureaucracy) to disseminate traditional media) ➤ Internet based communication barriers <ul style="list-style-type: none"> • Social media (i.e. lack of access and underutilization of social media) 	Population external communication barriers comments: <ul style="list-style-type: none"> - Provide internet access at libraries and community centres in rural areas - Collaborate with partners to effectively access populations - Use of innovative and creative communication methods to transfer knowledge
	ii. Informal communication methods: <ul style="list-style-type: none"> ➤ Word of mouth 	ii. Technological barriers: <ul style="list-style-type: none"> ➤ Dial-up internet or lack of access to high-speed internet ➤ No cell phone towers or coverage 	
Theme #5: Reach			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
None	None	i. Low reach in rural and outlying areas: <ul style="list-style-type: none"> ➤ Participation barriers (e.g. transportation, distance, inconvenience) ➤ Difficulty reaching priority populations (e.g. youth, Indigenous communities) 	i. Low reach in rural and outlying areas: <ul style="list-style-type: none"> - Build community capacity opportunities to expand reach - Increase access to programs and services (i.e. evening programs, centralized programs (i.e. urban core), provide transportation (i.e. “volunteer transportation initiative”, and “going to the people instead of them having to come to you” (i.e. home visits) - Use effective communication methods (i.e. phone consultations, word of mouth, radio, multiple communication methods, on-line courses, and social media (i.e. inclement weather)

			<ul style="list-style-type: none"> - Capitalize on community assets to expand reach (i.e. use partner locations to implement program)
		ii. Program impact is based on high reach (i.e. large participation rates): (e.g. difficult to justify the program, overall effectiveness)	ii. Program impact is based on high reach (i.e. large participation rates): <ul style="list-style-type: none"> - Adjust criteria for program effectiveness, based on participation rates (i.e. take into consideration contextual factors - rural vs urban)
Theme #6: Population Needs and Resources			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Environment	None	i. Built environment barriers: <ul style="list-style-type: none"> ➤ Access to programs and services <ul style="list-style-type: none"> • Limited availability and access to public health programs and services (i.e. distance to public health programs and services) ➤ Transportation <ul style="list-style-type: none"> • Limited availability and access to public transportation systems (i.e. no public transportation) ➤ Street and sidewalk connectivity <ul style="list-style-type: none"> • Low or no connectivity (i.e. sidewalks, street) 	i. Built environment barriers: <ul style="list-style-type: none"> - Collaborate with partners to develop volunteer transportation initiatives - Mobile health unit - Provide taxi vouchers to participants - Use evidence to increase funding for transportation initiatives - Use technology - Use existing community infrastructure - Provide programs centrally - Develop walkable rural hubs
		ii. Natural environment barriers: <ul style="list-style-type: none"> ➤ Weather <ul style="list-style-type: none"> • Winter weather (i.e. winter driving conditions) 	ii. Natural environment barriers: <ul style="list-style-type: none"> - Use technology during the winter months to network with public health practitioners and professionals external to the organization and promote CDP

		<ul style="list-style-type: none"> ➤ Geography (i.e. low population density and large geography) 	<ul style="list-style-type: none"> - Avoid health unit wide planning initiatives during the winter - Build and foster relationships with partnerships - Pool resources to build capacity - Share information and development knowledge amongst PHUs through LDCP - Modify programs based on local, needs, priorities and “geography” - Provide “collaborative shared services” based on health unit peer groupings - Provide regional programming
b. Population Characteristics	None	iii. Social environmental barriers: <ul style="list-style-type: none"> ➤ Geographic isolation (e.g. weather, degree of rurality, lack of access to services) 	None
		i. Population diversity and low density: <ul style="list-style-type: none"> ➤ Heterogeneity across municipalities and within neighbourhoods regarding local needs, priorities, and contexts <ul style="list-style-type: none"> • Low population density and urban sprawl 	None
		ii. Health inequities among priority populations: <ul style="list-style-type: none"> ➤ Indigenous communities (e.g. engagement with Indigenous communities is a key priority) 	ii. Health inequities among priority populations: <ul style="list-style-type: none"> - Community engagement with Indigenous communities
		iii. Social environmental and health barriers: <ul style="list-style-type: none"> ➤ Low income and poverty 	iii. Social environmental and health barriers: <p>Low Income and poverty:</p>

		<ul style="list-style-type: none"> ➤ Low levels of education ➤ High prevalence of food insecurity 	<ul style="list-style-type: none"> - collaborate with community developers on a poverty reduction strategy to identify at-risk neighbourhoods <p>Low education:</p> <ul style="list-style-type: none"> - Increase access to education in rural areas <p>Food insecurity:</p> <ul style="list-style-type: none"> - Collaborate with community planners, municipalities, and community coalitions to “create supportive environments” (i.e. community gardens) - Partner with an academic institution to build research capacity in the area of food insecurity - Support innovative community food security initiatives (i.e. access to healthy food at retail businesses, such as a hardware store)
<p>c. Behaviour and Health</p>	<p>None</p>	<p>i. Modifiable risk factors for chronic diseases in rural areas (i.e. high prevalence in rural areas):</p> <ul style="list-style-type: none"> ➤ Tobacco Use ➤ Alcohol Consumption ➤ Physical Inactivity ➤ Nutrition (e.g. lack of fruit and vegetable consumption) 	<p>i. Modifiable risk factors for chronic diseases in rural areas (i.e. high prevalence in rural areas):</p> <p>Tobacco use:</p> <ul style="list-style-type: none"> - Adequately fund NRT across the health unit (i.e. family health team) - Cross collaboration across and within teams to promote smoking cessation (i.e. walking group with smoking cessation clients) <p>Alcohol use:</p> <ul style="list-style-type: none"> - Modify Ontario’s alcohol policy that currently contradicts public health practice

			<p>Physical inactivity:</p> <ul style="list-style-type: none"> - Creation of supportive environments through collaboration with planners, municipalities, partnerships, and community coalitions to promote physical activity (i.e. walkable communities) - Building capacity by collaborating with schools in the development of physical activity modules - Maximize community assets to promote physical activity <p>Nutrition (e.g. lack of fruit and vegetable consumption):</p> <ul style="list-style-type: none"> - Increase access to fruits and vegetables targeting food deserts in rural areas (i.e. “fill a bus with...fresh vegetables and fruits”) - Provincial funding allocation for healthy eating programs - Provincially led situational assessment of nutrition services in rural and urban areas - Collection of neighbourhood level data to better understand the factors that affect fruit and vegetable consumption at the local level <p>General suggestion:</p> <ul style="list-style-type: none"> - Focus on “across topics” rather than on “buckets of topics”
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III. Inner Setting			
Theme #1: Structural Characteristics			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
	i. Decentralization: <ul style="list-style-type: none"> ➤ Decentralized decision-making (e.g. greater staff autonomy) ➤ Cross collaboration across and within teams (decision-making is dispersed across the organization to build capacity (e.g. share resources) 	i. Organizational complexity (i.e. role specialization): <ul style="list-style-type: none"> ➤ *Generalist role <ul style="list-style-type: none"> • Multiple hats (e.g. competing demands, multiple topics) (*See Internal Leadership Engagement-CDP champion in reference to organizational role) (please note “size” is interwoven throughout all themes) 	i. Organizational complexity (i.e. role specialization): <ul style="list-style-type: none"> - Local and provincial networking is encouraged to exchange information on a variety of topic areas
	ii. Informal structural characteristics: <ul style="list-style-type: none"> ➤ Size (i.e. small) affected informal approaches <ul style="list-style-type: none"> • Low administrative intensity (e.g. flexible, less bureaucratic, flexible, simple) 		
Theme #2: Culture			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Clan Culture (i.e. collaborative)	i. Dominant organizational characteristics (i.e. a very personal place like a family): <ul style="list-style-type: none"> ➤ Family culture (family extend beyond organization) 	None	N/A
	ii. Leadership style (i.e. mentoring and nurturing leadership style) <ul style="list-style-type: none"> ➤ Culture pf transformational leadership style 		

	<ul style="list-style-type: none"> • Supportive (e.g. work-life balance, employee health and wellness programs) • Lead by example 		
	<p>iii. Management of employees (i.e. emphasize teamwork, consensus, and participation):</p> <ul style="list-style-type: none"> ➤ Culture of intraorganizational collaboration <ul style="list-style-type: none"> • Shared values, norms, attitudes, and beliefs (e.g. live values) 		
	<p>iv. Organizational glue (i.e. loyalty and mutual trust):</p> <ul style="list-style-type: none"> ➤ Culture of empowerment (e.g. open, flexible, trusting, respectful, supportive, innovative, accessible, and autonomous) 		

Theme #3: Implementation Climate

Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Tension for Change	None	i. Health unit restructuring: (e.g. branch office closures, reduction of FTEs – purposes of efficiencies, modernization of OPHS)	None

Theme #4: Readiness for Implementation			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Internal Leadership Engagement	i. CDP team champions: <ul style="list-style-type: none"> ➤ Champion personality characteristics (e.g. innovativeness, persistence, and persuasiveness) ➤ Champion organizational role <ul style="list-style-type: none"> • Generalists (e.g. breadth of knowledge in various topic areas) ➤ Champion influence tactics <ul style="list-style-type: none"> • Pull together a diverse group of professionals (i.e. collaboration and engagement with community partners) • Appeal to a higher authority (i.e. municipality, management etc.) 	i. *Destructive internal leadership style among management (i.e. staff perspective) <ul style="list-style-type: none"> ➤ Unsupportive (e.g. rural programming) 	i. Destructive internal leadership style among management comment: To maintain positive relationships among staff to cope with destructive leadership behavior
	ii. *Management transformational leadership style (i.e. management perspective): <ul style="list-style-type: none"> ➤ Supportive leadership <ul style="list-style-type: none"> • Express confidence in the abilities of their staff ➤ Empowerment <ul style="list-style-type: none"> • Encourage staff autonomy • Decentralized decision-making ➤ Innovative thinking (e.g. absorptive capacity for innovation (embraced new ideas); break out of convergent thinking and routines; established a vision for improvement; and be willing to take risks) 	ii. *MOH destructive leadership style: <ul style="list-style-type: none"> ➤ Autocratic leadership style (e.g. attempt to motivate others by asserting authority) 	

	<ul style="list-style-type: none"> ➤ Lead by example <ul style="list-style-type: none"> • Practice what they preach 		
	<p>iii. *Management transformational leadership style (i.e. staff perspective):</p> <ul style="list-style-type: none"> ➤ Supportive leadership <ul style="list-style-type: none"> • Accessible (e.g. just pop by) 		
	<p>iv.*MOH transformational leadership style:</p> <ul style="list-style-type: none"> ➤ Vision <ul style="list-style-type: none"> • Communicate a clear vision and direction for the future ➤ Lead by example <ul style="list-style-type: none"> • Practice what they preach (e.g. promote partnership engagement and collaboration and promote the role of public health) ➤ Innovative thinking <ul style="list-style-type: none"> • Rural health innovator ➤ Charismatic <ul style="list-style-type: none"> • Authority and status to influence implementation 		
b. Access to Knowledge and Information (i.e. share new knowledge)	<p>i. *Absorptive capacity for new knowledge (i.e. share new knowledge):</p> <ul style="list-style-type: none"> ➤ Internal training and professional development (e.g. lunch and learns, knowledge broker program, in-service etc.) 	<p>i. *Low absorptive capacity for new knowledge (i.e. share new knowledge):</p> <ul style="list-style-type: none"> ➤ Unaffiliated with academic Institution (e.g. geographic distance, lack of dedication and time to explore academic partnerships, and courses and specialities misalign with public health) 	<p>i. Low absorptive capacity for new knowledge (i.e. share new knowledge):</p> <ul style="list-style-type: none"> - Participate on a LDCP as an effective approach to leverage and collaborate with academic researchers - Collaborate with academic institutions to provide research and evaluation support to rural public health units (i.e. training, tools, webinars, workshops etc.)
c. Available Resources	None	i. Lack of dedicated and ongoing funding:	i. Lack of dedicated and ongoing funding:

		<ul style="list-style-type: none"> ➤ Ministry funding <ul style="list-style-type: none"> • Lack of funding for rural public health units (i.e. high costs of implementation) • Disproportionate allocation of funding towards healthcare compared to public health • Lack of public health funding (i.e. program planning, research, evaluation, and evidence-informed decision-making) • Standardized funding formula (e.g. does not consider rural and urban variability) • Funding freezes 	<ul style="list-style-type: none"> - Review and modify the current funding formula to reflect contextual factors (rural vs urban) - Advocate to municipalities to increase funding - Explore external funding sources (i.e. grants) - Increase funding for public health
		<p>ii. Lack of time:</p> <ul style="list-style-type: none"> ➤ Increased staff time to implement programs in branch offices and rural areas 	None
		<p>iii. Low human capacity:</p> <ul style="list-style-type: none"> ➤ Limited human resources to achieve capacity in rural PHUs <ul style="list-style-type: none"> • Low FTE (compared to urban) 	<p>iii. Low human capacity:</p> <ul style="list-style-type: none"> - Collaborate with partners to increase capacity - Cross collaboration within and across teams - Participate in LDCP - Participation in practice and professional organizations and networks to exchange knowledge - Implement knowledge translation strategies/approaches to develop capacity through partnerships - Build partnership relationships - Minimize duplication of services

			<ul style="list-style-type: none"> - Decrease the number of programs and the number of staff assigned to a project
		iv. Lack or limited program resources: <ul style="list-style-type: none"> ➤ Inadequate resources to implement program in rural areas (e.g. failure to implement program/provide resource, low reach, weak sustainability) 	iv. Lack or limited program resources: <ul style="list-style-type: none"> - Share resources among partnerships to increase resource capacity - Use resources more efficiently and effectively by determining community readiness - Use evidence to inform the use of resources - Pool MOHLTC resources to increase capacity - Network with peers to exchange resources
Theme #5: Intraorganizational Networks and Communications			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
None	i. Intraorganizational informal networking and communications: (e.g. informal networking and communication were encouraged. Informal communication promoted engagement and collaboration; decreased administration intensity or bureaucracy; and increased knowledge exchange)	None	N/A

IV. Characteristics of Individuals			
Theme #1: Individual Identification with Organization			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Commitment to the Organization	i. Employee retention: <ul style="list-style-type: none"> ➤ Dedication (e.g. careers for life) ➤ Multiple roles in public health ➤ Accumulated knowledge shaped through social experience (e.g. practice) 	None	N/A
b. Other Personal Attributes	ii. Employee passion: <ul style="list-style-type: none"> ➤ Job characteristics <ul style="list-style-type: none"> • Meaningful work (i.e. lived experience) • General psychological antecedents (e.g. motivation, self-efficacy) ➤ Relationship characteristics ➤ Connectedness (i.e. rewarding interpersonal connections with colleagues and the community - “family”) 	None	N/A
V. Process			
Theme #1: Planning			
Subthemes	Factors that Facilitate Implementation	Factors that Impede Implementation	Solutions
a. Planning Documents	i. Strategic and operational plans: <ul style="list-style-type: none"> ➤ Strategic practice: Methodically planned efforts (e.g. timelines 3 to 5 years, explicit integration of rural health chartered in advance) 	None	N/A

	<ul style="list-style-type: none"> ➤ Strategic praxis: Multifaceted strategic directions and priorities (e.g. partnership collaboration and engagement, health equity etc.) ➤ Operational plans (integration of rural component; updated annually; and includes process and outcome indicators) <p>ii. Seminal publications, models, theories, operational lens (i.e. health equity lens), and frameworks: (e.g. logic models, The Ottawa Charter for Health Promotion, Social- Ecological Model, SDOH etc.)</p> <ul style="list-style-type: none"> ➤ SDOH framework (e.g. promote change at the organization and population level) ➤ Health equity lens (e.g. determine impact of social constructs, plan CDP programs, share knowledge with key stakeholders, and use HEIA as a health equity planning tool). 		
<p>b. Program Planning Cycle</p>	<p>i. Incorporate evidence-informed decision-making throughout the planning cycle: (e.g. from epidemiological diagnosis to outcome evaluation)</p>	None	N/A
<p>c. Planning at the Intervention Level (i.e. downstream vs upstream approaches)</p>	<p>i. Upstream approaches</p> <ul style="list-style-type: none"> ➤ Organization level (e.g. public health upstream movement; health unit staff and leadership support upstream) 	None	N/A

	<p>approaches; more impactful compared to midstream and downstream approaches)</p>		
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Note. Some components adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15. *Factors both facilitated and impeded implementation.

Appendix P – Evidence-Informed Realist Model of Context-Mechanism-Outcome (CMO) Configurations in Rural Ontario PHUs

A. Introduction

The final realist model of evidence-informed CDP programs and policies in rural Ontario PHUs was developed to reflect the complex interplay of individual characteristics (public health agents); mechanisms inherent in implementation (i.e. factors affecting implementation within the inner setting, outer setting, intervention characteristics, and process); and contexts, circumstances and conditions from the data gathered (i.e. rural public health units) that influenced implementation (impact) of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs (see Figure 1).

Guided by the CFIR, the major components of the realist model, identified evidence-informed context-mechanism-outcome (CMO) configurations that were found to influence implementation (impeded, or facilitated implementation, as specified) that emerged from this study within each component (i.e. characteristics of individuals (public health agents), inner/outer setting characteristics, intervention characteristics, and implementation process) and their potential impact on rural public health systems as a result (see Table below).

Overall, the realist model, provided a pragmatic structure for approaching multiple, complex, related, and temporal factors that facilitated and impeded the implementation of evidence-informed CDP programs and policies in rural public health units. The model drew attention to the importance of successful implementation. Failure to implement evidence-informed practice may contribute to health inequities, inefficient use of resources, poor health outcomes, and low public confidence in public health services (Canadian Public Health Association, 2016; Graham et al., 2006; Berwick, 2003). These impacts are especially important in rural Ontario public health units. The results of the study demonstrated that some factors impeded implementation of evidence-informed CDP programs and policies in rural Ontario PHUs, and this worsened with increased rurality. Therefore, the model can be used to guide implementation within and across multiple rural public health settings to minimize barriers to implementation.

B. Agents and their Roles

Chronic Disease Prevention (CDP) teams in Ontario PHUs are actively involved in “reducing the burden of preventable chronic diseases of public health importance” (Ontario Ministry of Health and

Long -Term Care, 2017, p.23). They are predominately staffed by health promoters, public health dietitians, public health nurses, support staff, dentists, epidemiologists, and administrators (i.e. MOH) who play a key role as “agents” to implementation of CDP programs and policies in public health (Ontario Ministry of Health and Long-Term Care, 2008, 2017). They deliver health promotion and disease prevention programs in accordance to the OPHS and are accountable to the BOH (Ontario Ministry of Health and Long-Term Care, 2008, 2017). This responsibility is carried out in collaboration with government, non-governmental, and community organizations operating at different levels with various perspectives, roles, and linkages (Ontario Ministry of Health and Long-Term Care, 2008, 2017). Individual mechanisms inherent to implementation include commitment to the organization (i.e. dedication, multiple roles, and accumulated knowledge shaped through social experience); and employee passion (i.e. meaningful work, connectedness, and other psychological antecedents).

C. Agency and Structure

To date, there are 35 PHUs across Ontario (Ontario Ministry of Health and Long-Term Care, 2018b). The WHO defines public health as “social and political concept aimed at improving health, prolonging life and improving the quality of life among whole populations through health promotion, disease prevention and other forms of health intervention” (World Health Organization, 1998, p.13). They are individually responsible for implementing the OPHS within their geographic borders (rural, urban, rural/urban mix, remote) (Ontario Ministry of Health and Long-Term Care, 2008, 2017). Rural Ontario PHUs organizational context, circumstances, and conditions (i.e. practice contexts) are affected by a complex interplay of mechanisms (factors) within the inner setting, outer setting, implementation process, and intervention characteristics that affected implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario PHUs. The evidence-informed context-mechanism-outcome (CMO) configurations that emerged from this study within each category are presented in the Table below.

Table 1: Evidence-Informed Context-Mechanism-Outcome (CMO) Configurations in Rural Ontario PHUs

Category	Context	Mechanism	Outcome
I. Intervention Characteristics	Evidence Strength and Quality	Using primary, secondary, and multiple data sources to inform planning and decision making to socially construct, assess, and translate knowledge; and demonstrate impact	Facilitated Implementation
		Emphasizing the lack of local data, small sample sizes, lack of centralized data and evidence-based repository and supports, and the dearth of rural research in rural PHUs	Impeded Implementation
	Complexity	Perceived difficulty of implementation resulting from long distance to travel to locations	Impeded Implementation
	Adaptability	Adapting programs and policies to meet local needs, priorities, and contexts by fostering flexibility, creativity (innovativeness), and compatibility	Facilitated Implementation
		Highly complex and unadaptable (“lost in translation”) programs/policies	Impeded Implementation
	Trialability	The ability to test and “scale up” a program/policy	Facilitated Implementation
II. Outer Setting	Cosmopolitanism	Community partnership engagement and collaboration that enabled partnership input, mutuality, networking and communication, mobilization, and	Facilitated Implementation

Category	Context	Mechanism	Outcome
		relationship building (social capital)	
		Incompatibility between public health and partnerships, lack of partnership knowledge and skill base towards evidence-informed practice, and low partnership capacity	Impeded Implementation
	External Policies and Incentives	Compatibility with the current policy (i.e. OPHS), non-prescriptiveness, and inclusion of new standards (i.e. health equity)	Facilitated Implementation
		External push to implement new standards, but not public health capacity, non-prescriptiveness, and lack of adequate and dedicated funding	Impeded Implementation
	External Leadership Engagement	Transformational leadership styles/approaches (empowering and supportive)	Facilitated Implementation
		Dysfunctional leadership (autocratic; excessive political behaviour; making decisions based on inadequate, biased, and weak information; unsupportive and disempowered; poor communication; and poor integration and linkages between governments)	Impeded Implementation
	Population External Communication Methods	Print, broadcast, social media, and word of mouth spread innovations	Facilitated Implementation

Category	Context	Mechanism	Outcome
		Technological barriers (i.e. lack of access to traditional communication modalities, low capacity, administrative bureaucracy, lack of access to social media)	Impeded Implementation
	Reach	Evaluating reach is a mechanism to justify program needs and ensure impact	Impeded Implementation
	Population Needs and Resources	Environmental barriers (i.e. built, natural, social), population characteristics (i.e. diversity, low density, health inequities, socio-economic barriers), and modifiable risk factors for chronic disease	Impeded Implementation
III. Inner Setting	Structural Characteristics	Decentralized decision-making, cross-collaboration across and within teams, and informal structures	Facilitated Implementation
		Organizational complexity (i.e. role specialization – generalist role)	Impeded Implementation
	Culture	Clan culture (i.e. perceived family; mentoring and nurturing leadership style; teamwork; loyalty and mutual trust).	Facilitated Implementation
	Implementation Climate	Perceived tension for change, particularly health unit restructuring	Impeded Implementation
	Readiness for Implementation	Transformational leadership styles/approaches (i.e. supportive, empowering, visionary, leader, innovative, charismatic); champions (i.e.	Facilitated Implementation

Category	Context	Mechanism	Outcome
		innovative, persistence, persuasive, influencers, and generalists); and learning opportunities that included substantial sharing of information and opportunities for training and professional development	
		Dysfunctional leadership approaches (i.e. unsupportive, autocratic); a perceived lack of dedicated resources (i.e. time, funding, capacity, and resources); and perceived low absorptive for new knowledge due to non-affiliation with an academic institution	Impeded Implementation
	Intraorganizational Networks and Communications	Perceived informal communication mechanisms (i.e. open-door policy)	Facilitated Implementation
IV. Characteristics of Individuals (Public Health Agents)	Individual Identification with Organization	<p>Commitment to the Organization (demonstrating dedication, multiple roles, and accumulated knowledge shaped through social experience)</p> <p>Other Personal Attributes (establishing employee passion - i.e. meaningful work, connectedness, and other psychological antecedents)</p>	Facilitated Implementation
V. Process	Planning	Planning documents and the planning process (i.e. program	Facilitated Implementation

Category	Context	Mechanism	Outcome
		planning cycle, planning at the intervention level etc.)	

Note. Some components adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.

*Also included within Agents and their Roles

D. Implementation

Implementation changes in response to individual characteristics, organizational, and intervention characteristics (Damschroder et al., 2009). As implementation is seen as a socially developed phenomenon, it is created through a dynamic process (planning, engaging, executing, and reflecting & evaluating (Damschroder et al., 2009). Since, implementation research cuts across several disciplines including medicine, organizational behaviour, public health, political science, psychology, agriculture, and marketing, and there is a growing and scattered literature on this topic and many perspectives to consider (Mitchell, Fisher, Hastings, Silverman & Wallen, 2010; Sales, Smith, Curran & Kochevar, 2006; van Achterberg, Schoonhoven, & Grol, 2008; Greenhalgh & Wieringa, 2011). There are several terms that describe moving knowledge to action in public health (Graham et al., 2006). Graham et al. (2006) review identified and operationalized a wide range of terms including knowledge translation, knowledge utilization, knowledge transfer, knowledge exchange, research utilization, implementation, diffusion, dissemination, continuing education, and professional development. One critical point, however, is that implementation, regardless of its depth or specificity, primarily focuses on the application or integration of evidence into practice or policy (Graham et al., 2006). Given that this model required a definition of implementation, the one that is cited most frequently in funding announcements of major funding agencies and in implementation and dissemination manuscripts is that “implementation is the process of putting to use or integrating evidence-based interventions within a setting”(Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008, p. 118). Within a realistic investigation, the workings of implementation mechanisms (M) within a particular context, circumstance, and condition (C) influenced implementation of evidence-informed chronic disease prevention programs and policies in rural areas.

E. Agency versus Structure

This approach posits that public health agencies (rural PHUs) were embedded in complex structures that interacted with a range of factors that influenced implementation. Therefore, implementation was seen as a complex and dynamic process that had many convergent and divergent activities occurring over time, and these forces synergized to influence implementation outcomes (Urquhart, Sargeant, & Grunfeld, 2013; Chaudoir, Dugan, & Barr, 2013). For example, chronic disease prevention programs in Ontario rural PHUs (i.e. public health agency) were embedded in an open system that were influenced by public health agents, organizational characteristics, and four domains of implementation (i.e. inner setting, outer setting, process, and intervention characteristics) in which they interacted. Guided by the CFIR, these factors facilitated and impeded the implementation in Ontario rural PHUs.

Figure 1 is an evidence-informed model of context-mechanism-outcome (CMO) configurations, guided by the CFIR for evidence-formed CDP programs and policies in Rural Ontario PHUs

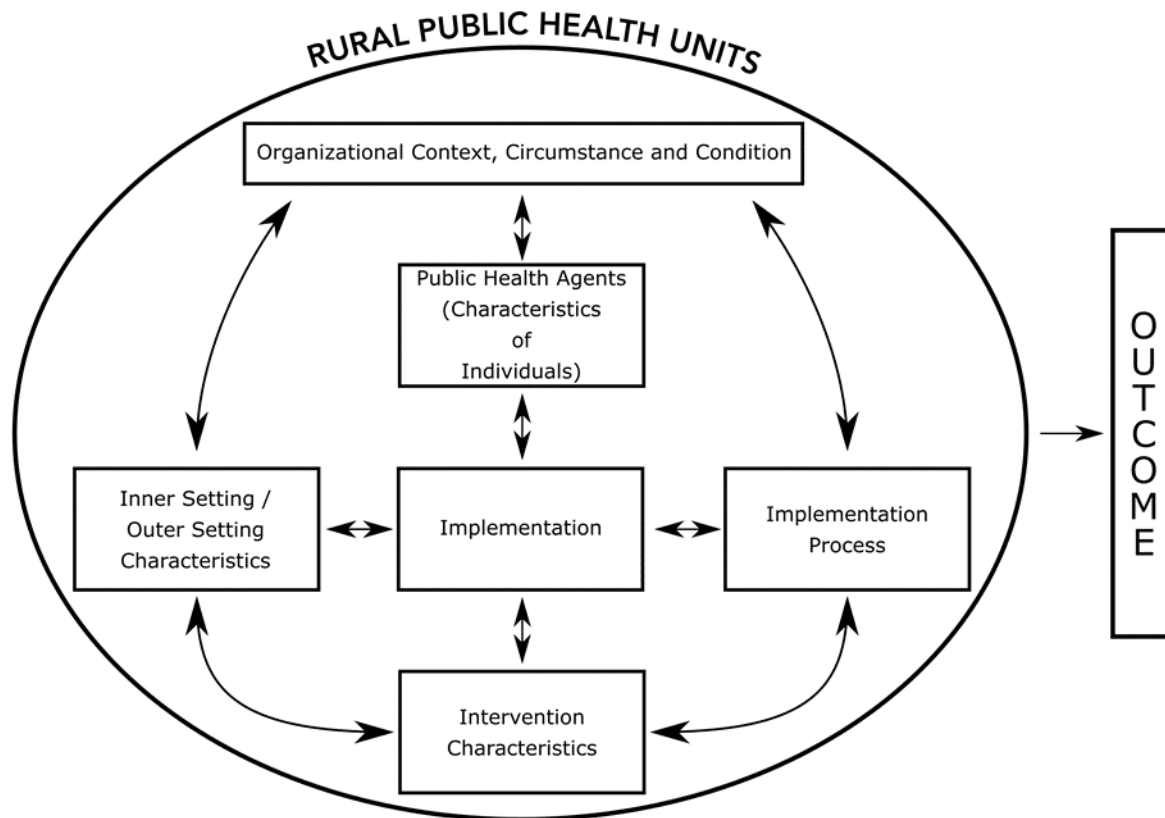


Figure 1. Evidence-informed realist model of context-mechanism-outcome (CMO) configurations in rural Ontario PHUS

Note. Domains adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.

Appendix Q – Member Checking Information Sheet

I. Your Responsibilities as a Member Checker

What does participation involve?

This next phase is referred to as “member checking”. It is a method used in qualitative research to validate the study results. Member checking involves reviewing the attached table (See attached table and instructions below) and providing feedback to the Student Investigator.

a. Overview of the Table: The major themes that facilitated and impeded implementation of evidence-informed chronic disease prevention programs and policies in rural Ontario public health units are presented in Table 1 (see attachment). The table includes a conceptual ordering of domains (i.e. intervention characteristics, outer setting, inner setting, characteristics of Individuals, and process); constructs (i.e. evidence); themes (i.e. lack of local data); and solutions. The domains and some of the constructs were adapted from the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2009). Please note the size of the table is formatted in landscape and legal for ease of readability.

b. Reviewing the Table: To better assist you, please read and answer the questions to help guide you through the member checking review process.

- Do the findings resonate with you? Do they accurately reflect the factors that facilitate and impede the implementation of evidence-informed chronic disease prevention and policies in rural Ontario public health units?
- Is there anything missing that was not captured? If so, please identify and describe?
- Upon reflection, are there any additional solutions that you would have included? Are there any that do not belong?

How and when do I report back to the Student Investigator?

Please contact the Student Investigator by email at (d8white@uwaterloo.ca). There are no formal feedback forms. Please provide feedback by **October 29 @4:30**. However, if this is inconvenient, please let the Student Investigator know, to arrange an alternative date.

Can I discuss the results with other focus groups participants, or other participants that were involved in the study?

Yes, you are welcome to do so.

Can I discuss the results with other non-participants or non-participating health units?

No, these are preliminary results. They are not published and are confidential. Thank-you

Was everyone contacted to verify the data?

No, only a subset of the sample was contacted to participate in this next phase of the study (i.e. 3 of 6 participating health units and 1 non-participating health unit. This was based on sample



characteristics. However, all participants from the selected health units were contacted, with the following exceptions:

- 1) Did not provide consent to be contacted; or
- 2) Did not provide a valid health unit e-mail address

II. Your Rights as a Member Checker

Is participation voluntary?

Yes, participation in this next phase of the study is completely voluntary.

Will I receive anything for my participation?

You will receive no payment for your participation.

Will my information be kept confidential?

The information that you share will be kept confidential. There will be no identifying individual results in the report. Non-attributed quotes might be used.

III. Questions, comments, or concerns

If you have any questions regarding any of the themes, or would like additional information, please feel free to contact the Student Investigator by email at (d8white@uwaterloo.ca).

RulPHS Next Steps

After the member checks process is completed, the dissertation goes through an extensive review and editing process. This takes several months. This is a normal part of the PhD process. It is anticipated that the dissertation will be defended in Spring 2020. At this time all the participating health units will be notified to discuss possible next steps (i.e. presentation at the health unit etc.).

References

Damschroder, L., Aron, D., Keith, R., Kirsh, S., Alexander, J. & Lowery, J. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science*, 4(50), 1-15

Appendix R – Summary of Member Check Feedback

Table 1: Summary of Member Check Feedback for Implementation of EIPH CDP Programs and Policies in Rural Ontario PHUs

Category	Theme	Subtheme	Member Check Quotes
Intervention Characteristics	Evidence Strength and Quality	Use of Evidence	<p>Barriers of evidence-informed decision making:</p> <ul style="list-style-type: none"> - “You make a very good case for evidence-based decision-making and I fully agree with your comprehensive assessment of the barriers to be overcome as well as suggested solutions. They are practical and achievable.” - “Evaluation of rural programs and services has always been problematic for many reasons. Capacity, expertise, size, and funding issues to name a few. Additionally, the achievements may not be apparent within the 4[-] year political cycle and could take a generation to come to fruition.” - “Overall, the difficulty in doing public health work in chronic disease prevention, where impacts are not easily measurable over short time periods, is an important point discussed when looking at how this work risks not being prioritized, compared to healthcare.”
	Adaptability	None	<p>Rural health innovation:</p> <ul style="list-style-type: none"> - “The focus on the need to be [...] innovative (particularly with other rural health units) [is a] great example[] of how smaller health units need to work to be successful This also requires focusing on local priorities, including issues specific to rural populations, to demonstrate the value of public health.” - “Rural Health Innovation – this is really the critical aspect of all this work.” <p>Lost in translation:</p> <ul style="list-style-type: none"> - “It is also worth distinguishing, which you have eluded to, between rural southern and northern Ontario. The obstacles and solutions are different.” - “Urban/Rural Tension: Might want to address the challenge when a health unit has a rural area, but a dominant urban centre – the rural focus and awareness is usually lost.”

Category	Theme	Subtheme	Member Check Quotes
Outer Setting	Cosmopolitanism	Community Partnership Engagement and Collaboration	<p>Seek and use partnership input:</p> <ul style="list-style-type: none"> - “Without such partnerships, engagement and collaboration will be for not. In order to gain that trust, rural communities need to feel they are being listened to and heard. I think it should be more explicitly stated, regarding engagement at the local level, listening to their local concerns and needs as they perceive them is vital.” <p>Acknowledge the community:</p> <ul style="list-style-type: none"> - “The focus on the need to be [...] collaborative (particularly with other rural health units) [is a] great example[] of how smaller health units need to work to be successful. This also requires focusing on local priorities, including issues specific to rural populations, to demonstrate the value of public health.” - “Rural public health programs can, in my opinion, best be carried out by staff who are [...] willing to enlist the assistance of community partners.” <p>Lack of compatibility between partnerships and public health:</p> <ul style="list-style-type: none"> - “Another significant challenge we face is the lack of awareness, as you addressed, of what exactly public health does in and for rural communities. This is also experienced in urban centres. We need to do a better job of improving the visibility of public health and not just when there is a crisis.” - “Rivalries: Unique to rural is the idea that when get into rural area, adjacent populations are historical rivals, not partners.” <p>Low partnership capacity in rural areas:</p> <ul style="list-style-type: none"> - “Role Overload: Be clearer on what this means in rural area – someone from urban won’t understand the degree of overlap [...]. But it doesn’t say what that looks like [...] until see it in rural area [...]. This also applies to community partners, having the same person represent multiple community partner organizations – allows us to develop deep relationships, but means working group capacity is shallow and prone to group think. One staff at multiple planning tables, but so are community partners, so we know each other well, but we’re all doing too much.”

Category	Theme	Subtheme	Member Check Quotes
		Bonding Social Capital Between CDP Public Health Professionals and Community Partners	<p>Relational social capital:</p> <ul style="list-style-type: none"> - “One of the most important aspects, in my opinion and as you point out, is the critical factor of relationships and trust established within rural communities.”
	External Policies and Incentives	Modernization of Ontario Public Health Standards (OPHS)	<p>Current landscape of public health:</p> <ul style="list-style-type: none"> - “Of most significance in the current political climate is the uncertainty of public health’s future. Regionalization will have a tremendous impact on rural health. Municipalities will be expected to contribute more financially and will, in effect, have less representation and decision-making authority on boards of health, especially in the north. The proposed northeast entity will see 108 municipalities represented by approximately 13 to 15 board of health members covering over 400,000 sq.km.”
	External Leadership Engagement	Appointed External Leadership Style	<p>Board of Health (BOH):</p> <ul style="list-style-type: none"> - “As you state, board of health decision-making is often influenced by political agendas and overt interference. It may be worth emphasizing as a solution, the significance of building a skills-based board where the priority is clearly the health of communities, both rural and urban, and not focusing solely on expenditures. With that type of expertise at the table, evidence-based decision-making is far more likely.” - “Another solution to consider is actively recruiting BOH members from elected officials, citizen representatives and provincial appointees with a rural experience.” - “Your suggestion that a "middleman" with an office within the political environment is an interesting one. We kind of kicked it around already. I would point out that in Carver's analysis in his book "Boards that Work" he notes that effective Boards hire the CEO and do not get involved in the day-to-day minutiae of running an [organization]. In Ontario health units, the role of the MOH to the Board of Health has changed in some areas, and has become more of a staff, as opposed to a line position, the latter having been taken over by an administrator (who is then the CEO). This can create difficulties and it may be that this has led you to make this suggestion. (As I noted, the Board has to trust, respect and support the role of the MOH. If this is lost, the running of the health unit becomes problematic!)”

Category	Theme	Subtheme	Member Check Quotes
			<p>Ministry of Health and Long-Term Care (MOHLTC): - “Funding from the Ministry (review for current landscape).”</p> <p>Local Health Integration Network (LHIN): - “Might want to [change] reference to LHINs given current landscape – Instead use e.g. be a player at larger table of local healthcare delivery.”</p> <p>Public Health Ontario (PHO): - “LDCPs have been defunded, so a recommendation to participate in one is irrelevant now.”</p>
	Population External Communication	None	<p>Technological barriers: - “The only thought that came to mind and fell under a few of the “Solutions” column was use of technology. It made me think that while it is listed as a solution, it is also noted as an “Impeded Implementation”. This is one of our largest challenges we have when trying to service rural clients. Technology “in theory” is a great solution, however access to technology and service in rural community presents its own challenge. I was just a bit confused as to it being a theme for “Impeded implementation” in some areas and a “Solution” in others.”</p> <p>- “Use of social media ...Other areas (urban) have better online response rates, but we have worse internet speed [...]. This is unique rural challenge.”</p>
	Population Needs and Resources	Environment	<p>Natural environmental barriers: - “The difficulties of geography [...] are also important issues covered.”</p> <p>Social environmental barriers: - “The difficulties [...] and sparse rural populations, [...] are also important issues covered.”</p>
Population Characteristics		<p>Health inequities among priority populations: - “The difficulties of [...] remote priority populations (e.g., Indigenous) are also important issues covered.”</p>	
Behaviour and Health		<p>Modifiable risk factors for chronic diseases in rural areas (i.e. high prevalence in rural areas):</p>	

Category	Theme	Subtheme	Member Check Quotes
			<ul style="list-style-type: none"> - Rural lens on alcohol and physical activity – rural culture includes e.g. parents supplying alcohol, it’s just what’s done. Tobacco chew higher prevalence due to rural culture/blue collar. Generally, need to address the culture associated with rural make-up: less formal education (strong association between education level and incidence rates of alcohol/tobacco). Physical activity challenge – have to drive an hour to exercise for an hour or get their kids involved. Active transportation difficult because where we work and where we live are often far apart. Walkable communities unrealistic in most rural areas. Huge shift in farming, becoming sedentary due to high tech which is new challenge. Even to get mail, more likely to use a car to get to the end of the lane.”
Inner Setting	Readiness for Implementation	Internal Leadership Engagement	<p>CDP team champions – Champion organizational role (generalists):</p> <ul style="list-style-type: none"> - “It highlights [...] the needs for more generalist roles of staff, particularly specialist (e.g., Epidemiologists)” - “Rural staff have to be generalists – broad knowledge whereas urban can be narrow focus and deep knowledge” - “Rural public health programs can, in my opinion, best be carried out by staff who are able to multitask [...], while specialists such as epidemiologists are necessary, collaboration and delegation to others with expertise (even informal expertise - i.e. experiential, as opposed to formal academic) can reap benefits.”
		Available Resources	<p>Lack of dedicated and ongoing funding:</p> <ul style="list-style-type: none"> - “Somewhere it is important to continue to emphasize that an ounce of prevention is worth a pound of cure, and that, as a consequence, funding to health unit programs should not be cut (as current government proposals suggest).” - “Rely on external funding sources should be “explore” not “rely” on different ways to work with partners to leverage grants” <p>Low human capacity:</p> <ul style="list-style-type: none"> - “It highlights the issues related to lower human resource capacity in smaller health units.”



Category	Theme	Subtheme	Member Check Quotes
Process	Planning	Program Planning Cycle	Prioritization: - “Prioritizing implementation strategies can be useful, and would vary, depending on the particular situation of an individual health unit.”

Appendix S – RulPHS Study Results Compared to the CFIR (Domains and Constructs)

Table 1: RulPHS Study Results Compared to the CFIR (Domains and Constructs)

RulPHS Category	CFIR Domain	RulPHS Theme	CFIR Construct	Comments
Intervention Characteristics	Yes	Evidence Strength and Quality	Yes	N/A
				N/A
		Complexity	Yes	N/A
		Adaptability	Yes	N/A
		Trialability	Yes	N/A
Outer Setting	Yes	Cosmopolitanism	Yes	<ul style="list-style-type: none"> Social capital was not an explicit construct in the CFIR (i.e. embedded in cosmopolitanism). However, input from participants indicated that social capital was a strong influence on implementation. Therefore, the results provide empirical support for the inclusion of social capital as a separate construct in the CFIR, and to operationally define social capital in terms of relational, material, and political aspects of social capital (Hawe, & Shiell, 2000).
		External Policies and Incentives	Yes	N/A
		External Leadership Engagement	Construct showed relevance to some aspect of the framework	<ul style="list-style-type: none"> Within the CFIR “External Leadership and Engagement” was discussed within “Cosmopolitanism” (i.e. outer setting) and “Engaging” (i.e. process) External Leadership Engagement was not an explicit construct within the outer setting, but the study showed that “External Leadership Engagement” was a powerful influence in the outer setting in rural PHUs

RulPHS Category	CFIR Domain	RulPHS Theme	CFIR Construct	Comments
		Population External Communication	Construct showed relevance to some aspect of the framework	<ul style="list-style-type: none"> The CFIR includes the construct “Networks and Communication” as critical to implementation in the inner setting However, input from participants indicated that population external communication in the outer setting was also shown to influence implementation in rural PHUs The concept of communication channels was located within the process domain (i.e. planning) in the CFIR
		Reach	Missing in the CFIR	<ul style="list-style-type: none"> The CFIR did not discuss the influence of reach in terms of implementation (i.e. reach and implementation were viewed as mutually exclusive). Specifically, Damschroder et al. (2009) stated, “The CFIR opens the “black box of the “I” (implementation) component (p. 12)
		Population Needs and Resources	Yes, but language was modified	<ul style="list-style-type: none"> The theme “Population Needs and Resources” in this study was slightly modified to reflect “populations” rather than “patients” to better represent public health practice (i.e. “patient” is a clinical term)
Inner Setting	Yes	Structural Characteristics	Yes	N/A
		Culture	Yes	N/A
		Implementation Climate	Yes	N/A
		Readiness for Implementation	Yes	<ul style="list-style-type: none"> Included “Champions” within “Leadership Engagement” in RulPHS study (i.e. within engaging – process domain in CFIR).
		Intraorganizational Networks and Communications	Yes	<ul style="list-style-type: none"> Included the term “Intraorganizational” in RulPHS study
Characteristics of Individuals	Yes	Individual Identification with Organization	Yes	<ul style="list-style-type: none"> Included “Other Personal Attributes” within the “Individual Identification with Organization” construct in RulPHS study (i.e. separate construct in CFIR)

RulPHS Category	CFIR Domain	RulPHS Theme	CFIR Construct	Comments
Process	Yes	Planning	Yes	N/A

Note. Domains and Constructs adapted from “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science,” by L. Damschroder, D. Aron, R. Keith, S. Kirsh, J. Alexander, & J., Lowery, 2009, *Implementation Science*, 4(50), p. 1-15.