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HIV Testing Service Utilization Among Men and Women in Dominica

Carol Rosetta Jno.Baptiste-Smith
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Carol Jno.Baptiste-Smith

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Review Committee
Dr. Vasileios Margaritis, Committee Chairperson, Public Health Faculty
Dr. Richard Jimenez, Committee Member, Public Health Faculty
Dr. Fred Tabung, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2018

Abstract

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Carol R. Jno.Baptiste-Smith

MA/MS, University of the West Indies, 2009

BS, University of the West Indies, 2003

Doctoral Study Submitted in Partial Fulfilment

of the Requirements for the Degree of

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Abstract

Voluntary HIV/AIDS testing and counselling (VHTC) is one of the preventive measures used in many countries to decrease the spread of HIV/AIDS. Archived data from National HIV/AIDS Response Program's (NHARP) raw 2016 dataset were used to identify relationships and to assess significant differences between sociodemographic factors and selected sexual risk behaviours versus VHTC practices among adults 18 years and older who resided in Dominica. The health belief model was used as the framework for this cross-sectional study. The sample comprised 982 participants (40% [394] men and 60% [588] women). Logistic regression analysis was used to assess associations between sociodemographic and sexual risk exposure factors versus VHTC. Findings revealed that, as compared to age group > 65 years, participants in age groups 25-44 years were 5 times more likely--and 45-64 years were 2 times more likely--to have engaged in VHTC (*OR* = 5.11, *95% CI* = 2.03, 12.8 and *OR* = 2.63, *95% CI* = 1.07, 6.49, respectively). The odds not to engage in VHTC were 48% higher for participants from Grand Bay district (rural area) compared to Roseau health district (capital) (*OR* = .52, *95% CI* = .29, .94). The odds of nonengagement in VHTC were 51% higher for participants not having vaginal sex, compared to those who reported having vaginal sex *(OR* = .49, *95% CI* = .26, .92). The implications for positive social change include providing public health practitioners with data to plan and implement educational programs specific to the demographic characteristics in Dominica. This will enhance current efforts to raise awareness regarding HIV/AIDS and may increase VHTC practice among the population that may reduce the incidence of HIV/AIDS.

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Dedication

This dissertation is dedicated to some of the special people in my life. I express my gratitude to one of the wonderful ladies in my life, my mother and friend Cylma Lewis. To my darling husband Bishop Patrick Smith for his unwavering love and support. You were the wind beneath my wings. My daughters Clerol and Cleronel Austrie and my first grandson Clesean Austrie, I say thanks. The three of you gave me the will and determination needed to undertake this project. You are my pride and joy and simply the best. Special thanks to my siblings all who means so much to me. To my church family and friends of Second Chance Ministries in Tortola, British Virgin Islands, thanks for your words of encouragement and prayers offered on my behalf.

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Secondly, I am grateful to Dr. David Johnson chairman and the other members of the National Human Research Ethics Committee and also the staff of the National HIV/AIDS Response Program for your assistance and for accommodating me.

Last but not least I will be forever grateful to God Almighty for giving me the strength grace and resources to complete this dissertation. Thank you Lord.

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Section 1: Foundation of the Study and Literature Review

Introduction

Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) is a public health problem that has posed major issues among particular groups in several countries worldwide (Joint United Nations Programme on HIV and AIDS [UNAIDS], 2016a). Globally, over 36 million people were living with HIV by the year 2015. Sub-Saharan Africa has had the greatest burden of HIV infections with approximately 70% of all HIV infections occurring among that population (AIDS Virus Education Research Trust [AVERT], 2016). In 2013, the Caribbean had 250,000 HIV infections among which 12,000 were new cases (UNAIDS, 2016a). An estimated 96% of all HIV/AIDS cases within the Caribbean were observed in Cuba, the Dominican Republic, Haiti, Jamaica and Trinidad and Tobago (AVERT, 2016). Data on HIV in the small Caribbean country of the Commonwealth of Dominica (from now on referred to as Dominica) is not readily available therefore in-depth assessment on the status of HIV/AIDS is difficult (Index Mundi, 2016). This may possibly be due to fear of stigma and discrimination surrounding HIV/AIDS in this small island. Dominica has a total estimated population of 73,897 (male to female ratio = 1.02) (Country Watch, 2017). According to the UNAIDS (2012), the island had approximately 376 diagnosed cases of HIV/AIDS during the period of 1987 to 2011. In 2011 alone, 15 new HIV cases were reported in Dominica most of which (64.2%) were males. Per the report, the age group most affected were 25-49 years old.

Public Health workers on the island of Dominica have been involved in several prevention strategies to curb the HIV infection. These strategies include education regarding safer sex, pre and post exposure prophylaxis, and Voluntary Human Immunodeficiency Virus Testing and Counselling (VHTC). Though VHTC is an essential prevention intervention for HIV infection, certain people do not engage in HIV testing (CDC, 2016d). In 2011, a total of 6,257 HIV tests were performed in the island of Dominica out of which only 37% were males (UNAIDS, 2012). Reasons for inequalities in testing practices are unexplained due to lack of sufficient research about this issue (UNAIDS, 2016b). The VHTC service is provided by skilled health care workers and volunteers within the public and private sector (United States Agency for International Development [USAID], 2012). Researchers have revealed inadequacy in the quality of skills and quantity of trained individuals who provide health care services to the population. This study was necessary because more research is critical to assess the factors necessary to enhance VHTC practice among the population. The aim of this quantitative study was to explore the VHTC practices among men and women in Dominica. I assessed sociodemographic factors to identify contributing factors and barriers to testing. Findings from the study can contribute to current education strategies to curb the HIV infection rate within the population. This section includes information about the background of the study, problem statement, nature of the study, limitations, assumptions, delimitations, research questions, hypotheses, theoretical framework, significance of the study, and definitions of terms.

Problem Statement

Every individual should know their HIV status. Knowledge of HIV status is vital to provide timely treatment and supportive care to HIV positive individuals (CDC, 2015; Schuelter-Trevisol et al., 2015). In addition, by knowing one's status, prevention intervention strategies can be usurped, the spread of infection can be avoided, and the quality of life of at-risk populations can be enhanced. Upscaling HIV education strategies is important in meeting VHTC needs. In Dominica, the most affected HIV population ranges from 25 to 49 years old (UNAIDS, 2015; Avert, 2016). According to these reports, in 2014, only 3.3% of the overall Dominica population were tested for HIV, from which only 38% were men. On the contrary, the United States has recorded over 50% of the population who have never had HIV testing done (CDC, 2016e). Also in 2012, approximately 3.6% persons were tested across Latin America and the Caribbean (AVERT, 2016). Although these were low percentages, increased HIV infection cases were seen (from 6 in 2009, to 16 in 2014) among men in Dominica (UNAIDS, 2015). This report stated that VHTC, provided at 13 sites is one of the HIV prevention services offered in Dominica and is coordinated by NHARP. However, little is known about the factors influencing VHTC service utilization in Dominica.

Several factors can influence VHTC utilization. Naidoo and Taylor (2015); Phillips, Ybarra, Prescott, Parsons, and Mustanski (2015); and Dennison, Wu, and Ickes (2014) explored some of these factors among different populations and found variations in associations of age, gender, ethnicity, geographical location and sexual risk behavior

factors. The UNAIDS, 2015report identified differences in VHTC among age groups in Dominica. Similarly, Hall, Walker, Shah, and Belle (2012) and Van Handel, Kann, Olsen, and Dietz (2016) identified variations in HIV diagnoses and testing among United States adolescents and young adults. Meyer-Rath, et al. (2015) explored the effect of several factors on VHTC including employment. Furthermore, Baker et al. (2011) and Fertman and Allensworth (2010) agreed that education levels can also influence health care access. Moreover, Dennison et al. found close associations among selected risk exposures and VHTC. Sexual behaviors put people at risk for contracting Sexually Transmitted Infections (STI) including HIV/AIDS and unwanted pregnancies. Perceptions of sexual risk behaviors vary by age, gender, cultural practices, and education level. High risk sexual behaviors refer to activities such as unprotected vaginal/oral/anal sexual activity, having multiple sexual partners, having a high risk partner, having a partner who injects or injected drug, exchange of sex for money or drugs, having sex under the influence of alcohol, marijuana and/or cocaine (CDC, 2015). For the purpose of my study I explored sexual risk factors such as having sex with sex workers, sex with STI partner, ever had STI, condom use, transactional sex, engagement in sex act (vaginal, anal and/or oral), multiple sex partners, partner with multiple sex partners, sex under non-injected drug use (NIDU), sex under injected drug use (IDU), sex under the influence of marijuana, cocaine, hallucinogens, alcohol).

Identified Gap

There is a need for more HIV education among the employed and unemployed males and females in Dominica. Though studies among adults in Boston and South Africa identified association of VHTC and modifying/sociodemographic factors (such as age, gender, and geographical location), sexual risk behaviours (such as having sex with sex workers, sex with STI partner, ever had STI, condom use, transactional sex, engagement in sex act [vaginal, anal and/or oral] , multiple sex partners, sex partner with multiple sex partners, sex under NIDU, sex under IDU, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) (Walter et al., 2016; Naidoo & Taylor, 2015), very few studies sought to identify factors associated with VHTC and employment status or VHTC and educational level among the employed and unemployed in Dominica. These sociodemographic factors are known to influence VHTC. The few authors who related sociodemographic factors with VHTC found that these factors influenced VHTC (Sanga, Kapanda, Msuya, & Mwangi, 2015). For example, these authors found that VCT uptake was found to be significantly predicted by age ($p = 0.003$), gender ($p < 0.001$), religion ($p < 0.001$), exposure to VCT information from a VCT center ($p < 0.001$) and type of school ownership ($p < 0.013$). Results of my study will be used to develop workplace policies and education programs to target the most at risk population such as the youths and men.

HIV testing and counseling can be enhanced by education intervention (Naidoo & Taylor, 2015). Assessment of education status can guide program planners to select

appropriate teaching methods for specific groups per educational level. I found no study that assessed the influence of either educational background or employment status on VHTC among the Dominican population. This study can fill the gap by exploring relationships among factors such as age, gender, employment status and educational level and how they interact with individual perceptions and beliefs to influence VHTC. Findings from this study could contribute to educational intervention strategies and provide pertinent information to policy makers to help improve the HIV testing among the employed and unemployed Dominican population.

In this study my goal was to identify factors associated with VHTC service utilization in Dominica so that action can be taken to enhance HIV testing and prevent HIV among Dominicans. I assessed potentially significant differences between selected influencing factors namely VHTC versus gender, age group, employment status, educational level, ethnicity, geographical location, and sexual risk behaviors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol). This can assist in efforts to improve knowledge of HIV/AIDS and the practice of VHTC among the adult population.

Purpose of Study

The purpose of this quantitative cross-sectional study was to explore the sociodemographic, employment related and sexual risk behaviors factors (such as having

sex with sex workers, sex with STI partner, ever had STI, condom use, transactional sex, engagement in sex act (vaginal, anal and/or oral) , multiple sex partners, sex partner with multiple sex partners, sex under NIDU, sex under IDU, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) influencing VHTC among adults 18 years and over in Dominica. I explored the association between the independent variables (age, gender, ethnicity, geographic location, employment status, education level, and HIV risk behaviors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) and the dependent variable (VHTC). I summarized the data and explored relationships between employed and unemployed adults in Dominica seeking VHTC service. I employed adjusted multivariable logistic regression analysis to determine whether educational level was positively associated with employment status. In addition, inferential statistics was used to determine whether socio-demographic and HIV risk exposure factors were associated with VHTC among adults in Dominica, 2016. I used the information to determine whether the differences support my hypotheses. Findings can contribute to educational programs developed to enhance current interventions (such as safer sex, early testing and treatment, and condom use). This research can guide health care providers to formulate education strategies tailored towards employed and unemployed individuals.

This study can inform policy and practice for VHTC service utilization to produce community benefits, thereby contributing to solutions for societal problem-solving that brings about change in behaviors. Patterns for HIV testing can be identified to assess deficient areas. Results can be used to encourage community-level approaches to support early detection and treatment of HIV infection as well as support research to promote health and well-being.

Research Questions and Hypotheses

Research Question 1: What is the association between sociodemographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults?

$H_0$1: There is no significant association between sociodemographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults.

H_a1: There is a significant association between socio-demographic factors (age, gender, ethnicity, geographical location) and VHTC service utilization among Dominican adults.

Research Question 2: What is the association between employment status and VHTC service utilization in Dominica?

$H_0$2: There is no significant association between employment status and VHTC service utilization in Dominica.

H_a2: There is a significant association between employment status and VHTC service utilization in Dominica.

Research Question 3: What is the association between education level and VHTC service utilization in Dominica?

H_03: There is no significant association between education level and VHTC service utilization in Dominica.

H_a3: There is a significant association between education level and VHTC service utilization in Dominica.

Research Question 4: Are HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol associated with VHTC service utilization in Dominica?

H_04: HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) are significantly associated VHTC service utilization in Dominica.

H_a4: HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence

of marijuana, cocaine, hallucinogens, alcohol) are not significantly associated with VHTC service utilization in Dominica.

Theoretical Foundation

Theories pertain to several concepts developed to describe relationships among specific variables (Creswell, 2009). Theories are needed to support interventions, provide justifications to substantiate prevention programs and are for evaluating projects. The health belief model (HBM) is one of the several different types of theories used in health behaviour change. The author purports that prior to implementation of behaviour modification programs; the behavior should be understood and predicted (Rosenstock, 1966). The HBM is founded on the premise that health behaviours may be predicted by four core concepts (perceived susceptibility, perceived vulnerability, perceived benefits, and perceived barriers) with two additional concepts (cues to action and self-efficacy) (Rosenstock, Strecher, & Becker, 1988). This model can be applied to prevention programs such as education regarding HIV testing. This model was developed by the United States Public Health Service psychologists Godfrey Hochbaum, Irwin Rosenstock and Stephen Kegels during the 1950s (Glanz, Rimer, & Viswanath, 2015). The model comprises six stages: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The highlights of the HBM is the importance of knowing that one is vulnerable to a disease, how severely affected one can be, and how beneficial to them certain preventive actions can be if these actions are taken.

The HBM was used as the conceptual foundation theory for this quantitative study. Testing for HIV is a method of prevention intervention that can be applied to several constructs of the HBM. This model was chosen because it is widely used in individual health behaviour change (Glanz et. al., 2015). This theory was selected based on its uniqueness in providing the foundation for several prevention interventions. Based on its ability to help understand why some people get tested for HIV, as opposed to others who do not get tested, this model can provide a foundation for HIV testing and education programs. Several researchers have applied the HBM to research studies and varied health topics. For example this model has been used in past research studies on childhood vaccination (Humiston et al., 2011; Noroozi, Jomand, & Tahmasebi, 2011) and behaviour change programs (A., Oyekale, & T., Oyekale, 2010).

Rogers and Prentice (1997) identified a significant limitation of the HBM (as cited by Glanz et.al. 2015). The researchers recognized the absence of integrating fear as a construct of the HBM. Fear is an important aspect to be considered in behaviour change. Glanz et.al. made reference to past studies conducted by Champion, Skinner and Menon (2005) and Champion, Menon, Rawl, and Skinner (2004) that associated fear with mammography interventions, and also found significant association of fear with HBM constructs.

The HBM identifies several stages of change which provide opportunities for interventions strategies based on the stage at which the individual is situated. For example, interventions such as HIV/AIDS education can be provided to motivate

individuals at every stage of the HBM. This study applied the core constructs of the HBM identified as personal beliefs and perceptions that may influence sociodemographic factors (age, gender, ethnicity, etc.) to form the basis for behavioural change.

HIV Prevention Theoretical Framework

Health behaviour can be explained by application of the constructs of the HBM individually or collectively. The foundation of the HBM describes the socio-demographic or personal characteristics such as age, gender, ethnicity, and several others that can serve as motivational factors on individual perceptions/beliefs influencing behavioural actions (HIV testing) (Glanz, et.al., 2015). According to this model, individuals will be motivated to engage in a health promoting behaviour if it is perceived that danger could be avoided and that engaging in the healthy behaviour can be achieved easily. For example, if an employee seeks HIV testing for employment purposes and is diagnosed as HIV positive and gets treatment and supportive care, that individual will have a greater perception of susceptibility of HIV and can encourage others to seek information re testing. However, this experience may create fear and serve as a barrier to that person's colleagues who may not engage in testing.

The HBM provides explanation on the motivation to engage individuals in HIV testing and will benefit this study in motivating employed and unemployed adults to participate in this practice. This model was useful to the study of Noroozi, Jomand, & Tahmasebi (2011) who sought to assess the association of breast self-examination (BSE) rate with the constructs of the HBM due to low screening rates among Iranian women.

According to the findings only 7.6% of the participants reported engaging in BSE frequently. While perceived self-efficacy was an intermediate construct between modifying factors and HBM constructs, perceived self-efficacy and perceived benefits had the strongest association to BSE. The potential changes in behaviours for engaging in BSE are expected to be similar to that of the Dominican adult population and therefore the HBM was used as a model for this current study.

Per Glanz et.al. (2015) several aspects of the HBM in relation to HIV testing among adult population can be applied. However; this study only focused on perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy as the main facilitators to VHTC. These enabling factors were aligned with independent variables as main associates to VHTC among the Dominicans.

An individual perceives susceptibility when vulnerability of the risk of developing the disease is observed (Rosenstock, 1974). Individuals may be motivated to engage in HIV education interventions due to fear of the perceived risk (Kirakoya-Samadoulougou et al., 2013). Individuals have different perceptions based on personal factors (age, gender, place of residence, ethnicity, educational level, or employment status). People with perceptions of low susceptibility to infection may not accept that they are at risk and may continue to engage in risky behaviors (Pham et al., 2015). On the other hand, those who perceive themselves as highly susceptible to infections may more readily engage in healthy behaviors (Peralta, Holaday, & Mcdonell, 2015). Boxwala, Bridgemohan, Griffith, & Soliman (2010) further strengthened claims from Rosenstock (1974) that

background/socio-demographic factors may have indirect effect on perceived susceptibility to disease. Health promotion interventions have related susceptibility to disease with education needs of a target audience.

Perceived severity refers to how serious the disease condition is to the individual (Orji, Vassileva, & Mandryk, 2012). People who perceive the disease as debilitating or restricting their function will be more likely to engage in healthy behaviours to prevent the disease or its severity of the disease (McCoy et al., 2009). If individuals see themselves as unable to work to earn a living due to HIV positive status, they may either engage in HIV testing so that if they are positive they can obtain early treatment or they may be fearful of being diagnosed as positive. People with high perception of the seriousness of HIV/AIDS will consider HIV testing to prevent the disease. On the other hand if one considers HIV/AIDS as a minor threat they will be reluctant to get tested. Socio-demographic factors can determine one's perception of the seriousness of HIV/AIDS. Males are less likely than females to utilize HIV testing services in Dominica (UNAIDS, 2015). Testing behaviours can be due to perceptions of VHTC practice and preparation for testing (Orisakwe, Ochiogu, & Ocholla, 2015). These researchers sought to describe patients' perceptions of the benefits of and barriers to HCT, and their willingness to testing. Findings revealed that the association between participants' perceptions of HCT and their willingness to test for HIV was not significant ($p > 0.05$). On the contrary, Shi, Kanouse, Baldwin, Kim (2012) assessed perceptions of adults in the 2005 Los Angeles County health survey. These researchers found no significant

difference in HIV testing and whether one has a high or low perception of the seriousness of the disease. Perceived vulnerability/severity was measured by responses to risk exposure factors such as sex with HIV positive individuals, or sex with drug users. Continuing education regarding HIV/AIDS will be significant to assist in decision making at this point.

Perceived benefits refer to individuals' belief that the value added to their life far outweighs the cost that is paid in engaging in the healthy behaviour (Rosenstock, 1974). People believe that they may be at an advantage by engaging in HIV testing and if positive they receive early treatment, better quality of life, remaining gainfully employed, and living longer (McCoy et al., (2009). The author also identified reasons for seeking VHTC for example medical check-up as perceived benefits of HIV testing.

In the stage of Perceived Barriers the individual considers factors that would prevent them from engaging in the healthy behaviour. People may perceive travelling distance from testing site, availability and fear of results, confidentiality issues, and privacy concerns as hindrances to HIV testing (Huff, Chumbler, Cherry, Hill, Veguilla, 2015; Kirakoya-Samadoulougou et al., 2013; Njau et al., 2014; Moyer, Silvestre, Lombardi, Taylor, 2007; Wiwattanacheewin, Sindhu, Teitelman, Maneesriwongul, Viwatwongkasem, 2015). In addition to the above mentioned barriers, Kirakoya-Samadoulougou et al. (2013) identified concerns regarding test result. These barriers must be addressed for the individual to engage in the healthy behaviour. An individual can progress towards the outcome in the continuum by receiving more education that will

serve as further motivation to engage in HIV testing. Because the primary data collection tool does not address all the above mentioned barriers, I considered the latter barrier namely receiving HIV test.

Researchers described self-efficacy as the measure of confidence built amidst challenges experienced by the individual throughout the process (Stretcher, Rosenstock as cited by Glanz et.al. 2015). This concept explains self-confidence developed in practicing the desired health behaviour. According to Bandura (1977) self-confidence depicts a measure of control which motivates one to perform behaviour. Individuals who gain self-confidence can motivate their fellow co-workers to engage in HIV testing.

The HBM is significant to HIV testing education intervention among employed and unemployed adults. A sexually active individual will not get tested for HIV if they are ignorant of HIV infection and how harmful it can be to them and their partners. Education can raise awareness, motivate, and enhance knowledge (Glanz et al., 2015). Knowledge of the individual's demographic factors (age, gender, ethnicity, geographic location, employment status, sexual risk behaviors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol, and level of education) is significant in developing health education plans for adults. Education level plays a significant role in planning programs that will provide knowledge and skills for empowerment. Hargreaves (2010) reported that there is a positive correlation between

education and HIV infections. People are less likely to be infected with HIV when their education level is high as compared to those with lower education level. According to Hensen et al. (2014) the male population may less likely seek health care than females due to stigmatization although they are more likely to receive positive HIV results. Further studies could identify strategies to encourage the male population to seek preventive health care including VHTC services.

Andrews (2011) found remarkable associations between HIV testing and age, gender marital status and geographic location. In revealing results from three Caribbean countries the researcher claimed that younger males who were never married and those who reside in rural communities within the Caribbean were less likely to seek HIV testing. There was a further appeal for creating and implementing strategies geared towards self-assessment of risk behaviors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) to promote HIV testing.

Risk factors have strong influence on perceptions and decision making regarding preventive behaviours (Glanz et al., 2015). In the current study I hypothesized that the decision to engage in HIV testing is a process that begins with modifying factors. These factors were assessed based on the individual basic characteristics (age, gender, ethnicity, educational level, employment status). The individual can recognize the severity of the disease and their vulnerability to HIV infection however; tat individual can still be

indecisive about HIV testing. An individual can weigh the barriers and benefits to determine if it is advantageous to get tested for HIV. With further education interventions, based on the identified need (e.g. information leaflets or providing transportation) the individual can gain confidence and feel motivated to participate in VHTC and utilize the service). This model demonstrates the significance of education intervention throughout the process. Education serves as a motivational tool to facilitate decision-making. Findings from this study can provide a foundation for education programs for employed and unemployed individuals.

Nature of the Study

In this cross-sectional study, I conducted a secondary analysis of NHARP's (Ministry of Health, Dominica) VHTC archived data. This study focused on quantitative research consistent with exploring socio-demographic, employment, educational and sexual risk exposure factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol associated with VHTC services among adults 18 years and older in Dominica. The VHTC opt-out voluntary service is offered to individuals as one of the HIV preventive approaches adopted by the Government of Dominica to combat the HIV/AIDS epidemic. Many people are unaware of their HIV status and behavior change must be enhanced through HIV education as an intervention to encourage VHTC. Assessing the behavioural factors associated with VHTC among the

population aligned with the perceptions or beliefs of the HBM which pave the way to behaviour change (Schnall, Rojas, & Travers, 2015). I explored independent variables which were defined as age, gender, geographic location/health districts, education level (primary, secondary, tertiary), risk behaviours (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol), and employment status.

The outcome variable was defined as HIV testing and counselling service utilization in the past 12 months and was determined by asking the question: When did you receive your last HIV test? In the analysis of this question, I identified those who were ever engaged in VHTC and those who were not. In the original questionnaire, the time component referred to activities within 12 months. For the purpose of my study I considered all participants who ever had VHTC done and stated a date as "yes" and those who stated that they never had VHTC done as "no". The covariate variables were employment status, educational level, and risk exposure factors. This quantitative analysis was used to identify relationships among variables throughout the study.

Literature Search Strategy

The literature search was conducted using electronic means to search databases from the Walden University library. These databases included Google Scholar, Science Direct, PROQUEST, EBSCO, MEDLINE, CINAHL, Open Access Journals Search Engine, and PubMed Central as well as multiple databases such as Thoreau Multi-

Database Search. The search terms used for the literature review included *HIV/AIDS, VHTC,* factors such *as age gender education, employment status influencing VHTC, sexual risk exposure behaviours and VHTC, HBM and HIV, Sub-Saharan Africa, Dominica, the Caribbean,* and *the West Indies*. During the literature search, approximately 100 peer-reviewed articles were examined. However, 18 were discarded due to attempts made to use peer-reviewed articles published between 2011 and 2016 to reflect the evolving trend of VHTC throughout the years. The next segment will provide a detailed literature review that summarizes influences of age, gender, ethnicity, geographical location, employment status, educational level, and risk exposure factors on VHTC.

Literature Review

Review of the literature identified previous research conducted on the factors influencing VHTC among different populations worldwide. Since limited research assessing VHTC practices in Dominica and the Caribbean was found, a gap in literature emerged, and this became a contributing factor to increase efforts in HIV/AIDS prevention interventions (Andrews, 2011; UNAIDS, 2015). On the contrary, the UNAIDS report revealed that although HIV infection rates are lower among females, women are more likely to utilize VHTC services. The factors affecting VHTC among Dominican males and females will be discussed later in this chapter.

Overview of HIV/AIDS in the Caribbean Region

HIV is a virus that can cause AIDS (Centers for Disease Control and Prevention [CDC], 2016a). This virus affects the CD4 (T cells) in the body. One can get infected by direct contact with blood, semen, rectal fluids, vaginal fluids, and breast milk (AIDS.gov, 2017). Since the discovery of HIV an estimated 78 million people worldwide has been infected (UNAIDS, 2016a). Furthermore, deaths from AIDS have been almost 39 million worldwide (WHO, 2017c). In 2015, there were approximately 2.1 million new cases of HIV in Latin America and the Caribbean region (AIDS.gov, 2017). We can see that HIV infections are widespread, but per CDC (2016b), in 2015, the Sub-Saharan Region had 65% of all new cases of HIV infection worldwide. Other areas that have substantial cases of HIV/AIDS infection are the United States, Asia, Central Asia, Pacific, Latin America, Caribbean, and Eastern Europe. In the United States, about 0.4% (1.2 million) people were living with the HIV virus by 2014 (CDC, 2016b). The Caribbean has the highest HIV cases in the Americas and the second highest HIV prevalence (between 1.9% and 3.1%) after Africa (UNFPA, n.d.). Per UNAIDS GAP Report (2014) approximately 1.1% of adults and children were living with HIV in the Caribbean.

According to UNAIDS (2012), Dominica reported its first case of HIV/AIDS in 1987. A total of 376 new HIV-positive cases were reported from 1987-2011. During this period the population change ranged between -0.8% and 0.5% annually (The World Bank, 2017). In 2011, there were 15 reported new cases. Most persons living with HIV/AIDS were between 25-44 years. In that same year Dominica had an estimated

HIV/AIDS prevalence of one per cent with a male-to-female ratio of positive cases at 2.5:1 (United States Agency for International Development (USAID), 2012). It is speculated that this figure may be underestimated due to inadequate data on high risk groups such as men having sex with men (MSM) among which the epidemic is clustered. For example MSM in the Middle East and North Africa had an estimated prevalence of 3.0% (95% CI 2.4-3.6) as compared to the Caribbean's 25.4% (21.4-29.5) (International AIDS Society, 2014). As stated in the UNAIDS' (2015) report the most high-risk population are difficult to reach and may be spreading the virus. The main concern for health authorities in Dominica is the threat of an unmanageable surge in HIV infection. Interventions should include education strategies to motivate high risk groups to engage in prevention including VHTC.

Many people do not know their HIV status. In 2013, out of the 1,242,000 adults and adolescents living with HIV in the United States, approximately 161,200 (13%) were not aware of the infection (CDC, 2016b; Henry J. Kaiser Family Foundation, 2016). In 2015 approximately 40% of the 36.7 million people worldwide living with HIV did not know they were infected (AVERT, 2017b).

HIV testing is the only way that one can be aware of their status and seek care if they are positive for HIV. Because HIV testing is critical to improving intervention efforts, more research is needed to understand the characteristics of individuals who get tested for HIV. This research will explore factors related to VHTC among the adult population in Dominica.

Background of Dominica and Health System Profile

Map: Commonwealth of Dominica. New Internationalist (1973-2016).

Figure 1: *Map of Dominica*

Location

Dominica, commonly known as *The Nature Island of the Caribbean* is a mountainous island 754 sq. km wide, situated in the Eastern Caribbean and is the largest and most northerly of the Windward Islands (Commonwealth, 2017). The country is located at 15-25 north, 61-20 west, between two French islands Martinique to the south and Guadeloupe to the north. Though English is Dominica's official language, Creole (French patois), is spoken by the majority of people. Dominica was occupied by Caribs until 1763 when France took over and then surrendered the country into the care of the British colony (Commonwealth, 2017). However Dominica became independent in 1978 and was favoured to have the first female Prime Minister in the Caribbean by the name of Dame Mary Eugenia Charles, from 1980 to 1995.

Population (Age and Gender)

As of 2017, Dominica's total estimated population was 73,897 (Country Watch, 2017). According to 2016 estimates the ratio of male to females is 1.02 male(s)/female. The age and gender distribution is as follows; 0-14 years: 21.84% (male 8,239/female 7,871); 15-24 years: 15.7% (male 5,960/female 5,618); 25-54 years: 41.97% (male 15,693/female 15,264); 55-64 years: 9.6% (male 3,787/female 3,294); 65 years and over: 10.89% (male 3,561/female 4,470) (2016 est.) (Central Intelligence Agency [CIA], 2017).

Geography, Capital and Parishes

Dominica is a little over four times the size of Washington, DC (CIA, 2017). There are 10 parishes (St. Andrew, St. David, St. George, St. John, St. Joseph, St. Luke, St. Mark, St. Patrick, St. Paul, and St. Peter). Its capital (Roseau) is located in the parish of St. George. Approximately 15,000 people reside in Roseau. The urban region is populated with approximately 69.5% of the total population up to 2015.

Ethnicity

According to the 2010 census, blacks in Dominica represented 86.8% of the population while 8.9% of the population were mixed, 2.9% of Carib descent, 0.8% White and 0.7% classified as Other (CIA, 2017). The black population represent descendants from slaves who occupied the country from African descents. The few Caribs are descendants from those who occupied the island prior to invasion of the French colony. The other groups represented migrants from other countries.

Religion

Most Dominicans (61.4%) practice Roman Catholicism while 28.6% belongs to the Protestant churches (CIA, 2017). Protestants include Evangelicals (6.7%), Seventh Day Adventists (SDA) (6.1%), Pentecostals (5.6%), Baptist (4.1%), Methodist (3.7%), Church of God (1.2%), and others (1.2%). Other religious bodies included Rastafarians (1.3%), Jehovah's Witness (1.2%), and other (0.3%). Some Dominicans have no religious affiliation (6.1%) while some are unspecified (1.1%). Churches are very instrumental in contributing to the educational system in Dominica. The Roman Catholic, SDA and other churches operate educational institutions and provide formal and informal education to the population. In addition, churches contributed to cultural activities and moral development of the population of Dominica.

Education

Approximately 97.5% of the population from age 5 years to 12 years are enrolled in primary education while enrolment in secondary was at 89.2%, and tertiary enrolment 3.5% (Commonwealth Network, 2017). Dominica has a 12 years' compulsory education system which begins at the age of 5 years. Assistance is given at all levels of education. Students receive free text books at the primary level however free texts are given at secondary level from first to third forms. Students who are unable to afford textbooks receive assistance from the Education Trust Fund.

The ratio of female-to-male attendance at the primary level is 0.99:1 while at the secondary level 1.06:1(Commonwealth Network, 2017). The ratio of pupil-teacher at the

primary level 16:1 and secondary level is 14:1. Approximately 89% of the students complete primary school.

Tertiary level education is provided at a teacher-training college, a nursing school and at the regional University of the West Indies and the Dominica State College (Commonwealth Network, 2017). This Government-owned institution prepares students for General Certificate Examination (GCE) advanced levels and associate degrees. The Caribbean Examinations Council, Caribbean Secondary Education Certificate Examination, and Caribbean Advanced Proficiency Examinations provide examinations and certification at the respective secondary and post-secondary levels. These avenues can be used to disseminate HIV related information to the population. Program planners and educators can be guided towards development of information communication techniques for optimum information delivery. Most significant is preparation of HIV/AIDS information tailored towards specific groups based on their education attainment level.

Economy and Employment

According to Country Watch (2017) Dominica's economy has moved from its dependence on the agricultural crop (banana) to other agricultural crops including ground provisions however focus is mostly concentrated on tourism in the wake of promoting Dominica as an "ecotourism" destination. In addition, there is increased attention on offshore financial industry. Dominica has amazing sites (high, rugged mountains, rainforests, freshwater lakes, and hot springs) which render the island fit for tourist

destination. However development of these attractions is impeded by the country's poor infrastructure and the lack of an international airport.

The currency used on the island is the East Caribbean (EC) dollars (XCD) (Country Watch, 2017). Central Intelligence Agency (2017) recorded a debt burden of 70% in 2012 decreasing from 78% of GDP in 2011. Dominica's GDP was $812 million in 2016 and the GDP growth rate was 1.5% (2016) as compared to -1.8% in 2015. Approximately 29% of the population is below the poverty line.

The majority of the population are employed in agriculture (40%) while 32% are employed in the industry and 28% in services (CIA, 2017). Dominica's unemployment rate is at 23% which is 176th compared to the world. This high unemployment rate is a potential for risky behaviours, to seek means for survival. It is therefore critical for HIV risk factors to be discussed and prevention interventions including VHTC to be encouraged to enhance present programs.

Importance of HIV Testing and Counseling

The spread of HIV can be prevented by decreasing the number of sex partners, avoid sharing needles, correct and consistent condom use, pre and post-exposure prophylaxis, and health promotion (CDC, 2016c). Moreover, VHTC is one of the most effective prevention interventions against the spread of HIV. Testing can reveal HIV status so that HIV positive individuals can be referred early to a treatment care facility. Treatment with Antiretroviral Therapy (ART) was initiated in Dominica in mid-1990s

and has the potential to improve the quality of life for many HIV infected persons as well as to decrease their chances of infecting others (CDC, 2016c).

Approximately 40% of global at-risk, and non-diagnosed infected individuals, do not have any access to treatment nor preventive care, and therefore, do not have any knowledge about their HIV status (AIDS.gov, 2017). Of the 35 million people living with HIV in the world, 19 million did not know their HIV-positive status (AIDS.gov, 2017; Joint United Nations Programme on HIV/AIDS (UNAIDS), 2014). Inequalities in availability of preventive care services hamper the opportunity to get tested. In addition, research done in the Caribbean is limited and no extensive study on VHTC has been done among the Dominican population (Andrews, 2011). Continuous health education can improve HIV testing habits. Several other factors can influence VHTC.

Types of HIV Tests

The Centers for Disease Control and Prevention (2017) described three main types of HIV tests namely, HIV Antibody Test (3rd Generation HIV Test), HIV Antibody/Antigen Tests (4th Generation HIV Test), and HIV RNA Test. The differences in these tests depend on the testing window and specimens that can be identified in blood samples.

The window period for the HIV Antibody Test to detect HIV antibodies is three to 12 weeks from infection date (CDC, 2017). The virus can be detected by identifying antibodies in a blood sample. Most HIV Antibody Tests include rapid testing and home

tests. Rapid testing can be done from a specimen of blood from a finger-prick, or from a venous blood sample to be sent to the lab, or oral fluid (saliva) specimen.

The HIV Antibody/Antigen Tests (HIV Antibody/Antigen Combination test or HIV Antibody/Antigen duo test) is a blood test that helps practitioners to identify both HIV antigens and antibodies (CDC, 2017). This test is more predictive of the presence of HIV because of the protein 24 antigens which are part of the HIV virus. The combination HIV test helps to detect the HIV virus antigens, even if the antibody level is low. The HIV antigens can be detected within two to six weeks of HIV infection. An HIV-1/2 Antibody Differentiation test can be performed to confirm abnormal HIV Antibody/Antigen test result. Types of HIV Antibody/Antigen Tests include enzyme-linked immunosorbent assay (ELISA) also known as an enzyme immunoassay (EIA) that is done at a lab (CDC, 2017).The ELISA test detects HIV antibodies and antigens in the blood. In an individual who is tested HIV positive from the ELISA test, confirmation is done using the Western blot test. This test detects antibodies to specific HIV protein.

The HIV RNA Test is a nucleic acid assay (NAT or NAAT) performed on a blood test. The practitioner is able to detect HIV ribonucleic acid (RNA) within nine to 11 days post infection.

In Dominica, screening is done using rapid testing by a finger-prick sample to identify HIV antibodies in each individual mostly during HIV campaigns. Non Rapid Testing (e.g. ELISA) is done by sending samples from different sites to the lab for antibody testing. Before the test is done the healthcare provider explains the procedure

during pre-test counselling sessions. The client is asked to sign a written consent form prior to testing. In Dominica, during VHTC health care providers are guided by a HIV testing questionnaire designed as an interview tool for each client at every testing session (See appendix A). With the consent of the individual, the healthcare provider performs a finger prick rapid test or draws blood sample to send to the lab for testing. Rapid tests results are usually given to the client within 30 minutes of the test. If the specimen is sent to the lab, the client is asked to return within 3 days to one week for the result. Post-test counselling is done after every result is given. Clients with positive results are referred to the secondary care unit in the main hospital for further management. All results including onsite testing and lab analysis are sent to the National HIV/AIDS Response Programme (NHARP). Data collation and analysis are conducted by NHARP who prepares national reports for submission to the Ministry of Health.

The tool (Appendix A) was developed from the John Hopkins/Caribbean HIV/AIDS Regional Training (CHART) and USAID Voluntary Counselling and Testing for HIV Protocols (WHO, 2013). The CHART Coordinating Unit is located on the Mona Campus of the University of the West Indies in Kingston, Jamaica. This unit facilitates training from its regional offices in Bahamas, Barbados, Haiti, and Jamaica. The HIV testing form contains the provider's name, client information such as demographic data, background, and risk exposure factors (See Appendix A).

Voluntary HIV testing and counselling in Dominica

Health services in Dominica are provided mainly by the Ministry of Health with decentralisation of health care to three levels namely primary, secondary and tertiary care (UNAIDS, 2012). Primary care involves comprehensive health care services which are provided at 52 health centres/clinics or type 1 health centres and two small district hospitals. The main hospital is in the capital Roseau and one small private hospital is in the West of the island which provides secondary level care. Diagnostic services are provided by one Government-owned and one private-owned medical laboratory.

HIV/AIDS-related services are coordinated by the NHARP. Education, prevention, and awareness efforts have been geared towards decreasing HIV infections and controlling the spread of the disease. Voluntary HIV Testing and Counselling are provided at 13 sites. In 2006, a total of 2,414 persons were tested at the Government Laboratory at the Princess Margaret Hospital (UNAIDS, 2008). From this total, 78.7% were females among which an estimated 65.5% were pregnant women. This may be a possible explanation for the vast difference in male to female VHTC service utilization. In 2011, there was an increase in the number of HIV tests conducted in Dominica (62% females) (UNAIDS, 2012). However, in 2014, there was drastic decrease in the number of HIV tests conducted approximately (3.3% of the total population) (UNAIDS, 2015); Avert, 2016). These reports revealed a decrease in VHTC with more females than males being tested. The UNAIDS report revealed fluctuations in the prevalence of HIV in Dominica from1987 to 2011 (see Table 1 below). New HIV infections have decreased

globally (adults by 8%; children by 47%) however HIV remains a public health concern (Avert, 2016).

Table 1

HIV positive cases (selected years) from 1987-2011

Year	Total Population	Prevalence (%)	Ratio-male/female
1987	72,370	0.02	10:2
1992	70,970	3.1	18:4
1997	70,753	2.8	15:5
2002	69,824	2.3	13:3
2005	70,627	2.1	8:7
2007	70,950	1.8	12:1
2011	71,718	2.1	9:6

Source- (UNAIDS Report, 2012).

The most at risk populations identified in the UNAIDS report include men who have sex with men (MSM), prison inmates, sex workers, young people (15-24) and the indigenous (Kalinago) population. Public health programs should focus on preventing transmission of the virus. Research regarding factors influencing VHTC service utilization in Dominica is critical to promote strategies to encourage testing.

Government's Response to HIV/AIDS in Dominica

The government has shown commitment to the sustenance of HIV/AIDS management in Dominica. Prevention efforts are on-going through the scaling-up of VHTC and addition of rapid testing sites in the districts (UNAIDS, 2015). This is done through partnerships with non-governmental organization (NGO) agencies (Bhuwanee,

Conklin, & Sanders, 2014). These agencies include Dominica Planned Parenthood Association, Dominica Red cross, and National Youth Council, civil society organizations like the service clubs and Faith Based Organizations, and private diagnostic facility.

The Strategic Plan was developed during a series of participatory stakeholder workshops in 2014 as a method utilized to focus on the 90/90/90 UNAIDS target in Dominica. Challenges identified with the epidemic include low HIV testing rates, care and treatment for people living with HIV/AIDS, stigma and discrimination of target groups, and surveillance. These issues have been addressed in Dominica's National HIV and AIDS Strategic Plan 2015-2019. Objectives of the Strategic Plan relate to prevention, treatment and care, HIV/AIDS policy and sustaining HIV/AIDS response. The government is committed to achieve the UNAIDS target of 90/90/90 in response to HIV/AIDS.

The government subsidizes funds for HIV/AIDS prevention programs. For example, in 2011/2012 a sum of US$14958.59 was contributed for HIV/AIDS prevention programs (UNAIDS, 2015). The government consults with other external funding sources from internal and external sources for assistance to implement HIV/AIDS prevention programs. A total of approximately US$880,380.74 was sourced from external agencies for the period 2010-2011. The organizations below provided funds to Dominica's government to address the HIV/AIDS prevention program:

- PAN American Health Organization-US$28,122.40

- Centers for Disease Control and Prevention–US$150,000.00
- Dominica Social Security –US$11,235.95
- Government Contribution –US$149,58.59
- Other Private Sector and NGO-US$1310.00

In 2001, the Prevention of Mother-to-Child (PMTC) programme was established with the aim to reduce mother-to-child transmission of HIV in Dominica. This program is coordinated by the NHARP and Health Information Unit (HIU). Prevention of Mother-to-Child transmission is done through primary prevention of HIV among prospective parents, prevention of unwanted pregnancies among HIV infected women, and prevention of HIV transmission from HIV infected women to their infants. Before 2011, there were approximately 16 exposed infants to HIV infection due to mother-to-child exposure; afterwards, no new cases have been reported, making the programme 100% successful in its prevention (UNAIDS, 2015). The country is progressing towards achievement of elimination of HIV transmission from mother to child.

Monitoring and Evaluation (M&E) have been assigned to the NHARP and the HIU. Challenges with data collection have been one of the major identified problems. Training of data collection officers was identified as one of the remedial actions. Training for key stakeholders and health care providers has shown great improvement in the approach to M&E (NHARP, 2015). The HIV data collection and reporting is done on a national basis. Presently, data collection is undertaken within 13 sites on the island.

Factors associated with VHTC

The burden of HIV/AIDS is unequally distributed among the Caribbean population (Andrews, 2011). Most HIV infections occur among males 15 years and over in urban populations of African American descents well as among the individuals with high risky behaviors such as MSM**.** Several studies conducted in United States and South Africa respectively has identified factors that may influence individual's VHTC behaviours (Walter et al., 2016; Naidoo & Taylor, 2015). These factors include age, gender, ethnicity, religion, income, geographical location, education level, employment status, sexual risk exposure factors. Walter et al. (2016) examined some of these factors and concluded that these factors should be explored collectively to make meaningful comparisons. However, very few studies were located that include factors related to VHTC among the Caribbean population. Review of literature revealed no research done regarding VHTC among the Dominican population (Andrews, 2011; Elisburg, n.d.).

Age and VHTC

The most affected HIV/AIDS infection age group, ranges from 25-49 years (UNAIDS, 2015). Assessment of individuals' age is critical for identifying interventions tailored to specific age groups. Van Handel et al. (2016) have identified differences in results regarding HIV testing among age groups. These researchers compared VHTC practices between high school students (grades 9 through 12) and young people (aged 18 to 24) in the 50 states and the District of Columbia. The researchers found that young people were less likely than adolescents to get tested. Similarly, UNAIDS reported that in

2014, most of those tested for HIV in Dominica were females within the age group of 20 to 24 years. From these reports, increased VHTC has been observed among the females in the older age group 50 years and over. These findings are contrary to what Ford, Godette, Mulatu, and Gaines (2015) found within the older population in the US when conducted VHTC analysis using the Behavioural Risk Factor Surveillance System (BRFSS). Even though older people are more likely to seek medical attention compared to younger adults worldwide (Institute of Medicine (US) Committee on the Future Health Care Workforce for Older Americans, 2008), findings from Ford, Godette, Mulatu, and Gaines suggested that older US adults had unsustainably low testing habits compared to the Dominica older adult population.

This practice is contrary to that of the older population in the United States among who Ford, Godette, Mulatu, and Gaines (2015) conducted VHTC analysis using the BRFSS. In 2006 CDC recommended routine opt-out testing for all those 13-64 years old (CDC, 2006). However, Ford, Godette, Mulatu, and Gaines claimed that older adults in the United States had unsustainably low testing habits.

Adekeye, Heiman, Onyeabor, and Hyacinth (2012) also found that older populations do not see themselves at risk and therefore are more likely to have VHTC only during routine medical examinations. Since the researchers recommended that VHTC protocols expand to the much older population in the United States, similar recommendation may be made for the Dominican population but lack empirical evidence.

Assessment of VHTC habits will provide evidence for further research about VHTC by age.

Gender and VHTC

In Dominica, males more than females (2.5:1) are most affected with HIV/AIDS however; the practice of VHTC in Dominica is dominated by the female population (2:1) (UNAIDS, 2015). There is no documented rationale for this situation in Dominica however; similar findings were revealed among other populations such as the youths in Baltimore, Maryland (Decker et al., 2014). The researchers assessed gender influence on past year's VHTC and individual-and partner-level factors among heterosexually experienced youth (15-24 years). Findings revealed that while over half of the population engaged in past year VHTC, most of those tested were females (69.4% women vs. 49.6%, $p = 0.005$).

Even though more females seek testing services compared to males, it is recommended that males as well as females should be engaged in education interventions to prevent the spread of HIV infection (Singh, Luseno, & Haney, 2013; DiCarlo et al., 2014). These researchers claim that some women are not enthused about communicating HIV information to men and these men were hesitant to engage in HIV testing. However, little is known about HIV testing behaviours and HIV communication preferences of males and females in Dominica. Only three studies were identified that made references to the knowledge of HIV among Dominican population. Elisburg (n.d.) cited the work of Sorhaindo (1992) as well as Caribbean Epidemiology Centre (1994) who associated HIV

knowledge with behaviour regarding decision-making. Elisburg built on former studies to establish knowledge and attitudes regarding HIV/STDs and contraception in Dominica. Results revealed that knowledge regarding HIV is generally high (90%). It was therefore difficult to make a comparison between HIV knowledge levels of men versus women.

Geographic locations and VHTC

According to the CIA (2017), in 2015 the urban region was more populated than the rural areas in Dominica (69.5% of the total population). Studies have indicated that quality care to infected individuals is hampered by inequalities in VHTC at various geographic regions (Ohl & Perencevich, 2011; Sutton et al., 2011). Further research by Trepka et al. (2014) assessed individual-level demographic and community-level socioeconomic and health care resource factors associated with late diagnosis of HIV in rural and urban areas in Florida. Researchers found that rural participants especially men in older age groups were more likely than urban respondents to experience late HIV diagnosis (i.e. later than three months). Similarly, Ohl and Perencevich (2011) used the BRFSS to conduct a study among urban and rural populations in the United States to assess frequencies of HIV testing. These researchers found that people in the most remote rural areas were substantially less likely than persons in the most urban areas to report HIV testing in the past year (odds ratio 0.65, 95%, *CI* 0.57-0.75). Review of the UNAIDS (2015) report indicated that vulnerable groups for HIV infection in Dominica include men who have unprotected sex with other men, sex workers, youth 15-24 years and prisoners. I will seek to determine the geographical locations more likely to use VHTC

services. This data will guide planning for appropriate resource allocation to support prevention programs.

Ethnicity and VHTC

Central Intelligence Agency (2017) reported 86.8% blacks in the Dominican population. This is followed by 8.9% of the population mixed, 2.9% of Carib descent, 0.8% White and 0.7% other. The literature search revealed no study conducted that compared VHTC among ethnic groups in Dominica however other studies have shown disparities in VHTC among ethnic populations in the United States, Africans and Caribbean Black women in Canada (Sutton et al., 2011; Murray & Oraka, 2014; Logie, Jenkinson, Earnshaw, Tharao, & Loutfy, 2016). Per Murray and Oraka (2014), HIV testing behaviour was highest among non-Hispanic white (80.7%). As for Non-Hispanic Asians (71.2%), they do not perceive themselves to be susceptible to HIV, compared to non-Hispanic blacks (95%) and Hispanics (95%) that are willing to relish the benefit of VHTC.

Taylor, Hembling, and Bertrand (2015) sought to test a conceptual model of the pathways linking HIV-related stigma, racial discrimination, housing insecurity, and well-being (depression, social support, self-rated health) among males and females (15-59 years old) in Guatemala. Researchers found that ethnicity did not serve as a facilitator to risk exposure to HIV neither did HIV knowledge among that specific group. Also, researchers raised concerns about HIV knowledge and testing among indigenous groups.

In this study I sought to identify disparities in VHTC among the different population sectors in Dominica.

Education level and VHTC

In a research conducted by Naidoo and Taylor (2015) among college male and female youths in the South African districts of Ugu and eThekwini, education level played a significant role in HIV knowledge. These researchers encouraged education intervention to enhance VHTC especially among males as early as during their high school years since most of those more likely to have been tested for HIV were females (*n* = 1,137; *OR*: 44.90; 95%, *CI*: 7.77-259.38).

Researchers support claims that education level is a dominant feature in health care access including VHTC (Onyeabor et al., 2013; Dennison, Wu, &, Ickes, 2013). Similarly, Singh, Luseno, and Haney (2013) enforced the significance of assessing gender equality and education as interventions to promote VHTC in Africa. Researchers' findings cemented the fact that education and gender equality must be considered in planning interventions for VHTC among males and females. Since most Dominicans (about 89%) complete at least primary level education, they should be equipped with the capability of possessing adequate HIV knowledge and basic communication skills to prevent HIV (CIA, 2017). It was not certain to what extent education level influences Dominican males and females decision to get tested.

Employment and VHTC

Infection from HIV is preventable and can affect workplace productivity of those infected and affected. The age group most affected by HIV/AIDS in Dominica includes adults 25-49 years old (UNAIDS, 2015). This is the most economically productive group in the country and it is critical that their health remain at its optimum. Strategies to create prevention interventions in the workplace are critical to protect employees and their families. Some employees such as commercial sex workers and health care workers are at higher risk for HIV infection than others (Meyer-Rath et al., 2015; Njau, et al., 2014; Ostermann et al., 2015). However Kirakoya-Samadoulougou et al (2013) claimed that VHTC was low while risky sexual behaviours was high among certain groups of health care workers in Burkina Faso, West Africa. Sex workers for example are among the vulnerable Dominican populations at high risk for HIV infection (UNAIDS). HIV education in the workplace can be developed to prevent transmission of the virus.

Researchers claim that tailoring services based on clients' employment status can improve VHTC (Batra et al., 2016; Mataboge et al., 2014). For example, the VHTC preferences of female bar workers and male mountain porters identified as two important high-risk groups in the Kilimanjaro Region of Tanzania were assessed by Ostermann et al., 2015). Direct assessments and the Discrete Choice Experiment (DCE) data revealed significant differences in locations for HIV testing and confidentiality between the groups. Bar workers were less likely to prefer home testing and were more concerned about disclosure issues when compared with community colleagues. Regarding male

porters, preferences were to do HIV test where treatment was readily available. Meyer-Rath et al. (2015) claimed that implementation of universal VHTC at workplaces in countries with high HIV prevalence would enhance VHTC. This research can substantiate education intervention at workplaces regarding HIV/AIDS and VHTC.

While employed individuals can benefit from workplace policy for HIV prevention, the unemployed can benefit from onsite education and testing programs. In 2007 the England Department of Health recommended changes to the pre-employment health screening for health care workers (Salkeld, & McGeehan, 2010). This was done as a protective measure for patients against contracting major communicable diseases from health care professionals. However, this was met with much scrutiny by researchers. According to these writers, the policy included only new employees and eliminates those already employed who may have been infected before. The ethical dilemmas of workplace policies regarding HIV has been a debatable issue for a long time. Njau et al. (2014) conducted qualitative research to identify factors that influence whether and where people test for HIV. These factors included quality of tests, confidentiality, and accessibility of this service. However, the study was limited to only urban participants who were likely to have more HIV testing options than the rural population. Assessing whether employed individuals are more likely to get tested for HIV as opposed to those unemployed is vital in understanding the HIV testing behaviours of the most economically productive groups in the country. This research may provide data to support the design of prevention programs.

Sexual Risk Exposure and VHTC

The review of literature did not reveal any study regarding the influence of risk exposure factors on VHTC among the population of Dominica. Other studies (Walter, Lundgren, Umez-Eronini, and Ritter (2015) as well as Hutton et al. (2013) have revealed that factors such as sexual practices, multiple sexual partners, and alcohol/substance abuse are among features that may impact VHTC among special groups. However, Walter et al. (2016) revealed that no one factor is responsible for influencing VHTC. For instance, Knussen, Flowers, and McDaid (2014) claimed that in comparison to the variable age, Unprotected Anal Intercourse (UAI) did not influence VHTC among MSM in Scotland. These researchers identified the need to explore other factors such as alcohol/substance abuse, multiple sexual partners, employment status, and education levels to identify reasons for fear of testing. Similarly, Pham et al. (2015) conducted a study among Vietnamese MSM and found that injecting drug use was significantly associated with having sexual partners who also inject drugs however; alcohol use and multiple sexual relations were also identified among those who perceive themselves at low risk for HIV infection. This group was less likely to engage in VHTC. Moreover, Walter et al. (2016) claimed that while drug use is associated with increased sexual risk behaviors, reductions in drug use alone is not responsible for the reduction in HIV risk behaviors but is influenced by several other risk exposure factors.The issue with most of the studies involving risk exposure factors is the sampling method for data collection.

Researchers concluded that readers should exercise prudence during interpretation of the findings due to the purposive sampling techniques used. My study associated multiple factors with VHTC. The full complement of the secondary data except those that did not meet the inclusion criteria was used to improve validity of the study.

Definitions of Terms

Adult: An adult is a person older than 19 years of age unless national law defines a person as being an adult at an earlier age (World Health Organization (WHO), 2017). For the purpose of this study an adult was defined as a person 18 years of age or older.

Acquired Immune Deficiency Syndrome (AIDS): Acquired immunodeficiency syndrome caused by the HIV virus (AIDS): a set of symptoms and illnesses that occur at the very final stage of HIV infection. It is diagnosed when a person's immune system is almost entirely destroyed, and too weak to fight off infections (AVERT, 2017).

Age group: Years of life during January to December 2016 as characterized by 18–24, 25–44, 45–64, and ≥65 (CDC, 2015).

Geographical location: The physical address or health district as indicated by participant. This was categorized by the researcher based on Dominica's seven Health districts.

Human immunodeficiency virus (HIV): HIV is a virus that causes AIDS. HIV is a STI that can also be spread by contact with infected blood, or from mother to child during pregnancy, childbirth or breast-feeding (WHO, 2017).

Risk exposure factors (behaviours): Factors that can place people at risk for HIV/AIDS (CDC, 2015). In this study risk exposure factors will be described mainly as having sexual relations in various forms. This include bisexual (males or females having had sexual intercourse with both male and female partners or homosexuals (males having had sexual intercourse with males and females having had sexual intercourse with females, multiple partners, engagement in intergenerational sex, and engagement in transactional sex, sex with persons with other STIs, sex with sex workers, exchanged sex for money, had sex with persons who used non-prescription injected drugs, had multiple sexual partners, had sex with a partner who had multiple sexual partners, sex under the influence of alcohol, marijuana and/or cocaine, and condom use.

Sexually transmitted infections (STI): Infections spread, predominantly by sexual contact (including vaginal, anal and oral sex); through non-sexual means (via blood or blood products); transmitted from mother to child during pregnancy and childbirth (WHO, 2016).

Voluntary HIV testing and counselling (VHTC): An HIV intervention that includes both voluntary pre- and post-test counselling and voluntary HIV testing (Commonwealth Regional Health Community Secretariat, 2002). Voluntary testing in this study was defined as testing at least once.

Assumptions

I assumed that individuals who engaged in VHTC during primary data collection gave honest responses to questions. I also assumed that the data collectors of the primary

survey asked questions in a non-judgemental way to encourage openness and truthful responses. It was assumed that VHTC among the Dominican population was influenced by specific factors such as employment status and education level. In addition, I assumed that the participation in VHTC among the study population was completely voluntary and participants were not forced to engage in VHTC. Furthermore, it was assumed that this secondary data source contained accurate information. I also assumed that researchers followed ethical guidelines including strictly voluntary participation of respondents without coercion to participate in the survey. In addition, that procedures and objectives of the research were explained that allowed participants to get a clear understanding of the research process.

Scope and Delimitations

I explored the factors influencing VHTC among Dominican adults 18 years old and over. I also identified the association between education level and VHTC as well as the relationship between employment status and VHTC among the participants. The comparison of age, gender, sexual risk behaviours, educational level and employment status was used to provide recommendations for HIV education plans. The literature surrounding factors influencing VHTC among the adult population in Dominica is limited. The delimitations for this study included the convenience sampling methodology used which restricts extrapolation to the general population**.** Findings will be used to plan education programs to prevent HIV transmission. This is a secondary data analysis

research study, and by this, contact with neither primary investigators nor participants was accessible.

Significance of the Study

The UNAIDS' (2015) report revealed that only 3.3% out of the total population of Dominicans 15 years and older in 2014 (est.70, 000) engaged in VHTC. This report also stated that although Dominica's men were more likely than women to be infected with HIV and they were less likely to seek VTHC. I explored several factors associated with VHTC practices among adult men and women. These factors included employment status and educational level among others and will help to boost HIV prevention strategies among the workforce. This study can fill the gap in the literature by identifying the factors related to gender, employment and education that affect VHTC uptake among adults in Dominica. The results can contribute to positive social change by providing public health professionals with the data to scale up planning and implementation of HIV education prevention and management interventions. Also, results may suggest ways for improving health services to both males and females in Dominica. This study can also contribute to positive social change by providing solutions for behavior change towards improvement of VHTC services and decrease in HIV/AIDS cases. Findings from this study will provide literature for future community-level research to promote health and well-being.

Summary

The prevalence of HIV/AIDS in Latin America and the Caribbean (0.5%) region is due to factors including deficiency in HIV/AIDS education and economic issues (UNFPA, n.d.; Avert, 2016). Thirty years have passed since the first case of HIV/AIDS infection was reported in Dominica. (UNGASS Country Progress Report: Commonwealth of Dominica, 2008). Amidst several on-going prevention interventions, education and VHTC are critical (Avert, 2016; CDC, 2016d). The socio-demographic characteristics of HIV testing among Dominica's population have not been explored in its entirety. In this study I explored the socio-demographic and employment related HIV testing factors among adult men and women in Dominica. I further examined the relationships between educational level as well as employment status and VHTC. In this chapter several areas of the study were discussed including problem statement, purpose of the study, theoretical framework, the nature of the study, assumptions, scope and delimitations, limitations and significance of the study. These areas were necessary to provide a background to identification of factors related to HIV testing practices among the Dominican population. Several concepts of the HBM (perceived susceptibility, perceived severity, perceived barriers, perceived benefits, and self-efficacy) were used as a theoretical framework. Variables are age, gender, ethnicity, geographical location, employment status, educational level, risk exposure (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the

influence of marijuana, cocaine, hallucinogens, alcohol), and VHTC. In section two the research design and data collection technique for this study will be described.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative cross-sectional study was to use correlational methods to explore the socio-demographic, employment status, and sexual risk exposure factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) influencing VHTC among adults 18 years and over in Dominica. Voluntary HIV Testing and Counselling services are rendered at public as well as private health facilities in Dominica. The office of NHARP is responsible for collecting all data from the public testing sites in Dominica and is not privy to data from private health facilities. Because the government has no control over data collected from the private health facilities; only retrospective unpublished data from selected public health care facilities was used for analysis. The NHARP's office collects completed data-gathering tools from all public testing sites for public health surveillance. This section of the proposal includes the research design and rationale, methodology (population, sampling and sampling procedures, instrumentation and operationalization of constructs, data analysis plan), threats to validity, and ethical procedures.

Research Design and Rationale

The quantitative cross-sectional research design was used to explore the variables influencing VHTC among adults 18 years and over in Dominica. I applied the

correlational method of enquiry using cross sectional data (Campbell & Stanley, 1963 as cited by Creswell, 2009). I conducted a secondary analysis of archived data from NHARP's database. The archived data was to assess differences between VHTC and age, gender, ethnicity, geographical location to determine whether they were statistically significant or not. This data was also used to assess relationships between education level and VHTC of employed and unemployed adults in Dominica. In addition, association between sexual risk exposure factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) and VHTC of those employed and unemployed was measured. Creswell (2009) described the usefulness of a quantitative study in measuring relationships between variables as well as identifying trends, attitudes, and opinions of a sample of the population. The cross-sectional research design was selected because it is less time-consuming and can describe associations between an exposure and outcome prevalence in a particular population at a set point in time (Creswell, 2009). The quantitative strategy that was used could depict trends and characteristics of VHTC among a sample of employed and unemployed people from the Dominican population of VHTC service users.

The quantitative approach was the strategy of choice for this survey. The data was analyzed using statistical methods to present findings. For RQ1 I presented a descriptive analysis of the data for all independent and dependent variables. Logistic regression

analysis was also used to compare these variables with odds of engaging in VHTC. For RQ2, RQ3 and RQ4 logistic regression analysis was used to compare differences between those that participated or did not participate in VHTC according to their covariate (employment status). For RQ4 logistic regression analysis identified sexual risk behaviours of those engaged or did not engage in VHTC based on the level of risk exposure factors. Results were presented in the form of tables and/or figures and interpreted by drawing conclusions based on findings. Because this data was collected by NHARP for national reports, there were no time and resource constraint affiliated with the design chosen. In the following sections the methodology and threats to validity will be described.

Methodology

Population

The population most affected by HIV/AIDS in Dominica included those 25 to 49 years old (UNAIDS, 2015). The target population for this study included employed and unemployed individuals 18 years old and over that resided in Dominica during the time of the survey and were involved in VHTC in 2016. This age group 18 years and older was selected because this age group is considered adults per United Nations Children's Fund (2015) definition of a child (United Nations Children's Fund (UNICEF) (n.d.). This Convention on the Rights of a Child defined child as "every human being below the age of eighteen years with the exception of laws that obtained majority in light of their own country's definition" (United Nations Children's Fund [UNICEF], n.d.). In Dominica, the

Employment of Children (Prohibition) Act stated that the minimum age for employment was 12 years (United Nations Children's Fund, 2015). Per NHARP's database, participants as young as age 15 years received VHTC services (UNAIDS). Participants aged 18 years old and over were chosen to allow for comparisons of VHTC behaviours among the employed and unemployed adults. Retrospective data collection was done from NHARP's database which comprised VHTC data collected for public health surveillance purposes.

Sampling and Sampling Procedures

Per NHARP's database, approximately 1,304 respondents 15 years and older participated in VHTC in 2016. The original data was collected using convenience sampling technique (UNAIDS, 2015). This is because most data gathering occurred during HIV testing campaigns while some data was collected from clients who visited the data gathering sites during regular clinic hours. Data collected for the purpose of VHTC were coded and stored in locked files at the respective sites before transport to the NHARP's office located in the central location within the capital of Dominica. The validity of the data can be established based on the national reports reflecting that the variables were used to measure what the study purports that would be measured (UNAIDS, 2015); UNGASS Country Progress Report Commonwealth of Dominica, 2008; USAID, 2012). The sampling frame included convenience samples of persons 15 years and over residing in Dominica in January to December 2016. This retrospective

cross-sectional study utilized national VHTC data collected at different testing sites in Dominica from January 2016 to December 2016.

Recruitment, Participation, and Data Collection

The NHARP's database comprises data collected from January to December 2016 for public health surveillance purposes and was used for my study. Data from NHARP is not stored electronically and was accessed from hard copies of files stored at the NHARP's office. The use of secondary data required permission from relevant bodies. A letter was sent to the chairman of the National Human Research Ethics Committee of the Ministry of Health to seek permission to use the data to conduct the study among the Dominican population. The letter included the research title, researcher's name and contact information, site of the research, number of subjects to be enrolled, proposed duration and summary of the study, and fair selection of subjects. Approval for the study was sought from Walden University's Institutional Review Board (IRB) prior to collecting the data. After obtaining permission from the ethics committee to use the data, I trained three assistants to go to the NHARP's office and manually select participants from the raw data from hard copies of files for my study. Permission for using the files was sought from the coordinator of the Ethics committee in Dominica. Data was de-identified for confidentiality. I did not manipulate the secondary data. An identification number was assigned to each questionnaire. In order to obtain the study sample the data was filtered to include adults 18 years and older who resided in Dominica during the time of the national survey and to ensure that the sample of participants respond to items

regarding previous VHTC (dependent variable). Data were placed on a Microsoft Excel spread sheet for convenience of screening and cleaning for errors. Data was transferred into Statistical Program for Social Sciences (SPSS) version 24.0 data file for analysis. Data were stored in a data base on a password-protected computer to ensure that I and trained data collection personnel were the only ones who had access to the data. All data will be deleted within five years or soon after the study is completed based on the NHARP's guidelines.

Sample Size and Power Analysis

The sample was selected among adults in Dominica who utilized the VHTC service in 2016. Per number of files submitted to the NHARP's office, a total of 1,099 participants utilized the VHTC service in 2016. A total of 92 participants were excluded from the survey because they were below 18 years. From the remaining 1007, about 25 participants did not respond to the outcome variable, leaving a final sample of 982 for analysis. I used G*Power Calculator (Erdfelder, Faul, & Buchner, 1996) to estimate a priori and post hoc statistical power. As I had a predetermined sample size to use for statistical analyses (n = 982), I was able to respond to how much power this sample size could provide to detect significant difference. Due to the fact that the dependent variable was a binary one (HIV screening yes/no) and there were 15 predictors, the minimum effect size (odds ratio) that can provide adequate power (> 0.80) was calculated 1.15 (Table 2 below). Also, post hoc power analysis was conducted to confirm that there was adequate statistical power.

Table 2

Z-Tests - Logistic Regression

Options: Large sample z-Test, Demidenko (2007) with var corr		
Analysis:	Compromise: Compute implied α & power	
Input:	Tail(s)	Two
	Odds ratio	1.1505376
	Pr(Y=1|X=1) H0	0.5
	β/α ratio	1
	Total sample size	982
	R^2 other X	0
	X distribution	Normal
	X parm μ	0
	X parm σ	1
Output	Critical z	1.3193975
	α err prob	0.1870363
	β err prob	0.1870363
	Power (1-β err prob)	0.8129637

Instrumentation and Operationalization of Constructs

Secondary data for this study were derived from retrospective data collected and managed by NHARP in Dominica. The instrument was developed at the Johns Hopkins/Caribbean HIV/AIDS Regional Training (CHART) sessions based on USAID Voluntary, Counselling and Testing for HIV Protocols (WHO, 2005). This VHTC questionnaire was developed by the Ministry of Health, Government of Dominica (see Appendix A). Completed forms were used for data collection to conduct a retrospective analysis that determined relationships between variables.

This tool contained three major segments (Client Information, Background, and Risk Exposure Factors). The section on client information consisted of socio-demographic data such as client's age, address, health district, ethnicity and employment

data. The background section contained data on education level, reasons for testing, when last test was done, frequency of condom use, and type of individual sexual practices. The third segment (Risk Exposure Factors) included data on whether behaviours were practiced over 12 months or ever, and whether behaviours were intentional or non-intentional. Questions for evaluating risk exposures included having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, and partner with multiple sex partners, sex under NIDU, condom use, and sex under the influence of marijuana, cocaine, hallucinogens, and alcohol).

For the purpose of my study I abstracted data on age, gender, health district, ethnicity, employment status, education level, whether the participant was ever tested for HIV, and risk exposure behaviours (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence marijuana, cocaine, hallucinogens, alcohol). Age was analysed from the question which asked participants to state their age in years; gender (male or female); ethnicity (black, white, Kalinago or other); address or by their health district. Participants were categorized based on their identification of their employment status (employed or unemployed).

Age was transformed to categorical ordinal measurement levels (1 = 18-24 years, 2 = 25-44 years, 3 = 45-64 years, and 4 = 65 years and over). Age groups were created to compare VHTC behaviours at different age levels. Age group and educational level were measured as categorical ordinal since they can be ranked (Laerd Statistics, 2013).

Gender, ethnicity, employment status, geographical location, and the dependent variable (VHTC) were used as categorical nominal variables. The variable geographical location was explored by using the item requiring the health district. If this item was left unanswered then the option for address was used to allocate the participant in the respective health district. Whereas the national questionnaire contained options for "Highest level of Education level = Primary, secondary, college or university", I collapsed this data to use only Primary, Secondary or Tertiary (Tertiary to encompass college or university). With regards to risk exposures, only responses for behaviours practiced within "12 months" was used to answer the research question. This was selected since behavioural practices within 12 months can sufficiently accomplish research objectives.

Regarding risk exposure factors, respondents' risk of HIV/AIDS was measured as a dichotomous variable (yes or no) based on their responses to the following questions:

- Sex with sex workers
- Sex with males
- Sex with females
- Transactional sex
- Vaginal sex
- Multiple sex partners
- Sex partner with multiple sex partners
- Sex under non-injected drug use (NIDU)

- Condom use
- Sex under the influence (marijuana, cocaine, hallucinogens, alcohol).

I recoded these variables to facilitate analysis. The categorization for recoding was similar to that used by Dehart and Birkimer (1997) and Koh and Yong (2013). Dehart and Birkimer developed the Sexual Risk Scale (SRS) to assess the extent of students' perception of engaging in risky behaviours. The researchers concluded that higher scores on the SRS scale implied increased likelihood of engaging in risky sexual activities including having multiple sex partners and lack of consistent condom use during sexual activity. Koh and Yong conducted a study among 423 men-who-have-sex-with-men (MSM) who utilized voluntary counselling and testing (VCT) services at a community-based center in Kuala Lumpur, Malaysia. The clients were asked to rate their risk perception which were then stratified into four groups: low risk (< 25% chance), medium risk (25–75% chance), high risk (> 75% chance). In my study, most of the risk factors were categorized as 1= present/yes or 0 = absent/no. Condom risk was classified as yes = 0 and no = 1.

The dependent variable (VHTC) identified those who ever utilized VHTC services in the past 12 months. These responses are also dichotomous (yes or no) and can be analysed based on the categorical level (Research Methods Knowledge Base, 2006). The dependent variable (VHTC) was identified by the question as indicated in the original questionnaire to document past VHTC ("when did you receive your last HIV test?"). Measurement was based on recorded date of last HIV test. This variable is

dichotomous and was coded as “yes” if participant was ever tested and “no” if respondent was never tested for HIV. People are usually identified as susceptible to HIV infection based on the utilization of VHTC services (Ostermann et al., 2015; Meyer-Rath et al., 2015; Njau, et al., 2014.

Data Collection of Secondary Data Set

The tool (Appendix A) originated from the John Hopkins/Caribbean HIV/AIDS Regional Training (CHART) and USAID Voluntary Counselling and Testing for HIV Protocols (WHO, 2013). This tool was developed by NHARP under the umbrella of the Ministry of Health in Dominica. The HIV testing tool contains the provider’s name, client information such as demographic data, background, and risk exposure factors (see Appendix A). The data were used by the ministry of health for national health surveillance.

Time Frame and Response Rates

Data collection was from archived data (coordinated by NHARP). Recruitment of participants was done by client visits to the health care facilities and HIV testing campaigns as part of World AIDS Day activities. A total population of approximately 1,099 adults engaged in VHTC during the year 2016. During that year, the total adult population of Dominica was approximately 51,161. Based on the convenience sampling method of this national survey, response rate was approximately 2%. Based on my inclusion criteria (adults surveyed by NHARP in 2016, age 18 years and over, resident of

Dominica, all reported ethnic background), a sample of 982 (89%) of all (1099) respondents were identified as part of my survey.

Discrepancies

Discrepancies in the data set included missing data from (participants' non-responses, data that were not applicable based on previous responses and non-participation of one health district in the national survey).

Missing data. Missing data in my study ranged from 0.1-24% and occurred mostly from item nonresponse. The questionnaire was anonymous and included three specific questions from which most of the missing values occurred. These questions included employment status, education level, and risk exposure factors (such as vaginal, oral, and anal sex). Based on the systematic pattern of missing values, I determined that the missing data were random. There was no relationship between the missingness and the responses. To avoid introducing bias to my findings that may lead to loss of statistical power, and in order to keep my data set, I addressed this problem by recoding and conducting multiple imputation analysis. Results were recorded and reported in the analysis.

The health districts described the participants' geographic location where VHTC was done. The original plan was to include the seven health districts based on the assumption that all health districts participated in VHTC for that year. However after receiving the data I recognised that one health district (Marigot) did not conduct VHTC for that year. As a result, I decided to exclude this health district from the analysis.

Findings from my survey reflected all health districts in Dominica except the Marigot health district.

Data that were not applicable based on previous responses. The tool developed by NHARP contained lead questions. These were followed by questions that were not applicable to some participants. For example, respondents who had no sexual partners within 12 months did not respond to follow up questions such as vaginal, oral and anal sex within 12 months. These items were recoded into "not applicable" category.

Operational Definitions of Variables

Table 3 depicts a description of the statistical analysis plan. Independent and dependent variables are listed with identification of the type of data, levels of measurement, definition, and data values.

Table 3
Operational Definitions of Variables

Variables	Data Type	Levels of Measurement	Definition	Data values/Units
Independent Variables				
Age group	Categorical	Ordinal	Years of life at time of survey	1=18-24 years 2=25-44 years 3=45-64 years 4=65 years +
Gender	Categorical	Nominal	Sex at Birth	1=Male 2=Female
Ethnicity	Categorical	Nominal	Race or Ethnicity	1=Black, 2= Kalinago 3=Other
Geographical Location/Address	Categorical	Nominal	Reported health district/ address	1=Roseau 2=Portsmouth 3=St.Joseph 4=Castle Bruce 5=La Plaine 6=Grand Bay
Educational level	Categorical	Ordinal	Reported highest level of education	1=Primary 2=Secondary 3=Tertiary
Employment status	Categorical	Nominal	Reported Employment status	1=Yes=employed 2=No=unemployed
Sexual Risk Factors	Binary Categorical	Nominal	Sex with sex workers	Yes=0 No=1
			Sex with males	Yes=1 No=0
			Sex with females	Yes=1 No=0
			Condom use	Yes=1 No=0
			Transactional sex	Yes=1 No=0
			Vaginal sex	Yes=1 No=0
			Multiple sex partners	Yes=1 No=0
			Sex partner with multiple sex partners	Yes=1 No=0
			Sex under non-injected drug use (NIDU)	Yes=1 No=0
			Sex under Injected Drug Use (IDU)	Yes=1 No=0
			Sex under the influence (marijuana, cocaine, hallucinogens, alcohol).	
Dependent Variable				
VHTC	Binary Categorical	Nominal	Adults ever screened for HIV	1=Yes 2=No

Data Analysis Plan

Collected data from the NHARP's database was inputted into the Statistical Program for Social Sciences (SPSS) version 24 to process, scrutinize, clean, and model to identify beneficial information that made implications, draw conclusions, and support decision making (Frankfort-Nachmias, & Nachmias, 2008). I organized all recoded variables into a multivariate analysis table. Chi-square analysis and logistic regression were performed.

Data Preparation and Cleaning

Archived data for this research were sourced from NHARP's database through a data use agreement process. Data were inputted into SPSS from the NHARP's database and recoded using the SPSS auto-recode function. The data included sociodemographic factors (IV-age, gender, ethnicity, geographical location, and educational level). The DV was VHTC service utilization (yes/no), and covariate (employment status-employed/unemployed). These variables were inputted as categorical and measured on a quantitative scale. The variable names were age group (1 = 18-24 years, 2 = 25-44 years, 3 = 45-64 years, and 4 = 65 years and over); gender (male = 1, female = 2); ethnicity (1 = Black, 2 = White, 3 = Kalinago, 4 = Other); geographical location (1 = Roseau, 2 = Portsmouth, 3 = St. Joseph, 4 = Castle Bruce, 5 = La Plaine, and 6 = Grand Bay); educational level (1 = primary, 2 = secondary and 3 = tertiary); employment status (1 = employed and 2 = unemployed). The DV (VHTC-1 = yes/2 = no) was considered and treated as a categorical variable and measured on a quantitative scale. Each variable was

defined by a name and added to SPSS version 24 under data view. For example, gender was placed under the name column and appeared as a string variable. Since gender is a dichotomous variable values were assigned such as 1 which represents male and 2 which represent female. The other categorical variables were dealt with in a similar way.

The recoding described in Table 3 was implemented with maximum caution. Any recoding process that was used to clean the dataset from incomplete or missing cases was consistent with the coding of Table 3. The SPSS program was used to clean the data while checking for consistency and to treat missing responses. I used SPSS to conduct descriptive statistics, produce frequency tables with the statistic for the variables and frequency for each variable. The frequency information identified missing data. I also identified extreme values that are out of range, for example number of values "unknown" and "not applicable" for sexual risk factors (such as number of sexual partners and partners having multiple sex partners). Missing and extreme values were excluded from the analysis and the final sample size of 982 has only valid data.

Research Questions and Hypotheses

Research Question 1: What is the association between sociodemographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults?

$H_0$1: There is no significant association between sociodemographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults.

H_a1: There is a significant association between socio-demographic factors (age, gender, ethnicity, geographical location) and VHTC service utilization among Dominican adults.

Research Question 2*:* What is the association between employment status and VHTC service utilization in Dominica?

$H_0 2$: There is no significant association between employment status and VHTC service utilization in Dominica.

$H_a 2$: There is a significant association between employment status and VHTC service utilization in Dominica.

Research Question 3: What is the association between education level and VHTC service utilization in Dominica?

$H_0 3$: There is no significant association between education level and VHTC service utilization in Dominica.

$H_a 3$: There is a significant association between education level and VHTC service utilization in Dominica.

Research Question 4: Are HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) associated with VHTC service utilization in Dominica?

$H_0$4: HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) are significantly associated VHTC service utilization in Dominica.

H_a4: HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) are not significantly associated with VHTC service utilization in Dominica.

Statistical analysis plan

I analysed the data using chi-square, and multivariable logistic regression. The multivariable logistic regression provided an estimation of odds of engaging in VHTC. In order to reduce the number of expected frequencies that are less than 5 some variables were pooled, recoded and Fisher's Exact test was conducted. This was done because these cells either contained expected frequencies less than 5 for the small tables or more than 20% in large tables. I used SPSS version 24 to assess how VHTC service utilization vary by age, gender, ethnicity, educational status, employment level and risk exposure factors.

Table 4

Statistical Procedures per Research Question and Hypothesis

Research Question	**Hypothesis (H_a)**	**Variables[1]**	**Statistical procedures/analysis**
RQ1: Quantitative: What is the association between socio-demographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults?	H_o: There is no significant association between socio-demographic factors (age, gender, ethnicity, and geographical location) and VHTC service utilization among Dominican adults.	IV: Age, gender, ethnicity, geographical location. DV: VHTC service utilization.	Descriptive statistics: Frequencies and chi-square analysis for all categorical variables. Inferential statistics: Binomial logistic regression- age, gender, ethnicity, geographical location vs. VHTC service utilization.
RQ2: Quantitative: What is the association between employment status and VHTC service utilization in Dominica?	H_o: There is no significant association between employment status and VHTC service utilization in Dominica.	IV: Employment status DV: VHTC service utilization.	Descriptive statistics: Frequencies, percentages, Chi square analysis for categorical variables. Inferential statistics: Binomial logistic regression: employment status vs VHTC service utilization.
RQ3: Quantitative: What is the association between education level and VHTC service utilization in Dominica?	H_o: There is no significant association between education level and VHTC service utilization in Dominica..	IV: Education level DV: VHTC service utilization	Descriptive statistics: Frequencies, percentages, Chi square analysis for categorical variables. Inferential statistics: Binomial Logistic Regression-education level vs VHTC service utilization.
RQ4: Quantitative: Are HIV sexual risk exposure factors associated with VHTC service utilization in Dominica?	H_o: HIV sexual risk exposure factors are not significantly associated with VHTC service utilization in Dominica.	IV: HIV sexual risk exposure factors (list the factors such as having sex with sex workers, sex with STI partner, ever had STI, condom use, transactional sex, engagement in sex act [vaginal, anal and/or oral] , multiple sex partners, sex partner with multiple sex partners, sex under non-injected drug use (NIDU), sex under injected drug use (IDU), sex under the influence ([marijuana, cocaine, hallucinogens, alcohol])). DV: VHTC service utilization	Chi square Inferential statistics: Binomial Logistic Regression-multiple HIV sexual risk exposure factors vs. VHTC service utilization

[1]variables with binary (e.g. yes/no) and ordinal (e.g., primary, secondary, tertiary) outcome will be managed as categorical variables.

Descriptive Statistical Analysis. Descriptive statistics were used to characterise independent variables (age, gender, ethnicity, geographical location/health district, educational level, employment status, and sexual risk exposure factors such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) and dependent variable (VHTC) (See Table 5). Frequency and percentage were calculated for all categorical variables to examine the characteristics of the study sample. Data were presented as a table.

Nonparametric tests such as chi-square statistical tests are ideal for measuring nominal and ordinal data (Frankfort-Nachmias, & Nachmias, 2008). Chi-square test was used since all main assumptions were met. These assumptions included: 1) observations were independent (i.e. observations were not related to each other) and 2) expected frequencies in each cell were greater than 5. An alpha level of 0.05 and the two-tailed directional hypothesis testing were used which indicated that rejection region was on both sides of the distribution.

Chi square analysis was conducted to describe the independent and dependent variables in RQ1, RQ2, RQ3, and RQ4 because both dependent and independent variables are categorical. For RQ1, I estimated the association of socio-demographic factors (age group, gender, ethnicity, geographic location) with VHTC service utilization (dichotomous) to identify significant difference in proportions. For example are there

differences in age groups according to VHTC status (yes/no); are there differences in gender according to VHTC status (yes/no); are there ethnic differences according to VHTC status (yes/no); are there differences in geographical location according to VHTC status (yes/no)? For RQ2 the association between employment status (binary) and VHTC service utilization (binary) was assessed for differences between employment statuses according to VHTC. For RQ3, I compared the association between education levels (primary, secondary and tertiary) with VHTC service utilization (yes/no) to identify significant difference in proportions between education levels according to VHTC. In addition, I conducted a multivariable logistic regression including all IVs to assess which factors were significantly associated with VHTC service utilization among adults in Dominica. A significance level of .05 was considered. The results with $p < .05$, were identified as sufficient evidence to reject a null hypothesis.

RQ 1: What is the association between modifying factors (age group, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults?

The odds probabilities of VHTC occurring as the values of the IVs change were examined by chi-square analysis. I conducted chi-square analysis for each variable to answer RQ1 to determine the association of VHTC service utilization as compared to age group (1 = 18-24 years, 2 = 25-34 years, 3 = 35-44 years, 4 = 45-64 years, and 5 = 65+ years), gender (1 = male/2 = female), ethnicity (1 = Black, 2 = Kalinago, 3 = Other), and geographic location (1 = Roseau, 2 = Portsmouth, 3 = St. Joseph, 4 = Castle Bruce, 5 = La Plaine, and 6 = Grand Bay.

Chi square analysis was conducted among age group, gender, geographical location, ethnicity and VHTC. Multivariable-adjusted logistic regression analysis was done to know which aspects of socio-demographic factors are associated with VHTC, controlled for HIV risk factors.

RQ 2: What is the association between employment status and VHTC service utilization in Dominica?

Chi-square test for independence was used to calculate the difference between observed and expected frequencies. I used SPSS crosstabs to analyse differences in employment status and VHTC. This measurement indicated if there is a relationship between employment status and VHTC. In order to determine which aspects of the measurements had an association and/or the relative association of different areas of the intervention. I divided employment status into two groups (employed and unemployed). This was measured against VHTC to determine significant results and whether to reject or not reject the null hypothesis based on the alpha level. Results were presented in the form of APA tables. Multivariable-adjusted logistic regression analysis was done to know which aspects of employment status is associated with VHTC, controlled for age, gender, ethnicity, geographic location, education, and HIV risk factors.

RQ 3: What is the association between education level and VHTC service utilization in Dominica?

Since both variables were categorical, I used chi-square to calculate the difference between observed and expected frequencies. I used SPSS crosstabs to analyse this

situation by assessing if differences exist between educational levels (primary, secondary and tertiary level education) and VHTC. Results of the Chi square analysis determined the level of differences between each group. This depicted the 95% confidence, point estimates (OR), and level of significance and determined whether there is significant association between education level and VHTC service utilization in Dominica. Multivariable-adjusted logistic regression analysis was done to know which aspects of education level is associated with VHTC, controlled for age, gender, ethnicity, geographic location, employment status, and HIV risk factors.

RQ 4: Are HIV sexual risk exposure factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) positively associated with VHTC service utilization in Dominica?

This research question measures nominal variables. The Chi Square Test of independence was used to determine this relationship. I analysed this situation by assessing if differences exist by the sexual risk exposure factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, sex under the influence of marijuana, cocaine, hallucinogens, alcohol). Chi square test was conducted to describe associations between each group of sexual risk exposure factor and VHTC.

Multivariable-adjusted logistic regression analysis was done to know which aspects of sexual risk exposure factors is associated with VHTC, controlled for age, gender, ethnicity, geographic location, and education.

Inferential statistical analyses. Inferential analysis can be used in statistics to make decisions or inferences of an event, phenomena, or population, by interpreting the results of the data and determining the true nature of the description (Creswell, 2009). Pearson's chi-square tests were applied as the primary bivariate analyses performed for RQ1, RQ2 RQ3, and RQ4. Multivariate adjusted logistic regression was used to estimate odds to make inferences regarding VHTC service utilization. SPSS software was used to compare those who use VHTC service to those who had no VHTC service, to derive odds ratios for the odds of using VHTC services. I used the multivariate adjusted logistic regression, adjusting for age, gender, ethnicity, geographic location, employment status, educational level and risk exposure factors (such as having sex with sex workers, transactional sex, engagement in sex act [vaginal, anal and/or oral], multiple sex partners, partner with multiple sex partners, sex under NIDU, sex under injected drug use (IDU), sex under the influence of marijuana, cocaine, hallucinogens, alcohol).

Threats to Validity

The instrument for this research was the questionnaire developed by the Ministry of Health (MOH). The data from this questionnaire was used to answer my research questions. Permission was sought from the National Human Research Ethics Committee of the Ministry of Health to use the data for my study. The two types of threats to validity

that can arise in a study are internal threat and external threat to validity (Creswell, 2009). Internal validity is threatened when a researcher may draw inaccurate conclusions from the data due to inadequate statistical power or violate statistical assumptions (statistical conclusion validity) (Creswell, 2009). To avoid this type of threat to validity the correct instrument was used with minimal adjustments as described in the above section on (Instrumentation and Operationalization of Constructs).

External validity regards how the researcher is able to apply the research findings to the wider population within the same settings, context and situations (Glanz, Rimer, & Viswanath, 2015). This study was limited to individuals within the same geographical location of the study sample. All participants of this study were residents of Dominica and therefore no other individuals were used as comparisons to this sample. The findings of this study can only be extrapolated to the Dominican population with limited external validity due to convenience sampling methods used. Most recent data were used to conduct my study. The use of this surveillance nationally represented data supports collection of data in a realistic setting however because the convenience sampling method was used and the participants were selected on a voluntary basis, external validity was impacted (UNAIDS, 2015). In addition, the number of missing counts from non-response can also affect validity. .

Reliability of this instrument was ascertained by its repeated use among the population (Kimberlin, Winterstein, 2008). According to Frankfort-Nachmias & Nachmias (2008) reliability is the ability of the measuring instrument to have consistent errors every time it

is tested. Prior to approval for national health surveillance the same questionnaire was tested and reviewed for consistency in errors by government officials and other stakeholders and endorsed by the Minister of health in the Ministry of Health (UNAIDS, 2008). This questionnaire has been administered multiple times to collect national surveillance data and consistently measures same variables however validity of results was impacted due to missing responses throughout the instrument. These missing and extreme values were excluded from the analysis. Also, based on these assessments, the findings of my study are limited to the Dominican population.

Ethical Procedures

Ethical concerns regarding this study involved protection of study participants. The data were de-identified to protect the privacy of clients so that reports or publication will not identify participants by name or initials. I applied to the Walden University Institutional Review Board (IRB) to seek permission to analyse the data before the study was conducted. The study was approved by Walden University's IRB (No: 12-22-17-0485130). This study was conducted in compliance with Walden University's ethical standards. A copy of the certificate of training from the National Institute of Health was submitted to Walden University. In addition, a letter was addressed to the chairman of the National Human Research Ethics Committee of the Ministry of Health to seek permission to use the retrospective data to conduct this study. Data were stored in a data base on a password protected computer and will be deleted 5 years after completing the study.

Summary

In this section I outlined the procedure for a quantitative secondary analysis of archived data using the NHARP's VHTC database. The goal of this quantitative study was to explore the association between the socio-demographic and sexual risk behaviour factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) influencing VHTC among male and female adults 18 years and over residing in Dominica in 2016. The purposive sampling technique was used selecting all the study participants from NHARP's database that met my inclusion criteria. Retrospective data from the database measured demographic characteristics and sexual risk exposure factors. The SPSS for windows version 24 was used for data analysis. Descriptive statistics, chi square, and logistic regression analysis were used for data analysis. Ethical approval for this study was obtained from the Walden University Institutional Review Board (IRB) and the National Human Research Ethics Committee of the Ministry of Health. Individual and societal benefits were explained in the final section on implications for social change. The next section describes the presentation of findings of my study. This is presented in the results of the study as shown in section 3.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative cross-sectional study was to explore the socio-demographic and sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) influencing VHTC among adults 18 years and over in Dominica. The null hypothesis stated that no significant association existed between socio-demographic and sexual risk exposure factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) and VHTC service utilization in Dominica. The alternate hypothesis stated significant association existed between these factors and VHTC service utilization in Dominica. In Section 3 I will discuss the results of statistical analysis using chi square and logistic regression, and will present a summary of the results discussed in this section.

Results

Descriptive Demographic Characteristics of the Sample

From a sample of 982 participants, approximately 708 (72%) adults reported to have engaged in VHTC in the past (as shown in Figure 3). This sample represented 1.9% of the total adult population of Dominica in 2016.

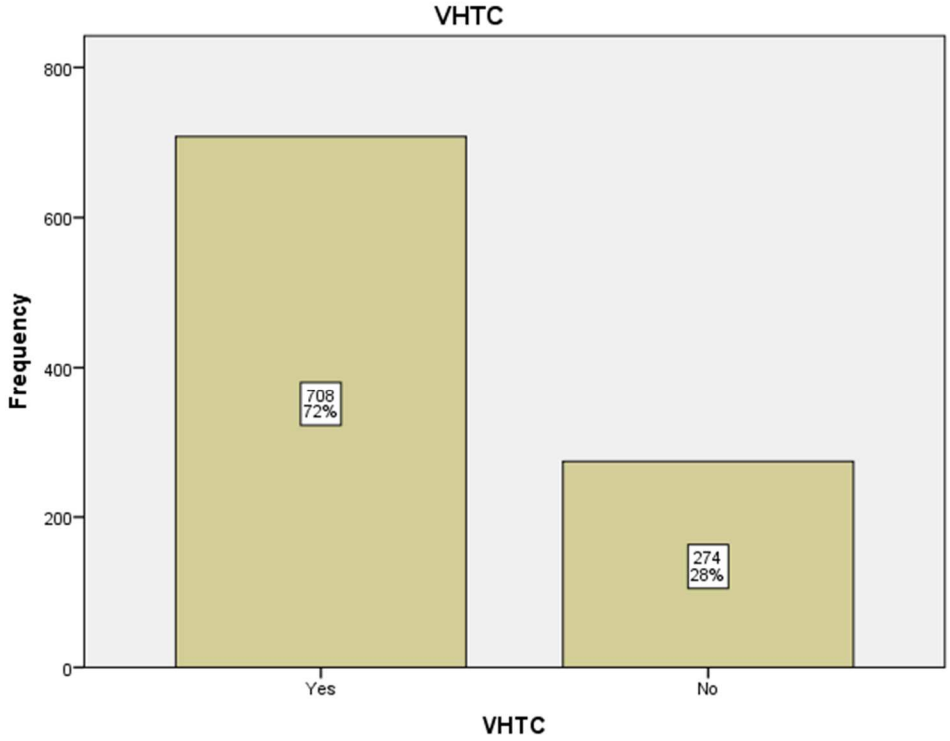

Figure 2. Distribution of participants engaged in VHTC in Dominica in 2016.

Among the 1,099 respondents who participated in the NHARP survey in 2016, a total of 92 did not meet the inclusion criteria therefore they were excluded from the survey. Out of the remaining 1,007, only 982 (97.5%) responded to the question, "When did you receive your last HIV test?" The final sample for my survey was 982 participants. Table 5 presents results of basic univariate analysis of participants who engaged in HIV screening in 2016. The sociodemographic variables included age group, gender, ethnicity, health district (geographical location), employment status, and educational level and the dependent variable (VHTC). Missing data ranged from 0.1-1%.

Most (49%) of the respondents were from the age group 25-44 years and least participants were from the older age group 65 years and over. The female gender (60%) dominated the respondents. The majority of respondents (37%) came from the Roseau district. Most participants from the survey (84%) were black. More than half (72%) of the respondents had engaged in VHTC in 2016. The sample included 982 respondents 394 (40%) were males and 588 (60%) were females.

Descriptive statistics in Table 5 depicts that the majority (688, 70%) of the respondents were employed. Secondary education (389/40%) was the most common education level among participants. The sample included 285 (29%) respondents whose highest education was primary level, and 308 (31%) were the tertiary level.

Table 5

Univariate Characteristics of HIV Screening among adults, 2016

Variables	Characteristics	Frequency	%
Age group	1=18-24	280	28.5
	2=25-44	484	49.3
	3=45-64	183	18.6
	4=65+	35	3.6
	Total	982	100
Gender	1=Male	394	40.1
	2=Female	588	59.9
	Total	982	100
Geographical location	1=Roseau	364	37.1
	2=Portsmouth	113	11.5
	3= St. Joseph	76	7.7
	4=Castle Bruce	203	20.7
	5=La Plaine	100	10.2
	6=Grand Bay	126	12.8
	Total	982	100.0
Ethnicity	1=Black	828	84.3
	2=Kalinago	84	8.5
	3= Other	60	7.2
	Total	982	100
Employment	1=Employed	688	70.1
	2=Unemployed	294	29.9
	Total	982	100
Education level	1=Primary	285.2	29
	2=Secondary	389.2	39.6
	3=Tertiary	307.6	31.4
	Total	982	100
VHTC	Yes	708	72.1
	No	274	27.9
	Total	982	100

A total number of 982 participants responded to the dependent variable (VHTC); however missing data for the sexual risk exposure variables ranged from 0.1-5% except for one variable (Sex partner with multiple sex partners) that had missing data of 24%. Most of the responses in the dataset were yes or no. Few other responses were unknown, not applicable and none. Only the "Yes" and "No" responses were included in the analysis of my data. Table 6 depicts descriptive statistics for sexual risk exposures (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol).

Responses for sex with sex workers were 965/98% (No = 895/91%), sex with males 982/100% (No = 383/39%), sex with females 980/99.8% (No = 569/58%), transactional sex 971/99% (No = 903/92%), sex with HIV positive persons 978/94% (No = 885/90%), anal sex 929/95% (No = 895/91%), oral sex 968/97% (No = 470/48%), engagement in vaginal sex 968/99% (No = 71/7%), multiple sex partners 964/98% (No = 746/76%), sex partner with multiple sex partners 746/76% (No = 473/38%), sex under NIDU 982/100% (No = 843/85%), sex under IDU 982/100% (No = 921/94%), condom use 982/100% (No = 147/15%), sex under the influence of marijuana, cocaine, hallucinogens, alcohol) 982/100% (No = 740/75%).

Table 6
Univariate Characteristics of HIV Screening by Sexual Risk Exposure

Variable Sexual Risk Exposures	Characteristics	Frequency	%
Sex with sex workers	Yes=1	70	7.1
	No=0	895	91.1
	Total	965	98.2
Sex with males	Yes=1	599	61
	No=0	383	39
	Total	982	100
Sex with females	Yes=1	411	41.9
	No=0	569	57.9
	Total	980	99.8
Transactional sex	Yes=1	68	6.9
	No=0	903	92
	Total	971	98.9
Condom use	Yes=1	834.4	85
	No=0	147.6	15
	Total	982	100
Sex with HIV positive persons	Yes=1	43	4
	No=0	885	90
	Total	978	94
Anal sex	Yes=1	34	4
	No=0	895	91
	Total	929	95
Oral sex	Yes=1	477	49
	No=0	470	48
	Total	968	97
Engagement in vaginal sex	Yes=1	897	91.3
	No=0	71	7.2
	Total	968	98.5
Multiple sex partners	Yes=1	218	22
	No=0	746	76
	Total	964	98

(table continues)

Variable Sexual Risk Exposures	Characteristics	Frequency	%
Sex partner with multiple sex partners	Yes=1	273	27.8
	No=0	473	48.2
	Total	746	76
Sex under Injected Drug Use (IDU)	Yes=1	60.8	6.1
	No=0	921.2	93.9
	Total	982	100
Sex under the influence (marijuana, cocaine,	Yes=1	242.2	24.6
	No=0	739.8	75.4
hallucinogens, alcohol).	Total	982	100

Chi square analysis and unadjusted odds ratios were conducted for all categorical independent socio-demographic variables (age, gender, ethnicity, health district/geographical location).

As can be seen by the frequencies cross tabulated in Table 7, there is a statistical significant relationship between the socio-demographic factors and VHTC. Age group versus VHTC revealed x^2 (3, N = 982) = 85.81, p < .0001. The 25-44 years old age group tends to be most engaged with VHTC as compared to the other age groups. The female versus male gender was statistically significantly different (x^2 (2, N = 980) = 64.78, p < .0001) regarding VHTC (Table 7). Females were more likely to engage in VHTC than males. The relation between ethnicity and VHTC was statistically significant (x^2 (2, N = 980) = 7.652, p = .022 (Table 7). Ethnicity was likely to affect participation in VHTC which was more pronounced among the Black ethnic group. As shown in Table 7, there is a statistically significant relationship between health district and engagement in VHTC,

x^2 (5, N = 982) = 51.86, p < .0001. Participants who engaged in VHTC differed by geographical location/health district. Respondents from the main health district in the capital (Roseau) were more frequently engaged in VHTC.

In Table 7 the Chi square analysis depicts that VHTC was statistically significantly influenced by employment status x^2 (1, N = 982) = 7.791, p = .005. Those who were employed were more likely to engage in VHTC as compared to the unemployed group. Those who participated in VHTC in 2016 differed by educational level. Participants with secondary level education were most likely to engage in VHTC in relation to primary and tertiary levels. These frequencies were statistically significant, x^2 (2, N = 982) = 16.66, p < .0001.

Table 7

Bivariate Characteristics of VHTC Among Adults, 2016

Characteristics		VHTC (*n*) %	No VHTC (*n*) %	x^2	*p*	*Unadjusted Odds Ratio*
Age group	18-24	(169) 24%	(111) 40%			2.26
	25-44	(407) 57 %	(77) 28%			3.32
	45-64	(121) 17%	(62) 23%			1.15
	65+	(11) 2%	(24) 9%			Ref.
	Totals	(708) 100%	(274) 100%	85.819	<.0001	
Gender	Male	(227) 32%	(165) 60%			0.849
	Female	(479) 68%	(109) 40%			Ref.
	Totals	(706) 100%	(274) 100 %	64.786	<.0001	
Ethnicity	Black	(583) 82%	(245) 89%			Ref.
	Kalinago	(67) 9.5%	(17) 6%			0.953
	Other	(58) 8.5%	(12) 5%			0.864
	Totals	(708) 100%	(274) 100 %	7.652	.022	
Geographical Location	Roseau	(288) 41%	(76) 28%			Ref.
	Portsmouth	(74) 10%	(39) 14%			0.491
	St. Joseph	(55) 8%	(21) 8%			0.518
	Castle Bruce	(157) 22%	(46) 17%			0.854
	La Plaine	(74) 10%	(26) 9%			0.734
	Grand Bay	(60) 9%	(66) 24%			0.255
	Totals	(708) 100%	(274)100%	51.866	<.0001	
Employment Status	Yes	514 (72%)	174 (63%)			1.13
	No	194 (28%)	100 (37%)			Ref.
	Total	708 (100%)	274 (100%)	7.791	0.005	
Education Level	Primary	180.2 (25%)	105 (38.3%)			0.840
	Secondary	289.8 (41%)	99.4 (36.4%)			0.490
	Tertiary	238 (34%)	69.6 (25.3%)			Ref.
	Total	708 (100%)	274 (100%)	16.668	.0001	

There were statistically significant ($p < 0.05$) associations between VHTC and several risk exposure variables as shown in Table 8. The risk exposure variables that were statistically significant denote that these participants were more likely to have had

VHTC as compared to their counterparts. These subsets included "Sex with males (x^2 (1, N = 982) = 57.83), p < .001; "Sex with females (x^2 (1, N = 980) = 52.19), p < .001); Transactional sex (x^2 (1, N = 971) = 5.90), p = .022; "Engagement in vaginal sex" (x^2 (1, N = 968) = 8.25), p = .006); "Had sex with persons who used non-prescription injected drugs (NIDU)" (x^2 (1, N = 982) = 4.80), p = .038); "Had multiple sexual partners" (x^2 (1, N = 9642) = 10.27), p = .002), "Had sex with a partner who had multiple sexual partners" (x^2 (1, N = 746) = 27.11), p < .001).

The other subsets were not statistically significant which means that differences were likely due to chance and included "Sex with sex workers" (x^2 (2, N = 980) =.564), p = .488); " "Condom use" (x^2 (2, N = 982) =3.65), p =.161); "Sex with HIV positive individual" (x^2 (2, N = 979) = 2,04), p =.359); "Anal sex" (x^2 (2, N = 929) =.701), p = .402); "Oral sex" (x^2 (2, N = 947) =.891), p= .345); "Sex under Injected Drug Use" (IDU) (x^2 (2, N = 982) = .915), p =.361); "Sex under the influence (marijuana, cocaine, hallucinogens, alcohol). (x^2 (2, N = 982) = 3.23), p = .080).

Table 8

Number and Percent of study subjects ever had VHTC by Sexual Risk Exposures

Sexual Risk Exposure	VHTC (Number) %	No VHTC (Number) %	x^2	*p*	*Unadjusted Odds Ratio*
Sex with sex workers	Yes=48 (7%) No=651 (93%)	22 (8%) 244 (92%)	.564	.488	Ref. 1.14
Sex with males	Yes=484(68%) No=224 (32%)	115 (42%) 159 (58%)	57.833	.000	Ref. 0.714
Sex with females	Yes=246 (35%) No=460 (65%)	165 (60%) 109 (40%)	52.195	.000	Ref. 0.98
Transactional sex	Yes=42 (6%) No=659 (94%)	26 (10%) 244 (90%)	3.962	.05	Ref. 1.34
Sex Risk-condom use	Yes=599 (88%) No=84(12%)	215 (85%) 38 (15%)	3.651	.161	Ref: 1.05
Sex with HIV positive persons	Yes=29 (4%) No=644 (96%)	14 (5%) 241 (95%)	2.047	.359	Ref: 0.804
Anal sex	Yes=23 (3%) No=663 (97%)	11(5%) 232 (95%)	.701	.402	Ref. 0.801
Oral sex	Yes=355 (51%) No=337 (49%)	122 (48%) 133 (52%)	.891	.345	Ref. 1.54
Vaginal sex	Yes=660 (94%) No=41(6%)	237 (89%) 30 (11%)	8.256	.006	Ref. 0.625
Had sex with persons who used injected drugs (IDU)?	Yes=38 (6%) No=665 (94%)	19 (7%) 252 (93%)	.915	.361	Ref. 0.515
Had sex with persons who used non-prescription injected drugs (NIDU)?	Yes=87 (12%) No=617 (88%)	48 (18%) 222 (82%)	4.801	.038	Ref: 0.488

(table continues)

Sexual Risk Exposure	VHTC (Number) %	No VHTC (Number) %	x^2	*p*	*Unadjusted Odds Ratio*
Had multiple sexual partners?	Yes=138 (10%) No=555 (90%)	80 (30%) 191 (70%)	10.274	.002	Ref: 0.324
Had sex with a partner who had multiple sexual partners?	Yes=172 (24%) No=339 (48%) Unknown=196 (28%)	101 (37%) 134 (49%) 38 (14%)	27.115	.000	Ref: 0.918 -
Sex under the influence (marijuana, cocaine, hallucinogens, alcohol).	Yes=164.2 (17%) No=78 (8%)	543.8(55%) 196 (20%)	3.23	.080	Ref. 1.323

N.B. All tests except for oral sex were conducted using Fisher's exact test

Binomial logistic regression analyses was conducted to examine whether VHTC (measured on a dichotomous scale-"Yes" or "No") can be predicted based on sexual risk exposures such as (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol), age group; gender; ethnicity; employment status, and educational level. In order to obtain valid results binomial logistic regression was used based on the following assumptions by Hosmer and Lemeshow (2000):

1. Dependent variable measured on a dichotomous scale (VHTC-"Yes" or "No").
2. One or more independent variables.

3. Independent observations with mutually exclusive and exhaustive categories (dependent variable).

All the above assumptions were met for this analysis of 982 cases. The baseline model shows a highly significant x^2 (14, N = 982) =115.42, p < .0001 and correctly classified 72% of the cases. The Hosmer and Lemeshow's test for model fit, was not significant (x^2 1, N = 982) = 9.974, p = .267), thereby suggesting a model fit. The model explained 16% (Nagelkerke R^2 = .160 of the variance in VHTC and correctly classified 74% of the cases as compared to 72% in the null model.

Research Questions and Hypotheses

Research Question 1: What is the association between sociodemographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults?

$H_0$1: There is no significant association between sociodemographic factors (age, gender, ethnicity, geographic location) and VHTC service utilization among Dominican adults.

H_a1: There is a significant association between socio-demographic factors (age, gender, ethnicity, geographical location) and VHTC service utilization among Dominican adults.

To address research question one, a binary logistic regression was conducted to determine whether a significant relationship exists between ages, gender, ethnicity, geographical location versus VHTC service utilization. Table 9 summarizes the analysis'

results. According to this analysis, age groups 25-44 years (*Wald* = 12.08, *p* = .001, *OR* = 5.11, *95% CI* = 2.03- 12.8) and 45-64 years (*Wald* = 4.44, *p* = .03, *OR* = 2.36, *95% CI* = 1.07-6.49) were significant predictors of VHTC as compared to age group >65 years, suggesting that these participants were 5.81 and 2.86 times (respectively) more likely than the age group >65 years to have engaged in VHTC. The health district of Grand Bay (*Wald* = 4.55, *p* < .03, *OR* = .52, *95% CI* = .29-.94) was significantly inversely associated with VHTC as compared to Roseau district, suggesting that participants were 48% less likely to have engaged in VHTC.

The other variables were not significant predictors of VHTC among adults in Dominica, 2016 and these included a) Age group 18-24 years in comparison to >65 years (*Wald* = .21, *p* < .64, *OR* = 1.25, *95% CI* = .47-3.29); b) Males (*Wald* = 3.65, *p* ≤ .56, *OR* = .48, *95% CI* = .23-1.01) were about 5 times more likely not to engage in VHTC as compared to females. c) Kalinago (*Wald* = .47, *p* < .49, *OR* = 1.29, *95% CI* = .62- 2.68) and others (including whites and mixed) (*Wald* = .15, *p* < .69, *OR* = 1.23, *95% CI* = .43-3.49) had a higher chance (1.2 times) of VHTC as compared to blacks d) Health districts of Portsmouth (*Wald* = 2.01, *p* < .15, *OR* = .66, *95% CI* = .37-1.17), St. Joseph (*Wald* = .005, *p* < .94, *OR* = .94, *95% CI* = .18-4.92), Castle-Bruce (*Wald* = .12, *p* < .72, *OR* = .88, *95%CI* = .43-1.79), and La Plaine (*Wald* = .13, *p* < .71, *OR* = .89, *CI* = .50-1.89) had a higher chance not to engage in VHTC (OR = .663, .941, .880, .897, respectively) in comparison to Roseau. Based on these results, the null hypothesis (*Ho1*) for research question one can be rejected.

Research Question 2*:* What is the association between employment status and VHTC service utilization in Dominica?

$H_0$2: There is no significant association between employment status and VHTC service utilization in Dominica.

H_a2: There is a significant association between employment status and VHTC service utilization in Dominica.

To address research question two, the binary logistic regression shown in table 9 revealed that the relationship between employed (*Wald* = 2.29, $p < .129$, *OR* = 1.32, *95% CI* = .92-1.91) as compared to unemployed was not statistically significant. Based on these results, the null hypothesis (*Ho2*) for research question two cannot be rejected.

Research Question 3: What is the association between education level and VHTC service utilization in Dominica?

H_0*3*: There is no significant association between education level and VHTC service utilization in Dominica.

H_a3: There is a significant association between education level and VHTC service utilization in Dominica.

The summary of the results of the binary logistic regression association between education level and VHTC service utilization in Dominica was presented in Table 9. Primary level (*Wald* = 1.79, $p < .18$, *OR* = .69, *95% CI* = .40-1.20) and secondary level education (*Wald* = .09, $p < .75$, *OR* = .93, *95% CI* = .61-1.43) were not significantly associated with VHTC and that means that primary and secondary level education made

it 0.69 and 0.93 times more likely not to have engaged in VHTC as compared to the tertiary level. As a result, the null hypothesis (*Ho3*) for research question three cannot be rejected.

Research Question 4: Are HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol associated with VHTC service utilization in Dominica?

$H_0$4: HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol are significantly associated VHTC service utilization in Dominica.

H_a4: HIV sexual risk behaviours factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, sex partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) are not significantly associated with VHTC service utilization in Dominica.

The analysis of the association of HIV sexual risk exposure factors versus VHTC service utilization in Dominica was conducted using binary logistic regression as summarized in table 9. Not having vaginal sex was significantly associated with VHTC

as compared to having vaginal sex (*Wald* = 4.89, $p < .02$, *OR* = .49, *95% CI* = .26-.92), suggesting that participants who reported vaginal sex (no) were 0.48 times more likely not to have engaged in VHTC.

Not having sex partner with multiple sex partners was not significantly associated with VHTC as compared to having sex partner with multiple sex partners (*Wald* = 3.54, $p < .06$, *OR* = .64, *95% CI* = .40-1.01). This suggested that these participants were 0.64 times more likely not to have engaged in VHTC. Not having multiple sex partners was not significantly associated with VHTC as compared to having multiple sex partners (*Wald* = .83, $p < .36$, *OR* = .47, *95% CI* = .09-2.35), suggesting that these participants were 0.47 times more likely not to have engaged in VHTC.

The other variables that were not statistically significant included not having sex with sex workers as compared to who had sex with sex workers (*Wald* = 1.36, $p < .24$, *OR* = 2.38, *95% CI* = .55-10.26) suggesting that those who did not have sex with sex workers are 2.38 times more likely to engage in VHTC in comparison to those who had sex with sex workers. Not having sex with males increased the likelihood of not engaging in VHTC by 0.82 times as compared to having sex with males (*Wald* = .28, $p < .59$, *OR* = .82, *95% CI* = .39-1.69). Not having transactional sex made it 1.65 times more likely to engage in VHTC as compared to having transactional sex (*Wald* = .19, $p < .66$, *OR* = 1.65, *95% CI* = .17-15.61). e) Not having multiple sex partners made it .47 times more likely not to engage in VHTC as compared with having multiple sex partners (*Wald* = .831, $p < .36$, *OR* = .7, *95% CI* = .09-2.35). Those not having sex with non-

injected drug users (NIDU) were 0.10 times more likely not to engage in VHTC as compared to those having sex with NIDU (*Wald* = 1.68, $p < .19$, *OR* = .10, *95% CI* = .003-3.20). Participants not having sex under the influence (marijuana, cocaine, hallucinogens, alcohol) were 1.4 times more likely not to engage in VHTC as compared to those having sex under the influence (*Wald* = 3.46, $p < .06$, *OR* = 1.38, *95% CI* = .98-1.94). Based on these results, the null hypothesis ($H_0$4) for research question four can be rejected.

The multivariable binomial logistic regression conducted, tested IVs as predictors of VHTC utilization among adults in Dominica, 2016. The results as shown in Table 9 indicated that the variables age group (25-44 years and 45-64 years), the health district of Grand Bay, and vaginal sex were statistically significant predictors to the likelihood of having engaged in VHTC. Also, according to these significant effects, the achieved statistical power for this regression analysis was very satisfactory (100%, G*Power calculator, Table 10).

Table 9

Presentation of Results for Logistic Regression analysis for age group, gender, ethnicity, employment status, educational level, sexual risk exposure factors and VHTC among Adults, 2016

	B	S.E.	Wald	Df	*P*	OR	95% C.I. for OR Lower	Upper
Age group (ref: >65y)								
18-24y	.227	.492	.213	1	.644	1.255	.478	3.294
25-44y	1.632	.470	12.082	1	.001	5.116	2.038	12.843
45-64y	.969	.460	4.442	1	.035	2.636	1.070	6.492
Ethnicity (ref: Black)								
Kalinago	.256	.373	.473	1	.492	1.292	.622	2.681
Other	.209	.531	.155	1	.694	1.233	.435	3.492
Sex with sex workers (ref: yes)								
No	.870	.744	1.367	1	.242	2.388	.555	10.269
Sex with females (ref: yes)								
No	-19.648	40201.069	.000	1	1.000	.000	.000	.
Sex with males (ref: yes)								
No	-.196	.370	.282	1	.595	.822	.398	1.696
Transactional sex (ref: yes)								
No	.501	1.146	.191	1	.662	1.651	.175	15.613
Vaginal sex (ref: yes).								
No	-.698	.316	4.892	1	.027	.497	.268	.924
Multiple sex partners (ref: yes)								
No	-.751	.821	.838	1	.360	.472	.094	2.357
Sex with partner with multiple sex partners (ref: yes)								
No	-.442	.234	3.548	1	.060	.643	.406	1.018
Sex under non-injected drug use (ref: yes)								
No	-2.282	1.758	1.685	1	.194	.102	.003	3.201
Sex under drug influence (ref: yes)								
No	.325	.174	3.469	1	.063	1.384	.983	1.947

(table continues)

	B	S.E.	Wald	Df	*P*	OR	95% C.I. for OR Lower	Upper
Gender (ref: female)								
Male	-.715	.374	3.658	1	.056	.489	.235	1.018
St.Joseph	-.060	.845	.005	1	.943	.941	.180	4.929
Castle Bruce	-.128	.362	.125	1	.724	.880	.432	1.790
La Plaine	-.109	.293	.137	1	.711	.897	.505	1.594
Grand Bay	-.643	.301	4.551	1	.033	.526	.291	.949
Employment Status (ref: no)								
Yes	.283	.187	2.299	1	.129	1.328	.920	1.915
Highest Education Level (ref: tertiary)								
Primary	-.369	.275	1.799	1	.180	.691	.403	1.186
Secondary	-.067	.214	.097	1	.755	.936	.616	1.422
Constant	22.621	40201.069	.000	1	1.000	6668720888		

Table 10

Post hoc power analysis given final sample size (n=982) and detected significant effects (Odds ratios) derived from logistic regression.

z tests - Logistic regression			
Options:	Large sample z-Test, Demidenko (2007) with var corr		
Analysis:	Post hoc: Compute achieved power		
Input:	Tail(s)	=	One
	Odds ratio	=	5.12
	Pr(Y=1|X=1) H0	=	0.2
	α err prob	=	0.05
	Total sample size	=	982
	R^2 other X	=	0
	X distribution	=	Normal
	X parm μ	=	0
	X parm σ	=	1
Output:	Critical z	=	1.6448536
	Power (1-β err prob)	=	1.0000000

z tests - Logistic regression			
Options:	Large sample z-Test, Demidenko (2007) with var corr		
Analysis:	Post hoc: Compute achieved power		
Input:	Tail(s)	=	One
	Odds ratio	=	2.64
	Pr(Y=1|X=1) H0	=	0.2
	α err prob	=	0.05
	Total sample size	=	982
	R^2 other X	=	0
	X distribution	=	Normal
	X parm μ	=	0
	X parm σ	=	1
Output:	Critical z	=	1.6448536
	Power (1-β err prob)	=	1.0000000

z tests - Logistic regression			
Options:	Large sample z-Test, Demidenko (2007) with var corr		
Analysis:	Post hoc: Compute achieved power		
Input:	Tail(s)	=	One
	Odds ratio	=	0.497
	Pr(Y=1|X=1) H0	=	0.2
	α err prob	=	0.05
	Total sample size	=	982
	R^2 other X	=	0
	X distribution	=	Normal
	X parm μ	=	0
	X parm σ	=	1
Output:	Critical z	=	-1.6448536
	Power (1-β err prob)	=	1.0000000

Summary

This quantitative study was conducted to investigate the relationships between the IVs (age group, gender, ethnicity, geographic location, educational level, and employment status, and several risk exposure factors namely having sex with sex workers, sex with males, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) versus VHTC utilization in Dominica, 2016. In this study I obtained secondary data representing the variables from archived data from NHARP's database. Results of the statistical analysis supported rejection of null hypotheses for RQ1 and RQ4 because some of the subsets included in the two variables were significantly associated with VHTC among adults in Dominica. In Section 4, I interpreted the findings, stated the study limitations, discussed the implications for social change, and submitted recommendations for future research.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this quantitative study was to explore the sociodemographic and sexual risk behavioural factors that may influence VHTC among adults 18 years and over in Dominica. This study was conducted to determine whether independent variables such as age, gender, ethnicity, geographic location, employment status, education level, and HIV risk behaviors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) predicted VHTC service utilization among adults in Dominica. The key findings of the statistical analysis substantiated rejection of two out of the four null hypotheses because some of the subsets included in the two variables were significantly associated with VHTC among adults in Dominica. The subgroups included age groups (25-44 years and 45-64 years), the health district of Grand Bay, and vaginal sex.

Interpretation of the Findings

Findings to Literature

Findings from my study suggested that 72% of the study population engaged in VHTC among adults in Dominica in 2016 (~1% total population, Dominica, 2016). Other reports identified that testing rate in 2014 among populations in the United States was

only 50% (CDC, 2016d), Latin America and the Caribbean = 3.6% (Avert, 2016), and Dominica = 3.3% (NHARP, 2015).

Similar to findings from Decker et al. (2014) who assessed the population (15-24 years) in Maryland, my current findings identified lower HIV testing rates among males 32 %, x^2 ($N = 980$) = 64.78, $p = .000$) as compared to females. Though this finding was statistically significant in the chi square analysis, the variable gender did not achieve statistical significance in the logistic regression analysis. My study assessed the VHTC behaviours for 2016 only. Further studies would be required to assess if trends exist in VHTC among both genders. The following paragraphs explain subsets of the variables that were statistically significant namely age group, health district, and sexual risk exposure factors (such as sex with partner with multiple sex partners, sex with partner with no multiple sex partners, and vaginal sex).

Age Group

The age group were based on CDC's 2015 age category for HIV risk factors however the age groups 25-34, 35-44 years, and 45-54, 55-64 years were collapsed to suit my study. Similar age categories were used in the survey to assess barriers and facilitators for HIV testing in South Africa (Mohlabanea, Tutshanaa, Peltzer, Mwisongod, 2016). Lubogo, Ddamulira, Tweheyo, and Wamani (2015) employed similar age groups to explore the factors associated with access to HIV care services among HIV seropositive clients identified by a home based HIV counseling and testing program in Kumi district, eastern Uganda. The relationship between age group and VHTC was

examined using binary logistic regression. My results showed that there were mixed responses to VHTC practice among the population. Compared to age group >65years those 25-44 and 45-64 years had increased VHTC practices. This finding is consistent with that of Ford, Godette, Mulatu, and Gaines, 2015); UNAIDS, 2015; Geyer, 2017). Consistent with other studies the age-group 18-24 years as compared to older age-group 65 years had increased VHTC practice (Van Handel et al., 2016). These inconsistencies between my study and previous studies emphasize the need to assess possibilities of other factors (such as socioeconomic status) influencing VHTC other than the contribution of age-group alone. Walter et al. (2016) supported the notion that one factor is insufficient evidence to predict VHTC behaviour.

Health District

Rural residents from Grand Bay were less likely to engage in VHTC, probably due to less information reaching these rural areas or access to the health centres, or due to the stigma attached to HIV/AIDS. Similarly, Ohl and Perencevich's (2011) research findings among United States population supported this claim. However, this is in contrast to findings of research among Florida residents that claimed that rural residents are more likely to have HIV testing done as compared to urban residents (Trepka et al., 2014). Based on the difference in study results, I suggest that further studies need to be done to determine the influence of different segments of a population on VHTC participation among the adults in Dominica.

Sexual Risk Exposure Factors

Logistic regression results in my study showed that no vaginal sex in comparison to the reference subsection (having vaginal sex) was significantly correlated with VHTC. This is similar to the findings from studies by Walter, Lundgren, Umez-Eronini, and Ritter (2015); Hutton et al. (2013) that found that selected sexual risk factors (such as sexual practices, multiple sexual partners, and alcohol/substance abuse) impact engagement in VHTC among specific groups. However, Walter et al. (2016) noted that VHTC can be influenced by not one but several factors. In support of this finding, Knussen, Flowers, and McDaid (2014) compared age to unprotected anal intercourse (UAI) and found that age alone did not influence VHTC among MSM in Scotland. Further studies are needed to determine relationships among VHTC and specific sexual risk exposure factors among Dominican adults.

Analysis and Interpretation of Findings to HBM Theoretical Framework

The Health Belief Model was used in this health behaviour survey based on the premise that health behaviours may be predicted by four core concepts (perceived susceptibility, perceived vulnerability, perceived benefits, and perceived barriers) with two additional concepts (cues to action and self-efficacy) (Rosenstock, Strecher, & Becker, 1988). Acknowledging vulnerability to and severity of contracting HIV, and the realization of benefits that can be gained from taking preventive actions forms the pinnacle of this model in VHTC prevention programs. Observing the factors that play a

role in facilitating this process was necessary to draw conclusions and make recommendations about adults seeking VHTC services in Dominica.

As per Boxwala, Bridgemohan, Griffith, & Soliman (2010) background/socio-demographic factors can impact perceived susceptibility to disease. The HBM is the framework for predicting health behaviours and was used in this current study as the basis for describing VHTC among adults in Dominica. Modifying factors such as sociodemographic factors (age, gender, ethnicity, employment, and educational status) can influence perceptions of behaviour (in which case VHTC) (Sanga, Kapanda, Msuya, & Mwangi, 2015; Tarkang & Zotor, 2015). As reported in Section 3, while some factors (age group, geographical location/health centres, and selected risk exposure factor (vaginal sex) were statistically significant in predicting VHTC among adults in 2016; on the other hand, educational level was not significantly associated with VHTC, although according to our results, most of those who sought VHTC were from the higher education level. This result indicates that educational level can be considered as enabling factor to engage in VHTC, but more research is needed to statistically validate this effect.

Perception of the seriousness of a disease condition will motivate an individual to change behaviours (Orji, Vassileva, & Mandryk, 2012). Bandura (1977) claimed that self-efficacy refers to the self-confidence that motivates one to perform a good behaviour. Most (72%) respondents in the 2016 survey had engaged in VHTC. This can reflect cues to action in response to service utilization.

Limitations of the Study

This study was conducted with the use of archived national surveillance data from NHARP's database. Several limitations were encountered with the use of this secondary dataset that impacted generalizability, validity, and reliability of findings. Firstly, I encountered issues such as missing data which can create validity issues in a research. Kang (2013) stated that if missing data are not adequately handled, the statistical power of the study can be decreased which can produce biased estimates that can lead to invalid conclusions. This can be avoided by proper classification and management of missing data during the analysis phase of the study. The data were imputed into the electronic system with caution and reviewed to ensure correctness. Missing data were recorded and reported.

Secondly, convenience sampling method was used during secondary data collection which posed validity, and reliability issues. Simundic (2013) suggested that random sampling is the best method that can be used to reduce bias in the study. This may impact on the capability of making generalizations to the wider population.

Limitations of study also included self-reported information from participants that can lead to recall and reporting bias which has the potential to impact on internal reliability of study results. Hassan (2005) stated that recall can be affected over time. Reported data that requires relating past experiences are dependent on participants' memory can influence the disease. My survey may be limited due to respondents' under or over reporting. According to Simundic (2013) the likelihood of participants to be more

or less likely to enter a study can introduce over or under representation of subjects. Furthermore, the use of secondary data may limit the research findings because the data were collected for national health surveillance which is a different reason than the intended purpose of my research.

The model in my study explained less than 30% of the variance in VHTC. This figure is low and can have an effect on validity which may bias the study. Findings will be limited to the study population in Dominica or similar populations and will not be extrapolated to others outside of this context.

Recommendations

Several recommendations may advance findings of future studies that assess the socio-demographic and risk exposure factors influencing VHTC among adults in Dominica. Walter et al. (2016) revealed that there may be several factors influencing VHTC and therefore these factors should be assessed mutually. Similarly, my study findings identified several different variables that statistically significantly affected the practice of VHTC. Based on this, I recommend that the scope of future studies in identifying the factors impacting on VHTC service utilization should be wide to include various risk exposure factors, (such as condom use, socioeconomic, and sexual relations [example marriage, cohabitation early sexual debut, and intergenerational sex]). These factors can influence sexual exposure and serve as confounding factors to VHTC service utilization (Schnall, Rojas, & Travers, 2015).

Geographic location, community-level socioeconomic and health care resource factors may influence access to VHTC services (Trepka et al., 2014). In my study I assessed geographic location (identified by health centres) from which participants accessed VHTC service. Findings revealed statistical evidence that location predicted VHTC practice. However; my study did not assess influence of socioeconomic conditions on VHTC. Future studies should assess influence of socioeconomic conditions of participants from urban and rural communities on VHTC. This will provide program planners with data for planning programs specific to the needs of participants. I recommend that future research employ different study designs, such as qualitative studies (Musheke, et al., 2013) to provide information of different quality. I also recommend that future researchers utilise newer sampling techniques, such as the stratification by geographical location urban rural using the stratified random sampling. This will enable health program planning and implementation specific to these locations. The time space sampling (TSS) method can also be used to reach more participants in different locations (Chen, et al., 2017). Additionally, the respondent driven sampling (RDS) technique can be used to encourage respondents to refer their peers thereby increasing participation in future research. This can improve the validity and generalizability of research surrounding VHTC utilization.

Implications for Professional Practice and Social Change

Professional Practice

Results from this study can provide knowledge on practice of VHTC in Dominica and can be used to encourage program planning for health care access among adults. Similar to the recommendations of Walter et al. (2016) future research findings can focus on wider risk exposure factors for adequate program planning. Rosenstock (1966) claimed that prediction and understanding of a behavior is necessary prior to implementation of behaviour modification programs. To the best of my knowledge, no other study of the questions in my research (predict VHTC practice among adults in Dominica) has been conducted. Based on this claim, the constructs of the HBM model can be included in behaviour change research study designed to complement health education programs. Understanding individual perceptions as described by the HBM can propagate greater involvement in VHTC.

Positive Social Change

The findings of this study have the potential to create positive social change at the individual, family and societal level by contributing to the existing information about VHTC practices among adults in Dominica. The factors influencing VHTC practice in the population can be detected and deficient areas of VHTC practice can be identified.

This information can be used to raise awareness of the status of VHTC among individuals in the population. Risky behaviors among adults in Dominica can be identified based on findings. This can contribute to existing knowledge to prevent spread

of HIV among the population. Information can also contribute to promotion of individual behaviour change. Result of this study can be used strategically in future efforts to increase testing among younger adults with the lowest incidence of VHTC. Community-level approaches to support early detection and treatment of HIV infection can receive a boost based on findings as per specific age groups and health districts. The findings can contribute towards promoting health and well-being among adults in the community.

The knowledge gained from this study can also be used to assist public health professionals, educators, community leaders, university personnel, policy makers, community organizations, and researchers to develop programs specific to adults in Dominica. The results can be made available to community partners such as the staff of NHARP and the Ministry of Health to encourage contribution towards policy development. This study can be used to initiate critical ways through which social change can be established by informing policy and practice, produce community benefits, contributing to solutions for societal problem-solving that brings about change in behaviors. The results can complement present intervention strategies by encouraging newly infected individuals and their family to seek treatment and supportive care. For example, my study results reveal that the majority of participants came from the Roseau, capital city of Dominica. Decentralization of health services by creating more community outreach programs for rural communities can encourage participation in VHTC. Developing creative ways for community involvement can bring all age groups together in the fight against risk exposure factors that can cause HIV infection.

Conclusion

This quantitative cross sectional correlation study explored the sociodemographic factors (age group, gender, ethnicity, educational level, employment status) and sexual risk behavioral factors (such as having sex with sex workers, sex with males, sex with females, transactional sex, vaginal sex, multiple sex partners, partner with multiple sex partners, sex under NIDU, condom use, sex under the influence of marijuana, cocaine, hallucinogens, alcohol) that may influence VHTC among adults 18 years and over in Dominica, 2016. The HBM was used as the framework for correlations of sociodemographic factors versus VHTC. Findings revealed that factors such as age group, geographical location/health centres, and selected risk exposure factors (vaginal sex) were significantly associated with VHTC among adults in 2016. However; several other factors were not significantly associated with the outcome. Various factors (some not included in the current study) may influence the practice of VHTC among adults in Dominica. These predictors should be assessed comprehensively in future studies so that effective prevention programs can be planned. Public health care practitioners may focus on individual's perception of HIV/AIDS and develop planning approaches to combat issues relating to VHTC.

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Appendix A

Ministry of Health

Testing and Counseling Form

CLIENT INFORMATION		
Counselor / Provider:	Date: dd / mm / yyyy	Referred by:
Client ID#		Sex: ☐Male ☐Female ☐Transgender ☐Unknown
Age: Date of Birth: dd / mm / yyyy		Health District: Address:
Marital Status: ☐ Currently Single (not in relationship) ☐ Currently Single (in a relationship) ☐ Currently Single (more than one relationship) ☐ Currently Married/Common Law and separated ☐ Currently Married/Common Law living together ☐ Currently Married/Common Law with other relationships ☐ Never had a relationship		
Ethnic Group: ☐ Black ☐ White ☐ Kalinago ☐ Asian ☐ Other _____		Country of Birth_____
Currently employed: ☐Yes ☐No	Occupation: _____	Country of Residence: _____
Are you currently pregnant (females only): ☐ Yes ☐ No ☐ Don't Know		
BACKGROUND		
Highest level of education: ☐ Primary ☐ Secondary ☐ College ☐ University ☐ Other _____		
Reason/s for this _____ test:		
☐ Employment / Work permit / Scholarship ☐ Insurance ☐ Immigration ☐ Check-up ☐ Pregnancy ☐ Possible exposure		☐ Partner referrel ☐ Provider initiated testing ☐ Symptoms ☐ To obtain HIV medical care ☐ Convenience/availability ☐ Other, specify
When did you receive your last HIV test:		
Date: dd / mm / yyyy Test site (where): _____		Reason: (use list

Result: ☐ Positive ☐ Negative ☐ Don't know ☐ Never received an HIV test	
Please answer the following questions:	
In the past 12 months have you been diagnosed with a sexually transmitted infection (STI)? ☐ Yes ☐ No	
Number of sexual partners during past 12 months: ☐ 0 ☐ 1 ☐ 2-4 ☐ 5-9 ☐ 10-20 ☐ >20	
Number of sexual partners during your lifetime: ☐ 0 ☐ 1 ☐ 2-4 ☐ 5-9 ☐ 10-20 ☐ >20	
In the past 12 months, how often have you used condom during sexual intercourse: ☐ Always ☐ Sometimes ☐ Usually ☐ Never	In the past 12 months what type sexual activity have you participated in? (Select all that apply) ☐ Vaginal ☐ Oral ☐ Anal
Please indicate any other condition (comorbidity): _____	

RISK/EXPOSURE FACTORS:

Before taking this _____ test, have you had:	In past 12 months				Ever			
If answer to the following questions are yes, ask whether it was intentional	Yes		No	UK	Yes		No	UK
Intentional	Y	N			Y	N		
Sex with male(s)								
Sex with female (s)								
Sex with perosn (s) of known HIV-positive status								
Sex with person (s) of known Gonorrhea/Chlamydia-positive status								
Sex with person (s) of known RPR (Suspect syphilis) positive status								
Sex with person (s) of known Herpes type II positive								
Sex with sex worker(s)								
Exchanged sex for money, drugs or material gain (Transactional)								
Injected non-prescription drugs (IDU)								
Used non-injected illicit drug (e.g. crack, cocaine, marijuana, halucinogenics etc.)								
Perinatal exposure to HIV (Born to HIV positive mother)								
Perinatal exposure to secondary syphilis (Congenital syphilis)								
Born to a mother with gonorrhea (Opthalmia neonatorum)								
Received transfusions of blood, blood products or clotting factors								
Received a transplant of tissue or organ or artificial insemination								
Occupational exposure while working in a health care setting or laboratory or providing safety or emergency services								
Confirmed diagnosis of TB at time of _____ (type of STI) diagnosis.								

If answer to the following questions are yes, ask whether it was intentional	Yes	No	UK	Yes	No	UK
Confirmed diagnosis of Hepatitis B at time of _____ (type of STI) diagnosis.						
Multiple sexual partners						
A partner who has multiple sexual partners						
Circumcision (male only)						

I identify myself as:				In past 12 months, have you had sex under the influence of:		
	Yes		No		Yes	No
Heterosexual				Alcohol		
Homosexual				Crack/Cocaine		
Bisexual				Halucinogenics		
Other				Marijuana		

Test Result:	Positive	Negative	Date received by counsellor	Was client given results?	Yes	No	Inknow	Date
HIV								
GC								
RPR								
Herpes Type II								
Other specify								

Notes/Comments:	Counsellor Signature and date: