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Comparison of Affordable Care Act and Ryan White Coverage on Treatment Compliance, Engagement, Affordability, and Health Status for People Living with HIV/AIDS

Todd Blum
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Todd Blum

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Review Committee
Dr. David Segal, Committee Chairperson, Health Services Faculty
Dr. Shari Jorissen, Committee Member, Health Services Faculty
Dr. Simone Salandy, University Reviewer, Health Services Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
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Todd Blum

MHA, Georgia State University, 1996

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Dissertation Submitted in Partial Fulfillment

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Abstract

The Ryan White HIV/AIDS Program (RWHAP) provides HIV care to uninsured people living with HIV/AIDS (PLWHA). Although the RWHAP has helped PLWHA achieve a viral suppression rate of 84%, this does not meet the 90% target goals under the U.N. 90-90-90 plan to end the AIDS epidemic. The Affordable Care Act (ACA) was enacted to enhance access and health status, but outcomes have not been measured for PLWHA. The purpose of this quantitative correlational cross-sectional study was to determine whether PLWHA enrolled in an ACA qualified health plan (ACAQHP) achieved improved health status compared to PLWHA enrolled in the RWHAP. Andersen's behavioral model of health services use provided the theoretical framework for this study. Research questions addressed variables such as demographic factors, difficulty in paying out-of-pocket medical expenses, health status, coverage status, treatment compliance, and engagement in care. A purposeful convenience sample of weighted secondary data from 30,670 PLWHA residing in Florida who participated in the 2015-2017 Medical Monitoring Project survey was used. Multiple linear regression only showed a statistically significant relationship between engagement in care and health status. Mann-Whitney U tests indicated a statistically significant difference in treatment compliance and engagement in care, but not in health status between RWHAP and ACAQHP enrollees. Findings also showed that those enrolled in the ACAQHP had less difficulty in paying their health care expenses than those in the RWHAP. Study results may be used to encourage enrollment in an ACAQHP and improve health outcomes due to access to more affordable comprehensive services.

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Dedication

This dissertation is dedicated to my family. To my wife, Hope, and my children, Brian, Carly, and Kailee, thank you for your patience and support, which allowed me to dedicate the time needed to complete my research. To my parents, Roz and Steve Blum, thanks for instilling in me the passion to pursue my dreams.

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Chapter 1: Introduction to the Study

Introduction

HIV is a public health concern in the United States as approximately 1.1 million people are currently diagnosed with HIV and an additional 50,000 new cases are detected annually (McQuade, Raimondo, Phivilay-Bessette, Marak, & Loberti, 2015). The federal government created the Ryan White HIV/AIDS program (RWHAP) in 1990 to help people living with HIV/AIDS (PLWHA) receive necessary medical care (Health Resources and Services Administration [HRSA], 2016a). The RWHAP is the payer of last resort as it provides funding for the medical care for more than 500,000 enrollees and covers expenses related to HIV medical services, case management, support services, antiretroviral therapy (ART) medications, health insurance premiums, coinsurance, copayments, and deductibles after all other sources of insurance coverage have been exhausted (Morin, 2015).

The Affordable Care Act (ACA) was passed into law in 2010 to improve insurance access and benefit quality of medical care for the underinsured and uninsured (U.S. Department of Health & Human Services, 2016b). Prior to the passage of the ACA, an estimated 30% (380,000) of PLWHA did not have health insurance and relied solely on support from the RWHAP (Rozin et al., 2015). Improved access under the ACA was achieved through the creation of state health care exchanges to sell insurance policies to consumers, the expansion of Medicaid coverage, and the elimination of insurance companies having the ability to deny coverage due to preexisting conditions (U.S. Department of Health & Human Services, 2016b). Because the RWHAP covers only

HIV-related care and support services on an outpatient basis, the ACA expanded the benefits offered to PLWHA by including access to physicians for preventive and subspecialty care and hospitalization, eliminated financial lifetime limits on covered claims, and improved the coordination and delivery of care (Dawson & Kates, 2015; U.S. Department of Health & Human Services, 2016b). To minimize monthly premium costs, ACA health insurance plans include large patient out-of-pocket expenses due to copayments, coinsurance, and deductibles. Researchers have shown that allocating greater financial costs to people enrolled in high-deductible health plans reduces the utilization of needed health care services resulting in a delayed diagnosis and increased rate of suffering and mortality for many chronic diseases including HIV/AIDS, cancer, and diabetes (Kannan & Veazie, 2014; Taber, Leyva, & Persoskie, 2015). To eliminate the burden of these out-of-pocket expenses, the HRSA (2014) approved the use of RWHAP funds to support the enrollment of their ACA-eligible consumers to an ACA Silver level plan by paying for insurance premiums, deductibles, copayments, and other out-of-pocket health care expenses.

Despite the creation of the RWHAP to provide PLWHA with HIV/AIDS-related care, PLWHA have not achieved the necessary level of viral suppression. It is unclear whether the transition to ACA health insurance coverage for PLWHA in Florida has resulted in improved health outcomes as measured by an increase in the viral suppression among PLWHA. This quantitative correlational cross-sectional study was conducted to review de-identified patient data obtained from the Florida Department of Health to determine whether PLWHA enrolled in an ACA qualified health plan (ACAQHP) achieved improved health status compared to PLWHA enrolled in the RWHAP. The results may lead to individuals afflicted with HIV/AIDS benefiting from improved health status by availing themselves of the subsidies offered to purchase ACA health insurance coverage. Chapter 1 includes the study background, problem statement, purpose, research questions and hypotheses, theoretical framework, nature of study, term definitions, assumptions, limitations, scope, delimitations, and significance of the study.

Background

Prior to the passage of the ACA in 2010, millions of Americans did not have health insurance coverage. The uninsured rate among the nonelderly population surged in the years immediately preceding the passage of this important legislation (The Henry J. Kaiser Family Foundation, 2016b). During calendar year 2010, more than 47 million people representing over 18% of the population of the United States did not have health insurance (Garfield, Majerol, Damico, & Foutz, 2016; The Henry J. Kaiser Family Foundation, 2016b). The health insurance coverage status of an individual is an important determinant in their overall health. Individuals with health insurance are generally healthier and experience lower disease and overall mortality rates than those without health insurance coverage (Wilper et al, 2009). Wilper et al. (2009) indicated that nearly 45,000 people die annually due to the lack of health insurance coverage. If the dearth of health insurance were considered an illness or disease, it would be ranked as the 10th leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2017c). Work-aged people without health insurance experience a risk of death that is 40% higher than similarly aged people with health insurance coverage (Wilper et al., 2009). Health insurance coverage has been found to be associated with the improved diagnosis, treatment, management, and mortality rate for people afflicted with numerous chronic medical conditions (Hogan et al., 2015; Yehia et al., 2014). Individuals covered with health insurance experienced a 14% increase in the frequency of being diagnosed with diabetes and high cholesterol and a 9% increase in the rate of diagnosis for high blood pressure (Hogan et al., 2015). People with health insurance were also more likely to have a lower blood pressure, total cholesterol, and hemoglobin A1C (Hogan et al., 2015). Health insurance coverage is also associated with prolonged viral suppression, reduced likelihood of HIV progressing to AIDS, and reduced likelihood of premature death (Bradley et al., 2016; Dawson and Kates, 2019; McManus et al., 2016; McManus et al., 2018; Raifman et al., 2019; Yehia et al., 2014).

To reduce the number of people without health insurance coverage and improve overall health, the ACA was passed into law in 2010. Numerous provisions were written into the law to achieve health-related goals. First, the ACA includes an individual mandate that requires all U.S. citizens and legal residents to obtain health insurance coverage or pay a fine (Kates, Dawson, Undem, & Perry, 2014; Westmoreland, 2016). The fine serves as an inducement to encourage people to sign up for health insurance coverage. The penalty for not enrolling in a health insurance plan in 2018 was the greater of 2.5% of annual household income, or a per person charge of $695 per adult with a maximum of $2,085 per family per year (Internal Revenue Service, 2017b).

Consumer protections were included in the ACA to ensure that insurance companies continued to provide coverage and pay for needed health care services should an enrollee become afflicted with a medical problem. For example, provisions of the ACA preclude insurance companies from denying coverage or raising the premium rates for people with preexisting medical conditions, establishing annual or lifetime financial coverage limits, and retroactively cancelling coverage after a person gets sick if they are found to have made inconsequential or irrelevant mistakes on an enrollment application form (Hellinger, 2015; Rozin et al., 2015; U.S. Department of Health & Human Services, 2017n; Viall, McCray, Mermin, & Wortley, 2016). Prior to the passage of the ACA, insurance companies used these strategies to minimize their claims exposure for PLWHA and other high-cost medical conditions. Additional requirements of the ACA include coverage for preventive health care services and the creation of a minimum medical loss ratio mandating the insurance companies spend between 80% and 85% of their premium dollars collected on health care claims (Kantarjian, 2017; The Henry J. Kaiser Family Foundation, 2015).

The federal governmental has made a substantial financial investment to subsidize the costs associated with purchasing ACA health insurance. The Congressional Budget Office (as cited in Ferris, 2016) estimated that ACA subsidies cost the federal government approximately $660 billion in 2016 and will cost an estimated $1.1 trillion over the next 10 years. Because of this financial investment, the number of people without health insurance has dramatically declined. From 2010 to 2016, the number of people without health insurance coverage decreased from 47 million to 27 million (The Henry J. Kaiser Family Foundation, 2016b, 2017a). Although the ACA reduced the number of people without health insurance, the reform initiative has failed to control rising health care costs resulting in the proliferation of high-deductible health plans. Patients enrolled in health insurance plans with high deductibles avoid seeking needed medical care. To minimize paying out-of-pocket financial costs, patients with high deductibles avoid getting physician-recommended diagnostic tests or procedures. Medical care avoidance delays disease diagnosis; reduces treatment options and health outcomes for a wide variety of health ailments including several types of cancer, heart disease, stroke, and arthritis; and increases overall suffering and the rate of mortality (Galbraith et al., 2012; Kannan & Veazie, 2014; Murphy, 2016; Taber et al., 2015). Considering the large financial investment spent on the ACA, it is important to understand whether this legislation has enhanced the health of PLWHA.

HIV/AIDS is a serious health problem for people living in the United States and specifically in the state of Florida. Nationally, there are more than 1.1 million PLWHA; in 2014, Florida had the third largest number of residents diagnosed and living with HIV at 110,000 (CDC, 2016b; Florida Department of Health, 2016b). The advent of ART medications turned HIV/AIDS from a fatal disease into a chronic medical condition. PLWHA who are compliant in taking their ART medications are more likely to become virally suppressed, which increases overall survival rates and reduces the spread of the disease (Drainoni et al., 2015; Greenberg, Purcell, Gordon, Barasky, & del Rio, 2015). PLWHA who are virally suppressed can experience a life expectancy similar to people who are not infected with the disease. Although ART medications are effective in slowing the progression of the disease and prolonging the lives of PLWHA, they are extremely expensive. The RWHAP, which was enacted in 1990, provides resources to low-income underinsured or uninsured PLWHA to cover HIV/AIDS expenses related to medical services, food, housing, case management, support services, ART medications, mental health, and substance abuse treatment (McQuade et al., 2015; Weiser et al., 2015). As the third largest recipient of HIV/AIDS treatment funding behind Medicare and Medicaid, the RWHAP provides care to 66% of PLWHA in the United States (The Henry J. Kaiser Family Foundation, 2017b). PLWHA are more likely to become virally suppressed if they receive care from RWHAP facilities (Morin, 2015).

Problem Statement

Several researchers have studied the impact of the services provided by the RWHAP on the health of PLWHA. Morin (2015) and Weiser et al. (2015) demonstrated improved health outcomes as measured by improved viral suppression for people enrolled in the RWHAP. Researchers have attributed the improved health outcomes of Ryan White PLWHA to the additional support services provided such as case management and mental health (Morin, 2015). Cahill, Mayer, and Boswell (2015) found that 73% of PLWHA enrolled in the RWHAP received continuous care (two physician visits, at least 3 months apart, within the previous 12 months) as compared to 51% of PLWHA who were not enrolled in the program.

Although the RWHAP has improved the health of PLWHA, the United States has failed to meet global health goals for the detection and treatment of HIV/AIDS set by the World Health Organization and the United Nations. The Joint United Nations Program on HIV/AIDS (UNAIDS) launched the 90-90-90 campaign to increase HIV/AIDS detection and treatment (Morin, 2015; UNAIDS, 2018). The objective of the program is to improve the detection rate of HIV to 90% of those infected, provide sustained ART treatment to 90% of those detected, and virally suppress 90% of the cases treated (Morin, 2015; UNAIDS, 2018). Currently the HIV detection rate in the United States is 86%, while only 37% of PLWHA nationally are prescribed ART medications and only 30% are virally suppressed (Greenberg et al., 2015; U.S. Department of Health & Human Services, 2016b).

Although the research regarding the health of PLWHA enrolled in the RWHAP provided important findings, I found only three studies in which researchers examined whether the comprehensive health insurance provided by the ACA improved the overall health status of PLWHA compared to those receiving Ryan White Care. In a study of PLWHA residing in Virginia who transitioned from the RWHAP to an ACAQHP, McManus et al. (2016) and McManus et al. (2018) reported that ACA coverage was associated with improved viral load suppression. Raifman et al. (2018) reported that among PLWHA residing in the United States in 2015, 79% who were enrolled in an ACAQHP were virally suppressed compared to 75% who were enrolled in the RWHAP. Due to the small study size and narrow geographic focus of these studies, further research was warranted to determine whether comprehensive health care coverage provided by the ACA improves the health status of PLWHA compared to PLWHA receiving Ryan White care.

Purpose of the Study

The purpose of this quantitative correlational cross-sectional research study was to determine whether the comprehensive care provided by the ACA improves the health of PLWHA compared to PLWHA receiving Ryan White care. A cross-sectional design was employed to measure multiple independent variables including demographic factors, treatment compliance, and engagement in care on the health of PLWHA enrolled in an ACAQHP compared to PLWHA enrolled in the RWHAP. Levin (2006) wrote that cross-sectional research is commonly used in social-science studies because it facilitates an understanding of the overall etiology of a disease and assists in the generation of research hypotheses. My study provided information on the impact that ACA health insurance coverage had on the health of PLWHA compared to the health of PLWHA in the RWHAP. Based on the substantial investment of public funds, it is important to understand whether PLWHA who enroll in an ACAQHP achieve improved health compared to PLWHA who enroll in the RWHAP.

Research Questions and Hypotheses

RQ1: What is the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), and coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression)?

H_o1: There is no statistically significant relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), and coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression).

H_a1: There is a statistically significant relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), and coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression).

RQ2: What is the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o2: There is no statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a2: There is a statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

RQ3: What is the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o3: There is no statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a3: There is a statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

RQ4: What is the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o4: There is no statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a4: There is a statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

RQ5: What is the difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o5: There is no statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a5: There is a statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

Theoretical Framework

The theoretical framework that I used for my study was Andersen's behavioral model of health services use. Since its inception, the behavioral model of health services use has become widely accepted and is the most commonly used framework to predict and explain the factors that impact health care access, utilization, and health outcomes (Graham, Hasking, Brooker, Clarke, & Meadows, 2017). Andersen and Newman (2005) postulated that the volume of health care services consumed by an individual is dependent on the predisposition of a person to utilize health care services, enabling factors of the person that facilitate access to health care services, and the diagnosed illness severity of the health care consumer. These three stages of the behavioral model of health services use, combined with the subset of operational variables from each stage, thematically complemented the dependent variable, independent variables, and research questions in my study. The independent variables, which included gender, race, age, and education level, were encompassed in the demographic and social structure characteristics that are part of the predisposing stage of the model (see Andersen & Newman, 2005). Other demographic independent variables such as income and patient out-of-pocket medical cost sharing expenses were represented in the model as financial aspects of enabling characteristics (see Andersen & Newman, 2005). Treatment compliance and engagement of care were classified as finance and community subgroups of enabling characteristics (see Andersen & Newman, 2005). Finally, the dependent variable (health status) was represented in the model as an evaluated symptom/diagnosis, which is a subcomponent of illness level, the third stage of the model (see Andersen & Newman, 2005).

Andersen’s behavioral model of health services use was suited to serve as a theoretical foundation for this study because it is regularly used to study PLWHA. Brennan, Morley, O’Leary, Bergin, and Horgan (2015) utilized Andersen’s model to examine factors that influenced the utilization of HIV outpatient services, while Holtzman et al. (2015) used the model to study factors that impacted treatment access, adherence, and compliance. Additionally, Walter et al. (2016) applied the model to examine the impact of decreased drug use on reduced HIV sexual risk behaviors. Ford, Godette, Mulatu, and Gaines (2015) used the model to study HIV testing prevalence and disparities among older adults in the United States. Finally, Haley et al. (2014) used Andersen’s model to develop retention strategies to reduce the number of missed office visits among low-income women residing in areas with a high prevalence of HIV. This model is described in greater detail in Chapter 2.

Nature of Study

I used a quantitative correlational cross-sectional design to examine the relationships between demographic factors, treatment compliance, engagement in care, and the health of PLWHA enrolled in the RWHAP or an ACAQHP. Levin (2006) wrote that cross-sectional research is commonly used in social-science studies to facilitate an understanding of the overall etiology of a disease because data regarding risk exposure can be gathered and associations between risk factors can be determined. A cross-sectional design is frequently used when scholars are trying to understand the impact of multiple independent variables on a dependent variable, when measured at a specific point in time (Frankfort-Nachmias, Nachmias, & DeWaard, 2015).

There are three principal advantages of a cross-sectional research design. First, a cross-sectional design enables researchers to conduct studies in natural and real-world situations using probability samples that increase the external validity of the study (Frankfort-Nachmias et al., 2015). Second, the random assignment of study participants to a control and experimental group is not needed in a cross-sectional design (Frankfort-Nachmias et al., 2015). This was an important consideration because the potential assignment of patients to either group might result in an adverse health event, which would be unethical because it would violate the responsibility of the researcher not to harm their study participants. Third, cross-sectional studies are less costly and time-consuming to conduct than other types of studies because data are collected at only one point in time (Levin, 2006).

There are several disadvantages of a cross-sectional design. First, because data in a cross-sectional study are collected at only one point in time, they may not be representative of the overall participant being studied (Sedgwick, 2014). Second, it is problematic to deduce a temporal relationship between an independent variable and an outcome; therefore, causation is unable to be determined and can only be logically or theoretically inferred (Frankfort-Nachmias et al., 2015; Sedgwick, 2014). Finally, researchers using a cross-sectional design are unable to control for alternative analytical explanations, which is problematic in developing clear inferences from the data (Frankfort-Nachmias et al., 2015).

A correlational design is also commonly used in social science and health care research when researchers are interested in understanding the relationships between multiple independent variables and a dependent variable in a population (Curtis, Comiskey, & Dempsey, 2015). A correlational design is used to measure the relationships between and among two or more variables (Field, 2013). One advantage of a correlational design is it allows researchers to inexpensively and quickly achieve a large sample size through the use of archived secondary data (Grand Canyon University, 2018). A second advantage of a correlational design is researchers can study the impact of different independent variables in a naturally occurring event that may be unethical to implement in an experimentally designed study (Curtis et al., 2015; Grand Canyon University, 2018). For example, it would be unethical to withhold ART medications from PLWHA to investigate the impact on viral load suppression. One disadvantage of a correlational design is the inability to establish causation among the independent and dependent variables (Grand Canyon University, 2018). Correlational research addresses the strength of relationships and cannot be used to establish a cause-and-effect relationship (Curtis et al., 2015). Additionally, a correlational design does not allow a researcher to extrapolate findings to answer other research questions (Grand Canyon University, 2018).

The Florida Department of Health agreed to share data from the 2018 version of the Medical Monitoring Project for use in the current study. This secondary data set provided information on PLWHA who were enrolled in the RWHAP or an ACAQHP. To protect the confidentiality of the study participants, all personal health data were de-identified. Financial, clinical, and socioeconomic variables including viral load rates, office visit frequency, ART missed doses in the past 30 days, age, sex, race, educational level, federal poverty level, and difficulty in paying out-of-pocket medical expenses were analyzed using SPSS.

I employed a multiple linear regression, an independent samples *t* test, and a chi-square test to analyze the secondary data, A multiple linear regression analysis is used to measure the level of statistical significance of association between different independent variables and a continuous dependent variable (Field, 2013). Multiple linear regression is frequently used in epidemiologic or health-related studies because it is often unsafe or unethical to randomly assign study participants to an experimental and control group. Instead, researchers include different independent variables and attempt to predict the probability of them affecting the dependent variable. In the current study, a multiple linear regression analysis was employed to examine the relationship between demographic factors, treatment compliance, engagement in care, and coverage status and the health status of PLWHA. Numerous researchers have used a multiple linear regression analysis to study the impact of health care access on health and compliance, engagement, and viral suppression among PLWHA (Carrico & Moskowitz, 2014; Stringer et al., 2016; Turan et al., 2017).

Second, an independent samples *t* test was used to examine the difference in mean treatment compliance, engagement in care, and health status among PLWHA who were enrolled in the RWHAP or an ACAQHP. The independent samples *t* test is an appropriate statistical analysis to answer research questions because an independent samples *t* test compares differences in the means between two unrelated groups (Field, 2013). Similar to a linear regression, an independent samples *t* test is commonly used in health care research (Pandey, 2015). Furthermore, researchers have used an independent samples *t* test to examine viral load suppression, medical care compliance, and engagement in care among PLWHA, and to investigate the impact of health insurance coverage on access to care and quality of care (Abuosi, Domfeh, Abor, & Nketiah-Amponsah, 2016; Drachler, Drachler, Teixeira, & de Carvalho Leite, 2016; Enriquez et al., 2015; Maman et al., 2015).

Third, a chi-square test was used to measure the difference in difficulty in paying out-of-pocket medical expenses between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. A chi-square test is a suitable statistical analysis to answer research questions because it measures the relationship between categorical variables among two independent groups (Field, 2013). Researchers have used a chi-square test to investigate viral load suppression, medical care compliance, and engagement in care among PLWHA (Chang, Fleming, Nunez, & Dombrowski, 2019; Stitzer et al., 2018).

Definitions

90-90-90 campaign: A United Nations program to end the HIV/AIDs epidemic as a public health threat by encouraging countries to ensure that 90% of PLWHA are aware of their diagnosis, 90% of people diagnosed with HIV regularly receive ART, and 90% of people on ART become virally suppressed (UNAIDS, 2018).

ACA: An acronym for the Affordable Care Act, which was a piece of health care reform legislation that was enacted in March of 2010. The main goal of the ACA was to reduce the number of Americans without health insurance through more affordable insurance premiums and an expansion of the Medicaid program (U.S. Centers for Medicare & Medicaid Services, 2017a).

AIDS: An acronym for acquired immunodeficiency syndrome. AIDS is the last phase of the HIV disease cycle. A diagnosis of AIDS is confirmed if the immune system of a patient is significantly weakened and the number of CD4 cells drops below 200 cells per cubic millimeter of blood or upon the contraction of an opportunistic infection (U.S. Department of Health & Human Services, 2017f).

Antiretroviral therapy (ART): Medications taken by PLWHA to limit the HIV virus from reproducing, which reduces the amount of HIV virus (viral load) in the body and the rate of transmission to an uninfected individual (U.S. Department of Health & Human Services, 2017c).

CD4 count: The number of CD4 cells in a person’s blood as measured by a laboratory test. CD4 cells are a form of white blood cells that safeguard the body from bacteria, infections, and a variety of diseases including many forms of cancer. A large CD4 count indicates better health. The CD4 count of a person without HIV ranges between 500 and 1,600 cells per cubic millimeter of blood. A CD4 count below 200 cells per cubic millimeter indicates that the HIV virus has progressed to AIDS (U.S. Department of Health & Human Services, 2017g)

Coinsurance: A percentage of the costs incurred for health services or prescription medications for a patient with health insurance after they met their deductible (U.S. Centers for Medicare & Medicaid Services, 2017e).

Copayment: The amount of money a patient with health insurance pays each time they consume a health care service such as a physician visit, emergency room visit, hospitalization, or prescription (U.S. Centers for Medicare & Medicaid Services, 2017e).

Deductible: The amount of money a patient with health insurance pays for a covered health care service before their insurance company begins to make payment (U.S. Centers for Medicare & Medicaid Services, 2017e).

Engagement in care: A variable in this study, which was measured by the number of HIV/AIDS-related physician visits within the previous 12 months.

Health insurance premium: The financial cost to purchase a health insurance policy (U.S. Centers for Medicare & Medicaid Services, 2017b).

HIV: An acronym for human immunodeficiency virus. HIV is a virus that attacks the body's CD4 cells resulting in a weakened immune system, which is then unable combat infections and disease. There is no cure for HIV, although appropriate medical care and medication can control the virus and limit its transmission to other people (CDC, 2016b).

HIV continuum of care: A framework that depicts the successive steps of medical care that PLWHA should receive and the proportion of PLWHA at each step. The four stages of the continuum of care include diagnosed, engaged in care, prescribed ART, and virally suppressed (CDC, 2017e).

Out-of-pocket maximum: The annual maximum amount of money a patient with health insurance will spend on deductibles, copayments, and coinsurance before their health insurance company pays for 100% of the costs for all covered health expenses (U.S. Centers for Medicare & Medicaid Services, 2018b).

Out-of-pocket medical expenses: The financial cost incurred by a patient to pay for medical bills, health insurance premiums, deductibles, copayments, and coinsurance (U.S. Centers for Medicare & Medicaid Services, 2018b).

PLWHA: An acronym for people living with HIV/AIDS (U.S. Department of Health & Human Services, 2017k).

RWHAP: An acronym for the Ryan White HIV/AIDS Program, which was established in 1990 when Congress passed the Ryan White Comprehensive AIDS Resource Emergency (CARE) Act. The RWHAP provides comprehensive medical care and other health care services on an outpatient basis to PLWHA who are poor, uninsured, or underinsured (HRSA, 2017a).

Treatment compliance: A variable in this study, which was measured by the number of missed ART doses in the past 30 days.

Viral load suppression: Viral load measures the amount of HIV particles, or copies, in a milliliter of blood and is determined through a laboratory test. A high viral load indicates a greater amount of HIV. The primary objective of HIV treatment is to become virally suppressed, which occurs when there are less than 200 copies of the HIV virus in a sample of blood (U.S. Department of Health & Human Services, 2015a).

Assumptions

There were several assumptions in this study. The first assumption was that comprehensive health insurance coverage would improve the health of PLWHA (see Wagner, Wu, & Sood, 2014). Although the scientific literature indicated the health benefits of having health insurance, a scarcity of information exists on the impact of the ACA on the health of PLWHA. The second assumption was the sample size of survey participants enrolled in the RWHAP and in an ACAQHP would be large enough to generate meaningful results and the sample would be representative of the overall Florida RWHAP. According to Chow, Shao, Wang, and Lokhnygina (2007), "in clinical research, sample size calculation plays an important role for assuring validity, accuracy, reliability, and integrity of the intended clinical study" (p. 1). The third assumption was that all Medical Monitoring Project interviewers reported the collected data accurately from the participants who participated in the health survey. The accuracy of the data collection process is an important consideration in enhancing the validity of the results of a study so that other researchers may replicate the study or compare the outcomes across multiple studies; poor clinical documentation may retard the ability to accurately measure treatment effectiveness and health care outcomes (De Moor et al., 2015; Springate et al., 2014).

The fourth assumption was that the survey participants understood the questions being asked of them by the survey data collectors, and provided answers that were reliable, accurate, and honest. DeLamater and Plante (2015) noted that asking people sensitive questions about their sexuality (and associated health complications) may increase survey response bias due to a larger number of nonresponses or misreported answers motivated by social desirability to avoid overall embarrassment. The fifth and final assumption was that the Medical Monitoring Project database included data on all of the variables examined in this study.

Scope and Delimitations

The scope of a study indicates the topics that will be explored and the specifications of the data set that will be used to substantiate the analytical findings and study conclusions (Goes & Simon, 2013). The scope of the current study was limited to PLWHA residing in Florida who were surveyed as part of the Medical Monitoring Project and had coverage through the RWHAP or an ACAQHP. All PLWHA who met the selection criteria were included in this study as long as health care utilization and outcome data were available. Utilization and outcome data were analyzed using de-identified personal health information obtained by the Florida Department of Health as part of the Medical Monitoring Project. Although the information contained in this database is not published or available in the public domain, it was appropriate for use in the current study because it contains the data needed to answer the research questions (E. Spencer, personal communication, March 1, 2019). Comparing the health outcomes of PLWHA enrolled in either the RWHAP or an ACAQHP would provide clarity on the impact that demographic factors, difficulty in paying out-of-pocket medical expenses, treatment compliance, and engagement in care have on health status.

Delimitations occur as a result of the inclusion and exclusion criteria determined by the researcher (Goes & Simon, 2013). The primary delimitation of the current study was the focus on PLWHA who resided in Florida, participated in the Medical Monitoring Project survey, and were enrolled in either the RWHAP or an ACAQHP. The health outcomes of PLWHA who did not participate in this survey and who had other forms of health insurance coverage were excluded from this study. A second delimitation was the impact of comorbidities associated with HIV/AIDS on viral load suppression. The failure for PLWHA to become virally suppressed may be a result of HIV/AIDS-related comorbidities and not the failure of the ACA to improve the health of enrollees in the program (Syed et al., 2016). These delimitations may prevent the findings of the current study from being generalized to other populations of PLWHA.

Limitations

This study had several limitations. The first limitation was the potential for inaccurate data and/or poor data entry in the patient’s medical record. Because secondary data were used for this study, I was dependent on medical personnel to accurately assess, diagnose, and document patient findings in the medical record. The second limitation was weaknesses in the design of this study. A quasi-experimental design was used because it would have been unethical to randomly assign participants to an experimental group and a control group. However, the absence of adequate control over alternative explanations limits my to draw clear inferences from the data (Frankfort-Nachmias et al., 2015). In addition, the use of a correlational cross-sectional design allowed for the measurement of viral load suppression at one point in time. The primary weakness of a correlational cross-sectional design is the inability to determine a cause-and-effect relationship between the dependent and independent variables (Curtis et al., 2015; Grand Canyon University, 2018; Setia, 2016; Solem, 2015). This limitation can be diminished through the use of statistical analysis to approximate an experimental design (Frankfort-Nachmias et al., 2015).

The third limitation of this study was the use of convenience purposive sampling methodology. A convenience sample is a nonprobabilistic sampling strategy in which study participants are selected based on the ease of access for the researcher (Laerd Statistics, 2012a). Convenience sampling may exhibit bias, and the included participants may not be representative of the overall population, which may limit the generalizability of the findings to other populations (Laerd Statistics, 2012a). This is in contrast to probabilistic sampling techniques, in which the selection of units is made randomly. The sampling strategy used in the current study was also purposive because the inclusion criteria required enrollment in either the RWHAP or an ACAQHP. A purposive sampling strategy is also a nonprobabilistic methodology in which participants are selected based on qualifications or characteristics selected by the researcher, which may limit the generalizability of the findings due to researcher bias or a nonrepresentative sample of participants (Laerd Statistics, 2012d).

Because the reasons why some PLWHA enrolled in either the RWHAP or an ACAQHP were unknown, the findings of this study may not be generalizable to other populations but may be representative of trends among PLWHA (see Etikan, Musa, & Alkassim, 2016; Jager, Putnick, & Bornstein, 2017) The fourth limitation was the potential threat to external validity. Frankfort-Nachmias et al. (2015) defined external validity as the extent to which the findings of a research study can be generalized to other people or other settings. The sample of PLWHA who have ACAQHP coverage may not be representative of other PLWHA with ACAQHP coverage in other parts of Florida or throughout the United States.

The fifth limitation was the threat to internal validity, which may have compromised the conclusions establishing a relationship between independent and dependent variables. Threats to internal validity, including include history and maturation, need to be controlled (Creswell, 2009). History refers to events that transpire during the passage of time throughout the course of the treatment period that may impact the results, while maturation refers to changes among study participants (Creswell, 2009).

Significance of the Study

A primary goal of the ACA is to improve health care outcomes for people enrolled in qualified health plans. The federal government is projected to spend $716 billion annually by the year 2024 to reduce the number of people in the United States without health insurance and improve the overall health of the population (Jeffrey, 2014). There is a scarcity of research on the change in the health of people enrolled in an ACAQHP. Considering the substantial investment in financial resources and time, it is important for the federal government, politicians, public health leaders, health care providers, and patients to understand whether people enrolled in ACAQHP achieve improved health. My study provided an opportunity to examine the health of patients enrolled in an ACAQHP.

To measure the relationship between health outcomes and enrollment in an ACAQHP, I selected the HIV/AIDS patient population for several reasons. First, I had access to secondary data provided by the Florida Department of Health to assess quality outcomes once IRB approval was obtained. Second, people with HIV residing in the Florida have failed to meet the global health goals set by the World Health Organization and the United Nations regarding the minimum percentage being subscribed ART medications and becoming virally suppressed (Florida Department of Health, 2016a).

Through examination of the impact that the ACA has on improving the health of PLWHA, this study has the potential to promote positive social change by assisting marginalized populations in understanding whether ACA health insurance coverage improves their overall quality of life. Marginalized populations, including African Americans, Hispanics, and the poor, represent the largest group of people to receive health care coverage through the ACA (Ferris, 2015). HIV also affects marginalized populations because it has disproportionately infected racial, ethnic, and sexual minorities and people with reduced financial means (Abara & Heiman, 2014; Yehia et al., 2014). Because researchers have not examined the impact of the ACA on the health of PLWHA in the state of Florida, the results from my study may provide important information to close a gap in the literature among the scientific community. Furthermore, the findings from my study may help raise awareness of the relationship between ACA health insurance coverage and enhanced quality of life for PLWHA. The results will be shared with Ryan White programs throughout the United States to help determine how RWHAP financial resources can be optimized to improve the health of PLWHA.

Summary

The ACA was passed in 2010 and was the most substantial piece of health care legislation enacted since the passage of Medicare and Medicaid in 1965. The primary objective of the ACA is to increase the percentage of Americans with health insurance so more people can access needed medical care and achieve an improved level of health. Although federal expenditures on the ACA will exceed $716 billion by 2024, little research has been conducted addressing the impact on health of this health care initiative. The objective of my study was to compare the health of PLWHA enrolled in either the RWHAP or an ACAQHP within the state of Florida. I also examined the relationships between demographic factors, out-of-pocket medical expenses, treatment compliance, and engagement in care on the health of this patient population. The results of this study may provide quantitative data to determine the impact on health of the ACA and provide strategies to optimize the percentage of PLWHA achieving viral suppression. The literature review in Chapter 2 provides an overview of the HIV/AIDS virus, the ACA, the RWHAP, and the impact that health insurance coverage has on the utilization of health care services and health outcomes.

Chapter 2: Literature Review

Introduction

HIV, the virus that causes AIDS, is an important global health problem. In 2015, 2.1 million people were newly diagnosed with HIV, which increased the total number of infected worldwide to 36.7 million (U.S. Department of Health & Human Services, 2017l). Nearly 60% of people with HIV worldwide are unaware of their disease status, and this can contribute to the spread of the disease (U.S. Department of Health & Human Services, 2017f; World Health Organization, 2016a). There is no cure for HIV, and if untreated, HIV can develop into AIDS, which damages the immune system and leads to the development of opportunistic infections that are often fatal (U.S. Department of Health & Human Services, 2017f). Approximately 35 million people globally have died from complications associated with the disease (World Health Organization, 2016a). In 2015, more than 1.1 million people living with HIV died throughout the world (World Health Organization, 2016a).

Since the first reported case of HIV/AIDS in the United States in 1981, an estimated 1.9 million people have been diagnosed with HIV (The Henry J. Kaiser Family Foundation, 2016a). Approximately 700,000 Americans have died from HIV/AIDS-related complications, and an estimated 1.1 million people in the United States are currently infected with the disease (CDC, 2016c, 2016d; The Henry J. Kaiser Family Foundation, 2016a; U.S. Department of Health & Human Services, 2017m). In 2015, 39,513 new cases of HIV were reported while 6,721 PLWHA perished from the disease (CDC, 2016c, 2016d; U.S. Department of Health & Human Services, 2017m).

Although HIV continues to spread, the rate of new infections in the United States is decreasing. From 2005 to 2014, the annual number of newly reported HIV cases declined by 19% (CDC, 2016d; The Henry J. Kaiser Family Foundation, 2016a; U.S. Department of Health & Human Services, 2017m). This decline has been attributed to the increased utilization of routine HIV testing and the improved efficacy of ART medications (Drainoni et al., 2015; The Henry J. Kaiser Family Foundation, 2016a). ART medications have enabled virally suppressed PLWHA to achieve a life expectancy comparable to the general population, rendering HIV a chronic medical condition as opposed to a death sentence (Doshi et al., 2015; Drainoni et al., 2015; Maulsby et al., 2015).

Comprehensive health insurance coverage has been found to be positively associated with improved health status for PLWHA. Yehia et al. (2014) stated that PLWHA who have health insurance coverage are less likely to develop AIDS and experience premature death. PLWHA are often uninsured. In 2014, an estimated 30% to 40% of PLWHA did not have comprehensive health insurance and relied solely on support from the RWHAP (Rozin et al., 2015). Although the RWHAP provides needed HIV-related health care services to PLWHA and has been found to be related to improved treatment outcomes, it does not provide comprehensive health care coverage and is not a health insurance product (Bradley et al., 2016). The RWHAP offers HIV-related care and support services on an outpatient basis and, as a payer of last resort, only provides care after all other sources of insurance coverage have been exhausted (Morin, 2015).

To improve insurance coverage access and benefit quality for the underinsured and uninsured, the ACA was passed into law in 2010 (U.S. Department of Health & Human Services, 2016b). Extensive resources have been committed by the United States Federal Government to implement the ACA. However, I found no studies that addressed whether the comprehensive health insurance provided by the ACA has improved the overall health status of PLWHA compared to PLWHA who are enrolled in the RWHAP within the state of Florida. Further research was warranted to examine whether comprehensive health care coverage provided by the ACA improves the health status of PLWHA within Florida. The purpose of this quantitative research study was to determine whether the comprehensive care provided by the ACA improves the health of PLWHA within Florida.

Chapter 2 is divided into the following sections. First, I provided a description of the literature search strategy. Second, I provided a description and literature review of Andersen’s behavioral model of health services use, which served as the theoretical foundation for this study and a description of the appropriateness of Andersen’s model for use in this study. Finally, I provided a literature review addressing the dependent and independent variables, HIV/AIDS, the ACA, the RWHAP, and the impact that health insurance coverage has on the utilization of health care services and health outcomes.

Literature Search Strategy

I conducted an online literature review using, CINAHL, Google, Google Scholar, Medline, and PubMed to develop an understanding of the current information published on the ACA, HIV/AIDS, the RWHAP, the health benefits of having health insurance, and

Andersen’s behavioral model of health services use. The search terms included *Affordable Care Act (ACA), ACA out-of-pocket costs, access to care, AIDS, Antiretroviral therapy (ART), ART adherence* and *viral suppression, behavioral model of health services use, continuum of care, health benefits of health insurance, health care reform, high deductible health plans, HIV, HIV engagement in care, HIV patient demographics, HIV physician visits, HIV prescribed ART, HIV retention in care, HIV treatment cost, HIV viral load suppression, Ronald Andersen, Ryan White HIV AIDS Program (RWHAP),* and *RWHAP continuum of care*.

The search terms were used individually and in combinations to narrow the search results. Search results were restricted to peer-reviewed journals and the websites of federal and state governmental agencies, international public health organizations, universities, health care foundations, and HIV/AIDS organizations. The time frame of the literature review was articles published between 2012 and 2018. Older references were selected if they were considered seminal studies, were included in the citation lists of other peer-reviewed references from within the restricted time frame, or were in other studies with a similar focus.

Theoretical Foundation

Behavioral Model of Health Services Use

The theoretical foundation for study was Andersen’s behavioral model of health services use. Andersen developed the behavioral model of health services use to understand the factors that determine how and why health care services are utilized (Babitsch, Gohl, & von Lengerke, 2012; Graham et al., 2017). Since the creation of the behavioral model of health services use in 1968, the model has gained widespread acceptance and has become the most commonly used framework for exploring the factors that impact health care access and utilization (Babitsch et al., 2012; Graham et al., 2017). The model has been used to predict and explain the use of health care services (Andersen, 1995). Although the model has evolved since its development due to changes in the health care delivery system, health policy, health care financing, and feedback from academicians and health care professionals, the updates have expanded the scope of the model and have not changed any of the essential elements or relationships among the central variables (Andersen, 2008).

Figure 1 shows the behavioral model of health services use as revised by Andersen and Newman (2005). This iteration of the model was selected because it was the first to include financial factors that facilitate access to care, such as income and patient out-of-pocket expenses, which served as independent variables in the current study. As shown in Figure 1, the behavioral model of health services use incorporates three stages including an initial predisposition to consume medical services, enabling circumstances that facilitate or inhibit the use of health care services, and illness level that represents a need for medical care (Andersen & Newman, 2005).

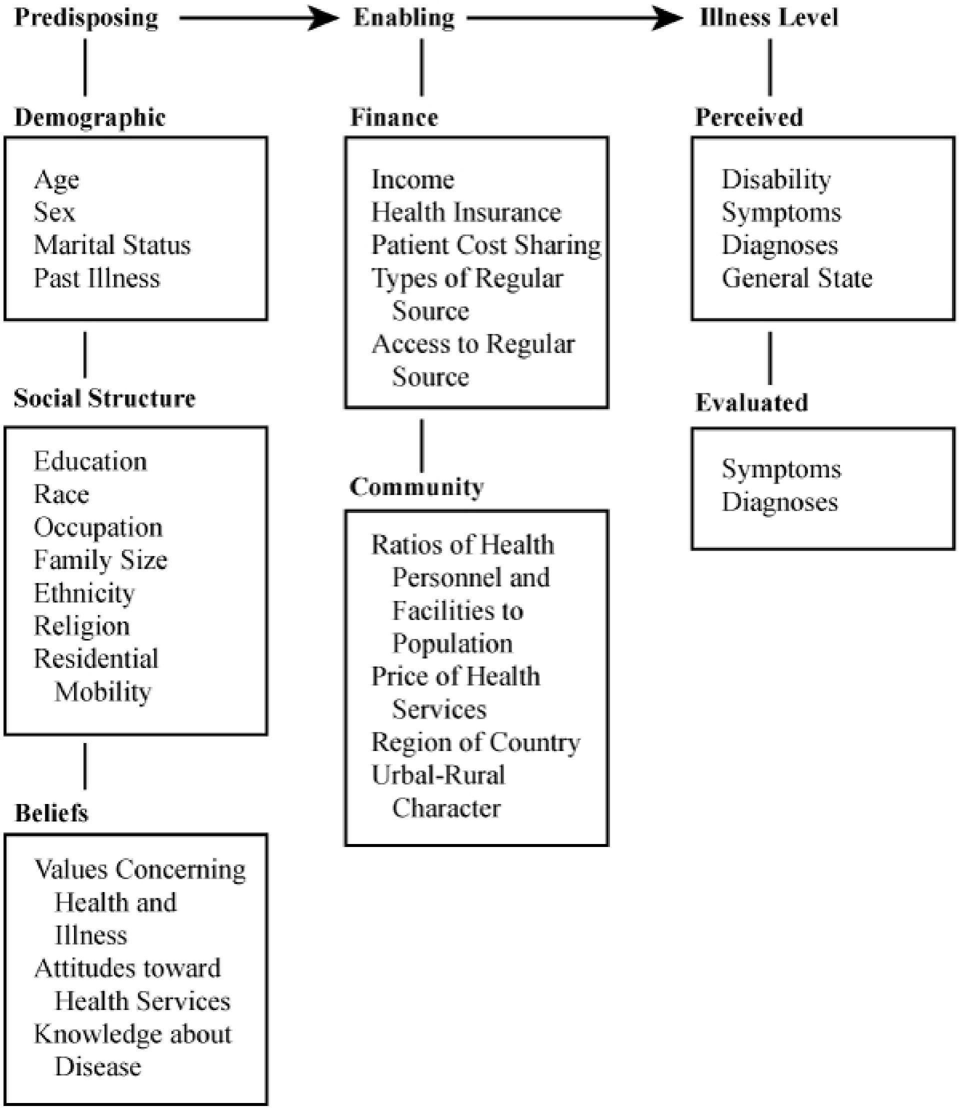

Figure 1. Revised behavioral model of health services use: Individual determinants of health services utilization. Adapted from Anderson and Newman (2005).

Predisposing characteristics. Individuals consume health care services at differing rates. Health care services can be forecast by attributes that are present prior to the onset of a medical condition (Andersen, 1968). Predisposing characteristics that influence health care utilization include demographic factors, social structure, and health beliefs. Demographic factors include age, sex, marital status, and past illness (Andersen & Newman, 2005). Social structure characteristics include traits such as education, race, occupation, ethnicity, and religion (Andersen & Newman, 2005). Finally, health beliefs, represent the perception of the treatment efficacy of medical care (Andersen & Newman, 2005). Individuals having positive feelings about their treatment plan or physician are more likely to use health care services, while people that have less faith in their treatment results are less likely to seek out medical care (Andersen, 1968).

Predisposing characteristics are influencers and not factors that directly cause the use of health care services. For example, age is not a reason to use health care services, yet older age was associated with increased levels of illness and an increased need for medical care (Andersen, 1968). Social structure characteristics are correlated with specific lifestyle choices and are impacted by behavior and the environment in which the family lives, which ultimately influences the consumption of health care services (Andersen & Newman, 2005). Predisposing characteristics are more likely to remain constant over time and precede the enabling characteristics described in the second stage of the model.

Enabling characteristics. Enabling characteristics, the second stage of the behavioral model of health services use are a set of conditions that facilitate access to health care services. Although an individual may be predisposed to utilize health care services, they must possess the resources to receive medical care. Enabling components include both financial and community resources (Andersen & Newman, 2005). Financial resources are the attributes that facilitate access to care including income, savings, health insurance, regular source of care, and the accessibility of care (Andersen & Newman, 2005). Community resources that influence the utilization of health care services, include the quantity, quality, and sophistication of health care facilities and providers and locational convenience (Andersen & Newman, 2005). A community that has a physician shortage may experience a reduced utilization of health services due to the inability of the infirmed to receive or access needed care.

Illness level. Illness level represents the third stage of the model. Presuming that both predisposing and enabling conditions are met, the consumption of health care services will occur if a perceived or evaluated illness exist combined with the individuals response to seek out care (Andersen & Newman, 2005). Characteristics of illness level attributed to the behavioral model include a self-diagnosed health level and symptoms, and an evaluated or clinically diagnosed medical condition.

Model Use in Research

The behavioral model of health services use is frequently cited as a theoretical framework to examine the factors that impact health care access and utilization (Babitsch et al., 2012; Graham et al., 2017; Holtzman, Shea, et al., 2015). The model has been utilized in HIV-related studies where researchers examined topics including access to medical care, linkage to and retention in care, and the access to and the use/adherence of ART medications. Anthony, Gardner, Marks, Anderson-Mahoney, and Metsch (2007) used the model to examine the utilization of HIV primary care services among people recently diagnosed with HIV. Using data obtained from the Antiretroviral Treatment Access Study (ARTAS), the authors examined the impact that age, gender, race, and education (predisposing factors), health insurance coverage, case management services, and having a usual source of medical care (enabling factors) and the existence of HIV symptoms (need factors) had on the probability of consuming health care services (Anthony et al., 2007). They found that racial disparities, education level, gender, insurance status, and experiencing HIV symptoms influenced the use of HIV primary care services. The researchers confirmed that predisposing, enabling, and need factors were associated with the utilization of health care services among people recently diagnosed with HIV (Anthony et al., 2007).

Ulett et al. (2009) customized the model to examine the clinical outcomes associated with timely linkage to and early retention in HIV care. Age, race, ethnicity, poverty, education, mental illness, substance abuse, and stigma were categorized as predisposing factors (Ulett et al., 2009). Enabling factors included insurance status, transportation, housing, social support, and self-efficacy (Ulett et al., 2009). Symptoms and health beliefs were classified as need factors. The independent variables were patient sociodemographic information, medical history, and clinic visit utilization and the dependent variables included early retention in outpatient HIV care and the time it took to initiate ART (Ulett et al., 2009). The authors found that older patients and African Americans took more time to receive a HIV diagnosis and younger patients, and people abusing drugs and alcohol had a lower probability of being retained in care after timely linkage to care (Ulett et al., 2009).

Holtzman et al. (2015) expanded the work of Ulett et al. (2009) by incorporating additional factors into the model to study perceived barriers and facilitators that impacted retention in care and ART adherence for PLWHA. Holtzman et al. (2015) identified five behavioral factors including health literacy, medication characteristics, reminder strategies, competing life activities, and pharmacy services that impacted retention in care and ART adherence that were not included in the work of (Ulett et al., 2009). Holtzman et al. (2015) reported that barriers and facilitators that impacted retention in care included transportation, clinic experiences, and appointment scheduling, while medication characteristics, pharmacy services, health literacy, and health beliefs influenced ART adherence. Factors that impacted both retention and adherence included stigma, mental illness, substance abuse, social support, reminder strategies, housing, insurance, symptoms, and competing life activities.

The behavioral model of health services use was also used as a theoretical foundation for studies examining the access to and the use of ART medications. Smith and Kirking (1999) concluded that women and PLWHA 15 to 24 years old have reduced access to ART medications, while Andersen et al. (2000) reported that vulnerable subgroups of people living with HIV including female drug users, African Americans, and people with less than a high school education were less likely to receive access to ART medications.

Appropriateness to Current Study

People living with HIV must be linked, engaged, and retained in care to achieve viral suppression (Goldman, Juday, Linthicum, Rosenblatt, & Seekins, 2014; U.S. Department of Health & Human Services, 2018d). Timely and appropriate access, and utilization of health care services are paramount to decreasing HIV mortality rates

(Goldman et al., 2014). Andersen’s behavioral model of health services use provides a framework that examines how patient and environmental factors impact health care access and outcomes (Andersen, 1968, 1995, 2008; Andersen, Davidson, & Baumeister, 2013; Andersen & Aday, 1978; Ogunsanya, Jiang, Thatch, Bamgbade, & Brown, 2016). These factors represent the primary focus of this dissertation and reasons detailing the appropriateness of using this model are listed below. First, researchers have successfully used the model to predict and explain how people living with HIV access health care services and ART medications (Andersen et al., 2000; Bozzette et al., 1998; Holtzman, Shea, et al., 2015; Katz et al., 2001; Smith & Kirking, 1999). Second, the predisposing, enabling, and illness factors used in the model align with the topic, study variables and research questions I examined in this study. The key dependent and independent variables in this study include insurance coverage, gender, race, age, education level, income, out-of-pocket medical costs, access to ART medications and medical specialists, and evaluated and diagnosed viral load/health outcomes. These variables have been incorporated into previous HIV research and represent either predisposing, enabling, or illness/outcome factors that are the foundational tenants of Andersen’s behavioral model of health services use (Andersen & Newman, 2005). Ronald Andersen reviewed my prospectus and informed me that his model was aligned with the objectives of this dissertation and would be appropriate to use as a theoretical foundation (R. Andersen, personal communication, October 11, 2016). My study expanded Andersen’s theory because it was the first time the model was used comparing the impact the ACA had on the access to medical services and the health of PLWHA to those enrolled in the RWHAP.

Literature Review Related to Key Variables and/or Concepts

This literature review provides an overview of the key variables and concepts included in this study, and is organized into four sections. The first section provides an overview of the ACA, while the second section summarizes the HIV/AIDS disease. The third section contains background information on the RWHAP, and the final portion of the literature review details the impact that health insurance coverage has on health care access, utilization, and outcomes.

Affordable Care Act

On March 23, 2010, President Barack Obama signed the Patient Protection and Affordable Care Act into law. The goals of the ACA are to reduce the number of uninsured or underinsured Americans and improve the affordability, accessibility, and quality of health care through improved coverage benefits and protections (U.S. Department of Health & Human Services, 2017n). Also known as Obamacare, the ACA was modeled after the universal coverage health reform initiative passed in Massachusetts in 2006, and represented the first national health reform legislation since the Medicare program was created in 1965 (Okoro, Dhingra, Coates, Zack, & Simoes, 2014; Sommers, Long, & Baicker, 2014).

Expansion of health insurance coverage. The ACA provides health insurance coverage to the uninsured through the expansion of Medicaid and the sale of commercial insurance policies through an online marketplace consisting of state and federal exchanges. As originally drafted, the ACA required states to ease eligibility requirements for adults to enroll in Medicaid. These new Medicaid eligibility requirements expanded coverage to families earning up to 138% of the federal poverty level (FPL) and removed the categorical eligibility requirement which limited coverage to children, parents with dependent children, pregnant women, and individuals with disabilities (Berry et al., 2016; Sommers, Musco, et al., 2014). However, the U.S. Supreme Court, in a 2012 ruling, declared that it was unconstitutional for the federal government to force states to expand their Medicaid programs (Wagner, et al., 2014). States retained the option to expand Medicaid eligibility if they desired and 32 states (including the District of Columbia) expanded their Medicaid programs, while 19 states declined to do so (Levitt, Claxton, & Cox, 2016; The Henry J. Kaiser Family Foundation, 2017c).

Online state and federal exchanges were created to help individuals purchase a private ACA qualified health insurance plan (ACAQHP). The objective of these exchanges were to enhance the competitiveness in the health insurance marketplace by providing people greater transparency to compare the costs of the different health insurance plans offered by multiple insurance companies (Kates et al., 2014; Westmoreland, 2016). The ACA contains an individual mandate that requires all U.S. citizens and legal residents, to obtain health insurance coverage or pay a fine by the year 2014 (Kates et al., 2014; Westmoreland, 2016). The penalty for remaining uninsured in 2017 was the greater of 2.5% of annual household income, or an annual per person charge of $695 per adult, $347.50 per child with a maximum of $2,085 per family per year (U.S. Centers for Medicare & Medicaid Services, 2017c). This fine served as an incentive to encourage millions of healthy Americans to sign up for ACA health insurance.

The ACA created four different tiers of insurance coverage, bronze, silver, gold, and platinum. Each tier of health insurance provides different levels of coverage, which influence monthly premium amounts. Monthly health insurance premium costs are primarily determined based on the percent of initially covered services paid by the insurance company. Bronze level plans pay 60% of covered expenses, silver level plans 70%, gold plans 80%, and platinum plans 90% (U.S. Centers for Medicare & Medicaid Services, 2017d). Generally, health insurance plans that pay the smallest percentage of initially covered medical expenses have the highest deductibles and the smallest monthly premiums (U.S. Centers for Medicare & Medicaid Services, 2017d). Conversely, health insurance plans that pay the largest percentage of initially covered expenses have the smallest deductibles and the highest monthly premiums. Bronze level plans typically have the lowest monthly premium, while platinum level plans generally are the most expensive (U.S. Centers for Medicare & Medicaid Services, 2017d). All ACA plans, regardless of tier, have the same annual out-of-pocket expense limit. An annual out-of-pocket expense limit is the maximum cost a patient incurs for deductibles, copayments, and coinsurance in any plan year before the insurance company begins to pay 100% of all covered claims. The amount of money spent on health insurance premiums and any non-covered health expense is not included in the annual maximum out-of-pocket expense limit. During the 2018 plan year the maximum out-of-pocket expense limit for an ACA plan for an individual was $7,350 and $14,700 for a family (U.S. Centers for Medicare & Medicaid Services, 2018b).

Two types of tax subsidies were created to help lower income Americans purchase and use their ACA health insurance coverage. First, the ACA provides subsidies to reduce health insurance premium costs to individuals and families with incomes between 100% and 400% of the FPL (The Henry J. Kaiser Family Foundation, 2017d; Wagner et al., 2014). The amount of the premium subsidy is calculated based on a sliding scale, so enrollees with incomes at 100% of the FPL level receive more financial support than do people earning 400% of the FPL (Westmoreland, 2016). Second, the ACA provides additional cost sharing assistance to reduce patient out-of-pocket expenses for copayments, coinsurance, and deductibles for enrollees earning between 100% and 250% of the federal poverty level (The Henry J. Kaiser Family Foundation, 2017d). Both of these subsidies are classified as tax credits and are paid directly to the health insurance companies (Martin & Schackman, 2012). ACA subsidies are only available to enrollees who select silver level plans (The Henry J. Kaiser Family Foundation, 2017d).

The subsidies provided by the ACA represent an investment to help reduce the number of people that do not have health insurance. Initial projections indicated that in 2014, the federal government would spend $17 billion on subsidies for people who purchased insurance through the ACA exchanges (Jeffrey, 2014). In 2016, the nonpartisan Congressional Budget Office (as cited in Ferris, 2016) reported that subsidy costs increased an additional 11%. By 2023, it is estimated that the annual subsidy cost for ACA health insurance policies will increase to $134 billion (Jeffrey, 2014).

Impact of the ACA on the uninsured. Prior to the implementation of the ACA in 2014, millions of people living in the United States did not have health insurance. In 2013, 44 million nonelderly people were uninsured (Foutz, Squires, Garfield, & Kaiser Family Foundation, 2017; Garfield et al., 2016). By the end of 2016 more than 17 million people gained access to health insurance coverage as the number of nonelderly uninsured people were reduced to 27 million (Garfield et al., 2016; The Henry J. Kaiser Family Foundation, 2016b).

This influx of 17 million newly covered individuals into the market due to the ACA has helped to reduce the disparities in health insurance coverage among low-income people and minorities. The largest groups of newly insured include young people between 18 and 34 years old, poor people, Blacks, Hispanics, and people residing in rural communities (Ferris, 2015). The ACA reduced the uninsured rate by 4.7% for Whites, 7.1% for Asians, 7.7% for Blacks, and 9.5% among Hispanics (Levins, 2015; The Henry J. Kaiser Family Foundation, 2016b). The uninsured rate declined 10.1% for people earning less than 100% of the FPL, 11.1% for those earning between 100% and 199%, and 3.0% for people with an income greater than 200% of FPL (The Henry J. Kaiser Family Foundation, 2016b). These demographic characteristics of the newly insured ACA members are also representative of the population most likely to contract HIV/AIDS. Zamani-Hank (2016) reported that 87% of PLWHA are young and earn less than 400% of the FPL. The ACA has improved the rate of health insurance coverage among populations that have historically been uninsured and may reduce the uninsured rate among PLWHA.

Features of the ACA. The ACA contains health insurance reforms that prevent private insurance companies from denying coverage to those in need. The ACA prevents insurance companies from denying coverage or raising the premium rates for people with preexisting medical conditions (U.S. Department of Health & Human Services, 2017a). Prior to the passage of the ACA, insurance companies could deny coverage or raise premium rates to people who became sick. The ACA also prohibits insurance companies from enacting annual or lifetime dollar limits on the payment of covered services (U.S. Centers for Medicare & Medicaid Services, 2018a). Insurance companies used annual and lifetime coverage limits to minimize their financial liability when paying claims for people with medical conditions that are costly to treat. Removing these financial coverage limits allow people in need of medical treatment to have their claims covered by their health insurance company. The ACA also forbids insurance companies from retroactively rescinding coverage due to an error or inadvertent mistake on a customer's health insurance application (U.S. Centers for Medicare & Medicaid Services, 2018c). The ACA mandates that insurance companies extend coverage for dependent children up to the age of 26 (Viall et al., 2016). Finally, the ACA prevents insurance companies from discriminating and refusing to insure people based on their sexual orientation and gender identity (U.S. Department of Health & Human Services, 2017o).

The ACA also includes mandates to improve the quality of medical care delivered to patients. The ACA requires insurance companies to devote a minimum percentage of their revenues on enrollee claims and initiatives to improve quality. The required medical loss ratio of premium dollars spent on health care is 80% for health insurance plans sold to individuals and small businesses and 85% for large group plans (Kantarjian, 2017; National Association of Insurance Commissioners, 2018). To improve health, an adequate amount of money should be spent on health care as opposed to insurance company corporate expenses and profits. Prior to the passage of the ACA, insurance companies spent as little as 50% to 60% of their revenues on the payment of medical claims as compared to Medicare which spent 97% of its revenues on health care services (Kantarjian, 2017). Senior citizens are provided prescription drug pricing discounts of 50% when they purchase Medicare Part D approved brand name medications (U.S. Department of Health & Human Services, 2017o). By 2020, the ACA will close the Medicare prescription drug gap, also known as the ‘donut hole’, where beneficiaries are required to pay the true out-of-pocket (TROOP) cost for covered medications until they reach the catastrophic maximum payment level and Medicare drug coverage payments resume (Livingston, 2017). The ACA also requires insurance companies to provide coverage for comprehensive health care services that will improve the quality of medical care offered to patients. Insurance companies under the ACA are required to provide enrollees free preventive care services. Preventive services that patients can access without cost include an assessment for obesity, blood pressure, cholesterol, depression, diabetes, cervical cancer, breast cancer, colorectal cancer, HIV, drug use, tobacco use, and sexually transmitted diseases (Han, Yabroff, Guy, Zheng, & Jemal, 2015; The Henry J. Kaiser Family Foundation, 2015). Researchers have shown that preventive services, offered to patients at no out-of-pocket cost remove barriers that inhibit utilization and reduce mortality rates by helping medical providers diagnose diseases earlier and before they develop into more serious medical problems. Han et al. (2015) reported the utilization of preventive tests increased after the ACA eliminated patient cost sharing for these types of medical services. Finally, to ensure coverage consistency, access, and improved health outcomes, the ACA mandated that all health insurance plans provide coverage for a comprehensive set of ten essential health benefits including “ambulatory patient services, emergency services, hospitalization, maternity and newborn care, mental health and substance use disorder services including behavioral health treatment, prescription drugs, rehabilitative services, laboratory services, chronic disease management, and pediatric services” (U.S. Centers for Medicare & Medicaid Services, 2017f, para. 1). As part of the prescription drug mandate, the ACA requires qualified health insurance plans to provide coverage for a minimum of one medication from each US Pharmacopeia category (U.S. Centers for Medicare & Medicaid Services, 2017f). This prescription mandate ensures that patients enrolled in ACA plans have access to a variety of medications to treat their medical conditions.

Impact of ACA on Access to Care for PLWHA. For PLWHA, the primary benefit of the ACA is improved access to comprehensive care. Crowley and Garner (2015) reported that having health insurance enhances health security and that the RWHAP should not be mistaken for health insurance coverage as it only covers HIV/AIDS-related care on an outpatient basis and is expressly prohibited by law from providing inpatient HIV/AIDS care and coverage for medical issues that are not HIV-related. PLWHA achieve overall improved health when utilizing the defined benefits of a commercial health insurance product. Prior to the enactment of the ACA, PLWHA had difficulty obtaining health insurance coverage as an estimated 24% to 30% were uninsured (Rozin et al., 2015; Viall et al., 2016). The ACA improves access to health insurance coverage among PLWHA by establishing safeguards to ensure they will not be discriminated when applying for or using their health insurance benefits.

Commercial health insurance protections. PLWHA have historically encountered obstacles in obtaining health insurance coverage. Provisions contained in the ACA prevent health insurance companies from denying coverage for preexisting medical conditions such as HIV/AIDS, retroactively rescinding coverage after a person becomes infected with HIV/AIDS, and charging higher premium costs or raising rates to PLWHA (Montague, 2012; U.S. Department of Health & Human Services, 2016a; Viall et al., 2016). ACA insurance coverage must be offered to PLWHA as health care insurance coverage must be made available to all people, regardless of health status, as long as they pay their premiums. The ACA eliminates the annual and lifetime financial limits that insurance companies often imposed on people with chronic diseases such as HIV/AIDS (Abara & Heiman, 2014; U.S. Department of Health & Human Services, 2016a; Viall et al., 2016). This provision is beneficial to PLWHA as treatment is costly and these annual and lifetime were often quickly surpassed. In addition to eliminating lifetime benefit expense limits, the ACA health insurance plans are required to cover at least one drug from every US Pharmacopeia category (Abara & Heiman, 2014; U.S. Department of Health & Human Services, 2016a). As PLWHA are often prescribed pharmaceutical cocktails consisting of multiple ART medications, the ACA now ensures that at least one medication from each of the combination classes is covered.

HIV/AIDS

HIV and AIDS continue to be a substantial health problem for the United States and countries throughout the world. Thirty-six point seven million people are afflicted with HIV/AIDS globally, while more than 1.1 million people in the United States are living with the disease (The Henry J. Kaiser Family Foundation, 2017f; U.S. Department of Health & Human Services, 2017l). HIV is a disease that attacks a person's immune system and eventually inhibits the body from fighting infections and certain types of cancer (CDC, 2016b; U.S. Department of Health & Human Services, 2017h). HIV compromises the ability of the immune system to fight infection by targeting and destroying CD4 cells, and over time, an infected person is unable to fight off viruses, bacteria, and parasites that a healthy person could (CDC, 2016b; U.S. Department of Health & Human Services, 2017h).

The health problems associated with a weakened immune system for people with HIV are identified as opportunistic infections. A patient with HIV who develops an opportunistic infection is then diagnosed with AIDS (U.S. Department of Health & Human Services, 2017b). Opportunistic infections are the most common cause of death for PLWHA and frequently occur when the CD4 count drops beneath 200 cells/mm3. Opportunistic infections that often strike PLWHA include heart disease, tuberculosis, pneumonia, lung disease, weight loss, cancer, meningitis, intestinal disease, and fungal infections (CDC, 2016a; U.S. Department of Health & Human Services, 2017b).

HIV stages and symptoms. Without treatment, HIV progresses through three stages of disease: acute HIV infection, clinical latency, and AIDS. The first stage of the disease, acute HIV infection, typically occurs 2-4 weeks after infection (U.S. Department of Health & Human Services, 2017i). People in the acute infection stage commonly experience flu-like symptoms (fever, muscle ache, sore throat) because the body is fighting the HIV infection. During the acute HIV infection stage, the risk of disease transmission and infecting others is the highest because the body is producing a high quantity of the virus (CDC, 2016b; U.S. Department of Health & Human Services, 2017i). Clinical latency is the second stage of the HIV disease. During this period, the HIV virus continues to slowly spread throughout the body and patients may not experience any symptoms of the disease (CDC, 2016b). HIV is transmissible throughout the clinical latency stage and untreated patients will progress to aids in an average of 10 years (CDC, 2016b), AIDS is the final stage of HIV and occurs as the result of a compromised immune system. Symptoms of AIDS include rapid weight loss, recurring fever, extreme tiredness, diarrhea, prolonged swollen glands, pneumonia, colored skin blotches, and neurological disorders such as memory loss and depression (U.S. Department of Health & Human Services, 2017e). Left untreated, people with AIDS survive about three years, unless they develop an opportunistic infection, which will shorten life-expectancy to approximately one year (U.S. Department of Health & Human Services, 2017i).

People with HIV may advance through the three disease stages at different rates due to individualized factors. The characteristics of patients with HIV that may delay the onset of AIDS include regularly taking ART medications, staying in care, and eating healthy (U.S. Department of Health & Human Services, 2017i). Factors that may hasten an AIDS diagnoses include old age, stress, and comorbidities such as cancer, hepatitis C, and tuberculosis.

HIV/AIDS testing. After a person is diagnosed with HIV, laboratory tests measuring CD4 cell counts and viral load are ordered every 3-6 months. A CD4 count measures the number of CD4 T lymphocytes in a blood sample and provides an indication on the overall health of the immune system (U.S. Department of Health & Human Services, 2017g). A higher CD4 count is indicative of a strong immune system as a healthy adult typically has 500 to 1,600 cells per cubic millimeter (mm3) (U.S. Department of Health & Human Services, 2017g). A person is diagnosed with AIDS when the CD4 count falls below 200 cells/mm3 (U.S. Department of Health & Human Services, 2017f). A viral load test measures the number of copies of HIV particles per milliliter of blood (U.S. Department of Health & Human Services, 2015a). The objective of HIV treatment is to reduce the viral load to an undetectable level, and become virally suppressed. PLWHA that are virally suppressed are healthier and live longer than those that are not virally suppressed and are less likely to transmit HIV to an uninfected sexual or drug partner (Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d).

HIV treatment and cost. Although there is no cure for HIV, the disease can be controlled or virally suppressed with appropriate medical care and treatment (U.S. Department of Health & Human Services, 2017f). The primary treatment for HIV is a combination of antiretroviral medications. Antiretroviral therapy (ART) medications prevent the HIV virus from multiplying and weakening a person’s immune system (U.S.

Department of Health & Human Services, 2017c). Prior to the development of ART medications in the 1990’s, people with HIV developed AIDS in just a few years (CDC, 2016b). A person diagnosed with HIV today, who is treated with ART medications, can live nearly as long as a person who does not have HIV (CDC, 2016b; Drainoni et al., 2015). To achieve the maximum health benefit, ART medications should be taken as soon as a person is diagnosed with HIV (U.S. Department of Health & Human Services, 2018c). ART medications can also be taken on a preventative basis (pre-exposure prophylaxis) to help minimize the chances that higher risk individuals contract HIV (U.S. Department of Health & Human Services, 2017d).

Although treatment with ART medications are effective in controlling the HIV virus, they are expensive. ART medications represent the single largest treatment expense for PLWHA. The lifetime cost of treatment for PLWHA ranges between $300,000 and $400,000 with ART medications comprising 60% to 70% of all incurred expenses (Nakagawa et al., 2015; Schackman et al., 2015). An early HIV diagnosis and initiation of treatment increases the total lifetime cost of ART medications but also improves quality of life and overall life expectancy (Nakagawa et al., 2015; Schackman et al., 2015).

Demographics of PLWHA in the United States. HIV/AIDS is a disease that affects Americans of diverse backgrounds. Since the initial reported case of AIDS in June of 1981, more than 1.9 million people in the United States have been infected with HIV, 1.1 million people are currently living with the disease, and more than 698,000 have perished (The Henry J. Kaiser Family Foundation, 2016a; U.S. Department of Health &

Human Services, 2017m). Among people living with HIV, 77% are male and 23% are female (CDC, 2017b, 2017f, 2017g). Transgendered people have a high prevalence rate for HIV but the exact number infected are unknown due to the lack of uniformly collected data (CDC, 2017d, 2017f). In 2015, males represented 81% of all people newly diagnosed with HIV, while females accounted for 19% (CDC, 2017f; U.S. Department of Health & Human Services, 2017m)

HIV also affects Americans of all ages. Young people are most likely to become infected with HIV, however, teenagers and people over 60 are also contracting the disease (CDC, 2017a, 2018b). Of all people newly diagnosed with HIV in 2016, 66.3% were between 13 and 39 years old, 28.6% were between the ages of 40 and 59, and 4.9% were older than 60 (CDC, 2017f).

HIV and minority communities. While HIV and AIDS effects all types of people, certain groups are more likely to become infected including men who have sex with men (MSM) and racial and ethnic minorities. MSM represent the largest group of people impacted by HIV and AIDS. Although MSM comprise an estimated 2% of the total population in the United States, they represent 55% of all people living with HIV (CDC, 2018a). Black and Hispanic/Latino populations also disproportionately have HIV as compared to people from other racial and ethnic backgrounds. In 2016, Blacks totaled 12% of the U.S. population and 44% of all new HIV diagnoses, while Hispanics/Latinos comprised 18% of the U.S. population and 25% of all new cases of HIV (CDC, 2017f; U.S. Department of Health & Human Services, 2017m). The rate of newly diagnosed

HIV cases in 2016 per 100,000 people was 43.6 for Blacks, 17.0 for Hispanics/Latinos, and 5.2 for Whites (CDC, 2017f).

Racial and ethnic minorities also represent a disparate percentage of people with HIV based on age, sexual orientation, and gender. Youth aged 13-24 are the most common age based group with HIV and 80% are MSM (CDC, 2018b). In 2015, among MSM aged 13-24 who were diagnosed with HIV, 58% were Black, 24% were Hispanic/Latino, and 18% were white (CDC, 2018b). MSM from minority ethnic and racial backgrounds, regardless of age, are also more likely to develop HIV. Among MSM who were diagnosed with HIV in 2015, 10,315 were Black, 7,570 were White, and 7,013 were Hispanic/Latino (CDC, 2018a). HIV disproportionately affects men and women of color. Among women diagnosed with HIV in 2016, 62.6% were black, 17.5% were Hispanic/Latino and 19.9% were White (CDC, 2017f). The rate of HIV infection in 2016 per 100,000 women was 26.2 for Blacks, 5.3 for Hispanic/Latino women, and 1.7 for Whites women (CDC, 2017f). Among men diagnosed with HIV in 2016, 42.5% were Black, 29.3% were White, and 28.3% were Hispanic/Latino (CDC, 2017f). The rate of HIV infection among men per 100,000 people was 24.8 for Blacks, 38.8 for Hispanics/Latinos, and 10.6 for Whites (CDC, 2017f).

HIV and socioeconomic status. Socioeconomic factors including income, poverty level, education, and employment create inequities in access to medical care and treatment outcomes. Reduced socioeconomic status is associated with riskier health and sexual behaviors, IV drug use, and health insurance status, and is associated with an increased probability of becoming diagnosed with HIV/AIDS, a delay in the onset of treatment, and an increased rate of mortality (American Psychological Association, 2018). As part of the seminal National HIV Behavioral Surveillance System for Heterosexuals Round 1 (NHBS-HET-1) study conducted by the CDC in 2006-2007, researchers collected socioeconomic data from people diagnosed with HIV. Although the study was limited to heterosexual participants and included only 188 participants with HIV, lower socioeconomic status related to education, income, poverty, employment status, and homelessness was associated with an increased prevalence of HIV (Denning & DiNenno, 2015). The results from this research study revealed an inverse relationship between HIV prevalence and socioeconomic status.

HIV continuum of care for PLWHA. The HIV continuum of care is a model that was developed to define the stages of HIV treatment and assist in the measurement, monitoring, and delivery of HIV care to PLWHA at each step in the treatment process. The four stages of the continuum of care include diagnosis, engagement in care, prescribed ART, and virally suppressed (CDC, 2017e; U.S. Department of Health & Human Services, 2016b). The first stage of the HIV care continuum is diagnosis. People who are unaware of their HIV infection status will not seek medical treatment, will more likely transmit the virus and infect others, and experience an increased mortality rate (Kay, Batey, & Mugavero, 2016; Mugavero, Amico, Horn, & Thompson, 2013). The second stage of the continuum of care is engagement. As there is no cure for HIV, treatment of the virus is a lifelong process which requires routine office visits with medical providers (U.S. Department of Health & Human Services, 2016b). Poor engagement in care is associated with a reduced CD4 count, lower chance of becoming virally suppressed, and an increased risk of death (Crawford, Sanderson, & Thornton, 2014; Horberg et al., 2013). The third stage of the continuum of care is access to and the appropriate use of ART medications. ART medications, when properly used, decrease the mortality rate of HIV and reduce the likelihood that the virus will be spread to uninfected people (Maulsby et al., 2015; Skarbinski et al., 2015). The final stage of the HIV continuum of care is viral suppression. PLWHA who are virally suppressed live longer than those that are not virally suppressed and are less likely to transmit HIV to an uninfected sexual or drug partner (Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d).

In 2011, 85% of people with HIV throughout the United States were diagnosed with HIV, 40% were engaged in care, 37% were prescribed ART, and 30% were virally suppressed (U.S. Department of Health & Human Services, 2016b). Although these figures show improvement from previously collected data, they still fall below the global health goals for the treatment and viral suppression of PLWHA set by the World Health Organization and the United Nations. The Joint United Nations Program on HIV/AIDS (UNAIDS) launched the 90-90-90 campaign to increase HIV/AIDS detection and treatment (Greenberg et al., 2015; Morin, 2015; UNAIDS, 2018). The objective of the campaign is to improve the detection rate of HIV to 90% of those infected, provide sustained ART treatment to 90% of those detected, and to virally suppress 90% of the cases treated (Morin, 2015; UNAIDS, 2018).

Impact of care engagement on the health of PLWHA. Engagement in care is an important determinant of the health of PLWHA. The CDC determined that PLWHA were engaged in care if they had a minimum of two HIV-related medical appointments during the previous 12 months that were separated by at least three months (CDC, 2017e; Kay et al., 2016). Poor engagement in care is associated with a delay in the initiation of ART medication, an increased rate of medication noncompliance, viral non-suppression, and an increased risk of death (Asamsama et al., 2017; Berg et al., 2005; Mugavero et al., 2013). PLWHA who remain consistently engaged in care are more likely to achieve and maintain long-term viral suppression and experience reduced mortality rates (Crawford, 2014; Crawford et al., 2014).

Other researchers identified an association between the number of missed medical visits and viral non-suppression. Brennan, Maskew, Sanne, and Fox, (2010) found the failure rate to achieve viral suppression within the first six months of initiating ART medications was 6.6% for patients who did not miss an appointment, 6.8% for those who missed one appointment, 10.9% for patients who missed two appointments, and 15.1% for patients who missed three or more appointments. Missed clinic visits are associated with reduced health outcomes as each missed medical appointment increased the risk of delayed viral load suppression by 17% (Mugavero et al., 2012). Poor engagement in care increased the occurrence rate of AIDS related illness or death as the mortality rate per 100 person-year was 2.1 for patients with no missed appointments, 5.8 for patients with 1 missed appointment, 8.9 for patients who missed 2 appointments, and 11.7 for patients who missed 3 or more visits (Park et al., 2007).

Impact of viral load suppression on the health of PLWHA. Viral load is the amount of HIV virus in a sample of blood. A viral load test is completed in a laboratory and measures the number of HIV virus particles or copies in a milliliter of blood (U.S. Department of Health & Human Services, 2015a). The goal of an effective HIV treatment plan is to suppress the viral load down to an undetectable level. A PLWHA is considered to be virally suppressed if their viral load is beneath 200 copies per milliliter (U.S. Department of Health & Human Services, 2015a). Viral load is commonly used to measure the health status of PLWHA. Both the World Health Organization and the CDC recommend using viral load levels to benchmark the degree in which ART medications control and suppress the HIV virus and to assess overall health status among PLWHA (U.S. Department of Health & Human Services, 2016c; World Health Organization, 2016b).

PLWHA who are virally suppressed are less likely to develop a HIV related opportunistic infection, transmit the virus to an uninfected sexual or drug partner, and are more likely to live healthier and longer lives (Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d). Of the 1.1 million PLWHA in the United States, only 361,764 (30%) were virally suppressed (Bradley et al., 2014). Men, Blacks and Hispanics/Latinos, younger PLWHA, and those with a low socioeconomic status were less likely to become virally suppressed then women, Whites, older PLWHA, and those with a higher socioeconomic standing (Adeyemi, Livak, McLoyd, Smith, & French, 2013; Bradley et al., 2014; Crawford et al., 2014).

Impact of ART medication adherence on the health of PLWHA. PLWHA require long-term therapeutic intervention with ART medications to optimize their health by becoming virally suppressed. Prior to the introduction of ART medications in 1996, HIV/AIDS was a terminal health condition resulting in certain death (Deeks, Lewin, & Havlir, 2013; Goldman et al., 2014). Now, PLWHA who properly take their ART medications can become virally suppressed and experience a life expectancy equal to that of the general uninfected population (Deeks et al., 2013). ART medication adherence directly impacts the effectiveness of ART treatment and viral load suppression and is the strongest predictor of viral suppression failure (CDC, 2012). Inadequately adhering to an ART regimen results in an increased rate of hospitalization, viral load, morbidity and mortality (Olson et al., 2014).

ART medication adherence is defined as the degree to which a PLWHA takes their ART medications at the correct dose and interval, and complies with other instructions issued by the treating medical provider (U.S. Department of Health & Human Services, 2018a). A sustained high level of ART medication adherence is crucial to becoming virally suppressed. While early researchers indicated that ART adherence rates of 90% were required to achieve viral suppression, due to the development of more effective ART medications, viral suppression can now be achieved at ART adherence rates as low as 80% (CDC, 2012; Kalichman et al., 2014; Machtinger & Bangsberg, 2018; U.S. Department of Health & Human Services, 2016c).

Holtzman, Brady, and Yehia, (2015) found that patient self-reported data over a 30 day period was an appropriate measure to determine ART treatment compliance. This personal estimate of ART usage can be used to calculate the proportion of days a person had access to ART medications and is instrumental in evaluating non adherence due to late refills or discontinued care (Holtzman, Brady, et al., 2015). Machtinger and

Bangsberg (2018) also suggested that patient self-reported data can be used to measure overall treatment compliance.

Ryan White HIV/AIDS Program

The Ryan White HIV/AIDS program (RWHAP) was created by Congress as part of the Ryan White Comprehensive AIDS Resource Emergency (CARE) Act of 1990 and serves as a safety net by providing medical care and ART medications for lower income PLWHA (The Henry J. Kaiser Family Foundation, 2017b). The legislation was named after Ryan White, a 13 year old hemophiliac, who contracted aids in the 1980s from a blood transfusion (Sood et al., 2014; Zamani-Hank, 2016). The RWHAP is administered by the HIV/AIDS Bureau at the Health Resources and Services Administration (HRSA), a division of the U.S. Department of Health and Human Services (HRSA, 2017a). In 2016, funds from the RWHAP provided comprehensive HIV/AIDS-related medical care and treatment to more than 535,000 PLWHA, reaching an estimated 48% of all people diagnosed with HIV in the United States (HRSA, 2017g; U.S. Department of Health & Human Services, 2017m). RWHAP eligibility guidelines require a HIV or AIDS diagnosis and either no health insurance coverage or limited coverage that does not fully pay for all HIV/AIDS-related health care services (HRSA, 2016b). There are also financial guidelines that regulate eligibility to enroll in the RWHAP. Although cities and states individually determine their own enrollment guidelines and benefits offered, participants must have a low annual income (Adimora, Ramirez, Schoenbach, & Cohen, 2014; HRSA, 2016b).

RWHAP funding. Since the creation of the RWHAP in 1990, Congress has reauthorized program funding in 1996, 2000, and 2009 (Johnson & Heisler, 2015; The Henry J. Kaiser Family Foundation, 2017b). The most recent Congressional authorization for the RWHAP lapsed in 2013. However, the original law did not contain a sunset provision or end date so funding for the RWHAP has been continually renewed based on annual appropriations from Congress (Johnson & Heisler, 2015; The Henry J. Kaiser Family Foundation, 2017b). Funding for the RWHAP has risen over time due to the treatment success and wide use of ART medications. Federal funding for the RWHAP in fiscal year 1991 was $257 million, $1 billion in 1998, and surpassed $2 billion in 2004 (Johnson & Heisler, 2015). The U.S Department of Health and Human Services allocated $2.32 billion in funding to the RWHAP in fiscal year 2017 (HRSA, 2017h; The Henry J. Kaiser Family Foundation, 2017e). With an annual budget of $2.32 billion, the RWHAP was the largest recipient of financial resources focused exclusively on HIV/AIDS care, and trailed only Medicare ($10.1 billion) and Medicaid ($6.1 billion) in HIV/AIDS-related federal spending (The Henry J. Kaiser Family Foundation, 2017e).

RWHAP structure and covered services. The RWHAP is comprised of five parts (A, B, C, D, and F):

Part A. Part A of the RWHAP provides funding grants to one of the 24 Eligible Metropolitan Areas (EMAs) or 28 Transitional Grant Areas (TGAs) which are located in the areas of the United States that are most severely affected by the HIV/AIDS epidemic (Crowley & Kates, 2013; HRSA, 2017b). To qualify as an EMA, an area must have a population of at least 50,000 people and have a minimum of 2,000 reported cases of

AIDS in the previous five years (HRSA, 2017b). TGA eligibility criteria include 1,000 to 1,999 reported cases of AIDS over the past 5 years in an area with a population of 50,000 people (HRSA, 2017b). The 52 EMAs and TGAs are all different sizes and are geographically dispersed throughout the United States. Some include only one city or county, while others comprise portions of multiple states (HRSA, 2016c). Part A of the RWHAP provides core medical and support services to PLWHA. Core medical services include the AIDS Drug Assistance Program (ADAP), AIDS pharmaceutical assistance, early intervention services, health insurance premium and cost sharing assistance for low-income individuals, home and community-based services, home health care, hospice services, medical case management services, including treatment-adherence services, medical nutrition therapy, mental health services, oral health, outpatient and ambulatory medical care, and substance abuse outpatient care (HRSA, 2017b). Support medical services include caregiver respite care, medical transportation services, outreach services, and translation services (HRSA, 2017b). Fiscal year 2017 RWHAP Part A funding was $654.2 million (HRSA, 2017h).

Part B. Part B of the RWHAP authorizes monetary grants to each of the 50 states, the District of Columbia, and all 8 U.S. Territories to improve the access and quality of health care for PLWHA (HRSA, 2017c). The specific services provided by Part B are determined by each state, and are generally similar to the core medical and support services provided in Part A of the RWHAP (HRSA, 2017c; The Henry J. Kaiser Family Foundation, 2017b). The second component of Part B funding provides RWHAP clients access to medications to treat the HIV/AIDS virus and other comorbidities associated with the disease (HRSA, 2017c). Funds from the Part B ADAP may also be used to pay the health insurance premiums and other out-of-pocket insurance costs such as copayments, coinsurance, and deductibles for RWHAP clients (HRSA, 2017c; Johnson & Heisler, 2015). Total fiscal year 2017 Part B funding was $1.31 billion, of which $900 million was allocated to the ADAP and the remaining $411 million was apportioned to pay for core medical and support services (HRSA, 2017h).

Part C. Part C of the RWHAP provides funding for early intervention services and capacity development and planning grants. Early intervention services offered under Part C include HIV testing, case management services, and counseling to reduce risks to people recently diagnosed with HIV/AIDS (HRSA, 2017d; The Henry J. Kaiser Family Foundation, 2017b). Part C development and planning grants enable public and private organizations to improve their organizational infrastructure to deliver higher quality HIV primary health care services (HRSA, 2017d). Fiscal year 2017 Part C funding was $200.5 million (HRSA, 2017h).

Part D. Part D grants authorize funding to public and private nonprofit organizations to provide HIV/AIDS health care services to women, infants, children, and youth. Services offered under Part D include outpatient health care, case management, referrals, clinical trials, and additional support services (HRSA, 2017e). The 2017 fiscal year allocation to Part D was $74.9 million (HRSA, 2017h).

Part F. Finally, funding from Part F of the RWHAP supports AIDS education and training centers, dental reimbursement programs, and special projects of national significance (HRSA, 2017f, 2018a, 2018b). AIDS education and training centers offer professional development educational services to health care providers who treat patients with HIV in clinics, hospitals, addiction treatment centers, mental health facilities, and health departments. Dental schools and dentists are provided reimbursement for non-compensated oral health care services provided to PLWHA and additional funds are allocated to support special projects of national significance to assist in the creation of alternative models of HIV care delivery that enhance quality, reduce costs, and help develop the health information systems within the RWHAP (HRSA, 2017f, 2018b). The total grant awarded under Part F in fiscal year 2017 was $71.5 million (HRSA, 2017h).

RWHAP coverage status. The services provided to PLWHA by the RWHAP are dissimilar to those provided by a health insurance company. The RWHAP does not provide coverage for comprehensive health care services. The RWHAP covers only outpatient HIV/AIDS-related medical care and treatment (Crowley & Garner, 2015; Emory Health care, 2017; Westmoreland, 2016). Specifically excluded from coverage under the RWHAP are medical services provided in an emergency room or a hospital inpatient setting, medical care by general physicians and subspecialists, and prescription medications unrelated to the treatment of the HIV/AIDS virus (Crowley & Garner, 2015; Emory Health care, 2017). Unlike a health insurance company, the RWHAP does not serve as the primary payer of HIV/AIDS-related medical claims. Federal statutes classify the RWHAP as a payer of last resort. Funds from the RWHAP may not be used to pay for any health care service in which payment has been rendered, or is expected to be rendered, from any health insurance policy or federal or state health benefits program (HRSA, 2014; Johnson & Heisler, 2015). Organizational recipients of RWHAP funds are required to access alternative sources of funds whenever possible and are required by law to attempt to enroll their clients into alternative health care programs that they may be eligible for, including private health insurance, Medicare, and Medicaid (HRSA, 2014; Johnson & Heisler, 2015).

RWHAP insurance purchasing and cost sharing assistance. Increasing numbers of PLWHA are obtaining health insurance coverage through ACA qualified health plans (ACAQHP). Private health insurance coverage is expensive as enrollees are often faced with large monthly premiums and high out-of-pocket expenses including copayments, coinsurance, and deductibles. Provisions of the RWHAP permit the use of RWHAP funds to cover ACA health insurance coverage premiums and any associated out-of-pocket expenses (Eaton & Mugavero, 2016; Zamani-Hank, 2016). The HIV/AIDS Bureau has authorized the use of RWHAP funds to purchase health insurance coverage since its initial passage in 1990 (Dawson & Kates, 2015).

While language in the original CARE Act focused on maintaining continual insurance coverage for PLWHA, updated policy guidelines and the 2006 reauthorization legislation specifically affirmed that funds could be used for purchasing new health insurance (Dawson & Kates, 2015). Although health insurance premium and cost sharing assistance is allowable under multiple sections of the RWHAP (Parts A, B, C, and D) the principal funding source is derived from the Part B ADAP (Dawson & Kates, 2015; HRSA, 2014). Although Part B of the RWHAP was initially intended (and continues) to provide medications for PLWHA, a greater emphasis has been placed on insurance purchasing and cost sharing assistance. In 2003, ADAP funds were used to purchase health insurance coverage and provide cost sharing assistance to 6% of clients nationwide, compared to 35% in 2013 (Dawson & Kates, 2015).

The proliferation of ACAQHPs has increased the complexity and importance of insurance purchasing and cost sharing subsidies to PLWHA. HRSA issued guidance notices to grantees strongly encouraging them to use RWHAP funds to help clients purchase health insurance through ACAQHPs (Dawson & Kates, 2015). The Centers for Medicare and Medicaid Services (CMS) also support the use of RWHAP funds to purchase ACAQHPs. In response to a lawsuit against an insurer in Louisiana who refused to accept RWHAP funds as payment for health insurance coverage, the CMS in 2014 issued interim final rule CMS-9943-IFC which required insurance companies participating in the ACA to accept third party payments from the RWHAP for insurance premiums and cost sharing assistance (Dawson & Kates, 2015). As of June 2014, the RWHAP has facilitated the enrollment of 16,000 people into ACAQHPs (Dawson & Kates, 2015).

RWHAP client demographics. In 2016, the RWHAP provided services to more than half a million PLWHA who were generally older, male, from a racial or ethnic minority population, and poor. At that time, 44.9% of PLWHA served by the RWHAP were older than age 50 and an additional 23.9% were between the ages of 40 and 49, while only 12.9% were younger than 30 years of age (HRSA, 2017g). Among the PLWHA served by the RWHAP in 2016, 71.7% were male, 27.0% were female, and 1.3% were transgendered (HRSA, 2017g). Racial and ethnic minorities were also more likely to use RWHAP services in 2016, as they represented 73.2% of the total number of clients served. In 2016, 46.9% of RWHAP clients with HIV/AIDS were black, 23.2% were Hispanic/Latino, 26.8% were white, and the remaining 3.1% were American Indian, Alaska Native, Asian, Native Hawaiian/Pacific Islander, and persons of multiple races (HRSA, 2017g).

RWHAP clients with HIV/AIDS that used services in 2016 had low annual incomes as 62.7% earned less than 100% of the FPL, while an additional 28.4% of clients earned between 101% and 250% of the FPL. In 2016, only 8.9% of RWHAP clients earned more than 251% of the FPL (HRSA, 2017g). Although RWHAP clients had low annual incomes, approximately 80% had health insurance coverage. Among PLWHA using RWHAP services in 2016, 32.4% had health insurance coverage through Medicaid, 16.5% were covered by a commercial carrier, 10.6% were insured through Medicare, 10.1% had several forms of coverage, and 20.5% were uninsured (HRSA, 2017g).

Impact of the RWHAP on care engagement and viral suppression rates. RWHAP clients achieve increased rate of engagement in care, access to ART medications, and viral suppression compared to PLWHA who do not receive services through the program. Among PLWHA throughout the United States, 40% are engaged in care, 37% are prescribed ART, and 30% are virally suppressed (U.S. Department of Health & Human Services, 2016b). Among PLWHA enrolled in the RWHAP 81% are engaged in care and 84% are virally suppressed (HRSA, 2016c).

Relationships Between Health Coverage and Outcomes for PLWHA

Health insurance provides a way to finance health care expenses and protects a person who is utilizing health care services from paying the full cost of treatment. In exchange for a predetermined premium cost, a health insurer is contractually obligated to pay a defined portion of covered medical expenses. Health insurance coverage enhances health outcomes by decreasing disparities in access to health care services. Diminished access to medical services reduces overall health and increases the mortality rate. Wilper et al. (2009) determined that the lack of health insurance is a contributing factor in death as the mortality rate was 40% lower for people with insurance coverage compared to people without insurance coverage. In 2015, the lack of health insurance contributed to the deaths of 44,789 Americans between 18 and 64 years old and would have been the 10th leading cause of mortality in the United States if classified as a medical disorder (CDC, 2017c; Wilper et al., 2009). Health insurance coverage provides improved clinical outcomes for patients with HIV/AIDS. Goldman et al. (2001) concluded that health insurance reduced the 6-month baseline mortality rate by 71% and 85% at follow-up, compared to those who were uninsured. Patients with commercial health insurance coverage more frequently achieved sustained viral suppression compared to participants who were uninsured (Yehia, Fleishman, Metlay, Moore, & Gebo, 2012) and health insurance coverage for PLWHA has been associated with prolonged viral suppression and a reduction in the progression of HIV to AIDS and premature death (Yehia et al., 2014).

ACA coverage and outcomes. Three important changes have been identified in the impact of the ACA on the health of PLWHA. First, provider-initiated HIV screenings have increased due to improved access to care (Carter, Owens, & Lin, 2017). Second, McManus et al. (2016), McManus et al. (2018), Raifman et al. (2018), and Dawson and

Kates (2019) reported that the viral load suppression rate for PLWHA enrolled in an ACAQHP was the same or higher than the viral load suppression rate for PLWHA enrolled in the RWHAP. Third, Simon, Soni, and Cawley (2017) reported the expansion of health insurance coverage due to the ACA increased the probability of having a HIV test by 5%. HIV testing is essential to diagnose HIV and achieve viral load suppression, which results in an improved overall health status and mortality rate.

The rate of hospitalization for PLWHA was higher in states that did not expand Medicaid as part of the ACA compared to states that did expand their Medicaid programs. The hospitalization rate of uninsured PLWHA dropped in ACA Medicaid expansion states from 13.7% to 5.5%, while the hospitalization rate in non-Medicaid expansion states increased from 14.5% to 15.7% (Hellinger, 2015). PLWHA who enrolled in Medicaid coverage provided through the ACA were less likely to die during their hospitalization as uninsured PLWHA experienced a 41% higher mortality rate while in the hospital compared to patients with insurance (Hellinger, 2015). Finally, low income adults with chronic medical conditions who enrolled in Medicaid coverage provided through the ACA reported enhanced access to care, medication adherence, and self-reported health (Simon et al., 2017; Sommers, Maylone, Blendon, Orav, & Epstein, 2017)

Health coverage, out-of-pocket expenses, and outcomes. The failure of the federal government and the Affordable Care Act to include mechanisms to regulate health care costs and decrease health care expenditures have compelled issuers of ACAQHP policies to incorporate large deductibles to minimize the cost of health insurance premiums (Wharam, Ross-Degnan, & Rosenthal, 2013). Insurance policies with high deductibles generally cost less than traditional health insurance, however, they burden patients with considerable out-of-pocket medical expenses (Bebinger & Murphy, 2015; Wharam, Zhang, Landon, Soumerai, & Ross-Degnan, 2013). For calendar year 2018, the Internal Revenue Service set the minimum deductible for a high deductible health plan at $1,350 for an individual and $2,700 for a family, while the maximum out-of-pocket expense for an individual was $6,650 and $13,300 for a family (Internal Revenue Service, 2017a).

As the cost of health insurance continues to increase, more people are selecting health policies that contain high deductibles. Created in 2003, millions of people with health insurance are now enrolled in high deductible health plans (Dolan, 2014; Grens, 2013). In 2009, 21% of people with group health insurance coverage and 47% of people who purchased individual health policies enrolled in plans with high deductibles (Beeuwkes-Buntin, Haviland, McDevitt, & Sood, 2011). By 2016, 35% of people with employer sponsored group health insurance and 54% of people who purchased individual health policies were enrolled in high deductible health plans (U.S. Department of Health & Human Services, Cohen, & Zammitti, 2017). Nearly 90% of people who purchased individual ACA policies through the marketplace were enrolled in a health insurance plan with a large deductible (Murphy, 2016).

Health insurance plans with high deductibles adversely impact two important principles of insurance coverage; to defend against large costs after needed medical services are consumed and to reduce barriers that inhibit access to care in order to maximize health status (U.S. Department of Health & Human Services et al., 2017). Researchers have shown that allocating greater financial costs to people enrolled in high deductible health plans results in medical care avoidance and an overall reduction in the utilization of medical care (Taber et al., 2015; U.S. Department of Health & Human Services et al., 2017). Medical care avoidance is characterized as an intentional failure to obtain timely treatment for a medical condition (Taber et al., 2015; U.S. Department of Health & Human Services et al., 2017). Multiple researchers indicated that between 33% and 43% of patients enrolled in a high deductible health plan deferred or skipped physician recommended diagnostic tests or procedures due to large out-of-pocket expenses and that adults with high deductibles were 2.7 times more like to delay or forgo care than were adults with traditional health insurance (Galbraith et al., 2012; Kannan & Veazie, 2014; Murphy, 2016).

The ability of a patient to afford medical care is impaired when the deductible amount increases as a percentage of annual income. Murphy (2016) reported that patients chose to avoid seeking needed medical care when deductibles reached 5% of their annual income. Deductibles under the ACA are often greater than this threshold. In 2018 a family of four enrolled in a high deductible health plan earning 200% of the FPL ($50,200 annually) would spend 26.5% of their annual household income on out-of-pocket payments for medical expenses before their insurance company began fully paying for all covered claims (U.S. Department of Health & Human Services, 2018b). The same sized family earning 300% of the FPL ($75,300 annually) would consume 17.7% of their income on health care expenses (U.S. Department of Health & Human

Services, 2018b). Individuals with an annual income of less than $19,999 and between $20,000 and $34,999 were 4.85 and 5.22 times more likely to avoid seeking medical care due to cost than were people earning more than $100,000 per year (Galbraith et al., 2012; Kannan & Veazie, 2014). Forty percent of families earning less than 400% of the FPL with a high deductible health plan delayed or refused needed medical care, compared to 15% of people with similar annual income who had traditional health insurance coverage (Galbraith et al., 2012; Kannan & Veazie, 2014)

Delayed access to care and outcomes. Severe health consequences can occur when people avoid obtaining needed medical care when they are sick. Delayed care results in a delayed diagnosis, an increase in overall suffering, reduced treatment options for a wide variety of health diseases including HIV, cancer, heart disease, stroke, and arthritis, and a rise in overall mortality (Kannan & Veazie, 2014; Taber et al., 2015). For PLWHA, delayed engagement in HIV medical care or the start of ART medications reduces the chances of viral load suppression and increases the overall rate of mortality and the chances of transmitting the disease to non-infected people (Fatukasi et al., 2017; U.S. Department of Health & Human Services, 2016b, 2018c). Patients with other treatable chronic conditions also experience increased mortality rates due to delayed access to medical care. Among patients with oral cancer, nearly 40% postponed seeing a physician until the disease had progressed to stage 3 or 4, while 50% of patients diagnosed with rectal cancer delayed seeking medical care for at least 6 months (Kannan & Veazie, 2015). Finally, patients with curable illnesses that are not promptly treated often end up seeking out care in more expensive settings such as hospitals and incur longer lengths of stay. Murphy (2016) stated that nearly 80% of emergency room physicians reported treating patients for a preventable medical condition because they delayed seeking care due to out-of-pocket costs that were unaffordable.

Summary and Conclusions

HIV and AIDS continues to be a considerable health problem in the United States as more than 1.1 million people are living with the disease (The Henry J. Kaiser Family Foundation, 2017f; U.S. Department of Health & Human Services, 2017l). HIV and AIDS disproportionately impacts marginalized members of society including men who have sex with men (MSM), racial and ethnic minorities, and people of lower socioeconomic status (CDC, 2018a; Denning & DiNenno, 2015; U.S. Department of Health & Human Services, 2017m). Viral load suppression is a commonly used measure to assess the overall health status of a PLWHA (U.S. Department of Health & Human Services, 2016c; World Health Organization, 2016b). PLWHA who are virally suppressed live healthier and longer lives and are less likely to transmit the virus to others (Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d). Key factors in becoming virally suppressed include engagement in care and ART medication adherence. PLWHA who remain consistently engaged in care and properly take their ART medications are more likely to achieve and maintain long term viral suppression, experience reduced mortality rates, and experience a life expectancy equal to that of the general uninfected population (Crawford, 2014; Crawford et al., 2014; Deeks et al., 2013).

For PLWHA, health insurance coverage is associated with viral load suppression and a reduced likelihood of premature death (Goldman et al., 2001; Yehia et al., 2012, 2014). Prior to the passage of the ACA in 2010, between 30% and 40% of PLWHA did not have comprehensive health insurance and received care solely provided by the RWHAP (Rozin et al., 2015). The RWHAP was created in 1990 and provides comprehensive HIV/AIDS-related medical care and support services on an outpatient basis to approximately 48% of all people diagnosed with HIV in the United States (HRSA, 2017g). RWHAP participants must be diagnosed with HIV or AIDS and either have no health insurance coverage or limited coverage that does not fully pay for all HIV/AIDS-related health care services (HRSA, 2016b). Although PLWHA who receive care provided by the RWHAP are more likely to become virally suppressed than are uninsured PLWHA who are not enrolled in the program, the RWHAP is not a health insurance product, as it does not provide coverage for comprehensive health care services. The RWHAP only provides outpatient HIV/AIDS-related medical care and treatment and excludes coverage for medical services provided in an emergency room, inpatient hospital setting, or for any other medical condition or medications unrelated to the treatment of HIV/AIDS (Crowley & Garner, 2015; Dawson & Kates, 2015; Emory Health care, 2017). Consequently, the health benefits associated with the comprehensive care provided by an ACAQHP may improve the health of PLWHA. In addition, the ACA provides several protections that will benefit PLWHA including the inability for insurance companies to deny coverage or raise the premium rates for people HIV/AIDS and the elimination of annual or lifetime dollar limits on the payment of covered services (U.S. Centers for Medicare & Medicaid Services, 2018a).

Little is known about the relationship between the ACA and the health of PLWHA. I have found only five studies in which researchers examined whether the comprehensive health insurance provided by the ACA has improved the overall health status of PLWHA compared to those receiving Ryan White Care. Bradley et al. (2016) found that PLWHA enrolled in an ACAQHP were 5% less likely to be virally suppressed then those enrolled in the RWHAP. Dawson and Kates (2019) found the viral load suppression rate was the same for PLWHA enrolled in the RWHAP and in an ACAQHP. However, McManus et al. (2016), McManus et al. (2018), and Raifman et al. (2018) reported the viral load suppression rate was higher for PLWHA enrolled in an ACAQHP compared to those enrolled in the RWHAP. My study will help close a gap in the research and expand scientific knowledge by providing seminal data on the relationship between the RWHAP, the ACA, and the health of PLWHA in the state of Florida.

The next chapter, Chapter 3, provides an explanation of the research design that will be used to help close the gap in this subject matter. Initially, the methodology of the study will be described including an overview of the study population, study sampling procedures, power analysis, sample size, data collection process, statistical assumptions, and data analysis. Finally, the threats to the validity of this study and the ethical procedures used to protect the participants and integrity of the data will be reviewed.

Chapter 3: Research Method

Introduction

HIV and AIDS are significant health problems in the United States as 1.1 million people are living with the disease (CDC, 2016d; U.S. Department of Health & Human Services, 2017m). It is important for PLWHA, health care providers, and health policy makers to understand the impact on HIV/AIDS health outcomes (viral load) when comparing the care provided by the RWHAP to the care received from an ACAQHP. The purpose of this quantitative correlational cross-sectional study was to explore the relationship between demographic factors, treatment compliance, and engagement in care on the health status (viral suppression) of PLWHA who were enrolled in the RWHAP compared to those who were enrolled in an ACAQHP.

Both descriptive and inferential statistical measurements were used. Descriptive statistics such as mean and percentages were used to measure categorical and continuous independent variables. Three inferential statistical methodologies were used to analyze the relationship and differences between the health of PLWHA who were enrolled in the RWHAP and those who were enrolled in an ACAQHP: multiple linear regression, chi-square, and an independent samples *t* test. Field (2013) recommended a multiple linear regression model to establish the statistical significance of association between multiple independent variables and one continuous dependent variable, and recommended an independent samples *t* test to compare differences in the means of two categorical unrelated groups. Field (2013) also recommended a chi-square test to determine whether a relationship exists between two independent groups.

Chapter 3 presents the research approach used in this study. A detailed description of the research design and rationale is provided, followed by the methodology of the study including the study population and setting, sampling procedures, data collection, variable description, variable operationalization, power analysis and sample size, statistical analysis and assumptions, and data analysis. The final sections include a description of the potential threats to validity, protection of participants, and a transition to Chapter 4.

Research Design and Rationale

This study addressed the relationships between independent and dependent variables of PLWHA enrolled in the RWHAP and in an ACAQHP, as well as differences in dependent variables between groups. The independent variables in the first research question were gender, race, age, education level, federal poverty level, coverage status, treatment compliance, and engagement in care, while the dependent variable was health status. The independent variable in the second research question was coverage status, while the dependent variable was treatment compliance. The independent variable in the third research question was coverage status, while the dependent variable was engagement in care. The independent variable in the fourth research question was coverage status, while the dependent variable was health status. The independent variable in the fifth research question was coverage status, while the dependent variable was the difference in difficulty in paying out-of-pocket medical expenses.

A quantitative design was appropriate because numerical data were used to measure the relationship among multiple independent and single dependent variables as well as differences between dependent variables across groups. Additional elements of this study that justified a quantitative approach included the use of a structured research instrument to collect data and the development of research questions with fixed responses, which were objectively answered (see Labaree, 2017). A quantitative design is a suitable choice when the objective of the study is to generalize the findings to larger populations (Creswell, 2009; Labaree, 2017).

Frankfort-Nachmias et al. (2015) noted that a cross-sectional design is frequently used in public health and social science research, while Levin (2006) and Setia (2016) indicated that a cross-sectional design is helpful in public health planning and enhancing the understanding of disease etiology. A cross-sectional study is observational, and a researcher can compare multiple variables and health outcomes simultaneously at a single point (Setia, 2016). This approach matched the current study objectives in measuring the relationships between independent variables and the viral load of PLWHA who receive care from the RWHAP and those who receive care from an ACAQHP as well as differences in the dependent variables between groups. This design does not require participants to be randomly assigned to control or comparison groups, which is often considered unethical in public health research due to the serious nature of withholding treatments/interventions (Frankfort-Nachmias et al., 2015). Cross-sectional studies can be both descriptive in examining disease frequency and distribution in a population and analytical in investigating the association among multiple factors and health outcomes (Barratt & Kirwan, 2010). The three primary disadvantages of a cross-sectional study include the inability to investigate a behavior over a period of time, the inability to establish a cause-and-effect relationship, and the lack of generalizability of findings to other points in time (Frankfort-Nachmias et al., 2015; Setia, 2016).

A correlational design is used to determine whether a relationship exists between two or more variables. Advantages of a correlational design include the ability to collect data on a large number of participants and to study a diverse set of variables and their interrelations (Field, 2013). A correlational design offers a researcher the ability to measure variables in health science studies that cannot be manipulated due to ethical reasons (Field, 2013). The primary disadvantage of a correlational study is that it only reveals the existence of a relationship and cannot provide a definitive reason for why the relationship exists (Frankfort-Nachmias et al., 2015). A correlational study cannot be used to draw inferences about the causal relationships between and among variables (Frankfort-Nachmias et al., 2015).

A correlational cross-sectional design provides a low level of internal validity and a high level of external validity, while the generalizability of the results may be limited due to the sampling methodology (Carlson & Morrison, 2009). Additionally, a correlational cross-sectional design provides a greater level of reliability than an editorial or a case report, yet is less reliable than a case control study or a randomized controlled study (Berezow, 2017). Reliability in a cross-sectional study is impacted by the inability of the researcher to control for the impact of competing alternative explanations on the results (Frankfort-Nachmias et al., 2015).

Methodology

Population

The study population was PLWHA residing in Florida who participated in the 2015–2017 Medical Monitoring Project surveys, and were enrolled in the RWHAP or an ACAQHP.

Sampling and Sampling Procedures

Sampling strategy. Because secondary data were collected in this study, a purposive convenience sampling strategy was used. A purposive sampling strategy is a nonprobabilistic methodology in which participants are selected based on qualifications or characteristics selected by the researcher, while a convenience sample is a nonprobabilistic sampling strategy in which participants are selected based on the ease of access and inclusion for the researcher (Laerd Statistics, 2012a, 2012d). Advantages of a purposive sampling strategy include the ability to quickly reach a targeted population and cost effectiveness (Laerd Statistics, 2012d). Disadvantages of purposive sampling are a vulnerability to errors in judgement by the researcher, researcher bias (which could reduce the internal validity and reliability of the study), and a potentially reduced level of external validity in that research findings may not be generalizable to other populations (Barrat, Ferris, & Lenton, 2015; Laerd Statistics, 2012d).

The benefits of a convenience sampling methodology include the ease of implementation and the ability to quickly achieve the needed sample size in a cost-effective manner while (Laerd Statistics, 2012a). Disadvantages of a convenience sampling strategy include a potential for bias in collecting data which could reduce the internal validity and reliability of the study, the possibility of a sampling error, and reduced external validity in that the study results may not be generalizable to other populations (Laerd Statistics, 2012a).

Sampling frame. All patients who have had continual RWHAP coverage for a minimum of one year and patients who have had coverage through an ACAQHP for at least one year (without any lapse in care enrollment) and have available medical and sociodemographic data will be included in this study. The one-year threshold of continuous insurance coverage for both groups of PLWHA was selected based on the results of other similar studies. Baicker et al. (2013) found one-year of continuous health insurance coverage was an appropriate length of time to measure whether patients achieved improved health (as measured by blood pressure, cholesterol, and glycated hemoglobin) due to their new insurance coverage. Sommers, Gawande, and Baicker (2017) reported the impact of health insurance coverage on life-threatening conditions such as HIV/AIDS may take at least one year to occur. The availability of medical and sociodemographic data will also determine eligibility for participation in this study. Patient data specific to the focus of each individual research question was also required and only PLWHA with the needed information for each individual research question was included in this study.

RQ1: The intent of the first research question is to analyze the relationship between demographic factors, treatment compliance, engagement in care, coverage status, and the health status of PLWHA. Necessary data for participant inclusion for this research question included demographic data including race, gender, age, education level, and federal poverty level, and medical record data from PLWHA who had either one year of continuous coverage from the RWHAP or from an ACAQHP, the number of ART missed doses in the past 30 days and physician office visit dates for a minimum of 12 months. PLWHA without this information were excluded from participation in this study.

RQ2: The aim of the second research question is to examine the difference in treatment compliance between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Participant inclusion criteria required documentation of either one year of continuous coverage from the RWHAP or from an ACAQHP and the number of ART missed doses in the past 30 days. PLWHA without this information were excluded from participation in this study.

RQ3: The goal of the third research question is to examine the difference in engagement in care between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Participant inclusion criteria required documentation of either one year of continuous coverage from the RWHAP or from an ACAQHP and physician office visit dates for a minimum of 12 consecutive months. PLWHA without this information were excluded from participation in this study.

RQ 4: The focus of the fourth research question is to examine the difference in health status between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Participant inclusion criteria required documentation of either one year of continuous coverage from the RWHAP or from an ACAQHP and viral load test results (to measure health status). PLWHA without this information were excluded from participation in this study.

RQ5: Finally, the objective of the fifth research question is to examine the difference in difficulty in paying out-of-pocket medical expenses between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Participant inclusion criteria required documentation of either one year of continuous coverage from the RWHAP or from an ACAQHP and documentation of the difficulty in paying out-of-pocket medical expenses. PLWHA without this information were excluded from participation in this study.

Power analysis and sample size. An accurate sample size is needed to generate reliable study findings that can be generalized to a larger population. Sample size in a study is determined by three factors: effect size, alpha level, and statistical power (Field, 2013; Frankfort-Nachmias et al., 2015). Effect size is a numerical value that identifies the strength of the differences or relationships among multiple variables in a research study (Creswell, 2009). A larger effect size requires a smaller sample size to identify the strength of the relationships among study variables, while a smaller effect size necessitates a larger sample size to reveal the magnitude of the relationships among the same variables (Creswell, 2009). While effect size values are classified as small, medium, or large, Cohen (1988) suggested that social science researchers use a medium effect size. For a multiple linear regression, Cohen (1988) defined a value of 0.15 as a medium effect size. Alpha (α), the second determinant of sample size, should be set at a low level in order to minimize the chances of a type 1 error. A type 1 error (false positive) occurs when a researcher perceives there is a statistically significant impact on a study population when it actually does not exist resulting in the incorrect rejection of the true null hypothesis (Field, 2013). An Alpha level of .05 was used in this research study. Both Field (2013) and Frankfort-Nachmias et al. (2015) recommended that the alpha level be set at .05 signifying that the probability of incorrectly rejecting a true null hypothesis will occur 5% of the time.

Power is inversely related with the probability of committing a type II error. A type II error (false negative) occurs when a researcher deems there is not a statistical significance when it actually does exist, resulting in the incorrect rejection of the null hypothesis (Field, 2013). The formula to determine power is 1- Beta (β). As power increases, the likelihood of committing a type II error decreases (Cohen, 1988). The Pennsylvania State University Eberly College of Science (2017) recommended a power level between 80% and 95% in order to identify a precise effect in clinical research. Therefore, β in this research study will be set at .20 resulting in a power level of 80%, signifying an 80% probability of avoiding a type II error.

Sample size calculation. The required sample size for each research question was calculated using GPower version 3.1.9.2. GPower is a commonly used free software application designed to calculate sample size (Faul, Erdfelder, Lang, & Buchner, 2007).

The first research question was: What is the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of RWHAP consumers (as defined by viral suppression)? This research question will be analyzed using a multiple linear regression. The GPower parameters for these research questions are: Test family = *F* test, Statistical test = Linear multiple regression: Fixed model, R^2 deviation from zero, Type of power analysis = A priori: compute required sample size given alpha, power, and effect size, Effect size = 0.15, Alpha = 0.05, power = 0.80, and Number of predictors = 8. Based on the aforementioned sampling criteria, the minimum total sample size needed was 109 participants. Research questions two, three, and four will be analyzed using an independent samples *t* test. The GPower parameters for these research questions are: Test family = *t* test, Statistical test = Means: Difference between two independent means (two groups), Type of power analysis = A priori: Compute required sample size given alpha, power, and effect size, Tails = 2, Effect size = 0.50, Alpha = 0.05, Power = 0.80, and Allocation ratio (n2/n1) =.20 (D. Segal, personal communication, May 19, 2018). The sample size for each research question is listed below.

The second research question was**:** What is the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP? Based on the aforementioned sampling criteria for an independent samples *t* test, the minimum total sample size needed was 228, of which 190 participants were enrolled in the RWHAP and 38 participants were enrolled in an ACAQHP.

The third research question was: What is the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the

RWHAP? The results of the aforementioned sampling criteria for an independent samples *t* test required a minimum total sample size of 228, of which 190 participants were enrolled in the RWHAP and 38 participants were enrolled in an ACAQHP.

The fourth research question was: What is the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP? Based on the aforementioned sampling criteria for an independent samples t test, the minimum total sample size needed was 228, of which 190 participants were enrolled in the RWHAP and 38 participants were in enrolled in an ACAQHP.

Finally, the fifth research question was: What is the difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP? This research question was analyzed using a chi-square test. The GPower parameters for these research questions are: Test family = z tests, Statistical test = Proportions: Difference between two independent proportions, Type of power analysis = A priori: compute required sample size given alpha, power, and effect size, Tails = 2, Proportion p2 = .40, proportion p1 = .15 (Galbraith et al., 2012), Alpha = 0.05, power = 0.80, and Allocation ratio (n2/n1) =.20 (D. Segal, personal communication, May 19, 2018). Based on the aforementioned sampling criteria, the minimum total sample size needed was 157 participants, of which 131 participants were enrolled in the RWHAP and 26 participants were enrolled in an ACAQHP.

The minimum sample size for this research study was 228. This minimum sample size was selected because it represented the largest number generated by GPower for all five of the research questions and was the appropriate number when utilizing a multiple linear regression, an independent samples *t* test, and a chi-square test. Additionally, when conducting the independent samples *t* test analysis, the sample population required a minimum of 190 participants who were enrolled in the RWHAP and 38 participants were enrolled in an ACAQHP.

Weighted data. The Florida Department of Health required the use of individual case weighted data in this study. For each study participant, the CDC weighted the individual response based upon demographic variables including age, birth gender, and race in order to ensure that survey participants were representative of PLWHA throughout the state of Florida (CDC, 2020). The primary benefit of using weighted data in my study was to enhance external validity. The results of my study are now generalizable to all PLWHA residing in Florida.

Data Collection Procedures

My dissertation used secondary data, which was made available from the Florida Department of Health after IRB approval was granted by Walden University. Study participants did not need to sign informed consent for their data to be included in this study. Individual level demographic, financial and health outcome data was obtained from the 2018 version of the Medical Monitoring Project survey for use in this study. This survey compiled HIV service care data for PLWHA enrolled in the RWHAP and in an ACAQHP. This database was populated with viral load test results, medical visits, ART medication compliance, and information identifying the difficulty PLWHA had in paying out-of-pocket medical expenses.

I considered the dataset as secondary data because I did not personally collect the information that I analyzed. Boslaugh (2007) wrote that secondary data including clinical information obtained from surveys and medical records is commonly used in public health research. The use of secondary research offers numerous advantages to public health researchers. Frankfort-Nachmias et al. (2015) stated secondary data may provide a conceptual-substantive advantage in that it may be the only data available to use in a research study. This was the case for my study. The only data available to examine the health of PLWHA in Florida enrolled in the RWHAP and enrolled in an ACAQHP was collected by the HIV/AIDS Section, Bureau of Communicable Diseases, Florida Department of Health. Reliable and accurate data obtained from secondary sources allows other researchers an opportunity to replicate the findings of a study (Frankfort-Nachmias et al., 2015). The findings of a scientific study are enhanced when other researchers are able to obtain similar results when using the same dataset. A final advantage of using secondary data is the realization of improved efficiencies, which result in savings of both time and money (Boslaugh, 2007). An added benefit was the de-identified dataset was provided to me in an electronic format, which minimized my time spent digitizing the information and maximized my time spent analyzing the data.

There are three principal limitations in using secondary data in scientific research and each of these limitations has been minimized in the design of this study. The first limitation of using secondary data is gaining access to the relevant data (Frankfort-

Nachmias et al., 2015). Fortunately, this obstacle was removed, as Emma Spencer, Ph.D., Surveillance Program Manager, HIV/AIDS Section, Bureau of Communicable Diseases, Florida Department of Health executed a Data Use Agreement and provided me the de-identified, blinded secondary dataset that I used in this study. A second limitation in using secondary data in a research study is the information was collected by other individuals to answer their own specific research questions and may not be completely applicable or transferable for use in other research settings (Frankfort-Nachmias et al., 2015). This potential limitation in the use of secondary data in this study was addressed, as the Florida Department of Health collected this data to monitor client-level outcomes for evaluation of disease status and health outcomes and would benefit from understanding the impact that the ACA has on the health of PLWHA. A third and final limitation of the use of secondary data is the researcher generally does not know how well the data was collected or the accuracy of the data entry process (Frankfort-Nachmias et al., 2015). Although I did not know the individuals collecting and entering data from the participants in the Medical Monitoring Project, clinical guidelines established by HRSA and the Florida Department of Health both required the documentation of all patient information without personal bias or error.

Instrumentation and Operationalization of Constructs

As shown in Table 1, I used four dependent variables in this study. The first, health status, was measured by viral load. The second, treatment compliance, was measured by the number of missed ART doses in the past 30 days. The third, engagement in care, was measured by the total number of HIV/AIDS-related physician visits within the previous 12 months. The fourth, difficulty in paying out-of-pocket medical expenses, was measured by the self-reported financial affordability data collected from study participants.

I also used four independent variables in this study. The first independent variable, demographic factors, included gender, race, age, education level, and federal poverty level. The second, treatment compliance, was measured by the number of missed ART doses in the past 30 days. The third, engagement in care, was measured by the total number of HIV/AIDS-related physician visits within the previous 12 months. The fourth, coverage status, was determined based on whether care was provided by the RWHAP or from an ACAQHP.

Viral load was selected as the determinant of health status for PLWHA for several reasons. First, the RWHAP, in November of 2013, identified viral load as a core performance measure that should be used to evaluate the care and treatment of PLWHA (U.S. Department of Health & Human Services, 2017j). Consequently, the HIV/AIDS Bureau recommends the use of viral load in the assessment of clinical outcomes and overall improvement in health (U.S. Department of Health & Human Services, 2017j). As the examination of changes in health among PLWHA was an integral component of this research study, the use of viral load was an appropriate proxy for health outcomes. Second, viral load has been used in other similar research studies by Crawford et al. (2014) and Mugavero et al. (2012) to assess the health status of PLWHA.

Viral load. Viral load, a continuous variable, was the dependent variable in this study, and was used to assess the health of PLWHA. The test date and numerical viral load count results were identified in the dataset as “Viral Load Count Date” and “Viral Load Count”. To simplify the nomenclature I renamed these study variables in SPSS, as “VLCOUNT” and “VLDATE”. I entered VLCOUNT into SPSS as a numerical value, while I entered VLDATE into SPSS using the mm/dd/yyyy format. I named the difference in viral load results “VLCHANGE”. I recoded study participants with unknown or missing viral load data in the SPSS data set as missing and excluded these participants from this study.

Gender. Gender, a categorical independent variable was identified in the dataset as “BIRTGEN”. In SPSS, I renamed this variable “GENDER” and coded 1 = Male, 2 = Female, 3 = Intersex/Ambiguous. I recoded study participants with unknown or missing gender data in the SPSS data set as missing and excluded these participants from this study.

Race. Race is also a categorical independent variable and was identified in the dataset as “HISPA_13” = Hispanic or Latino, “Race 9A” = American Indian or Alaska Native, “Race 9B” = Asian, “Race 9C” = Black or African American, “Race 9D” = Native Hawaiian or Other Pacific Islander, and “Race 9E” = White. To simplify the dataset codes, I renamed these variables in SPSS as “RACE” and will be coded as 0 = White, 1 = Black of African American, 2 = Hispanic or Latino, 3 = Asian, 4 = Native Hawaiian/Other Pacific Islander, 5 = American Indian/Alaska Native, 6= Multiracial. After I reviewed the racial identity of each study participant, I recoded 0 = each individual racial group and 1= white to create a dichotomous variable to focus on the group that was most impacted by HIV. I recoded study participants with unknown or missing racial data in the SPSS data set as missing and excluded these participants from this study.

Age. Age is a continuous ratio independent variable designated as “DOB_13” in the dataset. I retitled Age in SPSS as “AGE” and recorded the number as a numerical value. I recoded study participants with unknown or missing age data in the SPSS data set as missing and excluded these participants from this study.

Education. Education is an ordinal independent variable, referenced in the dataset as “EDUC” I renamed this variable in SPSS as “EDUCATION” and coded the responses as 1 = Never attended school, 2 = Grades 1 through 8, 3 = Grades 9 through 11, 4 = Grade 12 or GED, 5 = Some college, associate’s degree, or technical degree, 6 = Bachelor’s degree, 7 = Any post-graduate studies. I recoded study participants with unknown or missing education data in the SPSS data set as missing and excluded these participants from this study.

Federal poverty level. Federal poverty level is an additional ordinal independent variable that was used in this research study. Termed “INCOME_8” in the dataset, I renamed this variable “POVERTY” in the SPSS data set and coded as data as 1 = below 100% of the federal poverty level, 2 = 100-139% of the federal poverty level, 3 = 139-400% of the federal poverty level, 4 = more than 400% of the federal poverty level. I coded study participants with unknown or missing federal poverty level data as missing and excluded these participants from this study.

Difficulty in paying out-of-pocket medical expenses. Difficulty in paying out-of- pocket medical expenses is a dichotomous variable in this study and was labeled

“PAY_N5” in the dataset. I renamed this variable in SPSS as “Financial” and coded the data 0 = no, 1 = yes as a numerical value. I coded study participants with unknown or missing data on difficulty in paying out-of-pocket medical expenses as missing and excluded these participants from the study.

Treatment compliance. Treatment compliance in this study is a continuous ratio variable that was assessed based on the number of missed ART doses in the past 30 days. The number of missed ART doses in the past 30 days was identified as “ADH1_N5” in the data set, which I renamed as “ARTMissed”. I coded study participants with unknown or missing treatment compliance data indicating the number of days missed taking ART as missing and excluded these participants from the study.

Engagement in care. Engagement in care, a continuous ratio variable was measured in this research study as the total number of HIV/AIDS-Related physician visits within the previous 12 months. The dataset contained the field named “ApptDate” and “ApptType” which track appointment frequency. The number of these appointments from the calendar year prior to the year the participant completed the MMP survey were entered as a numerical value into SPSS in a field that I appropriately named “HIVVisits”. I recoded study participants with unknown or missing engagement in care data as missing and excluded these participants from the study.

Table 1

Summary of Research Variables

Research Question	Variable Name	Variable Type	Coding

1	Health Status	Dependent Variable	Numerical result of most recent viral load test results less viral load test results at time 0.
	Demographic Factors race, gender, age, education level, and federal poverty level	Independent Variable	Race - 0 = White, 1 = Black of African American, 2 = Hispanic or Latino, 3 = Asian, 4 = Native Hawaiian/Other Pacific Islander, 5 = American Indian/Alaska Native, 6 = Multiracial
			Gender - 1 = Male, 2 = Female, 3 = Intersex or Ambiguous
			Age - as a numerical value
			Education - 1 = Never attended school, 2 = Grades 1 through 8, 3 = Grades 9 through 11, 4 = Grade 12 or GED, 5 = Some college, associate’s degree, or technical degree, 6 = Bachelor’s degree, 7 = Any post-graduate studies

			Federal poverty level - 1 = below 100% of the federal poverty level, 2 = 100 - 139% of the federal poverty level, 3 = 139 - 400% of the federal poverty level, 4 = more than 400% of the federal poverty level
	Treatment Compliance	Independent Variable	Numerical value for the number of missed ART doses in the past 30 days
	Engagement in Care	Independent Variable	Numerical value for the number of HIV/AIDS-related physician visits in the past 12 months
	Coverage Status	Independent Variable	PLWHA enrolled in the RWHAP or in an ACAQHP
2	Treatment Compliance	Dependent Variable	Numerical value for the number of missed ART doses in the past 30 days
	Coverage Status	Independent Variable	PLWHA enrolled in the RWHAP or in an ACAQHP
3	Engagement in Care	Dependent Variable	Numerical value for the number of HIV/AIDS-related physician visits in the past 12 months
	Coverage Status	Independent Variable	PLWHA enrolled in the RWHAP or in an ACAQHP

4	Health Status	Dependent Variable	Numerical result of most recent viral load test results less viral load test results at time 0.
	Coverage Status	Independent Variable	PLWHA enrolled in the RWHAP or in an ACAQHP
5	Difficulty in paying out-of-pocket medical expenses	Dependent Variable	Difficulty in paying out-of-pocket medical expenses - 0 = no, 1 = yes
	Coverage Status	Independent Variable	PLWHA enrolled in the RWHAP or in an ACAQHP

Data Analysis Plan

I used the Statistical Package for the Social Sciences (SPSS) version 25 to complete the descriptive and inferential statistical analysis. The descriptive analysis I conducted included measures of central tendencies (mean and standard deviation) for all independent continuous variables and frequency distributions and percentage distributions for all independent categorical variables. Inferential statistical analysis is conducted to test hypotheses to derive answers to research questions based on study participants or populations. The objective of this research study was to understand the relationship between the health status of PLWHA enrolled in an ACAQHP and the health status of PLWHA enrolled in the RWHAP. To elucidate this impact, statistical analysis were completed on the following research questions:

RQ1: What is the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP and the health status of PLWHA (as defined by viral suppression)?

H_o1: There is no statistically significant relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression)

H_a1: There is a statistically significant relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression).

A multiple linear regression was used to analyze the data output from research question one. A multiple linear regression is used to examine if relationships exist between one continuous dependent variable and multiple independent variables (Field, 2013) A multiple linear regression analysis can also determine if confounding exists among the independent variables (Boston University School of Public Health, 2013). By estimating the relationship between a single independent variable, while holding other independent variables constant, a multiple linear regression can control for confounding variables in a model and allow a researcher to better understand the impact that one or more independent variables have on a dependent variable (Boston University School of Public Health, 2013). A multiple linear regression was the appropriate statistic to use because the dependent variable in this research question is continuous (Field, 2013).

RQ2: What is the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o2: There is no statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a2: There is a statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

An independent samples *t* test was used to analyze research question two. This test was appropriate to answer this research question because an independent samples *t* test compares differences in the means between two unrelated groups while a dependent *t* test measures related groups and indicates that the same participants are included in both groups (Field, 2013). This statistical test was suitable for this research question as the dependent variable is continuous and the independent variable has two different categorical groups (Laerd Statistics, 2018b).

RQ3: What is the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o3: There is no statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a3: There is a statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

An independent samples *t* test was used to analyze research question three. This test was an appropriate statistical analysis to answer this research question because an independent samples *t* test compares differences in the means between two unrelated groups while a dependent *t* test measures related groups and indicates that the same participants are included in both groups (Field, 2013). This statistical test was suitable for this research question as the dependent variable is continuous and the independent variable has two different categorical groups (Laerd Statistics, 2018b).

RQ4: What is the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o4: There is no statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a4: There is a statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

An independent samples *t* test was used to analyze the fourth research question. This test was an appropriate statistical analysis to answer this research question because an independent samples *t* test compares differences in the means between two unrelated groups while a dependent *t* test measures related groups and indicates that the same participants are included in both groups (Field, 2013). This statistical test was suitable for this research question as the dependent variable is continuous and the independent variable has two different categorical groups (Laerd Statistics, 2018b).

RQ5: What is the difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o5: There is no statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a5: There is a statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

A chi-square was used to analyze the fifth research question. This test was an appropriate statistical analysis to answer this research question because both the dependent and independent variables are categorical and are being measured among two independent groups (Laerd Statistics, 2018a).

Threats to Validity

Validity is an indication that the results of a study measure what is purported to be measured (Field, 2013). The two primary types of validity are external validity and internal validity. External validity represents the extent to which study findings can be generalized to other broader populations (Frankfort-Nachmias et al., 2015). The results of this study may be generalizable to PLWHA enrolled in the RWHAP and enrolled in an ACAQHP throughout the United States as the benefits provided by ACA plans are uniform regardless of geographic locale. However, the findings of this study are not generalizable to people with other types of insurance coverage and consequently, the impact on overall health may be dissimilar between these different types of patient populations.

Internal validity is affected by the methods in which the research data is collected and the design of the research study. The impact on internal validity from the collection of this research data were minimal as viral load results, the number of ART missed doses, and HIV office visit dates were transactional in nature, contained in lab reports and insurance claims forms, and were less likely to be impacted by bias or input error. However, due to the increased complexity of the data entry process, patient demographic information may have been less accurate than the clinical information contained in the medical record. The design of the research study also impacted internal validity as the observed variances in the dependent variable must be caused by the independent variable and not by another unintended, confounding, or covariate variable (Trochim, 2006). Before conducting multiple linear regression analyses, correlations were conducted to determine if any variables were highly correlated. If any variables were highly correlated, one or more of them would have been removed from the model to avoid multicollinearity.

Two additional factors associated with the individual participants in this research study that may have reduced internal validity include maturation and experimental mortality. Maturation occurs when there is a change in the health of study participants over time, while experimental mortality refers to participants that drop out of an ongoing study and are no longer included (Laerd Statistics, 2012b, 2012c). Maturation may have occurred in this study if the health of a participant changed and they no longer felt the need to engage in care or remain compliant in care. Finally, experimental mortality may have transpired among a study participant if they no longer desired to participate in the study, became angry, apathetic, or frustrated with their disease or care they received, or died.

Ethical Procedures

Obtaining informed consent from the study participants was not necessary due to the absence of any direct or indirect communication or interaction. Walden University required IRB approval to be obtained before accessing secondary data. The data set was not accessed until this approval was received. Finally, the data used to conduct this research study as well as the findings of this research study will be stored for seven years on a password protected computer network that is monitored by virus scanning software and secured by both a hardware and software firewall. At the conclusion of the seven-year data retention period, the electronic information will be erased using commercially available software such as Eraser or Cyberscrub.

I received the de-identified secondary data from the Florida Department of Health after Walden IRB approval was granted. I will provide documentation of this approval to the organization for their records. The dataset used in this study was supplied in a HIPAA approved de-identified format. Data that is de-identified per HIPAA guidelines does not contain any personal identifiers such as name, address, telephone number, social security number, date of birth, email address, medical record number, or another number or code that could be used to identify the study participant (U.S. Department of Health & Human Services, 2015b). Medical information that is de-identified per HIPAA guidelines is not considered protected health information and can be shared and/or used without restriction (U.S. Department of Health & Human Services, 2015b).

Summary

Chapter 3 provided an overview of this quantitative correlational cross-sectional designed study. The research design and rationale, methodology, threats to validity, and ethical procedures used to examine the relationships between the independent and dependent variables were described in significant detail. The next chapter, Chapter 4, will provide a presentation, interpretation, and explanation of the analyzed data.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to determine the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), and coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression). I also examined the difference in treatment compliance, engagement in care, and coverage status between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. The research questions and hypotheses were developed to determine whether a relationship existed between the health of PLWHA, the ACA, and the RWHAP. The research questions and hypotheses were the following:

RQ1: What is the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression)?

H_o1: There is no statistically significant relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression)

H_a1: There is a statistically significant relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression).

The independent variables for this research question were demographic factors, treatment compliance, engagement in care, and coverage status. The dependent variable was health status.

RQ2: What is the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o2: There is no statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a2: There is a statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

The independent variable for this research question was coverage status, and the dependent variable was treatment compliance.

RQ3: What is the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o3: There is no statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a3: There is a statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

The independent variable for this research question was coverage status, and the dependent variable was engagement in care.

RQ4: What is the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o4: There is no statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a4: There is a statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

The independent variable for this research question was coverage status, and the dependent variable was health status.

RQ5: What is the difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

H_o5: There is no statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

H_a5: There is a statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

The independent variable for this research question was coverage status, and the dependent variable was difficulty in paying out-of-pocket medical expenses. Chapter 4 includes the data collection methodology, a discussion of the statistical results, and a discussion of the results related to each research question.

Data Collection

Approval to conduct the study (IRB Number 03-28-19-0573087) was granted by Walden University on October 1, 2019. Data were requested from the Florida Department of Health on February 8, 2019 and were received on December 2, 2019. On January 15, 2020, the Florida Department of Health resent the same data set that included a new case weight variable for each individual respondent who participated in the study.

Initial Collection of Secondary Data

The data used were provided by the Florida Department of Health and were originally collected by the Centers for Disease Control and Prevention in conjunction with the Florida Department of Health as part of the Medical Monitoring Project in the 2015, 2016, and 2017 cycle years. In each of these 3 years, the Centers for Disease Control and Prevention randomly selected 800 PLWHA residing in Florida from the enhanced HIV/AIDS reporting system database. The overall response rate for the survey varied from year to year (2015 = 37.4%; 2016 = 41.6%; 2016 = 36.5%; U.S. Department of Health & Human Services, 2019). The number of cases that were provided for each year and the total number of cases are presented in Table 2.

Table 2

Number of Responses by Year

	Included in Data set			
	2015	2016	2017	Total
Original data set cases	299	333	292	924
Original data set RWHAP	179	192	152	523
Original data set ACA	30	33	28	91

Data Cleaning

Of the 924 cases provided, some needed to be removed from the data set before conducting further analyses. Six were eliminated because the respondents lived outside the state of Florida. Three hundred and sixty eight were excluded because the respondents did not have coverage from the RWHAP or an ACAQHP. Three were omitted because they were duplicates completed by the same individual. Two hundred and sixty four were removed because data were missing from one or more of the variables.

After cleaning the data set, I determined that 283 individual cases were eligible for inclusion. Among the 283 individual cases, 238 were participants enrolled in the RWHAP and 45 were participants with coverage from an ACAQHP. According to the statistical power analyses, to reach the appropriate statistical power for each of the research questions, 228 cases were needed with 190 from participants enrolled in the RWHAP and 38 from participants enrolled in an ACAQHP. The calculated power requirements were met.

Required Use of Weighted Secondary Data

After cleaning the secondary data and reducing the number of individual cases to 283, I was notified by the Florida Department of Health that the data set they sent to me did not include the individual case weighting variable that was required for me to include in my analysis. For each participant in the study, the Centers for Disease Control and Prevention (2020) weighted the individual response based on demographic variables including age, birth gender, and race to ensure the survey participants were representative of PLWHA throughout the state of Florida. As shown in Table 3, after rerunning the statistical analysis in SPSS with the individual case weighting variable included in the data set, I determined that the number of participants increased to 30,670. Among these 30,670 participants, 25,834 were enrolled in the RWHAP and 4,836 were enrolled in an ACAQHP (see Table 3). The primary benefit of using the weighted data was an enhancement in external validity. The results were now generalizable to all PLWHA residing in Florida. A post hoc power analysis was completed using the sample of 30,670 participants that was generated from the weighted sample size. As shown in Appendix C, the power achieved in this study was 100%, which meant there was a 100% probability of avoiding a Type II error, which occurs when a researcher fails to reject a false null hypothesis.

Table 3

Weighted Data Sample Size

	Weighted N
Sample Size	30670

Data Collection Discrepancies

There were some discrepancies between what was planned in Chapter 3 and what occurred during data collection. The individual data set cases provided by the Florida Department of Health were weighted by the Centers for Disease Control and Prevention based upon demographic variables including age, birth gender, and race (S. Geary, personal communication, January 24, 2020). The primary benefit of using the weighted data in this study was an enhancement in external validity. The results were now generalizable to all PLWHA residing in Florida.

Several clarifications in the coding and analysis of the operationalized data were necessary. First, multiracial was added as an additional code in the race/ethnicity descriptors. Second, federal poverty level was coded as 1 = below 100% of the federal poverty level, 2 = 100-139% of the federal poverty level, 3 = 139-400% of the federal poverty level, and 4 = more than 400% of the federal poverty level. Third, all surveys were coded as completed on July 1 of each response year. Fourth, an ACAQHP was coded as the primary health care coverage for all PLWHA who had both ACAQHP and RWHAP coverage.

Results

Demographics of Sample

As can be seen in Table 4, a majority of survey respondents were Black or African American (55.6%, n = 17,050) and male (68.0%, n = 20,859). Additionally, most respondents were between 40 and 59 years old (60.2%, n = 18,411) and the majority attended some college or received an Associate or Technical degree, received a bachelor’s degree, or participated in any Post-Graduate studies (52.8%, n = 16,193). Finally, most respondents had an annual household income of less than 139% of the FPL (63.7%, n = 19,536). Among the survey participants, 84.2% (n = 25,834) had RWHAP coverage while 15.8% (n= 4,836) had coverage through an ACAQHP. Additionally, 73.6% of respondents (n = 22,567) indicated they did not have financial difficulty in paying out-of-pocket medical expenses while 26.4% (n = 8,103) did have financial difficulty in paying out-of-pocket medical expenses.

Table 4

Variable Descriptives – Demographic and Financial Difficulty

RQ Associated	Variable	Category	Weighted N	Percent
1 (IV - Demographic)	Race	White	7668	25.0
		Black/African American	17050	55.6
		Hispanic/Latino	-	-
		Asian	-	-
		Native Hawaiian/Other Pacific Islander	-	-
		American Indian/ Alaska Native	290	0.9
		Multiracial	5662	18.5
1 (IV - Demographic)	Gender	Male	20859	68.0
		Female	9811	32.0
		Intersex/Ambiguous	-	-
1 (IV - Demographic)	Age (Mean = 49.2)	Under 30	1571	5.1
		30-39	5245	17.1
		40-49	7105	23.2
		50-59	11306	37.0
		60-69	4430	14.5
		70+	940	3.1
1 (IV - Demographic)	Education Level	Never Attended School	294	1.0
		Grades 1-8	1642	5.4
		Grades 9-11	4151	13.5
		Grade 12 or GED	8390	27.4

		Some College, Associate Degree, or Technical Degree	11578	37.8
		Bachelor’s Degree	3008	9.8
		Any Post-Graduate Studies	1607	5.2
1 (IV - Demographic)	Federal Poverty Level	< 100% FPL	15488	50.5
		100% - 139% FPL	4048	13.2
		> 139% - 400% FPL	10919	35.6
		> 400% FPL	216	0.7
1 through 5 (IV - Demographic)	Coverage Status	RWHAP	25834	84.2
		ACA	4836	15.8
1 (IV) & 5 (DV)	Difficulty in paying out-of-pocket medical expenses	Yes	8103	26.4
		No	22567	73.6

As shown in Table 5, the change in viral load suppression mean (n = 30,670) was -24.956 (s = 121,073), while the number of ART missed doses mean in the past 30 days (n = 30,670) was 1.6 doses (s = 4.5), and the average number of HIV/AIDS-related physician visits within the previous 12 months was 3.5 (s = 2.3; n = 30,670).

Table 5

Variable Descriptives - Health Status, Treatment Compliance, and Engagement in Care

RQ Associated	Variable	Category	Weighted N	Mean	Std. Deviation
1 (DV) & 4 (DV)	Health Status	Change in Viral Load Suppression	30670	-24956.4	121073
1 (DV) & 2 (DV)	Treatment Compliance	# ART Missed Doses in Past 30 Days	30670	1.6	4.5
1 (DV) & 3 (DV)	Engagement in Care	# HIV/AIDS-Related Physician Visits in Past 12 Months	30670	3.5	2.3

Sample Representativeness of Population

As shown in Table 6, data in the PLWHA sample were comparable to the national 2017 Cycle HIV Surveillance Report (CDC, 2019). In my study, Whites represented 25.0% of the sample size, while the remaining 75.0% of participants were people of color. Nationally, Whites represent 28.8% of PLWHA, while people of color account for the remaining 71.2% (CDC, 2019). Among study participants in my research study, 68.0% were male and 32% were female, compared to 74.6% male and 23.6% female nationally (CDC, 2019). In my study, 22.2% of participants were between the ages of 18-39, 60.2% were aged 40-59, and 17.6% were over 60 years old. Nationally, 26.0% of PLWHA are between the ages of 18-39, 55.7% are aged 40-59, and 18.3% were are 60 years old (CDC, 2019). Furthermore, in my study, 19.9% of PLWHA had less than a high school education compared to 16.6% nationally, 27.4% had a high school diploma or GED compared to 27.3% nationally, and 52.7% had more than a high school degree compared to 56.1% nationally (CDC, 2019). Finally, in my study, 50.5% of participants lived at or below the FPL and the remaining 49.5% lived above the FPL threshold. Nationally, 41.6% of PLWHA live at or below the federal poverty level and 58.4% live above (CDC, 2019).

The clinical data from my research study was also comparable to the national data reported in the 2017 Cycle HIV Surveillance Report (CDC, 2019). First, 68.3% of participants in my study achieved sustained viral suppression (all viral load results were less than 200 copies/ML) compared to 63.2% nationally (CDC, 2019). Second, 60.5% of participants in my study reported not missing an ART dose in the past 30 days compared to 60.8% nationally (CDC, 2019). Third, 83.3% of participants in my study reported having 2 or more HIV related medical appointments in the past twelve months compared to 78.0% nationally (CDC, 2019). Fourth, 73.6% of participants in my study reported no problems in paying out-of-pocket medical expenses, however, the CDC (2019) failed to include this data point in their report the results, so no comparative national benchmark exists. Finally, 15.8% of participants in my study reported having coverage from an ACAQHP compared to 20% nationally (D. Segal, personal communication, May 19, 2018).

Table 6

Sample Representativeness of Population

	Study Data	National Data
Whites	25.0	28.8
People of Color	75.0	71.2
Male	68.0	74.6
Female	32.0	23.6
Age - 18-39	22.2	26.0
Age - 40-59	60.2	55.7
Age - 60+	17.6	18.3
Education - < High School	19.9	16.6
Education - High School Diploma/GED	27.4	27.3
Education - > High School	52.7	56.1
Poverty Level - Equal to or Below	50.5	41.6
Poverty Level – Above	49.5	58.4
Viral Load Suppression Achieved	68.3	63.2
ART Doses - None Missed in Past 30 Days	60.5	60.8
HIV Visits - 2+ in Past 12 Months	83.3	78.0
PLWHA with ACA Coverage	15.8	20.0

Assumptions

Multiple linear regression (RQ 1). I used a multiple linear regression to examine the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression). There are eight assumptions that need to be considered when completing a multiple linear regression analysis. These assumptions include 1) a continuous dependent variable, 2) two or more continuous or categorical independent variables, 3) an independence of observations/residual values, 4) a linear relationship between the independent and dependent variables (collectively and individually), 5) homoscedasticity of the data, 6) no multicollinearity, 7) no significant outliers, and 8) residuals that are approximately normally distributed (Laerd Statistics, 2018d).

The first two assumptions (1, 2) have been met as the dependent variable in this research question, viral load change, is continuous, while the independent variables including race, gender, age, education level, federal poverty level, treatment compliance, engagement in care, and coverage status are all either continuous or categorical variables. The third assumption, independence of observations/residual was confirmed as the use of weighted data in this study eliminated the possibility of autocorrelation between the variables (Laerd Statistics, 2018d). The fourth assumption, the verification of linearity between the dependent variable and the independent variables, was confirmed by visual evaluation of the scatterplot of the studentized residuals against the unstandardized predicted value (Laerd Statistics, 2018d). The fifth assumption, homoscedasticity of the residuals, was also confirmed by visual evaluation of the scatterplot of the studentized residuals against the unstandardized predicted value (Laerd Statistics, 2018d). The sixth assumption, a lack of multicollinearity, was confirmed after removing the multiracial variable from the analysis. After the removal of this variable, Pearson correlation values for all remaining variables were less than .80, tolerance values for all variables were greater than 0.1 and VIF values for all variables were all less than 10 (Laerd Statistics, 2018d). The seventh assumption, the lack out outliers, was not met as visual evaluation of the studentized deleted residuals revealed data points greater than ±3 standard deviations. As these data points represented the change in viral load among PLWHA and were not abnormal outliers, they were appropriate to leave in the study when completing the statistical analysis (Laerd Statistics, 2018d). The eighth and final assumption, the normality of the distributions of residuals, was met as assessed by visual evaluation of the Q-Q Plot (Laerd Statistics, 2018d). Additional information on the analysis of these assumptions is provided in Exhibit D.

Independent samples *t* test (RQ 2). I used an independent samples *t* test to analyze the second, third, and fourth research questions. In the second research question, I examined the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. There are six assumptions that must be satisfied to run an independent samples *t* test. These assumptions include 1) a dependent variable that is continuous, 2) an independent variable that consists of two independent categorical groups, 3) an independence of observations, 4) a homogeneity of variances, 5) normality in the distribution of the dependent variable around the independent variables, and 6) no significant outliers (Laerd Statistics, 2018b).

The first three assumptions (1, 2, 3) for this research question were met through the overall design of the research study. The dependent variable, number of ART prescription refills is continuous. The independent variable is comprised of two independent categorical groups and an independence of observations has been achieved by ensuring that each participant has been assigned to a group of PLWHA that have coverage from either the RWHAP or the ACA. The fourth assumption, a homogeneity of variances, was not confirmed based on visual evaluation of the results of the Levene's test (Laerd Statistics, 2018b). The fifth assumption, the normality of the distributions of residuals, was not met as assessed by visual evaluation of all Q-Q Plots (Laerd Statistics, 2018d). The sixth assumption, the lack of outliers, was not met, as assessed by inspection of the boxplot output (Laerd Statistics, 2018b).

Due to violations of the assumptions of homogeneity, normality of the distributions, and outliers, I used a Mann-Whitney U to analyze the data instead of an independent samples *t* test (Laerd Statistics, 2018b). The Mann-Whitney U test is a nonparametric test used to determine if statistically significant differences exist between two groups when data from an independent samples *t* fails to meet the required assumptions (Laerd Statistics, 2018c). The Mann-Whitney U test has three assumptions that must be met which include a continuous or ordinal dependent variable, a categorical independent variable with two groups, and an independence of observations (Laerd Statistics, 2018c). As all three of these assumptions were met based on the design of my study, I ran a Mann-Whitney U test to determine if there were differences in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Additional information on the analysis of these assumptions can be found in Appendix E.

Independent samples *t* test (RQ 3). I used an independent samples *t* test to assess the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an

ACAQHP and PLWHA enrolled in the RWHAP. The same six assumptions of an independent samples t-test that were previously discussed must also be met in this research question. The initial three assumptions (a dependent variable that is continuous, an independent variable that consists of two independent categorical groups, and an independence of observations) were met through the overall design of the research study. The fourth assumption, a homogeneity of variances, was not confirmed based on visual evaluation of the results of the Levene's test (Laerd Statistics, 2018b). The fifth assumption, the normality of the distributions of residuals, was not met as assessed by visual evaluation of all Q-Q Plots (Laerd Statistics, 2018d). The sixth assumption, the lack of outliers, was not met, as assessed by inspection of the boxplot output (Laerd Statistics, 2018b).

Due to violations of the assumptions of homogeneity, normality of the distributions, and outliers, I used a Mann-Whitney U to analyze the data instead of an independent samples *t* test (Laerd Statistics, 2018b). The Mann-Whitney U test is a nonparametric test that is used to determine if statistically significant differences exist between two groups when data from an independent samples *t* fails to meet the required assumptions (Laerd Statistics, 2018c). The Mann-Whitney U test has three assumptions that must be met prior to running the statistical test which include a continuous or ordinal dependent variable, a categorical independent variable with two groups, and an independence of observations (Laerd Statistics, 2018c). As all three of these assumptions were met based on the design of this research study, I ran Mann-Whitney U test to determine if there were differences in engagement in care (as defined by the number of

HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Additional information on the analysis of these assumptions can be found in Appendix F.

Independent samples *t* test (RQ 4). I used an independent samples *t* test to assess the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. The same six assumptions of an independent samples t-test that were previously discussed must also be met in this research question. The initial three assumptions (a dependent variable that is continuous, an independent variable that consists of two independent categorical groups, and an independence of observations) were met through the overall design of the research study. The fourth assumption, a homogeneity of variances, was not confirmed based on visual evaluation of the results of the Levene's test (Laerd Statistics, 2018b). The fifth assumption, the normality of the distributions of residuals, was not met as assessed by visual evaluation of all Q-Q Plots (Laerd Statistics, 2018b). The sixth assumption, the lack of outliers, was not met, as assessed by inspection of the boxplot output (Laerd Statistics, 2018b).

Due to violations of the assumptions of homogeneity, normality of the distributions, and outliers, I used a Mann-Whitney U to analyze the data instead of an independent samples *t* test (Laerd Statistics, 2018b). The Mann-Whitney U test is a nonparametric test that is used to determine if statistically significant differences exist between two groups when data from an independent samples *t* fails to meet the required assumptions (Laerd Statistics, 2018c). The Mann-Whitney U test has three assumptions that must be met prior to running the statistical test which include a continuous or ordinal dependent variable, a categorical independent variable with two groups, and an independence of observations (Laerd Statistics, 2018c). As all three of these assumptions were met based on the design of this research study, I ran a Mann-Whitney U test to determine if there were differences in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. Additional information on the analysis of these assumptions can be found in Appendix G.

Chi-square (RQ 5). I used a chi-squared test to examine the difference in difficulty in paying for out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. A chi-square test has three assumptions that must be satisfied to run this test. The first two assumptions (categorical variables and an independence of observations) were met based on the design of the study. The third assumption of a chi-square test is that all cells in the SPSS cross-tabulation output table must have expected counts that are greater than five (Field, 2013). Additional information on the analysis of these assumptions can be found in Appendix H.

Research Question Results

Research Question 1. What is the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression)?

As shown in Table 7, the adjusted R^2 value (.050) for the model indicated that only 5.0% of the dependent variable was related to the independent variables, which suggests there are other factors that need to be considered. In future studies, researchers may want to employ a different statistical model that may provide an enhanced level of predictive ability.

Table 7

Multiple Linear Regression Analysis Results[b,c,d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.278[a]	.077	.050	1230444.526	.077	2.868	8	274	.004

a. Predictors: (Constant), Insurance. Age, GENDER, ARTMissed, EDUCATION, HIVVisits, RACE, PovertyLevel
b. Dependent Variable: VLCHANGE
c. Weighted Least Squares Regression - Weighted by Weight
d. The enter method was used to conduct this analysis. Entering all independent variables into the model simultaneously is appropriate when there is uncertainty in understanding which variables will generate the best regression equation and the research desires to see how all of the variable interact with one another (Statistics Solutions, 2020).

A multiple linear regression was conducted and, as shown in Table 8, only engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) was related at a statistically significant level to viral load change (β = -9774.960, t = -3.141, p = < .05). Based on these results, the null hypothesis would need to be retained as only one of the independent variables was related to the dependent variable at a statistically significant level when all variables were included in the model.

Table 8

Multiple Linear Regression – Coefficients

Coefficients^{a,b}

	Unstandardized Coefficients		Standardized Coefficients		
Variable	B	Std. Error	Beta	t	Sig.
Constant	-63246.110	52742.879		-1.199	0.232
Race	-24193.849	16648.524	-0.089	-1.453	0.147
Gender	-2055.865	15884.668	-0.008	-0.129	0.897
Age	1090.960	621.554	0.103	1.755	0.080
Education	3250.199	6246.503	0.033	0.520	0.603
Poverty Level	15880.569	8392.543	0.122	1.892	0.060
ART Missed	-217.72	1622.718	-0.008	-0.134	0.893
HIV Visits	-9774.96	3112.364	-0.187	-3.141	0.002
Insurance	-5448.301	20119.053	-0.016	-0.271	0.787

a. Dependent Variable: VL Change

b. Weighted Least Squares Regression - Weighted by Weight

Research Question 2: What is the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

A Mann-Whitney U test was run to determine if there was a statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. Distributions of the ART missed doses in the past 30 days for PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP were not similar, as assessed by visual inspection of the SPSS output. As depicted in Table 9, the mean number of missed ART doses was higher for RWHAP clients (mean = 1.72) when compared to PLWHA enrolled in an ACAQHP (mean = 0.81). This is a statistically significant difference (*p* = .000), so the null hypothesis is rejected and the alternative accepted.

Table 9

Mann Whitney U Results – Treatment Compliance
Treatment Compliance for PLWHA Enrolled in the RWHAP and an ACAQHP

	N	Mean	U	Z	p
Treatment Compliance - ACAQHP	4836	0.81			
Treatment Compliance - RWHAP	25834	1.72			
Treatment Compliance			53404348.500	-18.121	.000

Research Question 3. What is the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

A Mann-Whitney U test was run to determine if there was a statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. Distributions of the number of HIV/AIDS-related physician visits within the previous 12 months were not similar, as assessed by visual inspection of the SPSS output. As seen in Table 10, the mean number of HIV/AIDS-related physician visits was higher for RWHAP clients (mean = 3.56) when compared to PLWHA enrolled in an ACAQHP (mean = 3.19). This is a statistically significant difference (*p* = .000), so the null hypothesis is rejected and the alternative accepted.

Table 10

Mann Whitney U Results – Engagement in Care
Engagement in Care for PLWHA Enrolled in the RWHAP and an ACAQHP

	N	Mean	U	Z	p
Engagement in Care - ACAQHP	4836	3.19			
Engagement in Care - RWHAP	25834	3.56			
Engagement in Care			59708211.500	-4.843	.000

Research Question 4. What is the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

A Mann-Whitney U test was run to determine if there was a statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. Distributions of viral load suppression were not similar, as assessed by visual inspection of the SPSS output. As shown in Table 11, the change in viral load was greater for PLWHA enrolled in an ACAQHP (mean = -28661.290) when compared to RWHAP clients (mean = -5165.271). This is not a statistically significant difference (p = .696), so the null hypothesis is retained.

Table 11

Mann Whitney U Results – Viral Load Change
Viral Load Change for PLWHA Enrolled in the RWHAP and an ACAQHP

	N	Mean	U	z	P
Viral Load Change - ACAQHP	4836	-5165.271			
Viral Load Change – RWHAP	25834	-28661.290			
Viral Load Change			62187443.000	-.391	.696

Research Question 5. What is the difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

A chi-square test was conducted in order to determine if there was a statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. As shown in Table 12, there was a statistically significant difference between the two groups in relation to being able to pay for out-of-pocket medical expenses (*p*=.000) with a higher percentage in the RWHAP group (28.9%, n = 25,843) reporting difficulty than the ACAQHP group (13.1%, n = 4,835). Therefore, the null hypothesis is rejected and the alternative accepted.

Table 12

Chi-square Results- Financial Difficulty
Financial Difficulty in Paying Out-of-Pocket Medical Expenses

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	521.577[a]	1	.000

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 1277.67.

Summary

This chapter provided the statistical results for the research questions included in this study. A multiple linear regression was used to test the hypothesis in the first research question and only engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) was related at a statistically significant level to viral load change (β = -9774.960, t = -3.141, p = < .05). The adjusted R^2 value (.050) indicated that only 5.0% of the dependent variable was related to the independent variables, which suggests there are other factors that need to be considered. A Mann-Whitney U test was run on the second, third, and fourth research questions. The results of the Mann-Whitney U test indicated a statistically significant relationship in treatment compliance (p = .000) as the mean number of missed ART doses was higher for RWHAP clients (mean = 1.72) compared to PLWHA enrolled in an ACAQHP (mean = 0.81). Additionally, the Mann-Whitney U test also showed a statistically significant relationship in engagement in care (p = .000) as the mean number of HIV/AIDS-related physician visits was higher for RWHAP clients (mean = 3.56) compared to PLWHA enrolled in an ACAQHP (mean = 3.19). Furthermore, the Mann-Whitney U found no statistically significantly difference in viral load change (p = .696) between PLWHA enrolled in an ACAQHP (mean = -28661.29) and PLWHA enrolled in the RWHAP (mean = -5165.27). Finally, a chi-square test was run on the fifth research question to determine if there was a significant association between financial difficulty in paying for out-of-pocket medical expenses and health coverage status. The results of the chi-square test revealed a statistically significant association between these variables, $\chi^2(1) = 521.577$, p = .001.

In Chapter 5, the final chapter of this study, I will provide an interpretation of the statistical findings and a review of the limitations of the study. I will also discuss recommendations for further research as well as the implications of study findings. Finally, I will discuss the impact of the study findings on social change, community health, and public policy.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of my study was to determine the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), and coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression). Additionally, I examined the difference in treatment compliance, engagement in care, and coverage status between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. I provided information on the relationship between ACA health insurance coverage and the health of PLWHA compared to the relationship between RWHAP coverage and the health of PLWHA. Based on the substantial investment of resources and public funds on the ACA, it is important to understand whether care provided by an ACAQHP is related to better health outcomes of plan participants (Ferris, 2016). Five research questions were addressed in my study. Using secondary data provided by the Florida Department of Health, I analyzed the data for each of the five research questions.

For RQ1, a multiple linear regression was conducted and only engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) was related at a statistically significant level to viral load change (β = -9774.960, t = -3.141, p = < .05). Based on these results, the null hypothesis was retained because only one of the independent variables was related to the dependent variable at a statistically significant level when all variables were included in the model.

For RQ2, a Mann-Whitney U test was run to determine whether there was a statistically significant difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. The mean number of missed ART doses was higher for RWHAP clients (mean = 1.72) when compared to PLWHA enrolled in an ACAQHP (mean = 0.81). This was a statistically significant difference (p = .000), so the null hypothesis was rejected and the alternative hypothesis was accepted.

For RQ3, a Mann-Whitney U test was run to determine whether there was a statistically significant difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. The mean number of HIV/AIDS-related physician visits was higher for RWHAP clients (mean = 3.56) when compared to PLWHA enrolled in an ACAQHP (mean = 3.19). This was a statistically significant difference (p = .000), so the null hypothesis was rejected and the alternative hypothesis was accepted.

For RQ4, a Mann-Whitney U test was run to determine whether there was a statistically significant difference in health status (as defined by viral suppression) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. The change in viral load was greater for PLWHA enrolled in an ACAQHP (mean = -

28661.290) when compared to RWHAP clients (mean = -5165.271). This was not a statistically significant difference ($p = .696$), so the null hypothesis was retained.

For RQ5, a chi-square test was conducted to determine whether there was a statistically significant difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. There was a statistically significant difference between the two groups in relation to being able to pay for out-of-pocket medical expenses ($p = .000$) with a higher percentage in the RWHAP group (28.9%, $n = 25{,}843$) reporting difficulty than the ACAQHP group (13.1%, $n = 4{,}835$). Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted.

Chapter 5 includes a discussion of the findings. First, I interpret the findings of each research question by comparing the results to current peer-reviewed literature and to Andersen’s behavioral model of health services use, which was the theoretical framework used in this study. Second, I describe the limitations of this study with respect to generalizability, trustworthiness, validity, and reliability. Third, I provide recommendations for further study on this topic that are grounded in the strengths and limitations of this study as well as the literature reviewed in Chapter 2. Fourth, I explain the potential social change impact and practical implications of the findings of this study. Fifth, I conclude with remarks that capture the essence of the study.

Interpretation of the Findings

Research Question 1

The first research question addressed the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days), engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months), and coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression). Only engagement in care was related at a statistically significant level to viral load change. Engagement in care is an important determinant of the health of PLWHA (U.S. Department of Health & Human Services, 2016b). There is currently no cure for HIV, and treatment for the virus is a lifelong process that requires routine office visits with medical providers (U.S. Department of Health & Human Services, 2016b). PLWHA who remain consistently engaged in care are more likely to achieve and maintain long-term viral suppression and experience reduced mortality rates (Crawford, 2014; Crawford et al., 2014). In my study, 83.7% of PLWHA enrolled in the RWHAP and 81.0% of PLWHA enrolled in an ACAQHP were engaged in care. The results were favorable compared to Cahill et al. (2015) who found that 73% of PLWHA enrolled in the RWHAP and 51% of PLWHA not enrolled in the RWHAP were engaged in care. Current study findings were also favorable compared to the United States government report that 81% of RWHAP clients were engaged in care compared to 40% of PLWHA throughout the United States (HRSA, 2016c; U.S. Department of Health & Human Services, 2016b).

Research Question 2

The second research question addressed the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. There was a statistically significant difference in treatment compliance as the mean number of missed ART doses for RWHAP clients (1.72) was higher than the mean number for PLWHA enrolled in an ACAQHP (0.81). A sustained high level of ART medication adherence is crucial for virus suppression; inadequately adhering to an ART regimen results in an increased rate of hospitalization, viral load, morbidity, and mortality (Olson et al., 2014). The results of my study compared favorably to the work of other researchers who estimated that 45% of PLWHA in North America were not adherent to their prescription regimen (Gardner, McLees, Steiner, del Rio, C., & Burman, 2011; Kay et al., 2006). I found that 31.0% of PLWHA enrolled in an ACAQHP and 41.1% of PLWHA enrolled in the RWHAP were not adherent to their prescription regimen. Because little is known about the overall ART medication adherence rate among PLWHA enrolled in an ACAQHP, my findings may extend the knowledge related to ART medication adherence.

Research Question 3

The third research question addressed the difference with engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. There is no cure for HIV and treatment of the virus is a lifelong process which requires routine office visits with medical providers (U.S. Department of Health &

Human Services, 2016b). PLWHA who remain consistently engaged in care are more likely to achieve and maintain long term viral suppression and experience reduced mortality rates (Crawford, 2014; Crawford et al., 2014). Previous studies by Cahill et al., (2015) found that 73% of PLWHA enrolled in the RWHAP and 51% of PLWHA who were not enrolled in the RWHAP were engaged in care while the United States government reported that 81% of RWHAP clients were engaged in care compared to 40% of PLWHA throughout the United States (HRSA, 2016c; U.S. Department of Health & Human Services, 2016b). My study results compared favorably to these researchers as 83.7% of PLWHA enrolled in the RWHAP and 81.0% of PLWHA enrolled in an ACAQHP were engaged in care. My results also expand upon the findings of other research studies by demonstrating significantly higher engagement in care for PLWHA enrolled in RWHAP (3.56 average visits) compared to PLWHA enrolled in an ACAQHP (3.19 average visits).

Research Question 4

The fourth research question addressed the difference in health status (as defined by viral suppression) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. I found no statistically significant difference in viral load between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. I found that 66.8% of PLWHA enrolled in the RWHAP and 66.7% of PLWHA enrolled in an ACAQHP were virally suppressed. The goal of HIV treatment is to reduce viral load to an undetectable level and become virally suppressed (U.S. Department of Health & Human Services, 2015a). PLWHA that are virally suppressed experience a life expectancy equal to that of the general uninfected population and are less likely to transmit HIV to an uninfected sexual or drug partner (Deeks et al., 2013; Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d). Bradley et al. (2016) examined the viral load suppression rates by coverage status of 18,095 participants from the 2009 – 2013 Medical Monitoring Project survey and found that PLWHA enrolled in an ACAQHP were 5% less likely to be virally suppressed then those enrolled in the RWHAP.

While Bradley et al. (2016) reported that PLWHA enrolled in the RWHAP were more likely to be virally suppressed than PLWHA enrolled in an ACAQHP, McManus et al. (2018), Raifman et al. (2018), and Dawson and Kates (2019) reached an alternative conclusion. McManus et al. (2018) reported that among PLWHA residing in Virginia in 2015, 83.3% who were enrolled in an ACAQHP were virally suppressed compared to 79.9% who were enrolled in the RWHAP. Raifman et al. (2018) reported that among PLWHA residing in the United States in 2015, 79% who were enrolled in an ACAQHP were virally suppressed compared to 75% who were enrolled in the RWHAP. Although there was an improvement in viral load suppression among PLWHA enrolled in an ACAQHP type insurance plan, the results were not statistically significant and they concluded that transitioning from the RWHAP to an ACAQHP type insurance plan was not associated with a change in viral load suppression (Raifman et al., 2018). Dawson and Kates (2019) explored viral load suppression and insurance coverage among 3,645 nonelderly PLWHA in the United States who participated in the 2015 Medical

Monitoring Project survey and found that 66% of study participants enrolled in the RWHAP and in an ACAQHP were virally suppressed.

My study results were consistent with McManus et al. (2018), Raifman et al. (2018), and Dawson and Kates (2019) who reported that viral load suppression rates among PLWHA enrolled in an ACAQHP were equal to or better than PLWHA enrolled in the RWHAP. However, the findings of my study were inconsistent with the results of Bradley et al. (2016) who reported reduced viral load suppression rates among PLWHA enrolled in an ACAQHP compared to PLWHA enrolled in the RWHAP. My results may have been comparable to the findings of McManus et al. (2018), Raifman et al. (2018), and Dawson and Kates (2019) because these studies compared the viral load suppression rate of PLWHA enrolled in the RWHAP to the viral load suppression rate of PLWHA enrolled in the ACA after it was fully enacted in 2014. My study results may have been dissimilar to the findings reported by Bradley et al. (2016) because they examined viral load suppression rates from PLWHA enrolled in the RWHAP and ACA during 2009 to 2013, prior to full ACA implementation. An analysis of viral load suppression rates among PLWHA enrolled in the ACA prior to its full implementation in 2014, may have under reported the actual health benefits of this comprehensive insurance coverage. My results are important because they show PLWHA living in Florida can gain access to the comprehensive services provided by the ACA, while simultaneously maintaining their rate of viral load suppression achieved from the care provided by the RWHAP.

Research Question 5

The fifth research question addressed the difference in difficulty in paying for out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. I found a statistically significant difference as PLWHA enrolled in the RWHAP were 2.690 times more likely of having difficulty in paying out-of-pocket medical expenses than PLWHA enrolled in an ACAQHP. The ability of PLWHA to pay out-of-pocket medical expenses is an important consideration in becoming virally suppressed as higher out-of-pocket costs results in medical care avoidance, and an overall reduction in the use of health care services and in overall health (Galbraith et al., 2012; Kannan & Veazie, 2014; Murphy, 2016).

Multiple researchers indicated that between 33% and 43% of patients enrolled in a high deductible health plan deferred needed medical care and that adults with high deductibles were 2.7 times more like to delay or forgo care than were adults with traditional health insurance (Galbraith et al., 2012; Kannan & Veazie, 2014; Murphy, 2016). Severe health consequences can occur when people avoid obtaining needed medical care when they are sick (Galbraith et al., 2012; Kannan & Veazie, 2014; Murphy, 2016). Delayed care can result in an increase in overall suffering and reduced treatment options and health outcomes (Kannan & Veazie, 2014; Taber et al., 2015). For PLWHA, delayed access to care that hinders the timely engagement in HIV medical care and the start of an ART medication regimen reduces the chances of viral load suppression and increases the overall rate of mortality (Fatukasi et al., 2017; U.S. Department of Health & Human Services, 2016b, 2018c).

Researchers have identified health care related expenses as an impediment to accessing care (Dombrowski, Simoni, Katz, & Golden, 2015; Yehia et al., 2015). Yehia et al. (2015) found that out-of-pocket medical expenses deterred study participants from seeking care while Dombrowksi et al. (2015) reported that health care costs, or the perception of those costs resulted in a barrier to care among insured PLWHA. I have been unable to find quantitative data comparing the difficulty in paying for out-of-pocket medical expenses between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. Gardner et al. (2011) reported that few researchers have evaluated the degree to which health care expenses have inhibited access to care for PLWHA. As little is known about the financial difficulty that PLWHA have in paying out-of-pocket medical expenses, my study results are the first to quantify financial burden and may extend the overall knowledge related to potential financial barriers that PLWHA face when seeking medical care.

Interpretation of the Findings in Relation to the Theoretical Framework

The theoretical framework I used in this study was the behavioral model of health services use. Andersen developed the behavioral model of health services use to explain the factors that determine how and why health care services are utilized (Babitsch et al., 2012; Graham et al., 2017). Predisposing characteristics related to health care utilization include age, sex, marital status, past illness, education, race, occupation, ethnicity, religion, and the perception of the benefit of treatment efficacy (Andersen & Newman, 2005). Andersen et al. (2000) found that PLWHA with predisposing characteristics associated with vulnerable and marginalized groups were less likely to have access to medical care and ART medications, and become virally suppressed. My study results showed participants who were male, white, older, more educated, and had higher annual income were more likely to access care and become virally suppressed (Andersen et al., 2000). My study findings followed the relationship patterns of predisposing characteristics represented in the behavioral model of health services use. In my study, health status for PLWHA was better for whites compared to non-whites, males compared to females, older compared to younger, more educated compared to the less educated, and participants with higher income levels compared to those with lower income levels.

The second stage of the behavioral model of health services is enabling characteristics which are a set of conditions that facilitate access to health care services (Andersen & Newman, 2005). Although an individual may be predisposed to utilize health care services, they must possess the needed resources to receive medical care. Enabling components are characterized by financial attributes that facilitate access to care including income, savings, health insurance, and the accessibility of care (Andersen & Newman, 2005). The ability of PLWHA to pay out-of-pocket medical expenses is an enabling characteristic and is an important consideration in an individual’s ability to become virally suppressed (Andersen & Newman, 2005). Yehia et al. (2015) found that out-of-pocket medical expenses deterred individuals from seeking care, while Dombrowksi et al. (2015) reported that health care costs, or the perception of what those costs would be, created a barrier to care that prevented individuals from seeking out care even when insured. For PLWHA, a delay in seeking care or the start of ART medications reduces the probability of viral load suppression and increases the overall rate of mortality and morbidity (Fatukasi et al., 2017; U.S. Department of Health & Human Services, 2016b, 2018c). I found that PLWHA enrolled in the RWHAP were 2.69 times more likely to have financial difficulty in paying for out-of-pocket medical expenses than were PLWHA enrolled in an ACAQHP. PLWHA enrolled in the RWHAP are more likely to face real or perceived financial barriers to accessing necessary health care, which are representative of the enabling characteristic as described in the model.

The third and final stage of the behavioral model of health services use is illness level, which can influence an individual's belief that they need to pursue medical care (Andersen & Newman, 2005). A medical diagnosis is needed for an individual to have a perceived or evaluated illness that would influence the use of health care services (Andersen & Newman, 2005). Engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) is an important determinant of health, as PLWHA who remain consistently engaged in care are more likely to achieve and maintain long term viral suppression and experience reduced mortality rates (Crawford, 2014; Crawford et al., 2014). My study showed that PLWHA who were enrolled in the RWHAP (mean = 3.56) had a greater number of HIV/AIDS-related physician visits than were PLWHA enrolled in an ACAQHP (mean = 3.19). However, PLWHA enrolled in the RWHAP or an ACAQHP exceeded the recommended minimum of 2 HIV/AIDS-related physician visits within the previous 12 months (Cahill et al., 2015; Crawford et al., 2014). Consequently, the findings of my research study were aligned with the relationship patterns of illness level characteristics espoused by the behavioral model of health services use.

Limitations of the Study

The limitations that I raised earlier in this study were successfully resolved. First, I assumed that comprehensive health insurance would improve the health of PLWHA. The results of my study and the findings of other researchers including McManus et al. (2018), Raifman et al. (2018), and Dawson and Kates (2019) confirmed that comprehensive health insurance is associated with improved health for PLWHA. Second, I assumed the sample size of participants would be large enough to generate meaningful study results. I met this assumption as the weighted sample size of sample size 30,670 participants exceeded the 228 participants needed to meet the desired statistical power of the study. Third, I assumed that the data set would contain the data points needed to answer the research questions in this study. This assumption was confirmed after I received the data set from the Florida Department of Health and verified the needed information was included. Fourth, my use of a purposeful convenience sampling methodology could have reduced the external validity of the study and the potential generalizability of the results (Laerd Statistics, 2012a). However, the provision of weighted data by the organization enhanced the external validity, so the results can be generalizable to all PLWHA residing in Florida.

Fifth, challenges with the internal validity of my study could have compromised the conclusions establishing a relationship between independent and dependent variables (Creswell, 2009; Labaree, 2017). One common factor in research studies that reduces internal validity is selection bias which occurs when the study sample is not representative of the overall population (Creswell, 2009; Labaree, 2017). I maintained the internal validity of my study by using weighted data that was representative of all PLWHA residing in Florida. Sixth, my study used secondary data that was amassed as part of the Medical Monitoring Project survey, which was collected from survey participants directly, and from data abstracted directly from the participant’s medical records. I assumed that survey participants understood the questions being asked of them by the survey data collectors, and provided answers that were reliable, accurate, and honest. While DeLamater and Plante (2015) noted that asking people sensitive questions about their sexuality (and associated health complications) may increase survey response bias due to a larger number of nonresponses, or misreported answers motivated by social desirability to avoid overall embarrassment, Conway, Jako, and Goodman (1995) found that the use of standardized questions while collecting data provided the highest overall reliability. Additionally, I assumed that the data collectors accurately completed the data collection process. Mi, Collins, Lerner, Losina, and Katz (2013) found that data abstracted by non-physicians from a medical record resulted in excellent reliability.

Recommendations

The data I used in this research study was collected from respondents who resided in the state of Florida. As HIV/AIDS are diseases of national concern, additional research is needed to compare the relationship between the health of PLWHA, the ACA, and the RWHAP within different states and regions from across the United States. It is important to understand if the results of my study can be consistently replicated on a national level, which would provide PLWHA a better awareness of potential changes in health outcomes by transitioning care from the RWHAP to an ACAQHP.

Additional research also needs to be conducted examining the relationship that the duration of enrollment in the RWHAP or an ACAQHP has on engagement in care, treatment compliance, and viral load suppression. Participants in my study were enrolled in the RWHAP or an ACAQHP for a minimum of 12 months, yet the actual duration of coverage was unknown. Although Sommers et al., (2017) stated the impact of health insurance coverage on life-threatening conditions such as HIV/AIDS may take at least one year to occur, it would be important to understand how the results of this study would have differed based on the number of years of ACAQHP or RWHAP coverage. Further research may need to be delayed for several years to allow enough time to pass so a greater volume of ACAQHP data can be collected to assess changes in engagement in care, treatment compliance, and viral load suppression.

Future researchers should study the relationship that the RWHAP has on the engagement in care, treatment compliance, and viral load suppression of PLWHA who are also enrolled in an ACAQHP. A considerable number of PLWHA enrolled in an ACAQHP also continue to receive services through the RWHAP (Adamson, Lipira, & Katz, 2019; Bradley et al., 2016; Furl, Watanabe-Galloway, Lyden, & Swindells, 2018; McManus et al., 2018; Raifman et al., 2018). The RWHAP services provided to PLWHA enrolled in an ACAQHP include financial support for insurance premiums and cost sharing assistance for other out-of-pocket financial costs including deductibles, copayments, and coinsurance (Adamson et al., 2019; Bradley et al., 2016; Furl et al., 2018; McManus et al., 2018; Raifman et al., 2018). The RWHAP also provides wrap around services not typically covered by commercial health insurance carriers including mental health counseling and treatment, substance abuse counseling and treatment, dental care, housing assistance, and transportation services. Consequently, continued research is needed to understand how to maximize the effectiveness of the RWHAP post ACA implementation.

My recommendations for future research are similar to the recommendations proposed by other authors who have conducted similar studies. Bradley et al. (2016), suggested that additional information about the RWHAP support services PLWHA enrolled in the ACA receive is needed to understand the relationship between coverage status and health status. McManus et al. (2018) also recommended that future researchers examine the role that RWHAP wrap around services have on health outcomes for PLWHA enrolled in an ACAQHP and that studies should be conducted throughout the country so health outcomes could be understood on a larger scale. Raifman et al. (2018) advised that future researchers should assess how financial considerations and the length (in years) of insurance coverage influence viral load suppression. Finally, Ginossar et al. (2019) recommended additional information is needed to assess health outcomes for PLWHA enrolled in an ACAQHP.

Implications

Implications for Social Change

My study results may promote social change as PLWHA who enroll in an ACAQHP can gain access to the comprehensive health care services provided by health insurance coverage while simultaneously maintaining a high viral load suppression rate. PLWHA that are virally suppressed are generally healthier and live longer than those that are not virally suppressed HIV (CDC, 2016b; Drainoni et al., 2015; Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d). Furthermore, the lifespan of a person with HIV who is treated with ART medications is nearly the same as a person who does not have HIV (CDC, 2016b; Drainoni et al., 2015; Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d) so having access to information and services that promote viral suppression would be desirable. My study results may also promote social change by encouraging PLWHA to enroll in an ACAQHP, as PLWHA who receive care from the RWHAP were more likely of having a greater difficulty in paying out-of-pocket medical expenses than those enrolled in an ACAQHP. The ability of PLWHA to pay out-of-pocket medical expenses is an important consideration in becoming virally suppressed as higher out-of-pocket costs results in medical care avoidance, an overall reduction in the utilization of medical care, and in overall health (Galbraith et al., 2012; Kannan & Veazie, 2014; Murphy, 2016). For PLWHA, delayed access to care that hinders the timely engagement in HIV medical care and the start of an ART medication regimen reduces the chances of viral load suppression and increases the overall rate of mortality (Fatukasi et al., 2017; U.S. Department of Health & Human Services, 2016b, 2018c).

Implications for Practice

I found that PLWHA enrolled in an ACAQHP were statistically more likely to remain compliant with their ART treatment regimen and were statistically less likely to have financial problems in paying for out-of-pocket medical expenses than were PLWHA enrolled in the RWHAP. I also found no statistically significant differences in change in viral load suppression between PLWHA enrolled in the RWHAP or enrolled in an ACAQHP. These findings are important as they show that ACAQHP coverage may offer PLWHA a viable treatment alternative beyond the care that is provided by the RWHAP. In an era of the ACA, there is some uncertainty with respect to the future of the RWHAP. Numerous researchers including Cahill et al. (2015), Crowley and Garner (2015), Dawson and Kates (2015) Johnson and Heisler (2015), and Morin (2015), have advocated for changes in the RWHAP to ensure its survival post ACA implementation. As the most recent Congressional authorization for the RWHAP lapsed in 2013, there is no guarantee the funding that has been renewed based on annual appropriations from Congress will continue (Johnson & Heisler, 2015; The Henry J. Kaiser Family Foundation, 2017b).

In an era of the ACA, it may be beneficial for administrators from the Health Resources and Services Administration and the Florida Department of Health to refocus the RWHAP in Florida from funding care to subsidizing the costs of ACAQHP health insurance premiums and other out-of-pocket expenses such as coinsurance, copayments, and deductibles. Subsidizing health care costs associated with enrollment in an ACAQHP will help PLWHA gain access to the comprehensive services provided by the ACA, while simultaneously maintaining their rate of viral load suppression achieved from care provided by the RWHAP (Bradley et al., 2016; Furl et al., 2018; McManus et al., 2018; U.S. Centers for Medicare & Medicaid Services, 2018a). The RWHAP should also continue to provide wrap around services that are not typically covered by commercial health insurance carriers such as mental health care, substance abuse treatment, dental care, housing assistance, and transportation services because access to these supplemental services help PLWHA become virally suppressed (Berry et al., 2016; Morin, 2015). PLWHA who enroll in an ACAQHP and lose access to these services may experience a decline in health status (Berry et al., 2016; Morin, 2015). Finally, Ginossar et al. (2019) noted that by enrolling PLWHA into an ACAQHP, Virginia reduced their health care expenses nearly 50% compared to keeping the patients in the RWHAP. Similar financial savings in Florida could be used to help an even greater number of PLWHA become virally suppressed.

Practitioners including physicians, social workers, and public health workers could use this information to encourage PLWHA to enroll in an ACAQHP, which would provide the comprehensive health care benefits associated with health insurance coverage while also achieving viral load suppression rates comparable to that of the RWHAP. PLWHA who enroll in an ACAQHP will receive access to health care services that are specifically excluded from coverage under the RWHAP including hospital care provided in an emergency room or inpatient setting, and medical care by physicians for services unrelated to the treatment of the HIV/AIDS (Crowley & Garner, 2015; Emory Health care, 2017). Access to comprehensive health care as part of the ACA is becoming more important for virally suppressed PLWHA as they now live long enough to encounter other chronic conditions unrelated to HIV that are not covered by the RWHAP (Deeks et al., 2013; Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d).

Conclusion

Advances in ART medications have increased the viral load suppression rate and PLWHA that are virally suppressed experience a life expectancy equal to that of the general uninfected population (Deeks et al., 2013; Goldman et al., 2014; U.S. Department of Health & Human Services, 2018d). Although the RWHAP is not an insurance company and only covers outpatient HIV/AIDS-related medical care and treatment, it has served as a safety net by providing medical care and ART medications for lower income PLWHA that were uninsured or underinsured (HRSA, 2016b; The Henry J. Kaiser Family Foundation, 2017b). RWHAP clients have been more likely to be engaged in care, have access to ART medications, and become virally supressed than were PLWHA who have not received services through the program (U.S. Department of Health & Human Services, 2016b).

The passage of the ACA offered PLWHA enrolled in the RWHAP an opportunity to maintain and potentially enhance their rate of viral load suppression and receive comprehensive health insurance that may improve overall health and life expectancy. I found a statistically significant difference in treatment compliance and difficulty in paying for out-of-pocket medical expenses between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. PLWHA enrolled in the RWHAP missed a greater number of ART doses in the past 30 days than did PLWHA enrolled in an ACAQHP. I also found that PLWHA enrolled in the RWHAP were more likely to have financial difficulties in paying out-of-pocket medical expenses than those enrolled in an ACAQHP. Finally, the most important finding of my study was the lack of a statistically significant difference in the change in viral load between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP.

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Appendix A: G Power Sample Size Calculation

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[1] -- Saturday, August 31, 2019 -- 11:13:11
F tests - Linear multiple regression: Fixed model, R² deviation from zero
Analysis:    A priori: Compute required sample size
Input:       Effect size f²                  =  0.15
             α err prob                      =  0.05
             Power (1-β err prob)            =  .8
             Number of predictors            =  8
Output:      Noncentrality parameter λ       =  16.3500000
             Critical F                      =  2.0323276
             Numerator df                    =  8
             Denominator df                  =  100
             Total sample size               =  109
             Actual power                    =  0.8040987

[2] -- Saturday, August 31, 2019 -- 11:15:57
t tests - Means: Difference between two independent means (two groups)
Analysis:    A priori: Compute required sample size
Input:       Tail(s)                         =  Two
             Effect size d                   =  0.5
             α err prob                      =  0.05
             Power (1-β err prob)            =  .80
             Allocation ratio N2/N1          =  .2
Output:      Noncentrality parameter δ       =  2.8136572
             Critical t                      =  1.9705162
             Df                              =  226
             Sample size group 1             =  190
             Sample size group 2             =  38
             Total sample size               =  228
             Actual power                    =  0.8000279

[3] -- Saturday, August 31, 2019 -- 11:16:07
t tests - Means: Difference between two independent means (two groups)
Analysis:    A priori: Compute required sample size
Input:       Tail(s)                         =  Two
             Effect size d                   =  0.5
             α err prob                      =  0.05
             Power (1-β err prob)            =  .80
             Allocation ratio N2/N1          =  .2
Output:      Noncentrality parameter δ       =  2.8136572
             Critical t                      =  1.9705162
             Df                              =  226
             Sample size group 1             =  190
             Sample size group 2             =  38
```

```
                    Total sample size                =   228
                    Actual power                     =   0.8000279

[4] -- Saturday, August 31, 2019 -- 11:16:09
t tests - Means: Difference between two independent means (two groups)
Analysis:           A priori: Compute required sample size
Input:              Tail(s)                          =   Two
                    Effect size d                    =   0.5
                    α err prob                       =   0.05
                    Power (1-β err prob)             =   .80
                    Allocation ratio N2/N1           =   .2
Output:             Noncentrality parameter δ        =   2.8136572
                    Critical t                       =   1.9705162
                    Df                               =   226
                    Sample size group 1              =   190
                    Sample size group 2              =   38
                    Total sample size                =   228
                    Actual power                     =   0.8000279

[5] -- Saturday, August 31, 2019 -- 11:29:08
z tests - Proportions: Difference between two independent proportions
Analysis:           A priori: Compute required sample size
Input:              Tail(s)                          =   Two
                    Proportion p2                    =   .4
                    Proportion p1                    =   .15
                    α err prob                       =   0.05
                    Power (1-β err prob)             =   .8
                    Allocation ratio N2/N1           =   .2
Output:             Critical z                       =   1.9599640
                    Sample size group 1              =   131
                    Sample size group 2              =   26
                    Total sample size                =   157
                    Actual power                     =   0.7984614
```

Appendix B: Data Use Agreement

See the attached data use agreement, which has been executed by the Florida Department of Health.

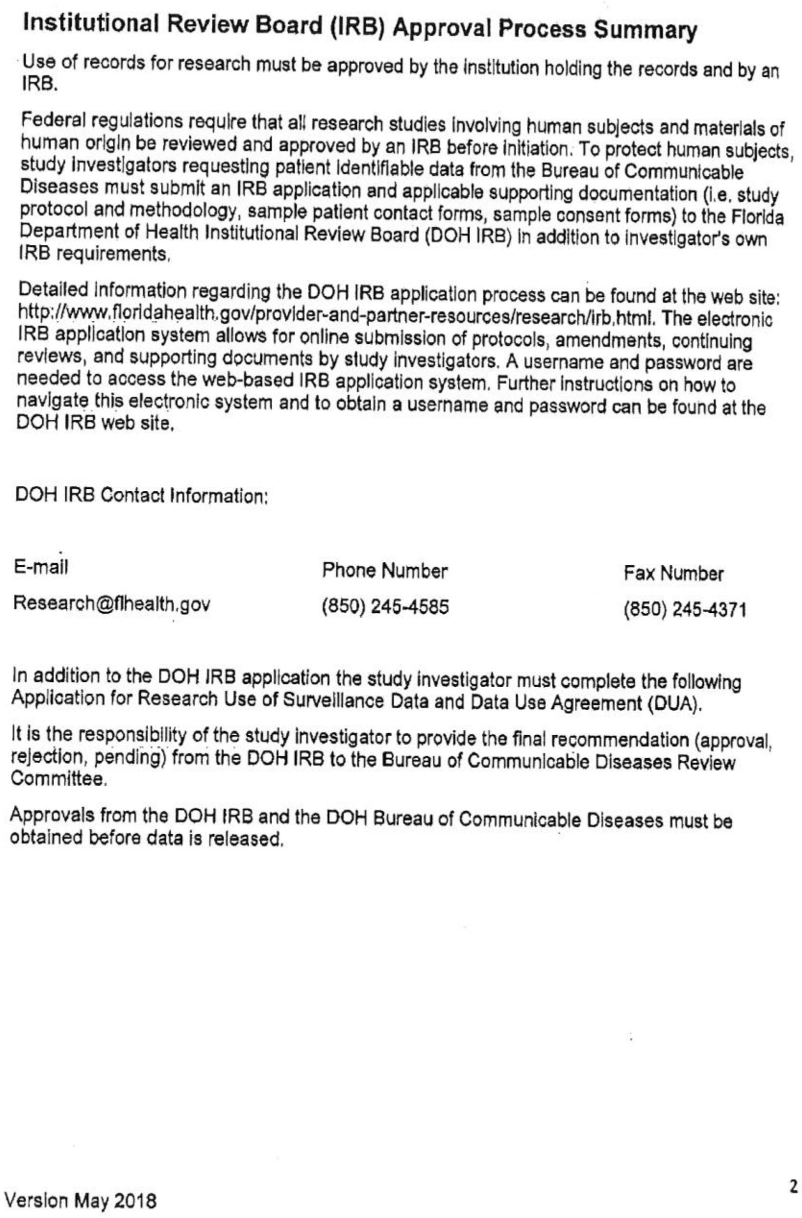
Florida Department of Health
Bureau of Communicable Diseases

Application for Research Use of Surveillance Data

Data Use Agreement

For studies that use data from
Florida HIV/AIDS Surveillance
Behavioral Surveillance
Medical Monitoring Project
STD & Viral Hepatitis Surveillance
Tuberculosis Registry

Florida
HEALTH



Institutional Review Board (IRB) Approval Process Summary

Use of records for research must be approved by the institution holding the records and by an IRB.

Federal regulations require that all research studies involving human subjects and materials of human origin be reviewed and approved by an IRB before initiation. To protect human subjects, study investigators requesting patient identifiable data from the Bureau of Communicable Diseases must submit an IRB application and applicable supporting documentation (i.e. study protocol and methodology, sample patient contact forms, sample consent forms) to the Florida Department of Health Institutional Review Board (DOH IRB) in addition to investigator's own IRB requirements.

Detailed information regarding the DOH IRB application process can be found at the web site: http://www.floridahealth.gov/provider-and-partner-resources/research/irb.html. The electronic IRB application system allows for online submission of protocols, amendments, continuing reviews, and supporting documents by study investigators. A username and password are needed to access the web-based IRB application system. Further instructions on how to navigate this electronic system and to obtain a username and password can be found at the DOH IRB web site.

DOH IRB Contact Information:

E-mail	Phone Number	Fax Number
Research@flhealth.gov	(850) 245-4585	(850) 245-4371

In addition to the DOH IRB application the study investigator must complete the following Application for Research Use of Surveillance Data and Data Use Agreement (DUA).

It is the responsibility of the study investigator to provide the final recommendation (approval, rejection, pending) from the DOH IRB to the Bureau of Communicable Diseases Review Committee.

Approvals from the DOH IRB and the DOH Bureau of Communicable Diseases must be obtained before data is released.

Instructions for Applicants

The Florida Department of Health (DOH), Bureau of Communicable Diseases may release data to entities with an approved Data Use Agreement (DUA), and accompanying IRB approval (if applicable) for the purposes authorized by Florida Statutes Chapter 381.0031. All persons with data access must sign the DUA outlining the terms and conditions for surveillance data use. A DUA is specific to the individual project, and all projects require annual review.

Program Managers within the Bureau of Communicable Diseases conduct a detailed review of every application for access to surveillance data, and make final decisions on a case by case basis. Requests for confidential or de-identified data will be granted only if the project meets statutory criteria and has implications for public health. Applications for the use of confidential data are judged based on:

- Scientific merit
- Technical feasibility
- Ability of the applicant to manage confidential data
- Potential benefit to the Florida Department of Health and the public
- Consistency with the epidemiologic research goals of section 381.0031, Florida Statutes

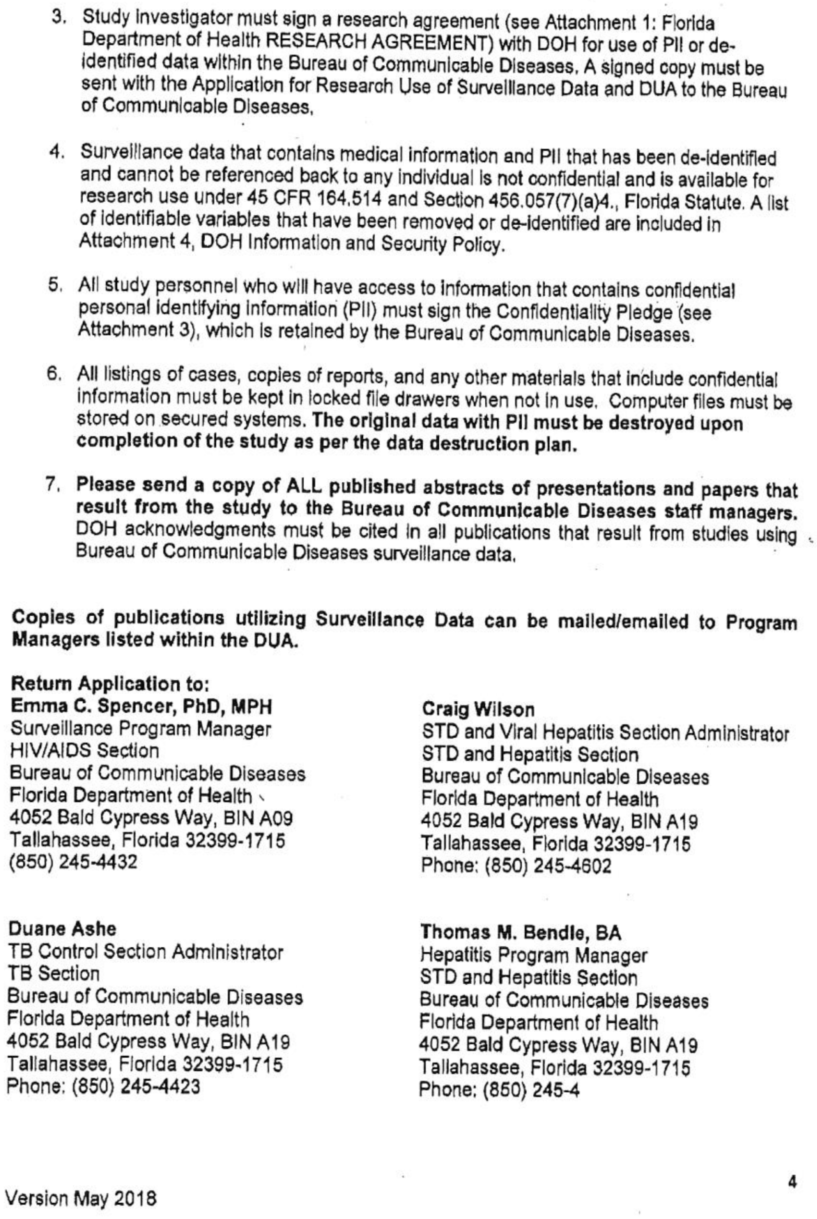
Approved applicants are held to the highest ethical standards and must agree to the stipulations detailed in the DUA.

Application Instructions for Research Use of the Bureau of Communicable Diseases Surveillance Data

Below are instructions for obtaining access to confidential personal identifiable information (PII) or de-identified (does not contain PII) Florida Communicable Diseases Surveillance data, including but not limited to, HIV/AIDS Surveillance, Medical Monitoring Project, National HIV Behavioral Surveillance, Sexually Transmitted Disease (STD) and Viral Hepatitis Surveillance, and Tuberculosis (TB) datasets.

1. Please indicate the purpose of your research proposal. The DUA can be used to request for any of the following:
   a. Patient Reporting Investigation Surveillance Manager (PRISM)
   b. Viral Hepatitis (MERLIN)
   c. Enhanced HIV/AIDS Reporting System (eHARS)
   d. TB Data Registry
   e. Medical Monitoring Project (MMP)
   f. National HIV Surveillance Behavioral System (NHBS)

2. Study investigator must complete all fields of the Application for Research Use of Surveillance Data and DUA. If a field is not relevant, please indicate this is non-applicable to the study proposal. An incomplete application will delay the review process by the Bureau of Communicable Diseases. **All agreements must be renewed annually.**



3. Study investigator must sign a research agreement (see Attachment 1: Florida Department of Health RESEARCH AGREEMENT) with DOH for use of PII or de-identified data within the Bureau of Communicable Diseases. A signed copy must be sent with the Application for Research Use of Surveillance Data and DUA to the Bureau of Communicable Diseases.

4. Surveillance data that contains medical information and PII that has been de-identified and cannot be referenced back to any individual is not confidential and is available for research use under 45 CFR 164.514 and Section 456.057(7)(a)4., Florida Statute. A list of identifiable variables that have been removed or de-identified are included in Attachment 4, DOH Information and Security Policy.

5. All study personnel who will have access to information that contains confidential personal identifying information (PII) must sign the Confidentiality Pledge (see Attachment 3), which is retained by the Bureau of Communicable Diseases.

6. All listings of cases, copies of reports, and any other materials that include confidential information must be kept in locked file drawers when not in use. Computer files must be stored on secured systems. **The original data with PII must be destroyed upon completion of the study as per the data destruction plan.**

7. **Please send a copy of ALL published abstracts of presentations and papers that result from the study to the Bureau of Communicable Diseases staff managers.** DOH acknowledgments must be cited in all publications that result from studies using Bureau of Communicable Diseases surveillance data.

Copies of publications utilizing Surveillance Data can be mailed/emailed to Program Managers listed within the DUA.

Return Application to:
Emma C. Spencer, PhD, MPH
Surveillance Program Manager
HIV/AIDS Section
Bureau of Communicable Diseases
Florida Department of Health
4052 Bald Cypress Way, BIN A09
Tallahassee, Florida 32399-1715
(850) 245-4432

Craig Wilson
STD and Viral Hepatitis Section Administrator
STD and Hepatitis Section
Bureau of Communicable Diseases
Florida Department of Health
4052 Bald Cypress Way, BIN A19
Tallahassee, Florida 32399-1715
Phone: (850) 245-4602

Duane Ashe
TB Control Section Administrator
TB Section
Bureau of Communicable Diseases
Florida Department of Health
4052 Bald Cypress Way, BIN A19
Tallahassee, Florida 32399-1715
Phone: (850) 245-4423

Thomas M. Bendle, BA
Hepatitis Program Manager
STD and Hepatitis Section
Bureau of Communicable Diseases
Florida Department of Health
4052 Bald Cypress Way, BIN A19
Tallahassee, Florida 32399-1715
Phone: (850) 245-4

FLORIDA DEPARTMENT OF HEALTH
APPLICATION FOR RESEARCH USE OF THE FLORIDA BUREAU OF COMMUNICABLE DISEASES SURVEILLANCE DATA

For Official use, only
Project # ____________
Date Received ____________
Date Reviewed ____________
Approved Yes ______ No ______

Date: October 7, 2019

Project Director Information:

Name of Requestor: Todd Blum

Title: Adjunct Professor, Florida Atlantic University, Ph.D. Candidate, Walden University

Requestor's Organization/Agency:

Mailing Address: 777 Glades Road, Boca Raton, FL 33431

Telephone Number: 954-609-3157

Fax Number: 561-338-6271

E-Mail Address: todd.blum@waldenu.edu

Contact Person (if different from Project Director):

Contact Person's Telephone Number:

Contact Person's E-Mail Address:

Does this application update a previous Data Use Agreement? ☒ **Yes** ☐ **No**

Please attach study investigator(s) curriculum vitae/resume.

Project Summary

Project Title: The Relationship Between the Affordable Care Act, the Ryan White HIV/AIDS Program and the Health of People Living with HIV and Aids

Purpose of the Project: The purpose of this research study is to determine if people living with HIV/AIDS who are enrolled in an Affordable Care Act qualified health plan show a statistically significant increase in engagement in care, treatment compliance, and viral load suppression compared to those enrolled in the Ryan White HIV/AIDS Program.

Analysis Plan: The Statistical Package for the Social Sciences (SPSS) version 21 will be used to complete the descriptive and inferential statistical analysis. The descriptive analysis to be conducted includes measures of central tendencies (mean and standard deviation) for all independent continuous variables and frequency distributions and percentage distributions for all independent categorical variables. Inferential statistical analysis including a multiple linear regression and independent samples t-test will be conducted to test hypotheses to derive answers to research questions based on study participants or populations.

Project Objectives: The objective of this research study is to understand the impact that the Affordable Care Act (ACA) has on the health of people living with HIV/AIDS compared to those enrolled in the Ryan White HIV/AIDS Program (RWHAP).

The research questions and hypotheses of the study are listed below.

Research Question 1: What is the relationship between demographic factors, treatment compliance, engagement in care, coverage status and the health status of people living with HIV/AIDS?

Null Hypothesis 1: There is no statistically significant relationship between demographic factors, treatment compliance, engagement in care, coverage status and the health status of people living with HIV/AIDS.

Alternative Hypothesis 1: There is a statistically significant relationship between demographic factors, treatment compliance, engagement in care, coverage status and the health status of people living with HIV/AIDS.

Research Question 2: What is the difference in treatment compliance between PLWHA enrolled in an ACA qualified health plan (QHP) and PLWHA enrolled in the RWHAP?

Null Hypothesis 2: There is no statistically significant difference in treatment compliance between PLWHA enrolled in an ACA qualified health plan (QHP) and PLWHA enrolled in the RWHAP.

Alternative Hypothesis 2: There is a statistically significant difference in treatment compliance between PLWHA enrolled in an ACA qualified health plan (QHP) and PLWHA enrolled in the RWHAP.

Research Question 3: What is the difference in engagement in care between PLWHA enrolled in an ACA QHP and PLWHA enrolled in the RWHAP?

Null Hypothesis 3: There is no statistically significant difference in engagement in care between PLWHA enrolled in an ACA QHP and PLWHA enrolled in the RWHAP.

Alternative Hypothesis 3: There is a statistically significant difference in engagement in care between PLWHA enrolled in an ACA QHP and PLWHA enrolled in the RWHAP.

Research Question 4: What is the difference in health status between PLWHA enrolled in an ACA QHP and PLWHA enrolled in the RWHAP?

Null Hypothesis 4: There is no statistically significant difference in health status between PLWHA enrolled in an ACA QHP and PLWHA enrolled in the RWHAP.

Alternative Hypothesis 4: There is a statistically significant difference in health status between PLWHA enrolled in an ACA QHP and PLWHA enrolled in the RWHAP.

Research Question 5: What is the difference in difficulty in paying out of pocket medical expenses (as defined by problems paying for any out of pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP?

Null Hypothesis 5: There is no statistically significant difference in difficulty in paying out of pocket medical expenses (as defined by problems paying for any out of pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

Alternative Hypothesis 5: There is a statistically significant difference in difficulty in paying out of pocket medical expenses (as defined by problems paying for any out of pocket medical or health insurance costs) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

Intended Use of the Data: The data will be used to complete my Ph.D. dissertation.

Benefit to the State: State any specific public health benefits from study outcomes.

Part B of the Ryan White HIV/AIDS Program (RWHAP) authorizes monetary grants to the state of Florida to improve the access and quality of healthcare for people living with HIV/AIDS (PLWHA). The Health Resources and Services Administration (HRSA) allows each state to use these funds to pay the health insurance premiums and other out of pocket insurance costs such as copayments, coinsurance, and deductibles for RWHAP clients to enroll in an Affordable Care Act qualified health plan (ACA QHP). By understanding the difference in the health status of PLWHA enrolled in the RWHAP compared to those with ACA QHP coverage, the state of Florida may be able to determine how it can best use federal funds to optimize the health of PLWHA.

Will the study results be used for publication and/or presentation? ☒ **Yes** ☐ **No**

If yes, then please provide publication and presentation information.

This dissertation will be published in the Proquest Dissertation Database.

A copy of all abstracts, grant applications, papers, or presentations that result from the use of data must be sent to the Bureau of Communicable Diseases for DOH clearance and review process prior to public release. DOH clearance requires review through the Office of Communications and can take up to thirty days. The publication must cite DOH as the data source, and include DOH authorship or acknowledgement.

Data Requested and Variable Specification

Does the study require use of PII? ☐ **Yes** ☒ **No**

If study requires use of de-identified data only, researchers do not need to sign the confidentiality agreement and will only need to follow the data security requirements for de-identified data.

The above study will utilize (check all that apply):

_____**Patient Reporting Investigation Surveillance (PRISM)**

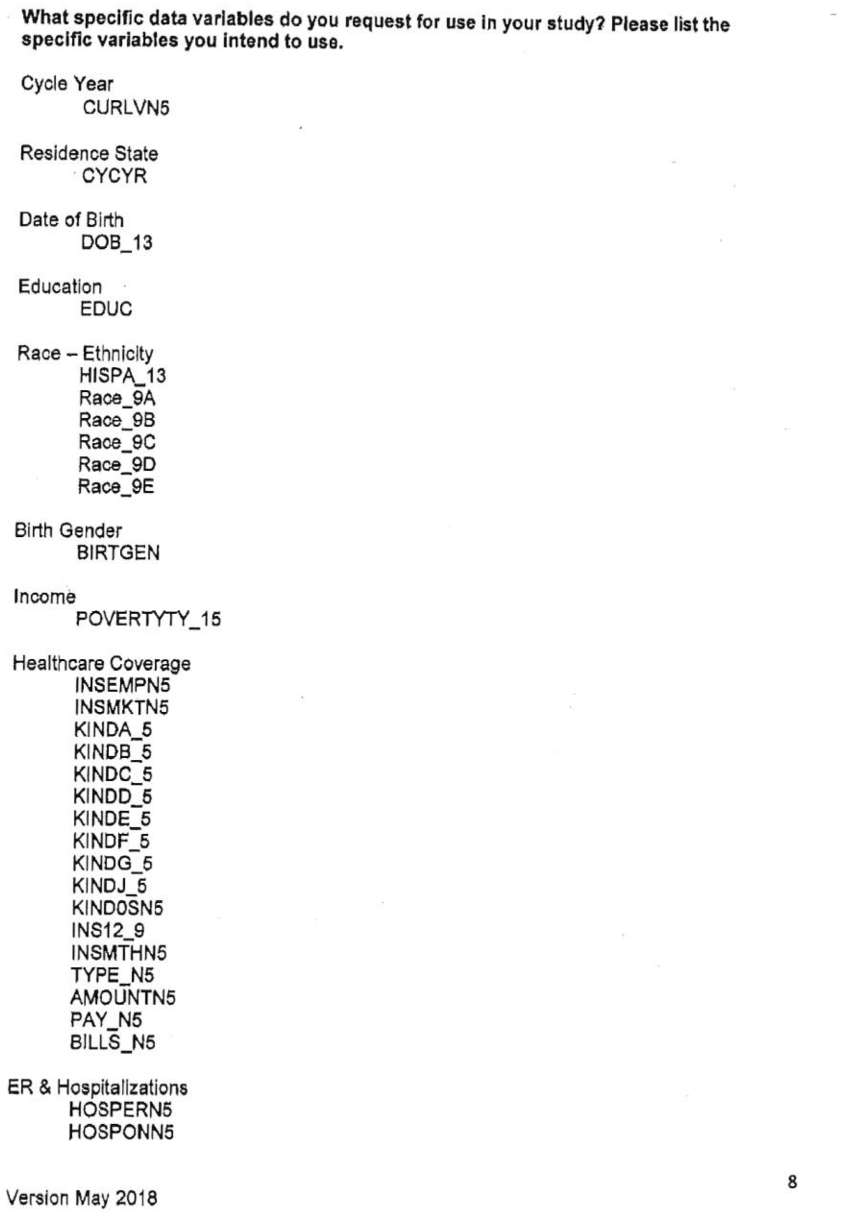
_____**TB Registry**

_____**Viral Hepatitis (MERLIN)**

_____**Enhanced HIV/AIDS Reporting System (eHARS)**

__X__**Medical Monitoring Project (MMP)**

_____**National HIV Behavioral Surveillance System, Miami-Dade County (NHBS)**



What specific data variables do you request for use in your study? Please list the specific variables you intend to use.

Cycle Year
    CURLVN5

Residence State
    CYCYR

Date of Birth
    DOB_13

Education
    EDUC

Race – Ethnicity
    HISPA_13
    Race_9A
    Race_9B
    Race_9C
    Race_9D
    Race_9E

Birth Gender
    BIRTGEN

Income
    POVERTYTY_15

Healthcare Coverage
    INSEMPN5
    INSMKTN5
    KINDA_5
    KINDB_5
    KINDC_5
    KINDD_5
    KINDE_5
    KINDF_5
    KINDG_5
    KINDJ_5
    KINDOSN5
    INS12_9
    INSMTHN5
    TYPE_N5
    AMOUNTN5
    PAY_N5
    BILLS_N5

ER & Hospitalizations
    HOSPERN5
    HOSPONN5

Version May 2018

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NUMONN5

HIV Diagnosis Date
    POS1S_9

Linkage to Care
    RFLNKN5

Care Utilization
    MSAPPTN5

HIV Treatment and Adherence
    EART_N5
    NART3_N5
    FART_N5

Current ART
    CART_N5
    ATMD12_9
    CART3_N5

Adherence
    ADH1_N5

Abstracted Medical Records Data (if available)
    Number of Outpatient Office Visits
    Date of Each Outpatient Office Visit
    Results and Date of Each Viral Load Test
    Viral Suppression

How will data be accessed and viewed?

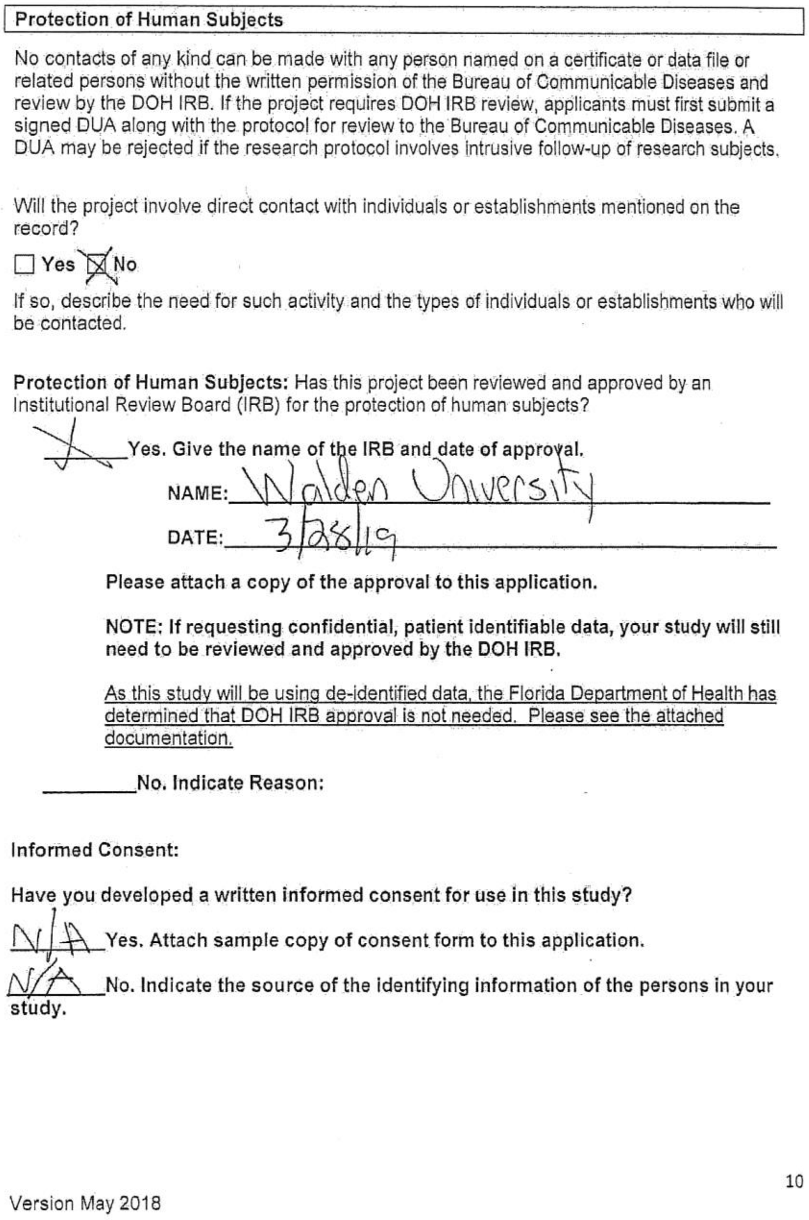
Data used to conduct this research study will be accessed on the protected computer network of Florida Atlantic University and viewed in SPSS, a statistical analysis program.

Does this project have a completion date or is it ongoing?

The project will be ongoing with an estimated completion date of 2020.

Completion date:

Ongoing (Note: all data use agreements must be renewed annually, even for ongoing projects.)



Protection of Human Subjects

No contacts of any kind can be made with any person named on a certificate or data file or related persons without the written permission of the Bureau of Communicable Diseases and review by the DOH IRB. If the project requires DOH IRB review, applicants must first submit a signed DUA along with the protocol for review to the Bureau of Communicable Diseases. A DUA may be rejected if the research protocol involves intrusive follow-up of research subjects.

Will the project involve direct contact with individuals or establishments mentioned on the record?

☐ **Yes** ☒ **No**

If so, describe the need for such activity and the types of individuals or establishments who will be contacted.

Protection of Human Subjects: Has this project been reviewed and approved by an Institutional Review Board (IRB) for the protection of human subjects?

X **Yes. Give the name of the IRB and date of approval.**

NAME: Walden University

DATE: 3/28/19

Please attach a copy of the approval to this application.

NOTE: If requesting confidential, patient identifiable data, your study will still need to be reviewed and approved by the DOH IRB.

As this study will be using de-identified data, the Florida Department of Health has determined that DOH IRB approval is not needed. Please see the attached documentation.

_________**No. Indicate Reason:**

Informed Consent:

Have you developed a written informed consent for use in this study?

N/A **Yes. Attach sample copy of consent form to this application.**

N/A **No. Indicate the source of the identifying information of the persons in your study.**

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Version May 2018

Data Custodians and Data Users

The Project Director is the Data Custodian for this project; however, there are some circumstances which may allow another person to be the Data Custodian.

Are you the Data Custodian for this project? ☐ **Yes** ☒ **No**

The Data custodian is responsible for observance of all conditions of use and for establishment and maintenance of physical and electronic security arrangements to prevent unauthorized use. This individual must have the legal authority to keep the information confidential and maintain confidentiality. If the custodian is changed, the organization must promptly notify the Bureau of Communicable Diseases.

If no, please indicate the name of the Data Custodian and their relationship to the requestor's organization:

Pierre Alexandre, Ph.D., Director, Health Administration Program, Florida Atlantic University

As an Adjunct Professor at Florida Atlantic University, Dr. Alexandre is my Department Director and direct supervisor.

Provide names and position titles of everyone affiliated with this project. Include more names on an attachment if necessary. All individuals listed below (or on an attachment) must provide their signature on the last page of this agreement.

Name	Position Title
Todd Blum, Ph.D. Candidate	Researcher
Pierre Alexandre, Ph.D.	Director, Health Administration Program, College of Business, Florida Atlantic University

Is the requested data needed for work being performed under contract with the DOH?

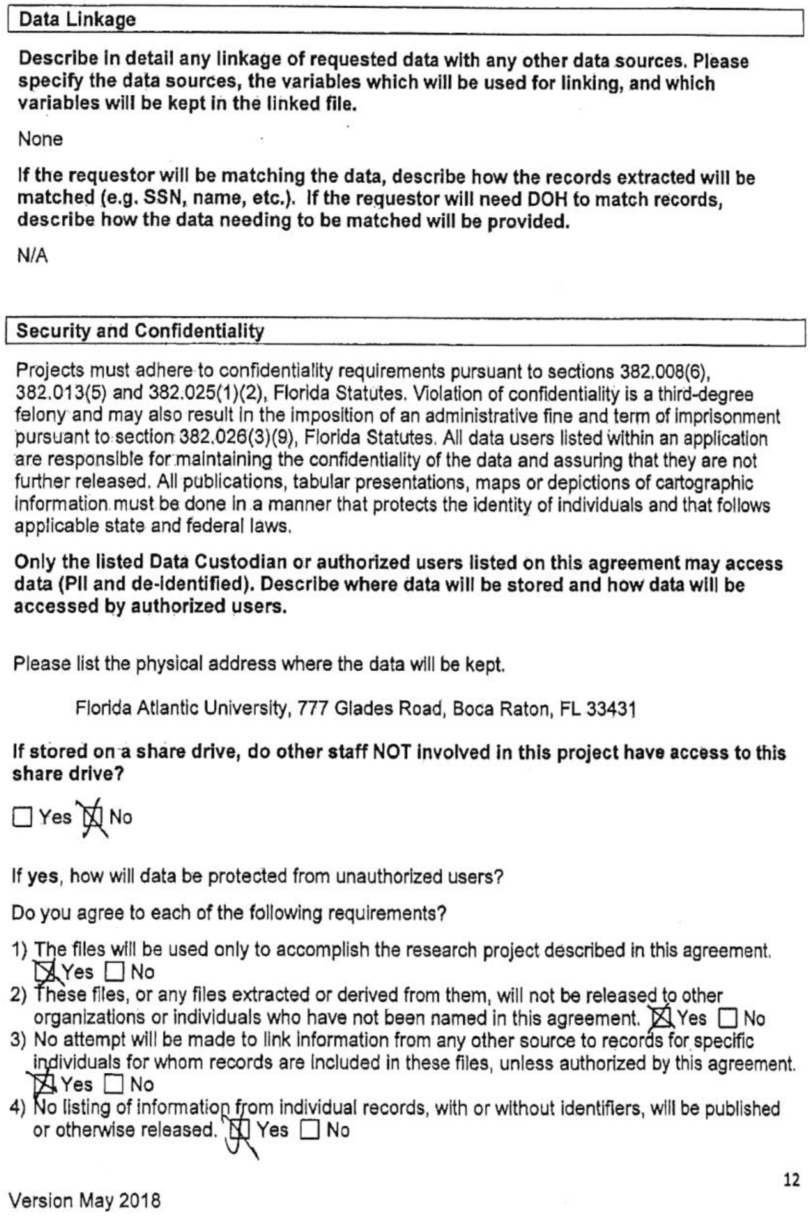
☐ **Yes** ☒ **No**

If yes, then please provide the DOH contract manager's name and phone number:

Are there any sub-contractors/outside collaborators affiliated with this project who will use or view the data?

☐ **Yes** ☒ **No**

If yes, each sub-contractor/outside collaborators or other individual WILL NEED to complete a separate data use agreement. Please list other collaborators.



Data Linkage

Describe in detail any linkage of requested data with any other data sources. Please specify the data sources, the variables which will be used for linking, and which variables will be kept in the linked file.

None

If the requestor will be matching the data, describe how the records extracted will be matched (e.g. SSN, name, etc.). If the requestor will need DOH to match records, describe how the data needing to be matched will be provided.

N/A

Security and Confidentiality

Projects must adhere to confidentiality requirements pursuant to sections 382.008(6), 382.013(5) and 382.025(1)(2), Florida Statutes. Violation of confidentiality is a third-degree felony and may also result in the imposition of an administrative fine and term of imprisonment pursuant to section 382.026(3)(9), Florida Statutes. All data users listed within an application are responsible for maintaining the confidentiality of the data and assuring that they are not further released. All publications, tabular presentations, maps or depictions of cartographic information must be done in a manner that protects the identity of individuals and that follows applicable state and federal laws.

Only the listed Data Custodian or authorized users listed on this agreement may access data (PII and de-identified). Describe where data will be stored and how data will be accessed by authorized users.

Please list the physical address where the data will be kept.

Florida Atlantic University, 777 Glades Road, Boca Raton, FL 33431

If stored on a share drive, do other staff NOT involved in this project have access to this share drive?

☐ Yes ☒ No

If **yes**, how will data be protected from unauthorized users?

Do you agree to each of the following requirements?

1) The files will be used only to accomplish the research project described in this agreement. ☒ Yes ☐ No
2) These files, or any files extracted or derived from them, will not be released to other organizations or individuals who have not been named in this agreement. ☒ Yes ☐ No
3) No attempt will be made to link information from any other source to records for specific individuals for whom records are included in these files, unless authorized by this agreement. ☒ Yes ☐ No
4) No listing of information from individual records, with or without identifiers, will be published or otherwise released. ☒ Yes ☐ No

5) No statistical tabulations or research results will be released which reveal information about identifiable individuals. ☒ Yes ☐ No
6) Statistical and research results derived from these files may be published. However, no results may be copyrighted by the author without the permission of the Bureau of Communicable Diseases.
☒ Yes ☐ No

Data Destruction Schedule

Consistent with Florida Statute, applicants must make provisions for the destruction of records after project conclusion, or when the data is no longer required. Maintaining the confidentiality of the individuals whose personal information is included in the Bureau of Communicable Diseases data is required to preserve the integrity of the data sharing process.

Please detail the manner and timeline for destruction. If you are following a data destruction policy set by your organization or agency, please attach that policy to your application, include provisions for paper copies of data in the destruction plan.

Data used to conduct this research study will be deleted from the Florida Atlantic University computer network at the conclusion of this research study.

Data Security Measures

Bureau of Communicable Diseases data may only be used for the specific purpose(s) described in this agreement. All persons with data access must maintain the confidentiality of the data and prevent release to unauthorized parties. All publications, tabular presentations, maps or depictions of cartographic information must aggregate results to protect the identity of individuals and comply with applicable state and federal laws. The appropriate Section (TB, STD, HIV/AIDS, Hepatitis) administrator shall be notified immediately by phone after discovery of any use or disclosure of the data not provided for by this agreement.

As the Data Custodian and signatory for this agreement, the Data Custodian bears full responsibility for adhering to all data confidentiality, security policies, and the terms of this agreement. The Data Custodian serves as the point of contact for receiving, maintaining, protecting, and ultimately destroying the data provided by DOH. Data may be used by the Data Custodian only for the purpose stated in this agreement, and may not be used for any other purpose. No entity with data access may link Florida Bureau of Communicable Diseases surveillance data with any other source of information without the written authorization of the Bureau of Communicable Diseases. Additionally, proper physical, computer and system security safeguards will be maintained by the signatory's requestor's organization/agency pursuant of the agreement.

Physical Security of Confidential Data containing Personal Identifiable Information

The requestor's organization shall ensure that DOH data are used and stored in an area that is physically safe from access by unauthorized persons during working and non-working hours. The requestor's organization agrees to safeguard DOH data from loss, theft, or inadvertent disclosure and, therefore, agrees to:

1. Secure all areas of the organization's facilities where employees assist in the administration of the program's use or disclose DOH data. Ensure that authorized individuals only access these secure areas with properly coded key cards, authorized door keys or access authorization; and access to premises is by official identification.
2. Issue identification badges to workers who assist in the administration of the organization's programs and require the organization's workers to carry these badges on their person at organization's facilities where DOH data are stored and used.
3. Store paper records with DOH data in locked spaces, such as locked file cabinets, locked file rooms, locked desks, or locked offices in facilities which are multi-use, meaning that where the requestor's organization and non-requestor's organization functions in one building in work areas that are not securely segregated from each other.
4. Use all reasonable measures to prevent non-authorized personnel and visitors from having access to, control of, or viewing DOH data.

Computer Security Safeguards of Confidential Data containing Personal Identifiable Information

The requestor's organization agrees to comply with the general computer security safeguards, system security controls, and audit controls in this section.

1. Encrypt portable computer devices, such as but not limited to, laptops and notebook computers, that process and/or store DOH data with an encryption solution that is full-disk utilizing a minimum algorithm of 256 bit AES or 3DES (Triple DES) if AES is unavailable.
2. Encrypt workstations where DOH data are stored using an encryption product that utilizes a minimum algorithm of 256 bit AES, or 3DES (Triple DES) if AES is unavailable, and is recognized as an industry leader in meeting the needs for the intended solution.
3. Ensure that only the minimum necessary amount of DOH data is downloaded to a laptop or hard drive when necessary for current business purposes.
4. Encrypt all electronic files that contain DOH data when the file is stored on any removable media type device (i.e., USB thumb drives, floppies, CD/DVD, portable hard drives, etc.) using an encryption product that utilizes a minimum algorithm of 256 bit AES, or 3DES (Triple DES) if AES is unavailable, and is recognized as an industry leader in meeting the needs for the intended solution.

5. Ensure that all emails sent outside the requestor's organization's e-mail environment that include DOH data are sent via an encrypted method using an encryption product that is recognized as an industry leader in meeting the needs of the intended solution.

6. Ensure that all workstations, laptops and other systems that process and/or store DOH data have a commercial third-party anti-virus software solution and are automatically updated when a new anti-virus definition/software release is available.

7. Ensure that all workstations, laptops and other systems that process and/or store DOH data have current security patches applied and are up-to-date.

8. Ensure that all DOH data are wiped from all systems and backups when the data is no longer legally required. The requestor's organization shall ensure in writing that the wipe method conforms to the U.S. Department of Defense standards for data destruction.

9. Ensure that any remote access to DOH data are established over an encrypted session protocol using an encryption product that is recognized as an industry leader in meeting the needs of the intended solution. The requestor's organization shall ensure all remote access is limited to the minimum necessary and maintains the principles of least privilege.

System Security Controls for Confidential Data containing Personal Identifiable Information

To comply with the following system security controls, requestor's organization agrees to:

1. Ensure that all systems containing DOH data provide an automatic timeout after no more than 15 minutes of inactivity.

2. Ensure that all systems containing DOH data display a warning banner stating that data is confidential, systems are logged, and system use is for business purposes only. Users shall be directed to log off the system if they do not agree with these requirements.

3. Ensure that all systems containing DOH data log successes and failures of user authentication and authorizations granted. The system shall log all data changes and system accesses conducted by all users (including all levels of users, system administrators, developers, and auditors). The system shall have the capability to record data access for specified users when requested by authorized management personnel. A log of all system changes shall be maintained and be available for review by authorized management personnel.

4. Ensure that all systems containing DOH data uses role-based access controls for all user authentications, enforcing the principle of least privileges.

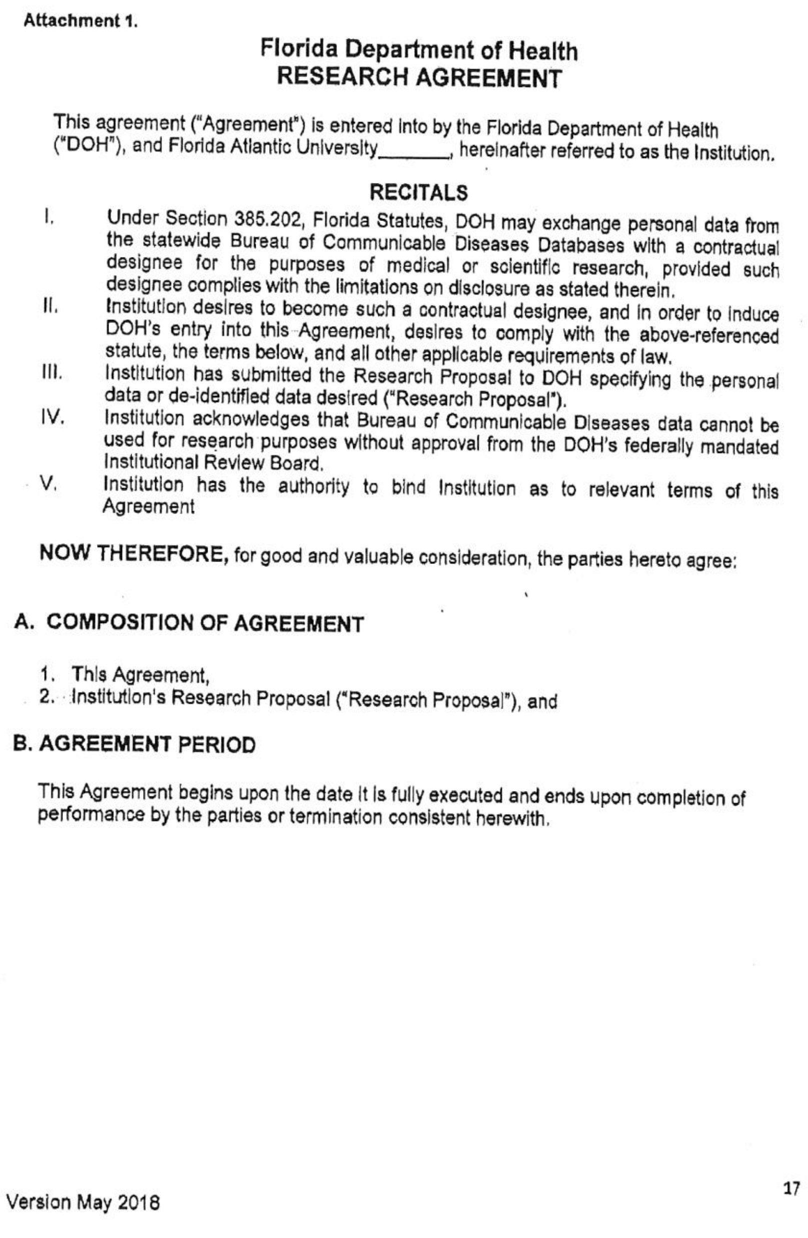
5. Ensure that all data transmissions over networks outside of the requestor's organization's control are encrypted end-to-end using an encryption product that is recognized as an industry leader in meeting the needs for the intended solution when transmitting DOH data. Encrypt DOH data at the minimum of 256 bit AES or 3DES (Triple DES) if AES is unavailable.

6. Ensure that all systems that are accessible via the Internet or store DOH data interactively use a comprehensive third-party real-time host-based intrusion detection and prevention program or are protected at the perimeter by a network based IDS/IPS solution.

Exceptions: In case the requestor's organization receives DOH data that are already HIPAA-anonymized (de-identified) at the source, i.e. before transmission from DOH to requestor, the Computer Security Safeguards #2 and the System Security Controls #2 and #3 above listed are lifted.

Any failure of persons listed in this agreement to abide by the terms of this agreement constitutes a breach and may result in legal action and/or the demand for immediate return of all data obtained hereunder, and the destruction under the supervision of DOH of all copies of the data in the requestor's, the organization's, employees, agents, assigns, or subcontractor's possession. All actions brought under this agreement will be in the State of Florida. Any action brought by the DOH under this agreement in which the DOH prevails, the DOH shall be entitled to its attorney's fees and court costs.

All persons who come in direct contact with Bureau of Communicable Diseases data (PII or de-identified) are required to sign this agreement. If additional signatures are required, please provide them on the last page of this agreement.



Attachment 1.

Florida Department of Health
RESEARCH AGREEMENT

This agreement ("Agreement") is entered into by the Florida Department of Health ("DOH"), and Florida Atlantic University_______, hereinafter referred to as the Institution.

RECITALS

I. Under Section 385.202, Florida Statutes, DOH may exchange personal data from the statewide Bureau of Communicable Diseases Databases with a contractual designee for the purposes of medical or scientific research, provided such designee complies with the limitations on disclosure as stated therein.

II. Institution desires to become such a contractual designee, and in order to induce DOH's entry into this Agreement, desires to comply with the above-referenced statute, the terms below, and all other applicable requirements of law.

III. Institution has submitted the Research Proposal to DOH specifying the personal data or de-identified data desired ("Research Proposal").

IV. Institution acknowledges that Bureau of Communicable Diseases data cannot be used for research purposes without approval from the DOH's federally mandated Institutional Review Board.

V. Institution has the authority to bind Institution as to relevant terms of this Agreement

NOW THEREFORE, for good and valuable consideration, the parties hereto agree:

A. COMPOSITION OF AGREEMENT

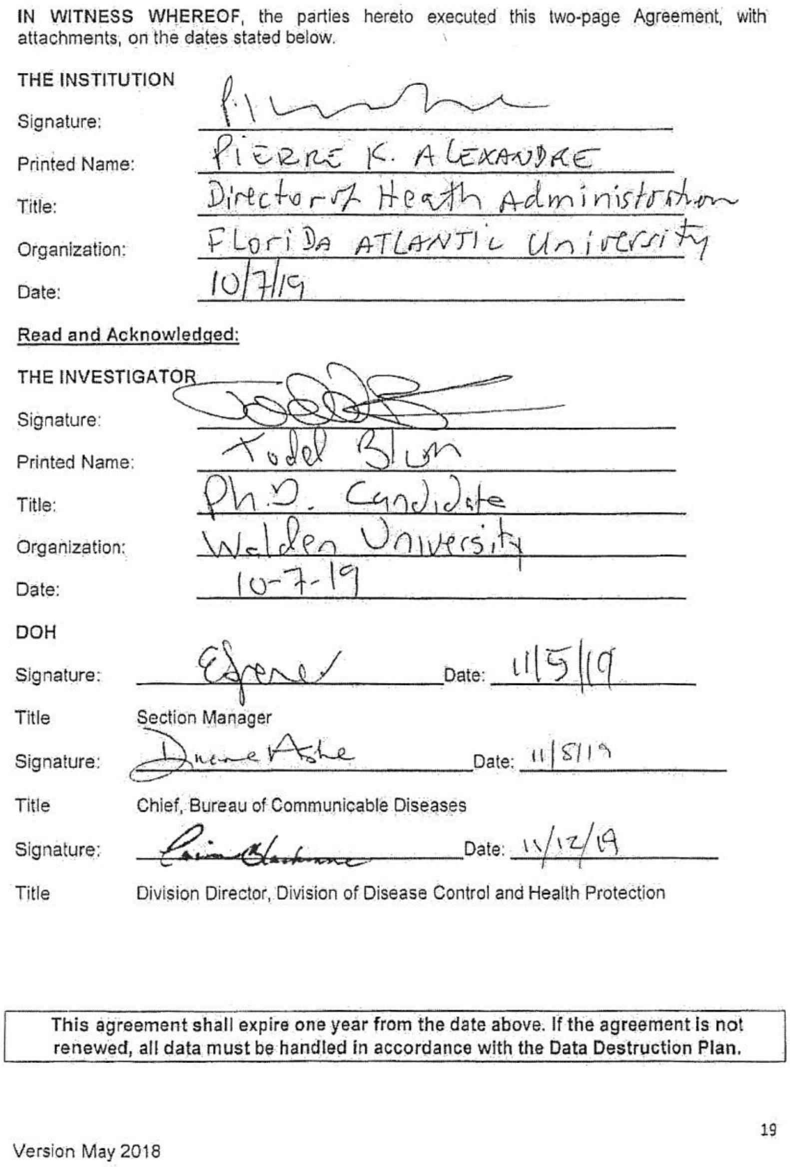
1. This Agreement,
2. Institution's Research Proposal ("Research Proposal"), and

B. AGREEMENT PERIOD

This Agreement begins upon the date it is fully executed and ends upon completion of performance by the parties or termination consistent herewith.

C. TERMS

1. The above recitals are true and correct and incorporated as if fully stated herein;
2. Institution shall comply with all terms of this Agreement;
3. DOH shall create a data file of the personal data from the Bureau of Communicable Diseases database as specified in the Research Proposal (the "Data File");
4. The costs of assembling the Data File shall be set consistent with Section 119.07(1)(a), Florida Statutes, and shall be paid to DOH prior to transfer of the Data File to Institution;
5. Institution shall arrange for transfer of the Data File in person, via messenger or by traceable delivery service, subject to DOH prior approval;
6. Institution shall not use the Data File for any other purpose than that specified in the Research Proposal;
7. Upon completion of the work outlined in the Research Proposal, the Institution shall destroy the Data File and any and all copies thereof;
8. Upon completion of the work outlined in the Research Proposal, Investigator must provide prior to publication, a courtesy copy of the articles and/or reports accepted for publication to DOH.
9. The Institution, except where prohibited by applicable Florida Law, agree to hold harmless, indemnify, and defend DOH from all liabilities, demands, damages, expenses, or losses arising out of performance under this Agreement, except to the extent where such liabilities, demands, damages, expenses or losses are the result of DOH negligence or willful misconduct; and
10. The law governing this Agreement shall be Florida Law and the venue for disputes over this Agreement shall be a State Court of Competent Jurisdiction in Leon County, Florida.



IN WITNESS WHEREOF, the parties hereto executed this two-page Agreement, with attachments, on the dates stated below.

THE INSTITUTION

Signature:

Printed Name: PIERRE K. ALEXANDRE

Title: Director of Heath Administration

Organization: FLORIDA ATLANTIC University

Date: 10/7/19

Read and Acknowledged:

THE INVESTIGATOR

Signature:

Printed Name: Todd Blum

Title: Ph.D. Candidate

Organization: Walden University

Date: 10-7-19

DOH

Signature: Date: 11/5/19

Title Section Manager

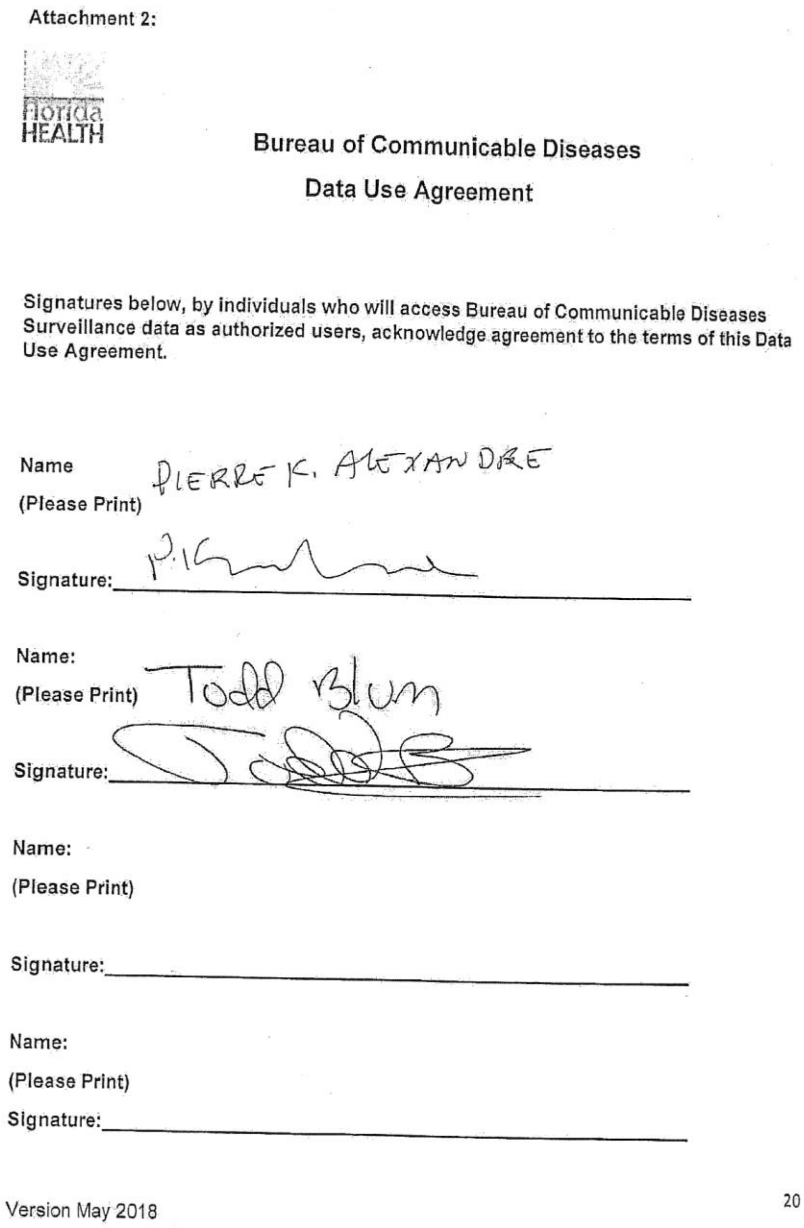
Signature: Date: 11/8/19

Title Chief, Bureau of Communicable Diseases

Signature: Date: 11/12/19

Title Division Director, Division of Disease Control and Health Protection

This agreement shall expire one year from the date above. If the agreement is not renewed, all data must be handled in accordance with the Data Destruction Plan.



Attachment 2:

Florida HEALTH

Bureau of Communicable Diseases

Data Use Agreement

Signatures below, by individuals who will access Bureau of Communicable Diseases Surveillance data as authorized users, acknowledge agreement to the terms of this Data Use Agreement.

Name (Please Print) PIERRE K. ALEXANDRE

Signature:______________________________

Name: (Please Print) Todd Blum

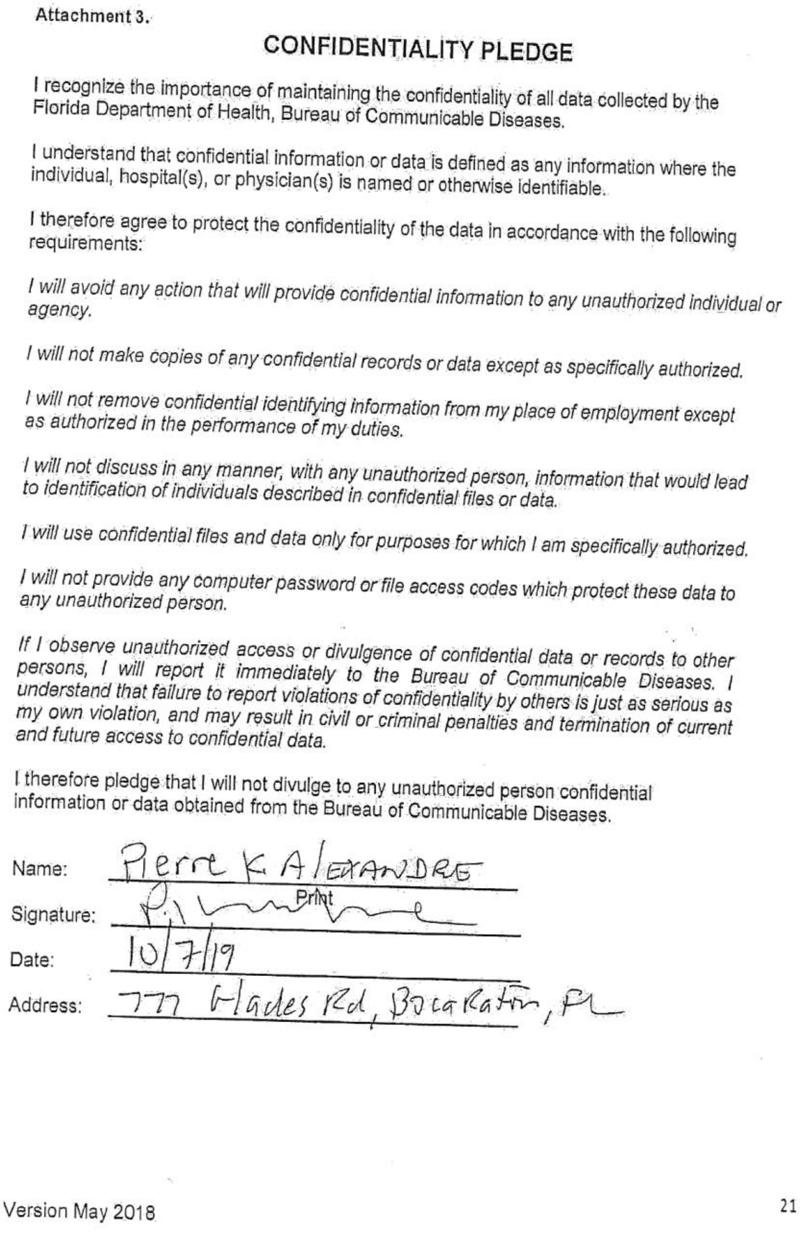
Signature:______________________________

Name: (Please Print)

Signature:______________________________

Name: (Please Print)

Signature:______________________________



Attachment 3.

CONFIDENTIALITY PLEDGE

I recognize the importance of maintaining the confidentiality of all data collected by the Florida Department of Health, Bureau of Communicable Diseases.

I understand that confidential information or data is defined as any information where the individual, hospital(s), or physician(s) is named or otherwise identifiable.

I therefore agree to protect the confidentiality of the data in accordance with the following requirements:

I will avoid any action that will provide confidential information to any unauthorized individual or agency.

I will not make copies of any confidential records or data except as specifically authorized.

I will not remove confidential identifying information from my place of employment except as authorized in the performance of my duties.

I will not discuss in any manner, with any unauthorized person, information that would lead to identification of individuals described in confidential files or data.

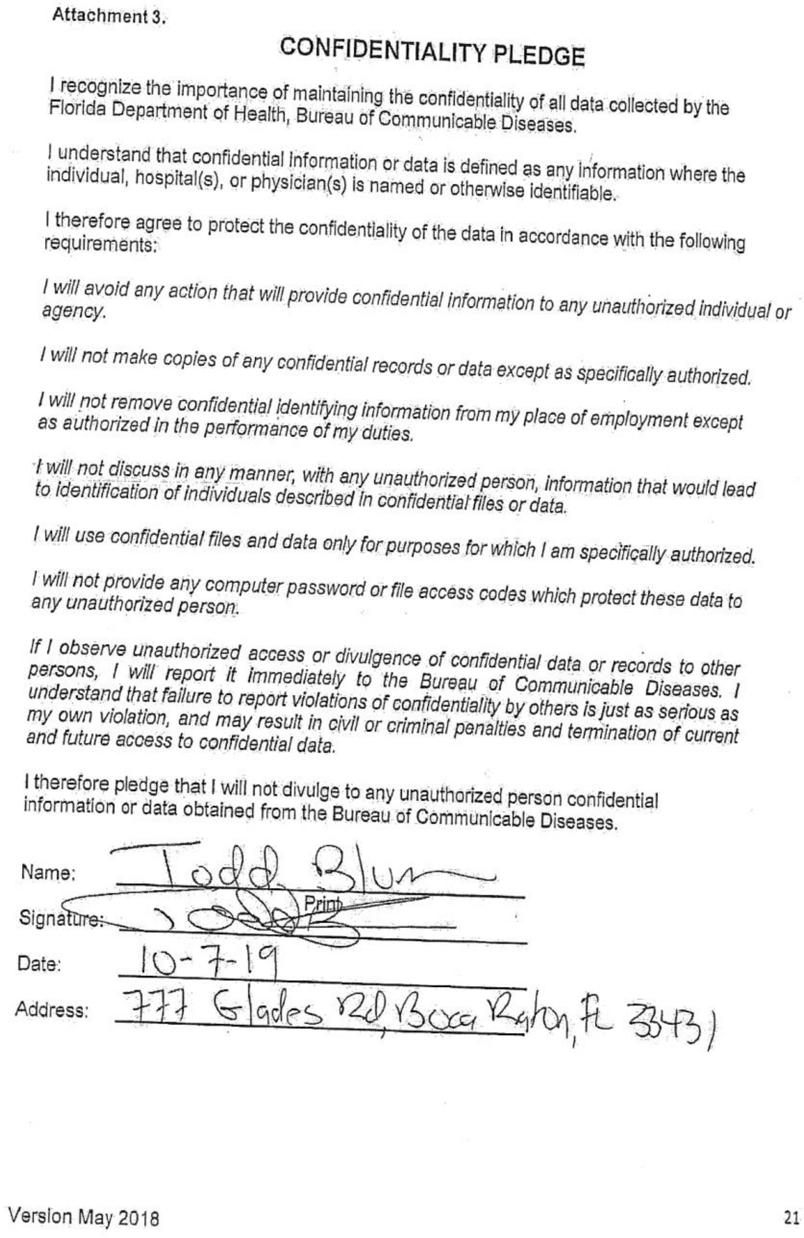
I will use confidential files and data only for purposes for which I am specifically authorized.

I will not provide any computer password or file access codes which protect these data to any unauthorized person.

If I observe unauthorized access or divulgence of confidential data or records to other persons, I will report it immediately to the Bureau of Communicable Diseases. I understand that failure to report violations of confidentiality by others is just as serious as my own violation, and may result in civil or criminal penalties and termination of current and future access to confidential data.

I therefore pledge that I will not divulge to any unauthorized person confidential information or data obtained from the Bureau of Communicable Diseases.

Name: Pierre K ALEXANDRE
Print
Signature: P.
Date: 10/7/19
Address: 777 Glades Rd, Boca Raton, FL



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I will not discuss in any manner, with any unauthorized person, information that would lead to identification of individuals described in confidential files or data.

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I will not provide any computer password or file access codes which protect these data to any unauthorized person.

If I observe unauthorized access or divulgence of confidential data or records to other persons, I will report it immediately to the Bureau of Communicable Diseases. I understand that failure to report violations of confidentiality by others is just as serious as my own violation, and may result in civil or criminal penalties and termination of current and future access to confidential data.

I therefore pledge that I will not divulge to any unauthorized person confidential information or data obtained from the Bureau of Communicable Diseases.

Name: Todd Blum
Print
Signature:
Date: 10-7-19
Address: 777 Glades Rd, Boca Raton, FL 33431

Version May 2018 21

Attachment 4.

Information Technology, Information Security and Privacy Policy 4
Data Classification and Protection
DOHP 50-10.4-16

De-identified Data

Medical information that has been de-identified and cannot be referenced back to any individual is not confidential and is available for public inspection and copying. 45 CFR 164.514 and Section 456.057(7)(a)4., Florida Statute.

Title 45: Public Welfare

PART 164—SECURITY AND PRIVACY

Subpart E—Privacy of Individually Identifiable Health Information 164.514 Other requirements relating to uses and disclosures of protected health information.

(a) Standard: De-identification of protected health information. Health information that does not identify an individual and with respect to which there is no reasonable basis to believe that the information can be used to identify an individual is not individually identifiable health information.

The following identifiers of the individual or of relatives, employers, or household members of the individual, are removed:

(A) Names;

(B) All geographic subdivisions smaller than a State, including street address, city, county, precinct, zip code, and their equivalent geocodes, except for the initial three digits of a zip code if, according to the current publicly available data from the Bureau of the Census:

(1) The geographic unit formed by combining all zip codes with the same three initial digits contains more than 20,000 people; and

(2) The initial three digits of a zip code for all such geographic units containing 20,000 or fewer people is changed to 000.

(C) All elements of dates (except year) for dates directly related to an individual, including birth date, admission date, discharge date, date of death; and all ages over 89 and all elements of dates (including year) indicative of such age, except that such ages and elements may be aggregated into a single category of age 90 or older;

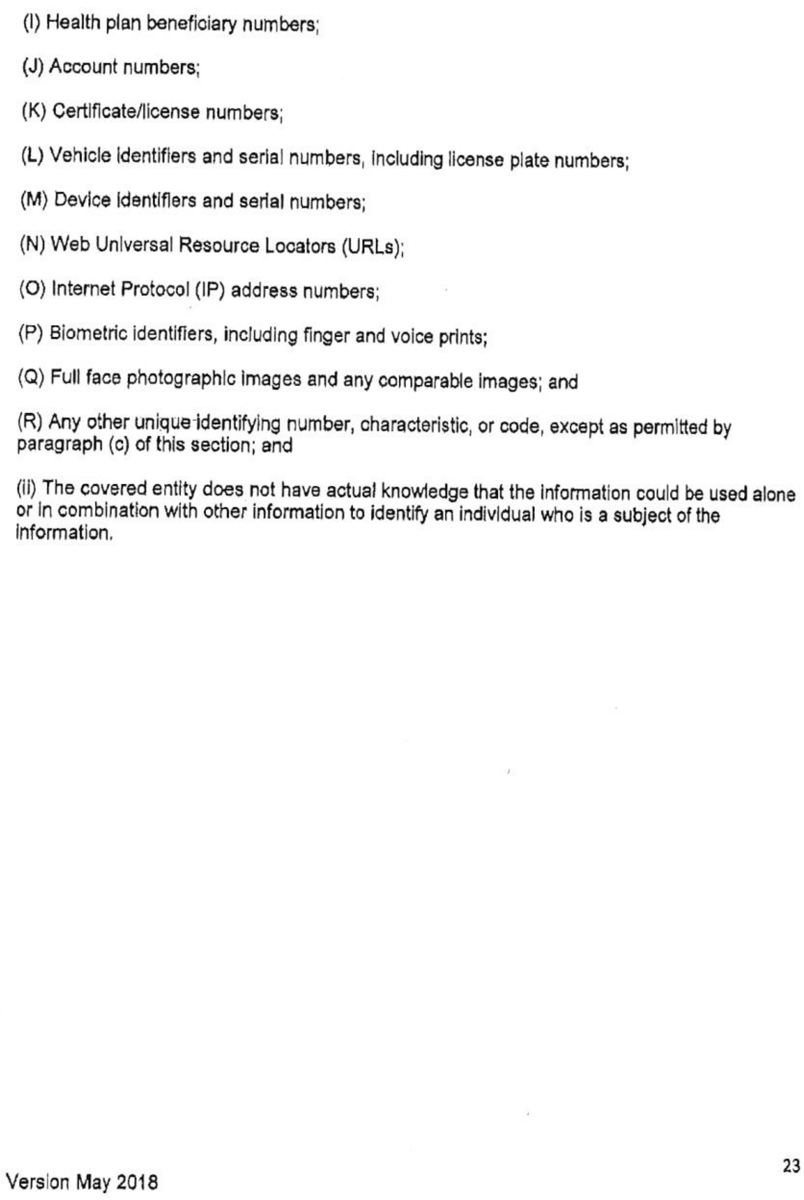
(D) Telephone numbers;

(E) Fax numbers;

(F) Electronic mail addresses;

(G) Social security numbers;

(H) Medical record numbers;



(I) Health plan beneficiary numbers;

(J) Account numbers;

(K) Certificate/license numbers;

(L) Vehicle identifiers and serial numbers, including license plate numbers;

(M) Device identifiers and serial numbers;

(N) Web Universal Resource Locators (URLs);

(O) Internet Protocol (IP) address numbers;

(P) Biometric identifiers, including finger and voice prints;

(Q) Full face photographic images and any comparable images; and

(R) Any other unique identifying number, characteristic, or code, except as permitted by paragraph (c) of this section; and

(ii) The covered entity does not have actual knowledge that the information could be used alone or in combination with other information to identify an individual who is a subject of the information.

Appendix C: Post Hoc Power Analysis

```
[1] -- Saturday, February 01, 2020 -- 23:59:33
t tests - Means: Difference between two independent means (two groups)
Analysis:   Post hoc: Compute achieved power
Input:      Tail(s)                        =  Two
            Effect size d                  =  0.5
            α err prob                     =  0.05
            Sample size group 1            =  25834
            Sample size group 2            =  4836
Output:     Noncentrality parameter δ      =  31.9118579
            Critical t                     =  1.9600413
            Df                             =  30668
            Power (1-β err prob)           =  1.0000000
```

Appendix D: Research Question 1 - Multiple Linear Regression Assumptions

In the first research question, I addressed the relationship between demographic factors (race, gender, age, education level, and federal poverty level), treatment compliance (as defined by the number of ART missed doses in the past 30 days, engagement in care (as defined by the number of HIV/AIDS-related physician visits, within the previous 12 months), coverage status (enrolled in the RWHAP or an ACAQHP) and the health status of PLWHA (as defined by viral suppression). I used a multiple linear regression to analyze this research question. There are eight assumptions that need to be considered when completing a multiple linear regression analysis. These assumptions include 1) a continuous dependent variable, 2) two or more continuous or categorical independent variables, 3) an independence of observations/residual values, 4) a linear relationship between the independent and dependent variables (collectively and individually), 5) homoscedasticity of the data, 6) no multicollinearity, 7) no significant outliers, and 8) residuals that are approximately normally distributed (Laerd Statistics, 2018d).

I met the first two assumptions (1, 2) as the dependent variable in this research question, viral load change is continuous, while the independent variables including race, gender, age, federal poverty level, out-of-pocket medical expenses, treatment compliance, and engagement in care are all continuous or categorical variables. The third assumption, an independence of observations/residual values can be checked using the Durbin-Watson statistic. Although the Durbin-Watson statistic can range from between 0 and 4, a value around 2.0 indicates an independence of observations and no correlation between the residual values (Laerd Statistics, 2018d). As I used weighted data in this study, the Durbin-Watson statistic for this research question was not generated by SPSS and I was unable to assess the independence of observations/residual. However, the Durbin-Watson statistic was not needed because the use of weighted data eliminated the possibility of autocorrelation between the variables in the study.

The fourth assumption, the verification of linearity between the dependent variable and the independent variables can be checked by examining a scatterplot of the studentized residuals against the unstandardized predicted value and by reviewing the partial regression plots between the dependent variable and each independent variable (Laerd Statistics, 2018d). I visually evaluated the scatterplot and confirmed there was a linear relationship between the variables. However, as weighted data was used in this research study, SPSS did not produce partial regression plots. Consequently, I confirmed the assumption of linearity based solely on the visual examination of the scatterplot.

I also used the simple scatter plot of studentized residuals by unstandardized predicted values presented in Figure 2 to assess the fifth assumption, the homoscedasticity of the residuals. Homoscedasticity is achieved when the variance is the same for all values of the predicted dependent variable (Laerd Statistics, 2018d). I confirmed homoscedasticity by visually evaluating the scatterplot of studentized residuals versus unstandardized predicted values.

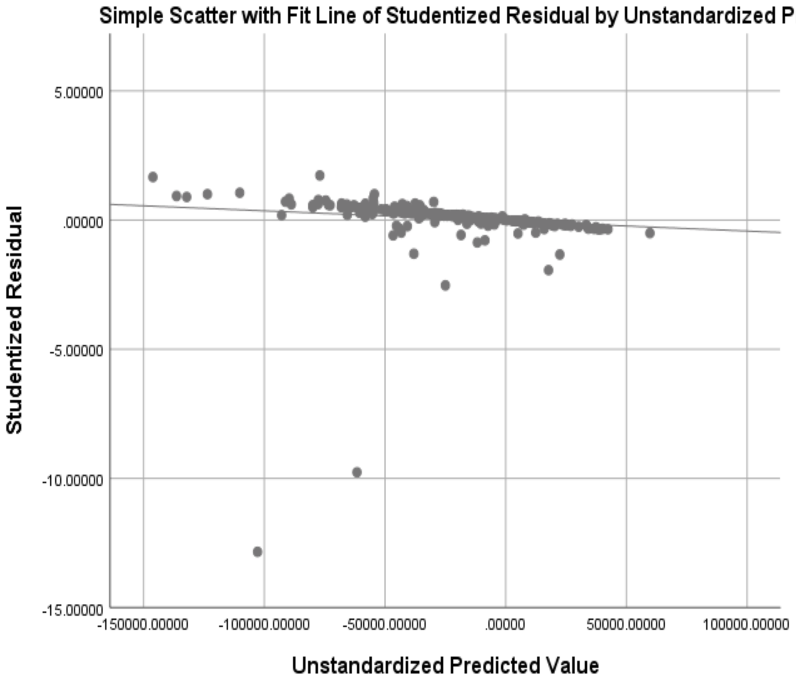


Figure 2. Scatter plot of the studentized residuals against the unstandardized predictive values depicting linearity of the dependent variable and all independent variables.

The sixth assumption of a multiple linear regression is the data must not demonstrate multicollinearity, which occurs when multiple independent variables are correlated with one another (Laerd Statistics, 2018d). The existence of multicollinearity is determined by reviewing the Pearson correlation results in the correlations table and the tolerance and VIF statistics in the coefficients table generated by SPSS. Multicollinearity is present if the Pearson correlation values are equal to or greater than 0.80 (Field, 2013) and if the tolerance value is less than 0.1 or the VIF is greater than 10 (Laerd Statistics, 2018d). I confirmed there was no multicollinearity as all tolerance values were less than 0.1, all VIF values were less than 10, and the Pearson correlation values for all variables as shown in Table 13 were less than 0.80.

Table 13

Pearson Correlation Values

	VLCHG	Race	Gender	Age	Education	Poverty Level	ART Missed	HIV Visits	Insurance
VLCHANGE	1.000	-0.101	-0.073	0.077	0.068	0.165	0.032	-0.195	-0.071
Race	-0.101	1.000	0.165	0.040	0.051	-0.062	0.118	0.024	0.229
Gender	-0.073	0.165	1.000	0.035	-0.176	-0.236	-0.067	0.104	0.032
Age	0.077	0.040	0.035	1.000	-0.029	-0.009	0.044	0.104	-0.020
Education	0.068	0.051	-0.176	-0.029	1.000	0.338	0.057	0.001	-0.063
Poverty Level	0.165	-0.062	-0.236	-0.009	0.338	1.000	0.178	-0.128	-0.148
ART Missed	0.032	0.118	-0.067	0.044	0.057	0.178	1.000	-0.125	0.073
HIV Visits	-0.195	0.024	0.104	0.104	0.001	-0.128	-0.125	1.000	0.058
Insurance	-0.071	0.229	0.032	-0.020	0.063	-0.148	0.073	0.058	1.000

The seventh assumption of a multiple linear regression test is there should be no significant outliers or extreme values in the dataset. The presence of data outliers can be determined by inspecting the casewise diagnostics and studentized deleted residuals for values great than ±3 standard deviations (Laerd Statistics, 2018d). Upon visual evaluation of the casewise diagnostics and studentized deleted residuals values, I confirmed the assumption of no significant outliers was violated as values exceeded ±3 standard deviations. Although outlier data should be removed if caused by a data entry error, the data may remain in the study if valid (Laerd Statistics, 2018d). As the data points represent the change in viral load among PLWHA and are not abnormal outliers, I purposely did not remove them when I ran the analysis. These outlier data points demonstrated large changes in viral load and eliminating them would bias the study against PLWHA who realized significant viral load changes.

The eighth and final assumption of a multiple linear regression test is a normal distribution of residuals, which can be evaluated using a normal Q-Q plot of studentized residuals. Normally distributed residuals are confirmed when the data points are closely proximate to the diagonal line (Laerd Statistics, 2018d). As can be seen in figure 3, the assumption of normally distributed residuals was met, as assessed by a Q-Q Plot.

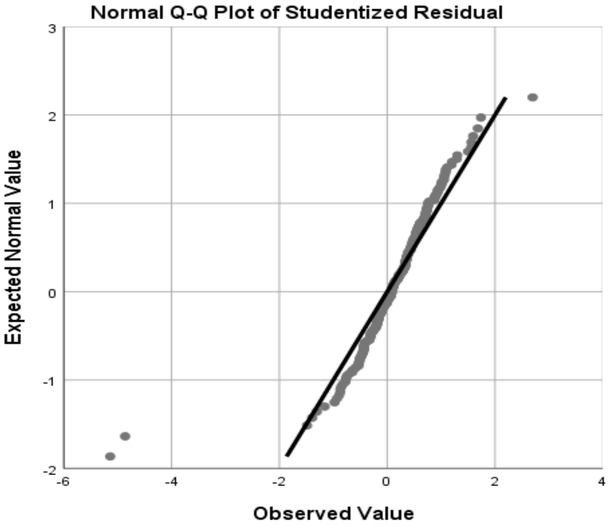


Figure 3. Normal Q-Q Plot showing residuals that are normally distributed.

Appendix E: Research Question 2 - Independent Samples *t* test Assumptions

In the second research question, I used an independent samples *t* test to address the difference in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. There are six assumptions that must be satisfied to run an independent samples *t* test. These assumptions include: a dependent variable that is continuous, an independent variable that consists of two independent categorical groups, an independence of observations, a homogeneity of variances, normality in the distribution of the dependent variable around the independent variables, and no significant outliers (Laerd Statistics, 2018b). I met the first three assumptions for this research question based on the overall design of the research study. The dependent variable, number of ART prescription refills is continuous, the independent variable is comprised of two independent categorical groups and an independence of observations has been achieved by ensuring that each study participant has been assigned to a group of PLWHA that have coverage from either the RWHAP or the ACA.

I used SPSS to determine if the final three assumptions of an independent samples *t* test were met. First, a Levene's test of equality of error variances was run to determine if there was homogeneity of variances. A homogeneity of variance exists when the variance within each group in the independent variable is equal (Field, 2013). Homogeneity is confirmed if the Levene's test produces a non-statistically significant result which occurs when the p-value (significance level) is greater than .05 (Field, 2013). The results of the Levene's test in Table 14 showed there was a heterogeneity in the variances in treatment compliance between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP as F(1,9461.358) = 310.602, p < .001.

Table 14

Levene's Test for Equality of Variances – Treatment Compliance

		F	Sig.	t	df
Treatment Compliance	Equal variances not assumed	310.602	.000	-16.883	9461.358

Second, I used SPSS to confirm the normal distribution of the data which occurs when the dependent variable is normally distributed by each level of the independent variable (Field, 2013). Two methodologies were used to determine if the study data was normally distributed. These two approaches included analyzing the results of the Shapiro-Wilk's test and interpreting the shape of the Normal Q-Q Plots (Laerd Statistics, 2018b). The Shapiro-Wilk's test confirms normality of distribution when the result is not statistically significant (Field, 2013). As I used weighted data in this study, SPSS did not generate the Shapiro-Wilk's test for this research question, so it was not used to assess the normality of distribution. Instead, I used the Normal Q-Q Plot output from SPSS for PLWHA enrolled in the RWHAP and enrolled in an ACAQHP to graphically assess the normality of the data distribution. Normally distributed data will appear as round dots located near the diagonal line (Laerd Statistics, 2018b). Based on my graphical assessment of the Normal Q-Q Plots presented in Figure 4 and Figure 5, treatment compliance (as defined by the number of ART missed doses in the past 30 days) data for both PLWHA enrolled in the RWHAP and in an ACAQHP was not normally distributed.

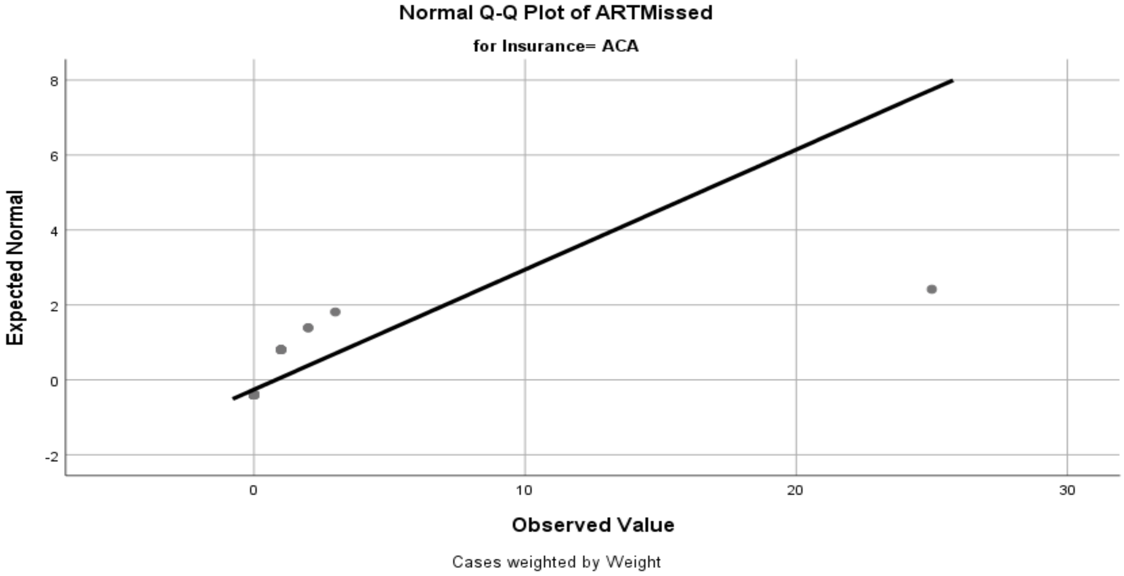


Figure 4. Scatter plot depicting treatment compliance data (as defined by the number of ART missed doses in the past 30 days) that is not normally distributed for PLWHA enrolled in an ACAQHP.

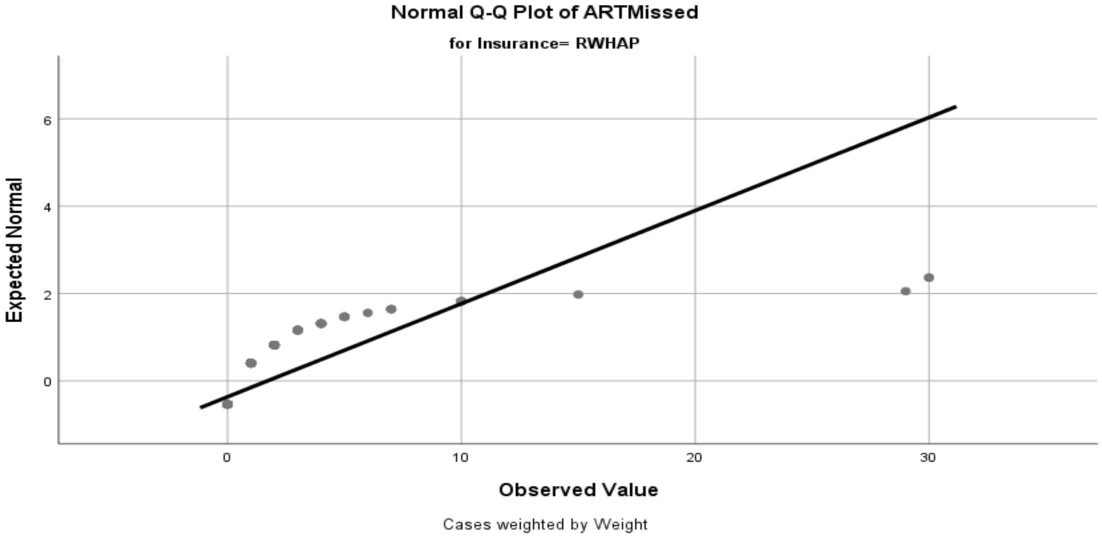


Figure 5. Scatter plot depicting treatment compliance data (as defined by the number of ART missed doses in the past 30 days) that is not normally distributed for PLWHA enrolled in the RWHAP.

Finally, I used SPSS to determine if the dataset contained a significant number of outliers. Outliers are single data points that vary from the others and can reduce the validity of the test results and were assessed by examining the box-whisker plot produced from SPSS (Field, 2013). Outliers are data points plotted above the top whisker or below the bottom whisker (Laerd Statistics, 2012e). Based on my visual inspection of the boxplot shown in Figure 6, I confirmed outliers were present in the data for PLWHA who were enrolled in the RWHAP and enrolled in an ACAQHP.

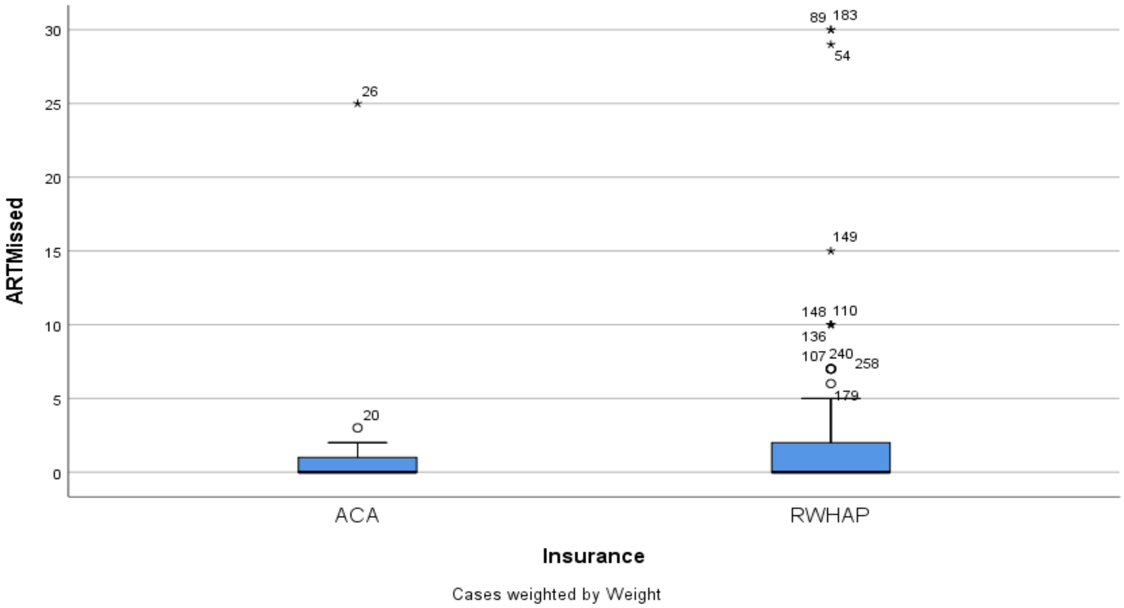


Figure 6. Box plot showing the presence of outliers for treatment compliance data (as defined by the number of ART missed doses in the past 30 days) for PLWHA enrolled in the RWHAP and enrolled in an ACAQHP.

Due to heterogeneity in the equality of variances, violations in the assumptions of normality in the distribution of the dependent variable around the independent variables, and the presence of significant outliers in the dataset, I used a Mann-Whitney U to analyze the data instead of an independent samples *t* test (Laerd Statistics, 2018c). The

Mann-Whitney U test is a nonparametric test used to determine if statistically significance differences exist between two groups when an independent samples *t* test when data fails to meet the required assumptions (Laerd Statistics, 2018c). The Mann-Whitney U test has three assumptions that must be met prior to running the statistical test which include a continuous or ordinal dependent variable, a categorical independent variable with two groups, and an independence of observations (Laerd Statistics, 2018c). As I met all three assumptions based on the design of my study, I used a Mann-Whitney U test to determine if there were differences in treatment compliance (as defined by the number of ART missed doses in the past 30 days) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

Appendix F: Research Question 3 - Independent Samples *t* test Assumptions

In the third research question, I used an independent samples *t* test to address the difference in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. The same six assumptions must also be met in this research question which include a dependent variable that is continuous, an independent variable that consists of two independent categorical groups, an independence of observations, a homogeneity of variances, normality in the distribution of the dependent variable around the independent variables, and no significant outliers (Laerd Statistics, 2018b).

I met the initial three assumptions (a dependent variable that is continuous, an independent variable that consists of two independent categorical groups and an independence of observations) based on the overall design of the research study. I used SPSS to determine if the three remaining assumptions (a homogeneity of variances, normality in the distribution of the dependent variable around the independent variables, and no significant outliers) were met. First, I ran a Levene's test of equality of error variances to determine if there was a homogeneity of variances. A homogeneity of variance exists when the variance within each group in the independent variable is equal (Field, 2013). Homogeneity is confirmed if the Levene's test produces a non-statistically significant result which occurs when the p-value (significance level) is greater than .05 (Field, 2013). The results of the Levene's test shown in Table 15 indicated there was a difference in the variances in engagement in care between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP as $F(1,9621.887) = 258.616$, $p < .001$.

Table 15

Levene's Test for Equality of Variances - Engagement in Care

		F	Sig.	t	Df
Engagement in Care	Equal variances not assumed	258.616	.000	-13.542	9621.887

Second, I used SPSS to confirm the normal distribution of the data which occurs when the dependent variable is normally distributed by each level of the independent variable (Field, 2013). As I used weighted data in this study, SPSS did not generate the Shapiro-Wilk's test for this research question, so it was not used to assess the normality of distribution. Instead, I used the Normal Q-Q Plot output from SPSS for PLWHA enrolled in the RWHAP and in an ACAQHP to graphically assess the normality of the data distribution. Normally distributed data will appear as round dots located near the diagonal line (Laerd Statistics, 2018b). Based on my graphical assessment of the Normal Q-Q Plots presented in Figure 7 and Figure 8, engagement in care data (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) for PLWHA enrolled in the RWHAP was not normally distributed.

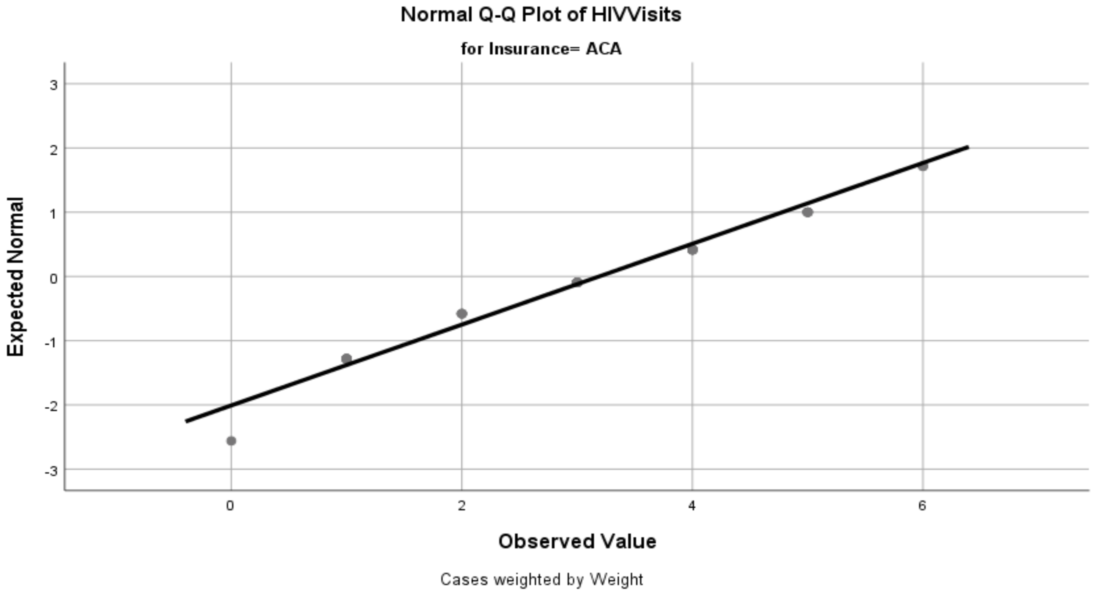


Figure 7. Scatter plot depicting engagement in care data (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) that is normally distributed for PLWHA enrolled in an ACAQHP.

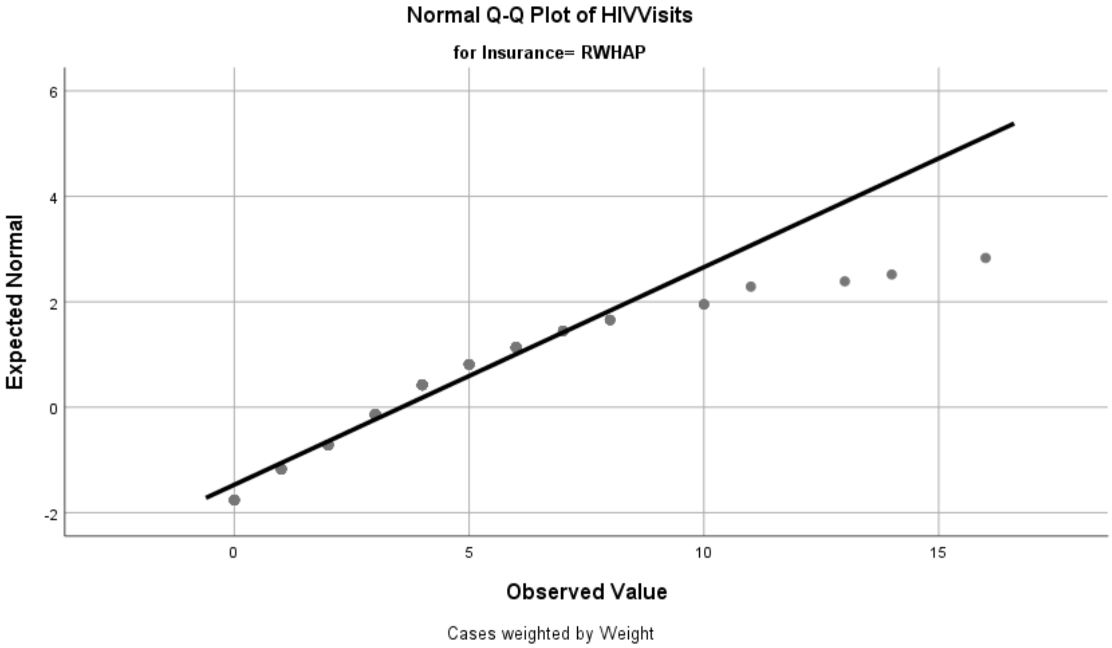
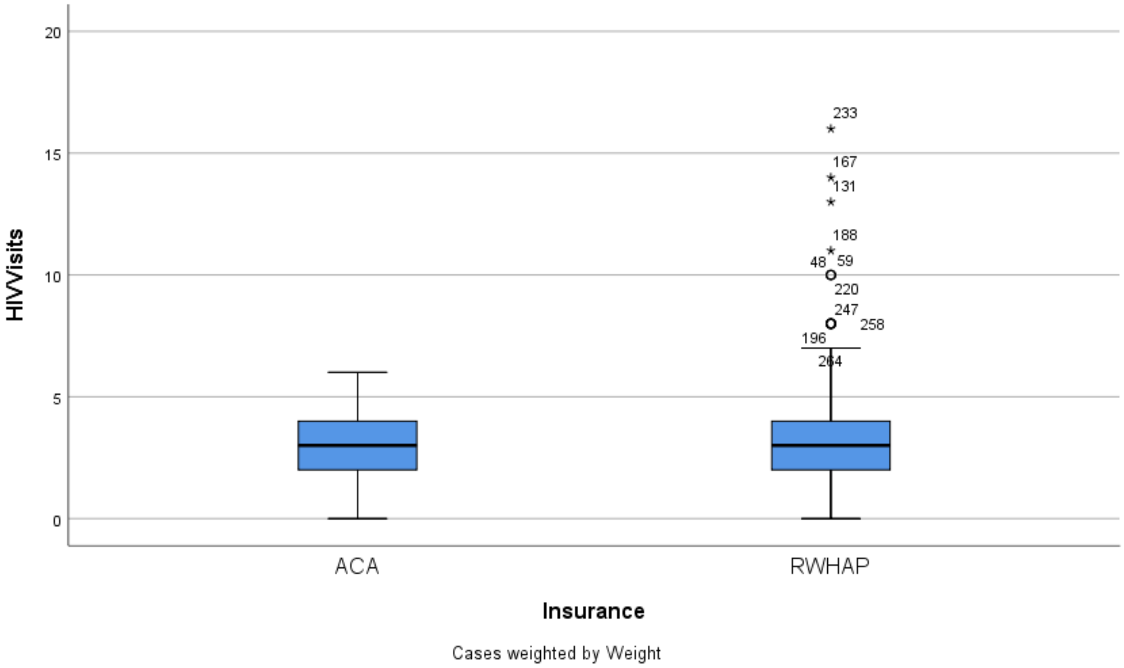


Figure 8. Scatter plot depicting engagement in care data (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) that is not normally distributed for PLWHA enrolled in the RWHAP.

Finally, I used SPSS to generate a box-whisker plot to determine the presence of any data outliers. Outliers are data points plotted above the top whisker or below the bottom whisker (Laerd Statistics, 2012e). Based on my visual inspection of the boxplot shown in Figure 9, I confirmed outliers were present in the data for PLWHA who were enrolled in the RWHAP and not in the data for PLWHA enrolled in an ACAQHP.



Cases weighted by Weight

Figure 9. Box plot showing the presence of outliers for engagement in care data (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) for PLWHA enrolled in the RWHAP and no outliers for PLWHA enrolled in an ACAQHP.

Due to heterogeneity in the equality of variances, violations in the assumptions of normality in the distribution of the dependent variable around the independent variables, and the presence of significant outliers in the dataset, I used a Mann-Whitney U to analyze the data instead of an independent samples *t* test (Laerd Statistics, 2018c). The Mann-Whitney U test is a nonparametric test used to determine if statistically significance differences exist between two groups when an independent samples *t* test when data fails to meet the required assumptions (Laerd Statistics, 2018c). The Mann-Whitney U test has three assumptions that must be met prior to running the statistical test which include a continuous or ordinal dependent variable, a categorical independent variable with two groups, and an independence of observations (Laerd Statistics, 2018c). As I met all three assumptions based on the design of my study, I used a Mann-Whitney U test to determine if there were differences in engagement in care (as defined by the number of HIV/AIDS-related physician visits within the previous 12 months) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP.

Appendix G: Research Question 4 - Independent Samples *t* test Assumptions

In the fourth research question, I used an independent samples *t* test to address the difference in health status (as defined by viral suppression) between PLWHA enrolled in an ACAQHP and PLWHA enrolled in the RWHAP. The same six assumptions must also be met in this research question which include a dependent variable that is continuous, an independent variable that consists of two independent categorical groups, an independence of observations, a homogeneity of variances, normality in the distribution of the dependent variable around the independent variables, and no significant outliers (Laerd Statistics, 2018b).

The same six assumptions must also be met in this research question which include a dependent variable that is continuous, an independent variable that consists of two independent categorical groups, an independence of observations, a homogeneity of variances, normality in the distribution of the dependent variable around the independent variables, and no significant outliers (Laerd Statistics, 2018b).

I met the initial three assumptions (a dependent variable that is continuous, an independent variable that consists of two independent categorical groups and an independence of observations) based on the overall design of the research study. I used SPSS to determine if the three remaining assumptions (a homogeneity of variances, normality in the distribution of the dependent variable around the independent variables, and no significant outliers) were met. First, I ran a Levene's test of equality of error variances to determine if there was a homogeneity of variances. A homogeneity of variance exists when the variance within each group in the independent variable is equal

(Field, 2013). Homogeneity is confirmed if the Levene's test produces a non-statistically significant result which occurs when the p-value (significance level) is greater than .05 (Field, 2013). The results of the Levene's test shown in Table 16 revealed there was a difference in the variances in health status between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP as F(1,30566.262) = 583.703, p < .001.

Table 16

Levene's Test for Equality of Variances – Health Status

		F	Sig.	t	Df
Health Status	Equal variances not assumed	583.703	.000	26.740	30566.262

Second, I used SPSS to confirm the normal distribution of the data which occurs when the dependent variable is normally distributed by each level of the independent variable (Field, 2013). As I used weighted data in this study, SPSS did not generate the Shapiro-Wilk's test for this research question, so it was not used to assess the normality of distribution. Instead, I used the Normal Q-Q Plot output from SPSS for PLWHA enrolled in the RWHAP and in an ACAQHP to graphically assess the normality of the data distribution. Normally distributed data will appear as round dots located near the diagonal line (Laerd Statistics, 2018b). Based on my graphical assessment of the Normal Q-Q Plots presented in Figure 10 and Figure 11, health status (as defined by viral load suppression) for both PLWHA enrolled in the RWHAP and enrolled in an ACAQHP were not normally distributed.

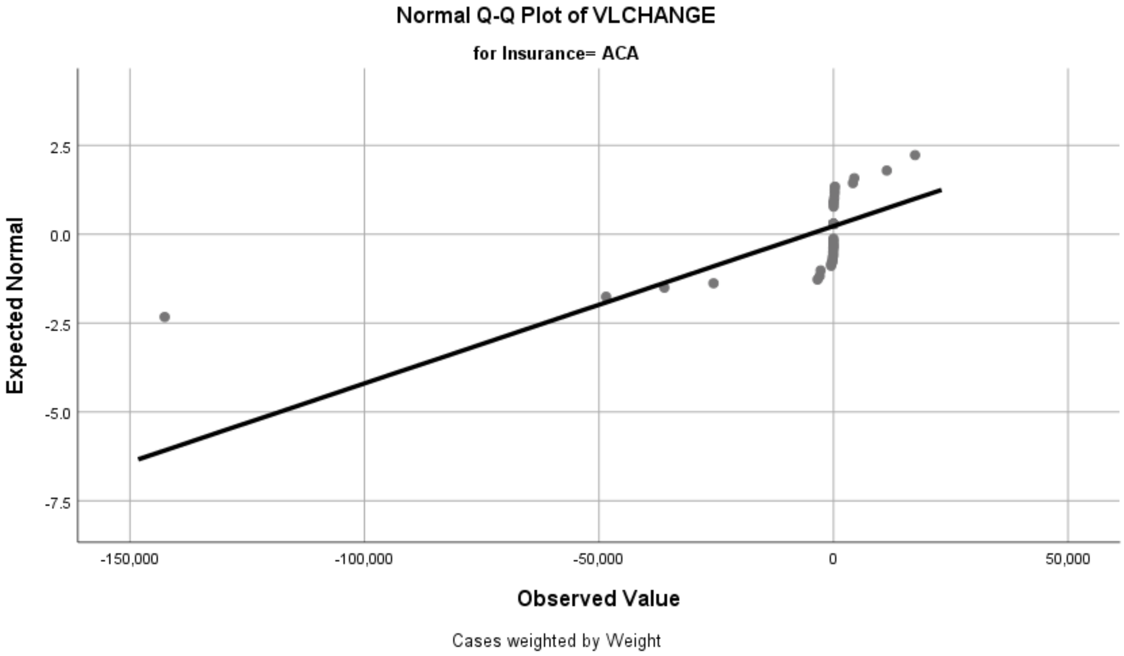


Figure 10. Scatter plot depicting health status data (as defined by viral load suppression) that is not normally distributed for PLWHA enrolled in an ACAQHP.

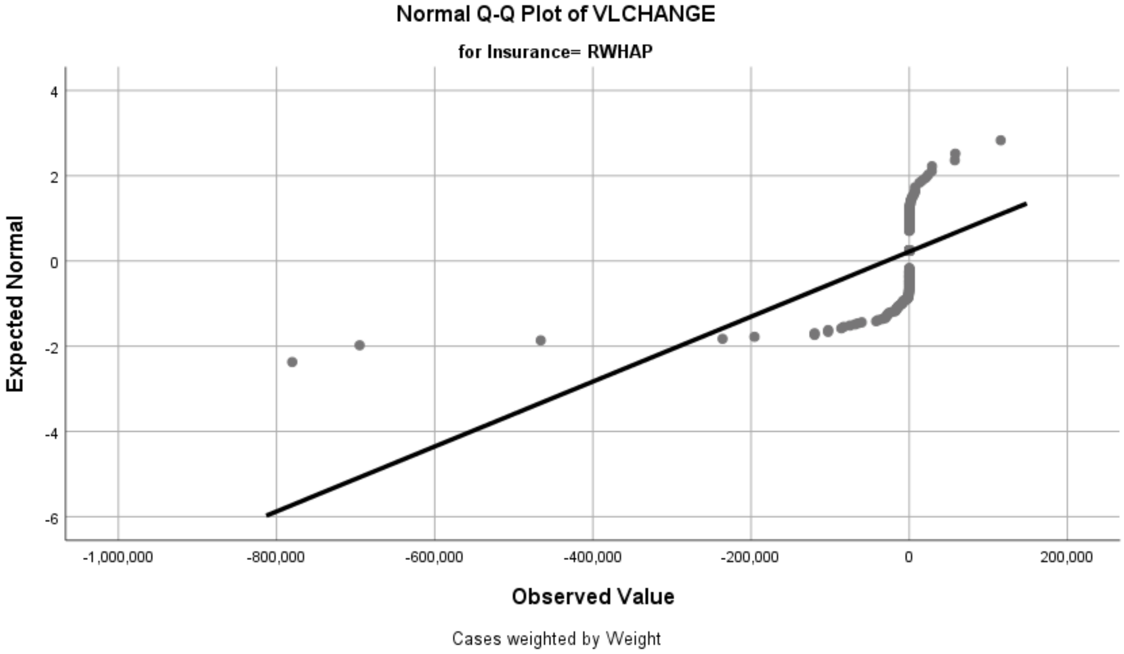


Figure 11. Scatter plot depicting health status data (as defined by viral load suppression) that is not normally distributed for PLWHA enrolled in the RWHAP.

Finally, I used SPSS to determine if the dataset contained a significant number of outliers. Outliers are single data points that vary from the others and can reduce the validity of the test results and were assessed by examining the box-whisker plot produced from SPSS (Field, 2013). Outliers are data points plotted above the top whisker or below the bottom whisker (Laerd Statistics, 2012e). Based on my visual inspection of the boxplot shown in Figure 12, I confirmed outliers were present in the data for PLWHA who were enrolled in the RWHAP and enrolled in an ACAQHP.

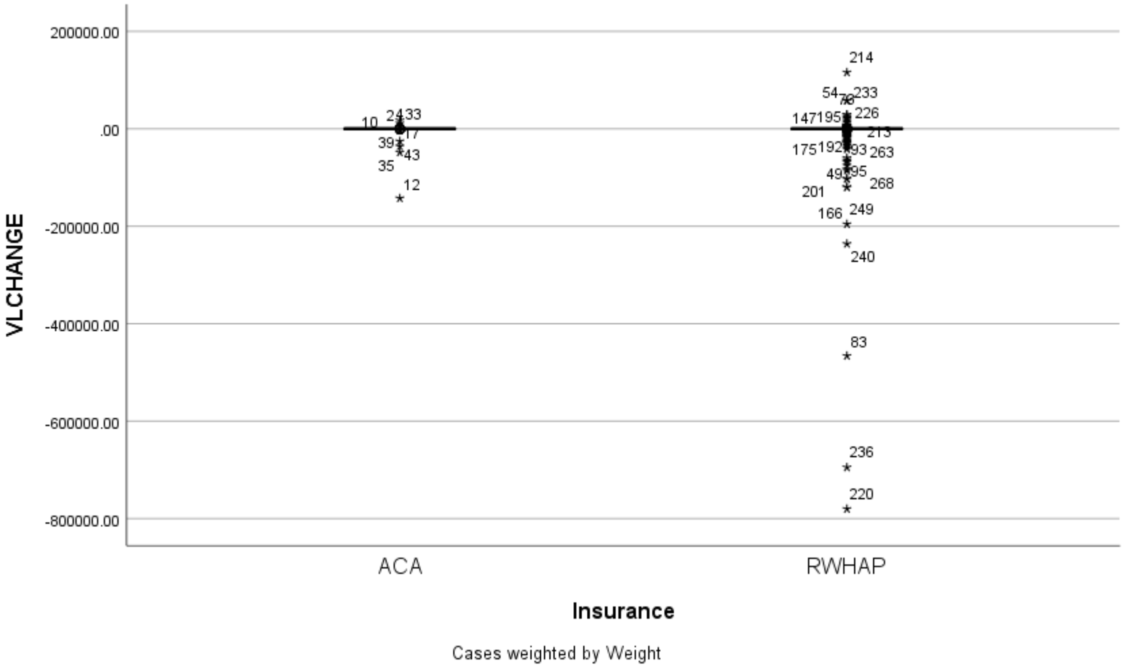


Figure 12. Box plot showing the presence of outliers for health status data (as defined by viral load suppression) for PLWHA enrolled in the RWHAP and for PLWHA enrolled in an ACAQHP.

Due to heterogeneity in the equality of variances, violations in the assumptions of normality in the distribution of the dependent variable around the independent variables, and the presence of significant outliers in the dataset, I used a Mann-Whitney U to analyze the data instead of an independent samples *t* test (Laerd Statistics, 2018c). The Mann-Whitney U test is a nonparametric test used to determine if statistically significance differences exist between two groups when an independent samples *t* test when data fails to meet the required assumptions (Laerd Statistics, 2018c). The Mann-Whitney U test has three assumptions that must be met prior to running the statistical test which include a continuous or ordinal dependent variable, a categorical independent variable with two groups, and an independence of observations (Laerd Statistics, 2018c). As I met all three assumptions based on the design of my study, I used a Mann-Whitney U test to determine if there were differences in health status (as defined by viral load suppression) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP.

Appendix H: Research Question 5 – Chi-Square Assumptions

In the fifth research question, I used a chi-square to address the difference ins difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP. There are three assumptions that must be satisfied to run this test. I met the first two assumptions (variables must be categorical and an independence of observations) based on the design of my study. The third assumption of a chi-square test is that all cells in the SPSS cross-tabulation output table must have expected counts that are greater than five (Field, 2013). As can be seen in Table 17, I met this assumption as all cell counts for the expected count were greater than five.

Table 17

*Insurance * Financial Crosstabulation*

Coverage		No Financial Issues	Financial Issues	Total
ACA	Count	4201	635	4836
	Expected Count	3558.3	1277.7	4836
RWHAP	Count	18366	7468	25834
	Expected Count	19008.7	6825.3	25834
Total	Count	22567	8103	30670
	Expected Count	22567	8103	30670

As I met all three assumptions of a chi-square test, I used this test to examine the difference in difficulty in paying out-of-pocket medical expenses (as defined by problems paying for any out-of-pocket medical or health insurance costs) between PLWHA enrolled in the RWHAP and PLWHA enrolled in an ACAQHP.