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Affordable Care Act and Human Papilloma Virus Vaccine Among Adolescent Females

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Walden University
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MPH, Walden University, 2009

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The human papilloma virus (HPV) is the most frequent cause of sexually transmitted diseases (STDs) and cancers for U.S. adults. The Affordable Care Act (ACA), enacted in 2010, eliminated copay expenses for childhood immunizations and expanded access to health care. The purpose of this secondary data analysis study was to determine if there was an association between ACA and the usage of HPV vaccine among adolescent females in Georgia. Data concerning HPV vaccinations from 2011 to 2015 were obtained from the National Immunization Survey-Teen dataset. Andersen's BM of health care use was applied to ascertain the factors that enhanced the usage of HPV vaccine. Multiple logistic regression analysis was used to determine if there was any association between ACA and HPV vaccination. The study results showed a significant association between ACA and provider visit ($p<.05$). Also, provider visit was significantly associated with HPV vaccination rate ($p<.05$). Adolescent females with health insurance had a higher rate of provider visit after the passage of ACA. From 2011 to 2015, 87.2% of insured adolescent females visited their provider. The rate of HPV vaccination increased among the insured adolescent females who visited the provider from 35.3% in 2011 to 53.9% in 2015. Provider visit was identified as the most influencing factor that enhanced usage of HPV vaccine. The knowledge gained from the results contributed to social change by providing insight on how, through increased provider visits, ACA has improved the HPV vaccination rate among teenage females in Georgia. The conclusion will assist in developing effective strategies and policies that will achieve the Healthy People 2020 goal of 80% of herd immunity against HPV.

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Dedication

I dedicate this dissertation to my mother and in memory of my late father who believed that women's education is empowerment, and who provided me the foundation to attain it.

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The writing of this dissertation was challenging and a significant learning experience. This process would not have yielded fruition without the help and support of various individuals, whom I am deeply indebted to. Firstly, I would like to thank my committee chair, Dr. Ji Shen, for his guidance and suggestions that were helpful. My special thanks to my committee member, Dr. Amany Refaat, who responded earlier on when I was trying to form my committee. Dr. Amany Refaat provided guidance and suggestions that helped me progress with this process. Also, I thank Dr. Ronald Hudak, who served the role of the university reviewer.

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Chapter 1: Introduction to the Study

Introduction

Human papilloma virus (HPV) infections and related cancers are health problems that are of concern to public health. HPV remains the most common cause of sexually transmitted disease (STD) in the United States among males and females (Dunne et al., 2014; National Cancer Institute, 2015; Sun, Chang, & Rutherford, 2013). About 79 million of the U.S. population is infected by at least a specie of the virus, while 14 million individuals acquire the infection annually (Dunne et al., 2014).

There are more than 150 types of HPV, of which 40 species are the primary cause of infections of the anogenital area and mucosa of the body (Dunne et al., 2014). The mucosal HPV are categorized as oncogenic (high-risk HPV) Types 16 and 18 or low-risk (Types 6 and 11; Dunne et al., 2014). The oncogenic types cause cancer of the cervix, vulva, vagina, penis, anus, and various oropharyngeal cancers (Arain, 2015). Anogenital warts and respiratory papillomatosis result from infection by low-risk HPV (Centers for Disease Control [CDC], 2015). Longstanding infection can lead to various cancers and diseases (National Cancer Institute, 2014). Globally, the most prevalent oncogenic strains of the virus HPV16 and HPV18 cause more than 400,000 cases of cancer and 22,000 case of cancer in the United States annually (National Cancer Institute, 2014).

In the developmental stage of adolescence, health behaviors that are formed can have an immediate and long-term effect in adulthood (Tebb, Sedlander, Bausch, & Brindis, 2015). Adolescents can engage in sexual risk behaviors that result in STDs (CDC, 2015). Youths, 15 to 24 years, are found to have 50% of the 20 million new cases

of sexually transmitted infections (STI) in the United States yearly (CDC, 2015). Among females, one in four are sexually active adolescent girls identified as having an HPV-related STD (CDC, 2015). The risk of exposure to STIs increases due to multiple sex partners (CDC, 2015). Vaccination of adolescents before being sexually active was noted to be effective in the prevention of HPV-related infections and cancers. Dunne et al. (2014) pointed out that the present and impending challenges in the prevention of HPV infections and cancers lie in increasing coverage for vaccination. Shen et al. (2014) reported that the rate of HPV vaccination among adolescents is lower among those facing cost-sharing for vaccination. Eliminating cost-sharing for the HC vaccine will increase compliance and vaccine uptake (Shen et al., 2014).

The Affordable Care Act (ACA) was enacted in 2010, and a significant provision of this law is no cost-sharing for preventive services, which included childhood immunizations such as the HPV vaccine. Despite this rule, the HPV vaccination rate in Georgia for adolescent females, in 2015, was 54.4% for one dose series, 38.7% for second dose, and 32.3% for three doses (Georgia Department of Health, 2016). Although the HPV vaccination increase was noted in first dose series, the completion of the series remained low, reflecting a significant gap in attaining the Healthy People 2020 goal of 80% of HPV vaccine coverage for adolescent females.

Underwood et al. (2015) identified that Georgian teens with private insurance in high school are less likely to complete the three doses of HPV vaccine compared to those who have Medicaid coverage. No study was conducted to evaluate if the ACA influenced the use of HPV vaccination among adolescents in Georgia. There was a need for this

study to explore if ACA had an impact on HPV vaccine use by evaluating the trend of vaccination from 2011 to 2015 after the ACA enactment in 2010.

HPV vaccine is one of the clinical preventive services recommended for adolescents starting at age 9 because it was proven to be effective in the prevention of HPV-related infections and cancers, if given before being sexually active. This vaccine is covered under ACA without cost-sharing, which is a significant provision of ACA for preventive services in both private and public insurance plans. However, HPV vaccination rate is still low compared to other recommended childhood immunizations and the Healthy People 2020 goal for adolescent females in Georgia. Determining if ACA influences vaccine uptake will provide knowledge about why the underuse of HPV vaccine still exists. This knowledge can be used to design programs that will improve use, with the goal of preventing HPV-related diseases and cancers through policy and clinical practice.

Chapter 1 consists of the background of this study, problem statement, the purpose of conducting the research, research questions, hypotheses, and the theoretical framework. Additional sections of this chapter include the nature of the study/research design, assumptions, scope and delimitations, limitations, significance, summary, and transition to Chapter 2.

Background of Problem

Underuse of HPV vaccine among adolescents is a public health concern as the HPV virus is the most typical cause of STDs in the United States among males and females (Dunne et al., 2014; National Cancer Institute, 2015; Sun et al., 2013). In United

States, youths 15 to 24 accounted for 50% of the 20 million new STIs yearly (CDC, 2015). Also, one in four sexually active adolescent females have an STD that is caused by HPV (CDC, 2015). The risk of exposure to HPV increases with multiple sex partners (CDC, 2015). Satterwhite et al. (2013) identified the most common STIs as chlamydia, gonorrhea, syphilis, herpes, HPV, hepatitis B, HIV, and trichomonas. Satterwhite et al. revealed that HPV STIs are the most frequent in the United States, with more adolescents and young adults acquiring HPV. Satterwhite et al. reported that approximately 110 million STIs are found among this population. Young women and men between the ages 15 to 24 (22.1 million) had 20% of infections (Satterwhite et al., 2013). Of the 19.7 million STIs reported, 50% of them were in this age group (Satterwhite et al., 2013). HPV infections were also prevalent in this population (Satterwhite et al., 2013).

Young adults are prone to contracting STDs because they tend to have multiple and older partners and they engage in unsafe sex practice (Nguyen et al., 2016). In a study involving 18,984 adolescents between the ages of 13 to 17 years, Nguyen et al. (2016) indicated that 56% of young adults reported having >2 partners, and 54% had concurrent partners. Also, 69% of young adults had sex with older partners, while 35% had sex outside of their ethnic group (Nguyen et al., 2016).

The burden of HPV infections in the United States is high, as 70% of cervical cancers are linked to HPV (Arain, 2015). There is also an increased incidence of oropharyngeal and anal cancers, including disparities in the cancer incidence rate (Jermel et al., 2013). The high-risk strains of HPV are the primary cause of "vaginal cancers, 55 percent, anal cancers, 79 percent and 62% of oropharyngeal cancers" (Dunne et al., 2014,

p. 69). The annual projected new incidence of cancers associated with HPV in the United States is 26,000 (CDC, 2014). About 17,000 of the new cases of cancer will occur in females, while 9,000 will occur in males (CDC, 2014). About 79 million people in the United States are infected with HPV, while 14 million of the population acquire the infection yearly (Dunne et al., 2014).

Arain (2015) indicated that the risk of HPV transmission increases with first sexual intercourse at an early age and multiple sexual partners, resulting in the high incidence of cervical cancer. Although the rate of cervical cancer is decreasing in the United States, the rate of cervical cancer among African Americans and Hispanic Americans is still high (Arain, 2015). When compared to European American women, African American women have a higher incidence rate of cervical cancer (34%) and mortality rate (Arain, 2015). Also, Hispanic American women have approximately 50-70 times increased incidence of cervical cancer and mortality rate when compared to non-Hispanic White women (Arain, 2015).

There is a marked rise, and frequent occurrence, of HPV16-induced oropharyngeal cancer (head and neck cancer) in the United States, and transmission was noted to be through deep kissing and urogenital sex (Gillison et al., 2012; Nguyen et al., 2016). Researchers who examined the HPV link with oral pharyngeal cancer identified high-risk sexual behaviors resulting in HPV that were comprised of multiple sex partners and starting sexual intercourse at an early age (Gillison et al., 2012; Nguyen et al., 2016; Sivasithamparam, Visk, Cohen, & King, 2013). Singhi and Westra (2010) analyzed 256 head and neck carcinomas and revealed that 182 (71%) of the tumors were HPV positive.

In a cross-sectional study conducted to ascertain the prevalence of oral HPV infection in the United States from 2009–2010 in both males and females from ages 14 to 69, Gillison et al. (2012) reported the oral HPV infection was 6.9%. Nguyen et al. (2016) claimed increased incidence of HPV 16 infection in 2,824 oropharyngeal cancers, reported in 23 U.S. studies. HPV 16 was identified in 60.2% of the sampled group (Nguyen et al., 2016).

There is a financial burden related to HPV-related infections and cancer. About 1.7 billion dollars is spent annually on HPV-related medical expenditures (Owusu-Edusei et al., 2013). The expenses included 485 million spent on cancers associated with HPV and 288 million spent on genital warts (Owusu-Edusei et al., 2013). In 2010, the annual estimate of health expenses for the prevention and remedy of diseases caused by HPV in the United States was $8.0 billion (Chesson et al., 2012). About $6.6 billion (82.3%) was spent on routine screening for cervical cancer and follow-up check-ups (Chesson et al., 2012). In addition, $1.0 billion (12.0%) was spent on both cervical cancer ($0.4 billion), and $0.3 billion was spent on oropharyngeal cancer (Chesson et al., 2012). Also, $0.3 billion (3.6%) was spent on treating genital warts, while $0.2 billion (2.1%) was spent on treating recurrent respiratory papillomatosis (Chesson et al., 2012). Dunne et al. (2012) denoted that the cost of HPV-associated diseases and cancer remained a problem for public health. To reduce the burdens, a vaccination-integrated approach must involve clinical medicine, in combination with public health and public policy (Dunne et al., 2012).

In Georgia, the Comprehensive Cancer Registry reported 400 cases of cervical cancer annually from 2008-2012, and 140 women died from cervical cancer from 2007 to 2012 (Berzen, McNamara, Bayakly, O'Connor, & Crane, 2016). African American women are more likely to die of cervical cancer than European American women (Berzen et al., 2016). One in 154 females in United States will develop cervical cancer in their lifetime (Berzen et al., 2016). The rate of cervical cancer in Georgia was 7.7 compared to the national rate of 7.6 (National Cancer Institute, n.d.). The rate of oropharyngeal cancer in Georgia at the same period was 12.1, while the national rate was 11.3 per 100,000 population per year (National Cancer Institute, n.d.).

The Georgian mortality rate for cervical cancer, oral cavity, and pharyngeal cancers is 2.6 per 100,000 compared to the national rate of 2.3 and 2.4 per 100,000 respectively (National Cancer Institute, n.d.). There is a higher incidence and mortality for both cervical and oropharyngeal cancers in Georgia (National Cancer Institute, n.d.). Even with the increased cancer incidence in Georgia, the HPV vaccination rate is still below the Healthy People 2020 goal. Underuse of the vaccine was reported in 2010 based on Jemel et al.'s (2013) study, which showed that only 32% of adolescents 13–17 years received three doses of the HPV vaccine. Vaccination rate was significantly lower among the uninsured found in some Southern states where cervical cancer rates were highest (Jemel et al., 2013). Ferrara, Audreya, Trotterb, and Hickman (2015) indicated that individuals without health insurance are less likely to receive an HPV vaccination. Georgia is one of the Southern states where the cervical cancer rate is above the national average (National Cancer Institute, n.d.), while the HPV vaccination rate remains low.

ACA is an insurance mandate enacted by President Obama in 2010. A significant mandate of this law is no cost-sharing for preventive services, such as childhood immunizations (Eno, Mehalingam, & Nathaniel, 2016). Childhood vaccines from birth until the age of 18 are covered fully under the ACA as preventive services (Eno et al., 2016). Under the ACA, the HPV vaccine is covered 100% without any out-of-pocket expenses. The ACA established a mandatory fund for community health centers (CHCs) and school-based health care clinics (SBHCs) to provide health care services to the uninsured and underserved populations with the aim of expanding access to preventive services (Curtis et al., 2014). Insurance coverage will decrease out-of-pocket expenses as a way to enhance vaccination uptake (Curtis et al., 2014).

The HPV vaccine is one of the preventive immunization vaccines for children from birth to age 18 that is covered under the ACA without cost-sharing (Eno et al., 2016; Kaiser Family Foundation [KFF], 2016). The HPV vaccine was recommended from age 11 to 12 because it was proven to be effective in the prevention of HPV infections and cancers; however, the vaccination uptake remained low in the United States (Rahman, Islam, & Berenson, 2015). The HPV vaccination is one of the clinical preventive services endorsed by the Advisory Committee on Immunization Practices (ACIP; Curtis et al., 2014). HPV vaccine can be given to girls at age 9, but girls and adult women 13 to 26 years who did not get started or complete the series can catch up at this period (CDC, 2015).

Despite the recommendation by ACIP, in Georgia as of 2015, only 54.4% of adolescent females received a dose of HPV vaccine, while 32.3% received three doses or

completed the series (Georgia Department of Health, 2015). The Healthy People 2020 goal for the adolescents is to attain 80% HPV vaccine coverage (Healthy People, 2016). Dunne et al. (2014) noted that the present and future tasks in preventing HPV infections and cancers lie in increasing vaccination coverage. This study is needed to explore if ACA has an impact on HPV vaccine use rate among adolescent females in Georgia, as the CDC's Community Guide on Preventive Services systematic suggested that insurance coverage will decrease out-of-pocket expenses as a way to enhance vaccination uptake (Curtis et al., 2014).

In this study, I explored if insurance coverage without cost-sharing of preventive services had an influence on the use of HPV vaccine by monitoring the trend of HPV vaccination rate after the enactment of ACA from 2011 to 2015. The factors that affected the use of health services were assessed to identify the one that had the most significance. The knowledge this study furnished will be useful in designing programs that will prevent HPV-related diseases and cancers through an integrated approach to policy and clinical practice.

Problem Statement

In spite of the implementation of the ACA with no cost-sharing for childhood immunizations, such as HPV vaccine, the use of the HPV vaccine remained below the Healthy people 2020 target for adolescent females in Georgia. Scholars reported that the HPV virus is the most prevalent cause of STDs among teenage females in the United States (CDC, 2015; Satterwhite et al., 2013) and cancers in adulthood (Dunne et al., 2014; National Cancer Institute, 2015; Sun et al., 2013). Despite the high prevalence of

HPV-related diseases and cancers, vaccine use remained low in the United States (Dunne et al., 2014; Jermel et al., 2013). Jemel et al. (2013) reported that only 32% of adolescent females aged 13–17 years received three shots of the HPV vaccine in 2010. Dunne et al. (2014) indicated that the HPV vaccination coverage for adolescent girls remained far below the Healthy People 2020 goal of 80%, compared to other vaccines recommended for this age group. Underwood et al. (2015) reported that adolescents with private insurance were more likely to complete three doses of the HPV vaccine. As of 2015, only 54.4% of adolescent females in Georgia received a dose of HPV vaccine, while 32.3% received three doses (Georgia Department of Health, 2015). The cost of the vaccine was identified as a barrier to use; eliminating this barrier can enhance uptake of vaccine (Shen et al., 2014). Underuse of the HPV vaccine among adolescents and high incidence rate of HPV-associated cancers heighten the need for prevention efforts to increase coverage for the vaccine (Jermel et al., 2013). Primary prevention of HPV through childhood immunization is necessary for reducing HPV-associated cancers and infections (Jermel et al., 2013). One of the strategies that was created to increase the use of vaccine compliance was health insurance reform that eliminated or minimized out-of-pocket expenses for the immunization (Dunne et al., 2014). ACA expanded primary and preventive services by the expansion of Medicaid and the reauthorization of the State Children's Health Insurance Program (SCHIP; Lathrop & Hodnicki, 2014). Adolescents can receive HPV immunization through well-child visits to providers, although more visits are necessary to complete the required doses (Shen et al., 2014). Eliminating cost-sharing for the HPV vaccine will increase access to provider visits, compliance, and HPV

vaccination rate. Although the ACA was implemented in 2010, scholars have not examined if there is an association between health care reform (ACA) with no cost-sharing with the HPV vaccination rate among adolescent females in Georgia. There was a lack of information on whether ACA affected the use of the HPV vaccine among adolescent females in Georgia. Also, no scholar attempted to statistically quantify if there was an association between ACA and the HPV vaccination rate among teenage females in Georgia.

Purpose of the Study

The purpose of this study was to explore if there was an association between the ACA and the rate of HPV vaccine among adolescent females in Georgia. HPV vaccination was one of the clinical preventive services recommended for adolescents by the AICP. The low HPV vaccine may have occurred due to cost resulting in out-of-pocket expenses for those with private insurance and for the uninsured. Scholars have not examined if insurance coverage through ACA influenced the HPV vaccine uptake in Georgia. In this study, I addressed this gap by statistically quantifying if an association or relationship existed by examining the trend of HPV vaccination from 2011 to 2015 after the enactment of ACA. The target population was adolescent females 13 to 17 years of age living in Georgia. I employed a quantitative design using secondary data. Data on the HPV vaccination from 2011 to 2015 were obtained from the National Immunization Surveys (NIS) Teen data. The variables evaluated were ACA insurance coverage (independent variable) and the HPV vaccination rate (dependent variable). The covariate variables were race or ethnicity and the rate of provider visit. The knowledge this study

provided is beneficial in in designing programs that aim to increase the use of HPV vaccine. The goal is to prevent HPV-related diseases and cancers, including attaining the Healthy People 2020 goal of 80% herd immunity of HPV through policy and clinical practice.

Research Questions and Hypotheses

RQ1: Is there any association between ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia?

$H_0$1: There is no association between ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia.

H_a1: There is a significant association between ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia.

RQ2: Is there any association between ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia?

$H_0$2: There is no association between ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia.

H_a2: There is an association between ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia.

RQ3: Is there any association between provider visits and the HPV vaccination rate among adolescent females in Georgia?

$H_0$3: There is no association between the provider visits and the HPV vaccination rate among adolescent females in Georgia.

H_a3: There is an association between the provider visits and the HPV vaccine vaccination rate among adolescent females.

RQ4: As Georgia did not expand Medicaid under ACA, is there any association between race and the HPV vaccination rate among adolescent females in Georgia?

$H_0$4: There is no association between race and the HPV vaccination rate among adolescent females in Georgia.

H_a4*:* There is an association between race and the HPV vaccination rate among adolescent females in Georgia.

Conceptual Framework

The theoretical framework applied to this study was Andersen's behavioral model (BM). This behavioral model has been used to study the use of health services. In the BM, there are three factors that result in the use of health services: predisposing, enabling, and need factors (Babitsch, Gohl, & Lengerke, 2012). The predisposing factors consist of demographics (age and sex), social factors (education, occupation, ethnicity, and family status), and mental factors (health beliefs(Babitsch et al., 2012). Enabling factors are comprised of conditions that enable the use of health services, such as income, access to health insurance coverage, available regular source of care, transportation, provider, wait time, the location of health facility, and health policies (Babitsch et al., 2012). The need factors can be an individual perceived need, which is the use of clinical preventive services, such as the HPV vaccine that prompted the provider visit (Babitsch et al., 2012). This theoretical framework was ideal for this study because it is appropriate

in examining the use of health services, and the HPV vaccine is one of the clinical preventive services provided.

The constructs in Andersen's BM applied to this study were predisposing factor (race/ethnicity); enabling factors (health insurance coverage and regular source of care (provider visit); and perceived need (HPV vaccine), as perceived need results in visiting the provider for vaccination. The variables that pertained to this study were race (predisposing factor), insurance coverage under ACA and provider visit (enabling factor), and HPV vaccine (based on the perceived need to vaccinate).

The ACIP recommended for adolescents to receive the vaccine at ages 11-12. These variables were assessed to ascertain if there was any association between them and the rate of HPV vaccine use. Investigating these variables helped in determining which factor had the most significant influence on the usage of HPV vaccine among the target population. The outcome may help in making ACA provisions and mandates that enhance use of HPV vaccine.

Nature of the Study

In this study, I employed a quantitative approach that involved secondary analysis of the NIS, NIS-Teen data, available for public use. I retrospectively compared the trends of insurance coverage, alongside the HPV vaccination rate from 2011–2015, to ascertain association. As the data were collected in a natural setting of the participant human population, the quasi-experimental design of secondary analysis was appropriate for this research. For this design, the HPV vaccine rate (dependent variable) was measured across

insurance coverage (independent variable); race/ethnicity (moderator variable); and the rate of provider visit, which was the mediating variable.

The target population was adolescent females, ages 13 to 17, living in Georgia. This nature of the study aligned with the theoretical framework of Andersen's BM that aimed to identify factors that influence use of health services. It helped me to ascertain the factor that had the most significant impact on HPV vaccine use. Determining the factors that had the most significant effect will be useful in formulating strategies that enhance the uptake of HPV vaccine among this target population.

Data

Secondary data from a government archive were used for this research. The data were obtained through a web search of the government's data archive: NIS, NIS-Teen sponsored by the CDC. Data for this study consisted of results of the survey conducted from 2011 to 2015.

I monitored the trend of HPV vaccine use rate from 2011 to 2015 to ascertain if there was an association between insurance coverage with no cost-sharing after the enactment of ACA and the vaccine uptake. Also, I observed race and the rate of provider visit. The data obtained were used to answer the research questions to deduce if there was an association between the independent variables and dependent variable. Answering the questions helped in drawing a conclusion on whether ACA influenced the use of HPV vaccine, with the goal of recommending strategies that can improve use of the HPV vaccine.

Definition of Terms

Adolescent female: A critical transitional period that includes the biological changes of puberty and the need to negotiate key developmental tasks, ages 10 to 19 (Healthy People, 2014).

Affordable Care Act (ACA): The ACA was enacted in March 2010 by President Obama as a federal statute with a mandate for people in the United States to obtain health insurance or pay monetary fines (Levy, 2016).

Age: A pertinent stage in a person's life (Oxford University Press, 2017).

Health insurance coverage with no cost-sharing: A key provision of the ACA of 2010 requiring private insurance plans to cover recommended preventive services, such as immunizations, without out-of-pocket expenses or copayment (KFF, 2015).

Human papilloma virus (HPV) vaccine: A vaccine that is effective in the prevention of HPV-related cancers (cervix, vulva, anal, and oropharyngeal) and diseases (CDC, 2016).

Provider visit: The percentage of adolescents who had contact with a health care provider within a year (CDC, 2016).

Race: A concept of human distinction based on physical characteristics, such as skin color, hair texture, eyes, and facial features (Takezawa, Smedley, & Wade, 2013).

Underuse: Not being used to full capacity when benefits exceed risks (Agency for Healthcare Research and Quality [AHRQ], 2016).

Assumptions

This study had assumptions. I assumed that the NIS-Teen nationally represented adolescents aged 13-17 years living in the United States. The NIS-Teen used a random digit dialing telephone survey of households, a combination of landline and cellular phone, including collecting information on vaccinations from the teens' vaccination provider; these multiple data collection methods strengthened the validity of data. I also assumed that the staff who collected the data were adequately trained and unbiased. Also, I assumed that the sampling, data collection methods, and weighting procedures applied made the data reliable.

Scope and Delimitations

The main delimitation of this study was that I focused on only adolescent females in Georgia aged 13 to 17 years. This research was a secondary analysis of partly exported data from the NIS-Teen data. The outcomes of the study cannot be used for generalization. Also, the definition of adequate provider data used for the 2014 NIS-Teen estimates was revised. This revision might affect vaccination coverage estimates. Further, population mobility from the relocation of residence or scattering of records due to the use of more than one provider can result in underreporting of immunization records by providers. Also, a decrease in response rates increased nonresponse bias.

Significance

This study is significant as it provided a broader view on ACA and use of HPV vaccine among adolescent females in Georgia. Identifying and filling the gap in the literature was vital in creating a positive social change. Monitoring the trend of HPV

vaccination from 2011 to 2015 after the enactment of ACA helped in showing the magnitude of the underuse of the HPV vaccine among adolescent females in Georgia. Determining the association between ACA and use of the HPV vaccine produced knowledge that is the first step in developing strategies to enhance vaccine use. Dissemination of the results of this study will assist in formulating an integrated approach that includes clinical medicine, public health, and public policy to develop strategies that will improve the use of the HPV vaccine among adolescent females to attain the Healthy people 2020 goal of 80% herd immunity for this age group. Achieving herd immunity through 80% of HPV vaccination coverage will result in the prevention of HPV-related infections and cancers, as well as the economic burdens linked to it. Healthy adolescents result in healthier adults, community, and an entire population.

The purpose of this study was to explore if the ACA impacted the use of the HPV vaccine among adolescent females ages 13 to 17 years in Georgia. I examined the factors that influenced the use of HPV vaccine, a clinical preventive service, by using Andersen's BM. Determining the factors that affected the use of HPV vaccine services may help in the formulation of strategies that will enhance the uptake of the vaccine. The information derived from this study provided insight on the factors that had the most influence in the use of HPV vaccine. The outcome resulted in knowledge on policies that can be beneficial in designing programs that center on enhancing the uptake of the HPV vaccine among this population, to attain the Healthy people 2020 goal of 80% herd immunity. The goal is to prevent HPV-related cancers and diseases through policy and clinical practice.

Positive Social Change

There are many potential positive social changes that may result from the information obtained from this study. The results of this study may help in developing strategies that will enhance the use of vaccine to attain the Healthy People 2020 goal of 80% herd immunity. The social change implications include knowledge in formulating policies by decision makers, researchers, and program developers to find ways to optimize the use of the HPV vaccine and to improve the health of the population through achievement of herd immunity. The long-term outcome will include decreasing the rate of HPV-related cancers, such as cervical cancer, and minimizing the financial burden related to HPV-related cancers and diseases, including reducing the percentage of STIs associated with HPV infections. An additional outcome will be herd immunity and improved health of individuals and various communities in Georgia.

Summary

There is a high prevalence of the HPV virus, a leading cause of STDs. Most of the infections are found in youths aged 15 to 24 years, who are responsible for half of the 20 million new STDs yearly. There are cancer burdens and an increased prevalence of oral pharyngeal cancers linked to HPV. Irrespective of higher incidence, the HPV vaccine use rate in Georgia among adolescent females was 54.4% for a dose of HPV vaccine, while 32.3% completed the series in Georgia in 2015. In Georgia, insurance coverage or no coverage was a barrier to obtaining the HPV vaccine. The provisions of ACA included no cost-sharing for preventive services and instituted a new compulsory fund for CHCs to provide health care services to the uninsured and underserved populations with the aim of

expanding access to preventive care. The provisions allowed access and provided infrastructures to enhance the use of the vaccine. Exploring the factors under Andersen's conceptual model that influence the use of HPV vaccine helped me in identifying the most significant factors related to receiving the HPV vaccine. The knowledge gained will be useful in formulating strategies to enhance vaccine uptake. The goal is to achieve the Healthy People 2020 goal of 80% herd immunity to HPV.

In Chapter 1, I introduced the study, background, problem statement, purpose of the study, research questions and hypotheses, and the conceptual framework. I also provided the nature of the survey, definitions, assumptions, scope and delimitations, and limitations. I concluded by stating the significance, implications for positive social change, and summary.

In Chapter 2, I will present the review of literature that supports the study. I will outline the significance of this study and discuss ACA, HPV burden, and underuse of HPV vaccine among adolescents.

Chapter 2: Literature Review

Introduction

HPV is the most frequent cause of STDs in the United States (Dunne et al., 2014). About 79 million members of the U.S. population is infected with at least a strain of the virus, while 14 million individuals acquire the infection annually (Dunne et al., 2014). Longstanding infection can result in various cancers and diseases (National Cancer Institute, 2014).

Youths ages 15 to 24 account for half of the 20 million new STIs yearly, and one in four sexually active adolescent females have an STD, such as HPV (CDC, 2015). The risk of HPV exposure increases when an individual has multiple sex partners (CDC, 2015). Latent effects of infections can result in genital warts and cervical and oropharyngeal cancers, which can be prevented through the HPV vaccination during adolescence (Dunne et al., 2014). Vaginal and vulvar cancers in women, anal types of cancer, and penile cancers in men can result later in life due to HPV (Meites, Kempe, & Markowitz, 2016). In Georgia, the prevalence rate of cervical and oropharyngeal cancers linked to HPV was above the national average at 7.7% and 12.1% respectively (Berzen et al., 2016). The mortality rate for cervical cancer, oral cavity, and pharynx cancers were 2.6% (National Cancer Institute, n.d.).

Despite the higher incidence and mortality for both cervical and oropharyngeal cancers in Georgia, the HPV vaccination rate is below the Healthy People 2020 goal of 80% herd immunity. Based on the data from the 2015 NIS-Teen, first HPV vaccine uptake among adolescent females was 54.4%, but decreased to 38.7% for second dose

and 32.3% for third dose (Georgia Department of Health, 2015). In the United States, for the same period among adolescent females, ≥1 dose HPV was 62.8 %, ≥2 HPV dose was 52.2%, and ≥3 dose HPV was 41.9% (Reagan-Steiner et al., 2016).

HPV vaccine is useful in the prevention of HPV-related diseases and cancers (CDC, 2016). The World Health Organization (WHO) recommended that the quadrivalent and bivalent HPV vaccines be integrated into the national immunization policies, making it a public health priority for prevention (as cited in Sun et al., 2013). The U.S. Food and Drug Administration (FDA) approved three HPV vaccines: the quadrivalent (4vHPV) and 9-valent HPV vaccines (9vHPV), gardasil and gardasil 9, and the bivalent HPV vaccine (2vHPV) cervix (as cited in Meites et al., 2016). All of the three vaccines target HPV 16 or 18 that cause most of the cancers linked with HPV (Meites et al., 2016). Globally, these strains cause more than 400,000 cases of cancer yearly and 22,000 in the United States (National Cancer Institute, 2014). The bivalent (HPV2) vaccines safeguard against HPV Types 16 and 18 associated with 70% of cervical cancers and most other types of cancer (Stokely et al., 2013). HPV4 guards against HPV Types 6 and 11, responsible for 90% of genital warts (Stokely et al., 2013). In addition, 9vHPV provides defense against these and five additional types: HPV 31, 33, 45, 52, and 58 (Meites et al., 2016). These three vaccines were approved to be given in a 3-dose series at intervals of 0, 1 or 2, and 6 months (Meites et al., 2016).

Based on clinical trial results in 2016, the FDA approved 9vHPV to be given to girls and boys between the ages of 9 through 14 years in a 2-dose series (Meites et al., 2016). Also, the ACIP recommended that adolescents initiating HPV vaccination within

this age range should receive a 2-dose series (Meites et al., 2016). Adequate vaccination is applied if 2vHPV or 4vHPV are completed in the same 2-dose series schedule at 0 or 6-month intervals, when the vaccination series was initiated before the 15th birthday (CDC, 2016). Only the 9vHPV is distributed in the United States since late 2016 (Meites et al., 2016).

HPV vaccine is one of the clinical preventive services covered under the ACA for adolescents. ACA states that there is no cost-sharing for preventive services, such as childhood immunizations, from birth to age 18 years, which included the HPV vaccine (Eno et al., 2016). This law established a mandatory fund for CHCs and SBHCs to provide health care services to the uninsured and underserved populations with the aim of expanding access to preventive services (Curtis et al., 2014; Forsberg et al., 2014). Medicaid expansion was included in the law, although it was made optional by the ruling of the Supreme Court (Curtis et al., 2014; Eno et al., 2016; Forsberg et al., 2014). Despite these provisions, the use of the HPV vaccine among adolescent females remains suboptimal in the United States.

Although ACA mandated no cost-sharing in both the private and government medical insurance plans for all childhood immunizations, including the HPV vaccine, the use of the HPV vaccine lagged behind the 2020 Healthy People goal of 80% herd immunity among adolescent females in Georgia. Underwood et al. (2015) identified that adolescents in high school with private insurance were at more likely to complete three doses of the HPV vaccine compared to others who had Medicaid coverage. Also, Jemel et al. (2013) noted that HPV vaccine coverage was significantly lower among the uninsured

in some Southern states, and Georgia was one of the states. Having private insurance (Underwood et al., 2015) and being uninsured (Jemel et al., 2013) were noted to be barriers to vaccination. Cost or out-of-pocket expenses involved in private insurance and the uninsured was observed to be a barrier to receiving the HPV vaccine. However, scholars have not explored if there is an association between insurance coverage under ACA with no cost-sharing and HPV vaccine use.

The purpose of this study was to explore if the ACA had an impact on the use of HPV vaccine among adolescent females, ages 13 to 17, in Georgia. This exploration involved measuring the trend between ACA insurance coverage to the HPV vaccination rate from 2011 to 2015. I wished to identify the degree of the relationship between ACA insurance coverage and HPV vaccination. Three factors that influence the use of health services (predisposing, enabling, and need factors), postulated by Andersen's BM, were used because HPV vaccine is one of the clinical preventive services. I measured the to determine the association and magnitude of the problem in Georgia. Determining the level of relationship between ACA and use of HPV vaccine is the key to developing strategies to enhance vaccine usage.

In this chapter, I reintroduce the problem statement and the purpose of the study. I also provide a synopsis of current literature on the significance of the problem. Other sections of Chapter 2 include the literature search strategy, the conceptual model of the study, and the literature related to key variables and or concepts. The variables are Georgia, ACA, HPV, risk factors, infections and cancers linked to HPV, HPV vaccine,

race, provider visits, predisposing, enabling, and need factors. Finally, this chapter will end with a summary and conclusion, including the transition to Chapter 3.

For this research, I searched for articles at the Walden University Library and expanded to EBSCO (Elton B Stephens Company), PubMed, Medline, and ProQuest for databases relating to studies on HPC. Databases searched included Academic Search Complete, Cochrane Database of Systematic Reviews (CDSR), Dissertations and Abstracts, and PsycINFO. I also searched publishers' databases, such as Elsevier and Springer. Additional searches were conducted through Google Scholar and the World Wide Web on relevant peer-reviewed articles. During the search, I used the following keywords: *HPV, HPV vaccination, HPV-related cancers and infections, burden related to HPV infections and cancers*, *economic burden of HPV, ACA, preventive services under ACA, use of HPV vaccine, Georgia and HPV vaccine,* and *the theoretical model relating to the use of health services (Andersen's BM)*. During the search, the focus was on current articles from 2012 to 2016.

I also conducted a search on governmental, organizational websites, and Britannica to obtain relevant data needed for the review. A search was made to determine the appropriate conceptual model applicable to this study. I decided to use the theoretical model relevant to health care use, which will be discussed in this chapter and the research design.

Theoretical Framework

Health care use is the use of health care services by individuals for preventing diseases, curing diseases, health promotion, and health maintenance (Andersen, 1968). It

also depicts the contact between a person's need for the health systems that help in assessing how the health care delivery system is being used and by whom. Health care use is dependent on supply based on the structure of the health system and need factors (Babitsch et al., 2012). Andersen's BM was the theoretical framework in this study. Andersen initially postulated this behavioral model in 1968, where a three-stage model consisting of predisposing, enabling, and need components were used to expound on the divergent use of medical care services by families. Andersen (1968) developed this framework to determine situations or factors that aid or hinder an individual's use of health services. According to the BM, use occurs where a person is predisposed to receive health services, enabling conditions that make it available for use and where there is perceived need to use and respond (Andersen, 1968). Each component of the model has subcomponents that consist of variables that are empirically measured and analyzed (Andersen, 1968). The interrelationship between the components and the use of health services were examined with the purpose of comparing and summating use of service (Andersen, 1968**).**

Andersen's BM has been applied in various studies pertaining to health care use (Babitsch et al., 2012). The BM evolved as a multilevel model that incorporated both individual and contextual determinants of use of health services (Babitsch et al., 2012). The BM consists of three factors: predisposing, enabling, and need factors (Andersen, 1968).

The predisposing factor is used to explain the inclination to use health services by individuals (Aday & Anderson, 1974). Predisposing factor include demographics (age,

sex, race, and religion), social factors (education, occupation, ethnicity, and family status), and health beliefs or values pertaining to health (Aday & Anderson, 1974; Andersen, 1995; Babitsch et al., 2012). The components of this factor exist before the onset of illness (Aday & Anderson, 1974).

According to Anderson (as cited in Hulka & Wheat, 1985), demographic factors, such as age and sex, are biologic-based factors that relate to the need for health services. Also, race or ethnicity determine health concerning disparities and can impact health care use (Institute of Medicine, 2006). The social factors that are defined by the occasional social structure are measured with education, occupation, family status, and ethnicity (Anderson, 1995). These characteristics influence the physical environment and the capability to cope with presenting problems and resources to take care of the problems (Anderson, 1995). Health beliefs include values, attitudes, and knowledge towards health and health services that can impact the perceived need for health services (Anderson, 1995). Anderson (1995) explained how social structure could affect both the enabling resources and perceived need, resulting in the use of health services.

Enabling factors involve these components: resources-personal/family and community (Andersen, 1995). The enabling factors are comprised of conditions that facilitate the use of health services, such as income, access to health insurance coverage, available regular source of care, transportation, provider, wait time, the location of the health facility, and health policies (Babitsch et al., 2012). Anderson (1995) noted that both personal and community resources must exist for use to occur. Penchansky and Thomas (1981) pointed out that income, having health insurance, and having a source of

care can enhance or hinder the use of medical services. Access could be measured by availability, accessibility, and affordability (Penchansky &Thomas, 1981).

The need factors are the individual perceived need, based on view and experience on general health, functional state, and illness that prompt the use of medical services (Babitsch et al., 2012). The perception of health may vary for individuals, and Andersen's BM offers a means for summing up these variations in the consumption or use of health care services (Jahangir, Irazola, & Rubinstein, 2012). Anderson (1995) explained that perceived need is not primarily a gauge of disease, but a social phenomenon that, if adequately modeled, can be expounded by health beliefs and social structure. Health education programs could influence the perceived need for health care and the change in financial incentives to seek care (Anderson, 1995).

This conceptual model evolved over the years and expanded to differentiate measures of possible access and realized access (Derose, Gresenz, & Ringel, 2011). The BM developed to incorporate environmental factors, health behavior, and health outcomes including equity, efficiency, effectiveness, and health and wellbeing (Derose et al., 2011). Also added was the significance of variables at the community level and factors particular to vulnerable groups or populations (Derose et al., 2011). The concept advanced beyond the personal level to health policy changes, environmental (rural or local) variables, provider supply, and the characteristics of health care system (Derose et al., 2011). Although there is a progression of the BM, most of its application is on the factors at the individual level that influence behavior in seeking care (Derose et al., 2011).

The BM was applied in various studies involving use of health services in health systems and health, especially in the United States and in the United Kingdom (Babitsch et al., 2012). The BM is flexible; the variables can be tested and applied to differing settings (Azfredrick, 2016). In the BM, researchers can choose independent variables depicted in the hypothesis (Azfredrick, 2016).

In the critique of Andersen's model, Goldsmith (as cited in Lo & Fulda, 2008) identified that the model did not define access in the original model posited in 1968. Anderson (1995) acknowledged the critique and defined access in multidimensional terms using potential access as the existence of enabling resources that enhance the use. Realized access is the use of services. Equitable access is dependent on demographic characteristics and needs factors (Lo & Fulda, 2008), while inequitable access results when the social structure, health belief, and enabling resources demarcate medical usage (Andersen, 1995). In using the BM in fostering equitable access, a variable must point to changes in policy that could cause a change in behavior (Andersen, 1995). In this study, I focused on policy change (ACA) to ascertain if the change in policy could have influenced the use of HPV vaccine.

Scholars who used the BM denoted the complexity of the model and did not convey the complexity in the production and presentation of the results (Babitsch et al., 2012). The operationalization of the model portrayed the use of a small set of variables and significant differences in the categorizations about both predisposing and enabling factors (Babitsch et al., 2012). Scholars who used Andersen's BM denoted that the set of

variables used are small and that there were differences in the categorizing of variables, common among predisposing and enabling factors (Babitsch et al., 2012).

Previously, Andersen's BM was applied and adapted to studies involving access and use of clinical preventive services across the lifespan from adolescence to the older population. Jahangir et al. (2012) explored the association between the three factors (need, predisposing, and enabling) and the use of preventive services in Argentina. This investigation involved logistic regression analysis of secondary data from the National Survey of Risk Factors between 2005 and 2009 among a cohort of 41,392 and 34,732 individuals for both years respectively (Jahangir et al., 2012). Jahangir et al. noted that although the predisposing and need factors are linked with use, enabling factors (ie., insurance coverage or access) require public intervention. Jahangir et al. identified the most significant factor (enabling), such as insurance coverage and income, to address through policies to enhance the use of preventive services in Argentina. Aday and Andersen (1974) suggested that in discussing access, certain groups of people have more or less access based on characteristics like age, sex, or race (predisposing factor) or community features, such as urban versus rural (enabling factor). Health policy strives to alter these characteristics (i.e., income or health insurance coverage) to improve access for this group (Aday & Andersen, 1974). Based on the framework of Andersen's BM, I demonstrated that need; enabling; and predisposing factors, including behavioral factors, are significantly associated with access and the use of preventive health services.

The BM can be applied in studies relating to health care use among adolescents. Studies on the use of reproductive health service (Azfredrick, 2016) and use of care for

behavioral and emotional problems (Reijneveld et al., 2014) among adolescents used Andersen's BM. The BM can be used to explore the use of health services for this population by applying the predisposing, enabling, and need factors. Also, the BM reflected the flexibility of using different variables (components) within the factors that are pertinent to each study.

Azfredrick (2016) applied Andersen's BM and examined how predisposing, enabling, and need factors influence the use of reproductive health services among adolescent females in Nigeria. In this study, the predisposing factor was age (average 14.77), enabling factors were parental support and communication and type of reproductive health facility, and the need factors were feelings of inadequacy and positive attitude about self (Azfredrick, 2016). The sampled population was comprised of 3,065 adolescent females (Azfredrick, 2016). Azfredrick showed that parental communication, the enabling factor, significantly influenced the use of reproductive health service among this group.

Reijneveld et al. (2014) used longitudinal data obtained from 2,230 adolescents between the ages of 10–19 years to assess the use of care by adolescents among behavioral and emotional problems, by type, and its determinants. In this study, the predisposing, enabling, and need factors based on Andersen's BM were applied (Reijneveld et al., 2014). Reijneveld et al. revealed that the use of services increased with age (predisposing factor), which was identified as the most influencing factor.

Andersen's BM was used to determine which of the three factors (predisposing, enabling, or need) influenced the use of health care services. Weller, Minkovitz, and

Anderson (2003) conducted a cross-sectional study among children with special health care needs (CSHCN) to ascertain how sociodemographic factors and type of insurance influenced the use of medical and health-related services. Weller et al. showed that the enabling factor (insurance) was mostly associated with the use of health services. Also, Weller et al. indicated that children with public insurance were less likely than those privately insured to use medical and health-related services.

Lo and Fulda (2008) researched the factors that affected preventive medical services among children ages 3–17 years of age in the United States using Andersen's BM. Lo and Fulda conducted a cross-sectional study involving children between the ages of 3–17 years. Lo and Fulda used data obtained from the National Survey of Children's Health. Lo and Fulda showed that household education (predisposing factor) and poverty level (enabling factor) significantly influenced the use of preventive care by older children. Lo and Fulda observed that household education (predisposing factor) and poverty level (enabling factor) influenced use of health care for people residing in the Northeast, Midwest, and South regions of the United States.

Various factors influence the use of health care services among adolescents (Massey, Prelip, Calimlim, Quiter, & Glik, 2012). Coker et al. (as cited in Massey et al., 2012) indicated that patient-provider relationship, access to services based on geographic location, and how adolescents perceive confidentiality play a role in how efficiently adolescents use preventive health care services. Use of preventive care services lagged among teens, even with the availability of preventive care services and insurance coverage (Massey et al., 2012). Massey et al. (2012) reported that scholars who studied

adolescents' use of preventive services focused mostly on ascertaining barriers in accessing health services rather than the abilities and competencies necessary to navigate and use the system. Massey et al. explored the knowledge, attitudes, and practices related to preventive and curative health care experiences and use among low-income adolescents who had public insurance in California. Massey et al. wished to understand health literacy among this group. Andersen's BM was used to explore adolescent interactions with the health care system and health providers (Massey et al., 2012). Massey et al. showed that perceived need for well-care visits influenced the use of health care services. However, most of the teens did not consider the need to visit a provider, except when they were sick or needed a sports physical (Massey et al., 2012). Massey et al. suggested that additional skills and competencies are necessary for this population to use their insurance coverage and to navigate the health care system successfully. Although these adolescents had insurance coverage, underlying factor like perceived need and health literacy competencies influenced use, despite having access (Massey et al., 2012).

ACA provides access to clinical preventive services, such as the HPV vaccine, by instituting no cost-sharing or copay for the vaccine (Eno et al., 2016; KFF, 2016). The access and infrastructure of the ACA aligned with Aday and Andersen's (1974) definition of access, which is both the availability of financial and health system resources within an area when needed. In the BM, external validation is necessary to ascertain if predisposing, enabling and need factors impact getting health care service (Aday & Andersen, 1974). When using the BM in fostering equitable access, a variable must point

to changes in policy that could influence change in behavior (Andersen, 1995). Aday and Andersen noted that the change in behavior resulting from a new policy could be determined by examining the rates of health care usage of particular subgroups about these factors (predisposing, enabling, and need) within a duration of time.

The constructs of Andersen's BM that were applied in this study were the predisposing factor (race/ethnicity), enabling factors (health insurance coverage [ACA] and rate of provider visits), and perceived need (HPV vaccine). Perceived need for vaccination resulted in visiting the provider. The variables that applied to this study were race/ethnicity (predisposing factors), insurance coverage (ACA), provider visit (enabling factors), and HPV vaccine (perceived need). In this study, the variables were health insurance (ACA; independent variable), HPV vaccination rate (dependent variable), race/ethnicity (moderator variable), and the provider visit (mediating variable). These variables are presented below after the discussion of Georgia landscape. In addition, age and sex (female) variables are included in the discussion.

Georgia Landscape

Georgia is one of the 50 states found in the Southern part of United States, with a population greater than 10 million people (KFF, 2017). Georgia is the ninth most populous state in the United States and the third most populous state in the Southern United States (KFF, 2014). Georgia is the 30th largest state, consisting of 159 counties, of which 37 of them are rural counties (KFF, 2014). About 87% of the state population reside in the metropolitan areas, and 26% of the state population lives in three of its most populous counties: Fulton, Gwinnett, and Cobb (KFF, 2014).

Population Distribution

Georgia is ethnically and racially diverse, consisting of 52% European Americans, 31% African Americans, 10 % Hispanic Americans, and 5% Asian Americans (KFF, 2017). The population of children aged 0–18 years was as follows: European American 42%, African American 33%, Hispanic American 17 %, Asian American, and other 10 % (KFF, 2017). The rate of Georgians living in poverty is slightly above the national average, with 22% versus 20% nationally; wide disparities rates exist by race/ethnicity and age (KFF, 2014). African Americans and Hispanic Americans are more likely to be in poverty than European Americans (KFF, 2014). Also, 30% of Georgian children under the age of 19 years were living in poverty in 2012 (KFF, 2014).

Health Insurance Coverage in Georgia

Before ACA, most of the Georgian population was covered by private health insurance, but by 2012, about 58% were insured under an employer plan or in the individual private market (KFF, 2014). Medicaid and the Children's' Health Insurance Program (CHIP) help to fill the gap in coverage, mostly for children not covered by private health insurance (KFF, 2014). About 40% of children in Georgia were enrolled in Medicaid or CHIP, known as Peach Care for Kids, in 2012 (KFF, 2014). However, before 2014, almost 182,000 children in Georgia who were uninsured were eligible for Medicaid or CHIP but did not enroll (KFF, 2014).

Georgia Health Care Delivery System

The health care delivery system and safety net providers in Georgia provide access to primary, preventive, and acute care services for the low-income and underserved population (KFF, 2014). There are 29 federally qualified health centers with 161 clinic sites in the state (KFF, 2014). In spite of the existing safety net, there are health professional shortage areas (HPSAs) and unmet need for care (KFF, 2014). As of 2014, Georgia had 193 primary care HPSAs with 59% of the primary health care need met (KFF, 2014). ACA extended coverage to the uninsured, but Georgia was one of the states that refused to expand Medicaid. The safety net providers are a source of health care services to those newly insured or those without options for affordable health coverage (KFF, 2014). The effect of the ACA on health care access and health care use in Georgia is yet to be determined (KFF, 2014).

HPV Vaccination Rate in Georgia

Among adolescent females in Georgia, the HPV vaccination rate remained below the Healthy People 2020 goal of 80%. The ACIP recommended the HPV vaccination of teen girls starting at ages 11 or 12 (Stokely et al., 2013). As of 2009, before the enactment of ACA, the vaccination rate for adolescents ages 13–17 who had received ≥1 HPV dose series in Georgia was 38.6% (Dorell, Stokley, Yankey, Cohn, & Markowitz, 2010). After the enactment of the ACA in 2010, as of 2013 and 2014, the ≥1 HPV dose series coverage among teen females aged 13 to 17 years was 53.1% and 65.4% respectively (CDC, 2015). For both reported years, the HPV ≥3 doses completion among this group was 32.6% and 47.1% (CDC, 2015). For adolescent females in Georgia, in

2015, the uptake was 54.4% for ≥1 HPV dose series but was 38.7% for the second dose and 32.3% for the third dose (Department of Public Health, 2016). There was an increased rate in the initiation of first dose series from 2009 to 2014 and a marked decrease in rate of >10 % between 2014 and 2015 (Department of Public Health, 2016). For the third dose series completion among adolescent females, there was an increased rate of >14% between 2013 and 2014 (Department of Public Health, 2016). The third dose completion rate for 2015 fell below both 2014 and 2013 rates (Department of Public Health, 2016). A decreased rate of >14% was noted between 2014 and 2015 for HPV ≥3 doses series completion (Department of Public Health, 2016). There arose a need to protect adolescent females from HPV-related diseases and cancers by optimizing the HPV vaccine uptake. Scholars have not determined if the ACA impacted the use of the HPV vaccine when the cost of the vaccine was noted as a barrier in vaccine use.

Affordable Care Act

The ACA was implemented in 2010 and was an important health care statute in the United States after the passage of Medicaid and Medicare in 1965 (Obama, 2016). The ACA aimed at making health care more accessible and affordable, while improving quality of care (Obama, 2016). The ACA was credited for reducing the uninsured rate from 16.0% in 2010 to 9.1% in 2015, down by 43% (Obama, 2016).

The ACA enhanced the use of clinical preventive services, such as the HPV vaccine among adolescents. The ACA grandfathered private health plans to provide coverage with no cost-sharing (Curtis et al., 2014; KFF, 2011). The lack of out-of-pocket expenses were meant for four types of clinical preventive services graded as A (strong

recommended) or B (recommended by the United States Preventive Services Task Force; Curtis et al., 2014; Forsberg et al., 2014; KFF, 2011). Vaccinations recommended by the ACIP, such as the HPV vaccine, were included in this category (Curtis et al., 2014). The Health Insurance Marketplace was established to provide access to private health insurance for small businesses that had fewer than 50 employees and families, including individuals to explore options for coverage as of January 2014 (Curtis et al., 2014; Forsberg et al., 2014).

More than 29 million children ages 0 to 18 years had health insurance coverage through Medicaid and CHIP (Forsberg et al., 2014). These were children with family income up to 100% of FPL, and eligibility was expanded through Medicaid or CHIP (Forsberg et al., 2014). Georgia was one of the states that maintained the Medicaid threshold for children ages 0 to 5 and 6 to 18 years (Forsberg et al., 2014). However, children ages 0 to 18 years with family income up to 235% of FPL could enroll in a separate CHIP program (Forsberg et al., 2014). These provisions created the potential to enhance access and the use of preventive services among adolescents (Forsberg et al., 2014).

No cost-sharing, as stipulated in the ACA, aligned with the CDC's Community Guide to Preventive Services recommendations of reducing client out-of-pocket expenses through insurance coverage (Curtis et al., 2014). Other suggestions included providers participating in the Vaccine for Children Program (VFC) and supplying vaccines to providers through VFC at no cost to provide access to adolescents who might have lacked

access (Curtis et al., 2014). These recommendations aimed at increasing the use of the HPV vaccine and other preventive services (Curtis et al., 2014).

Further, the ACA provided funding for CHCs, SBHCs, and local health departments as a means of increasing and sustaining the infrastructure that offers safety net preventive and health care services (Curtis et al., 2014; Forsberg et al., 2014). The ACA aided in increasing access to vaccinations for underinsured children eligible for VFC vaccines in the CHCs (Curtis et al., 2014; Forsberg et al., 2014). In 2011, about $95 million in federal grants was provided through the ACA to establish 278 SBHCs (Curtis et al., 2014). The increase benefited the low-income and uninsured adolescents with no medical homes (Curtis et al., 2014). In Georgia, the funding was used to establish community-based prevention, clinical prevention, infrastructure, and workforce, including research and data collection (Georgia Health Policy Center, 2012). Also in Georgia, the funding was used in establishing SBHCs in three counties based on the need assessment: Ware, Berrien, and DeKalb counties (Georgia Health Policy Center, 2012). All of these infrastructures improved access and quality of preventive services for adolescents (Curtis et al., 2014).

The implementation of the ACA aimed at increasing access to insurance and preventive services coverage (Dixon & Hertelendy, 2014). The use of preventive services, such as the HPV vaccine, remained less optimal despite the new benefits, improvement in quality measurement, and recommendations (Forsberg et al., 2014). This study was needed to explore if the ACA had an impact on the use of the HPV vaccine

among adolescent females in Georgia. In this study, I evaluated the trend of the HPV vaccination rate from 2011 to 2015 to ascertain if the ACA impacted the vaccine usage.

Immunization of children that aids in the eradication of diseases is a public health achievement. Vaccination against life-threatening diseases in children was noted to be cost-effective in the 20th century for medical intervention (Shen et al., 2014). Before the ACA, the barrier to immunization was financial, which involved out-of-pocket costs; about 7% of individuals with private insurance encountered cost-sharing (Shen et al., 2014). The ACA mandated first-dollar coverage or no cost-sharing for childhood immunizations (birth till 18 years) recommended by the ACIP (Shen et al., 2014). Eliminating out-of-pocket expenses for vaccines helped to remove the financial barrier that deterred access to vaccination (Curtis et al., 2014; Dixon & Hertelendy, 2014; Shen et al., 2014).

Shen et al. (2014) ascertained the role of cost-sharing on vaccine coverage for selected routine immunizations recommended for children and adolescents by modeling the effects of removing cost-sharing. For the study, Shen et al. employed two data sources: the NIS for children aged 19–35 months and the NIS-Teen for adolescents aged 13–17 years for 2008. The insurance types included in the data were comprised of private insurance, Medicaid, TRICARE, CHAMPUS, and CHAMP-VA; Indian Health Services; Medicare; Medigap; and single-service plans and uninsured (Shen et al., 2014). The behavioral effect of first-dollar coverage was estimated by using the Truven Health Analytics 2006 MarketScan commercial claims and encounters from January 1 to December 31, 2006, that were comprised of 16.1 million plan members (Shen et al.,

2014). Shen et al. also used the KFF Employer Health Benefits survey results to ascertain the percentage of privately insured children and adolescents who had first-dollar coverage or faced cost-sharing for all vaccines. The Market Scan database was used to identify the average cost of dose and administration for beneficiaries who received immunization. Shen et al. revealed that 36.9% of adolescent girls with private insurance received at least a dose of HPV vaccine. However, the subpopulation of teenage females who faced cost-sharing had a lower HPV vaccination rate of 28.9% for at least one dose of the HPV vaccine (Shen et al., 2014). Shen et al. found a significant drop rate of 8%. Also, Shen et al. showed that removing cost-sharing for HPV vaccination was projected to cost $5.5 million to insurers with the addition of 400,000 HPV vaccinations. However, Shen et al. reported that this study was done at a point in time and could not be extrapolated beyond this time. Data used were from separate years 2006 and 2008 (Shen et al., 2014). Also, Shen et al. indicated that the HPV vaccine was licensed and approved in 2006, and the initial uptake effect of a new vaccine could be the cause of the low uptake.

Tebb et al. (2015) examined how the health care needs of teens were considered during the implementation phases of the ACA and the potential threats to adolescent confidentiality. Tebb et al. revealed that the ACA expanded health insurance access, but inequities in coverage and access remained. Tebb et al. reported that about 10% of children and adolescents were uninsured before the enactment of the ACA. However, in 2012 after the initial implementation of the ACA, the rate of uninsured children and adolescents dropped to 5.5 % (Tebb et al., 2015). The increase in access was credited to

the elimination of the preexisting condition that impacted a proportion of adolescents with special health needs and Medicaid expansion (Tebb et al., 2015).

Although an increase in access was noted among children and adolescents, Tebb et al. (2015) reported that most adolescents lacked access in states that opted out of Medicaid expansion. The mandate for the expansion of Medicaid was made optional based on the Supreme Court decision (Eno et al., 2016). Challenges to access for this group could be from fluctuations in income among low-income families that can result in the loss of coverage or change of insurance provider network (Tebb et al., 2015). The disruption in the continuity of coverage could have affected the adolescents and caused underuse of preventive services (Tebb et al., 2015).

Scholars previously examined parental attitudes and provider recommendations regarding HPV vaccine use in Georgia. Gargano et al. (2013) claimed that both of them impacted the uptake of the vaccine. Also, Underwood et al. (2015) investigated the receipt of HPV vaccine Series 1 and 3 on both female and male adolescents, parental attitudes, and correlation of vaccine initiation and completion. Underwood et al. showed that adolescents in high school with private insurance were more likely to complete three doses of the HPV vaccine compared to those with Medicaid coverage. Scholars have not examined if the ACA had an impact on HPV vaccine use in Georgia.

The NIS-Teen monitoring of immunization coverage among teenagers, ages 13–17 years in the 50 states, including the District of Columbia, showed variation in coverage (Reagan-Steiner et al., 2016). The HPV vaccination coverage among adolescent females for ≥1, ≥2, or ≥3 doses increased in seven states, and the range for ≥1 HPV

vaccine dose was 9.4%–21% (Reagan-Steiner et al., 2016). A decrease in ≥3-dose HPV vaccination coverage among females was noted in Georgia when compared to 2014 (Reagan-Steiner et al., 2016). According to Reagan-Steiner et al. (2016), in 2015, the HPV vaccination rate for adolescent females in Georgia aged 13–17 years was 54.4% (HPV-1 dose), 38.7% (HPV-2 doses), and 32.3 % (HPV-3 doses).The Healthy People 2020 goal for this population in Georgia and the United States is to attain 80% coverage.

In the United States, about 24,600 newly diagnosed cancers are associated with two high-risk HPV types, which the currently licensed HPV vaccines target, including 3,800 related to five high-risk HPV types included in the 9-valent HPV vaccine (Reagan-Steiner et al., 2016). One of the goals of the ACA is to increase access to preventive services, which included the HPV vaccine. Yet, the use of HPV vaccine remained low in Georgia. In this study, I focused on ascertaining if the ACA impacted the use of the HPV vaccine among adolescent females in Georgia. The findings from this study can be used to identify strategies that can improve the use of the HPV vaccine, proven to be effective in preventing HPV-related diseases and cancers.

Age and Sex (Female)

Age is a particular stage in a person's life (Oxford University Press, 2017). Adolescence is a stage in life between the ages of 10 to 19 years that involves biological changes and the need to negotiate new developmental tasks (Healthy People, 2014). In the state of adolescence, health behaviors are formed that can have an immediate and long-term effect in adulthood (Tebb et al., 2015).

High-risk sexual behaviors are common among some adolescents, which result in STIs (CDC, 2015). Youths aged 15–24 years account for half of 20 million newly transmitted STDs in the United States (CDC,2015). Among adolescent females, one in four sexually active teens has a STD caused by HPV (CDC, 2015). The risk of exposure increases when people have multiple sex partners (CDC, 2015).

The adolescents make up 13.2 % of the U.S. population, which was about 42 million in 2014 (CDC, 2016). It is projected that this population will increase to 45 million by 2050 (CDC, 2016). There is a concern that predisposition to HPV-related infections and cancers will increase with the projected population due to high-risk sexual behaviors among adolescent females (CDC, 2016).

The HPV virus is the cause of cervical cancer, which is the third most prevalent cancer in the United States with an incidence of 1,200 new cases and 4,000 deaths annually (Jeudin, Liveright, Carmen, & Perkins, 2013). Immunization of adolescents before they become sexually active is the most effective way of preventing HPV-related infections. There was a need to improve the HPV vaccination rate with a focus on adolescent females to prevent an increase in cervical cancer in adulthood (Jeudin et al., 2013). The ACIP recommended that adolescents receive three doses of the HPV vaccine at ages 11 through 12 years as a means to prevent cervical cancer (Curtis et al., 2013).

Adolescents and young adults are at risk of having multiple sex partners who are older, and they are also more likely to engage in unsafe sex practices (Nguyen et al., 2016). Ford et al. (cited in Nguyen et al., 2016) studied adolescents ages 13 to 17 years in in the United States and examined sexual mixing, bridging, and concurrency with

condom use. Ford et al. (cited in Nguyen et al., 2016) showed that more than 56% of the 18,984 students sampled had more than two partners, and 69% had partners in varied age groups Ford et al. (cited in Nguyen et al., 2016) revealed that condom use was lower among those with multiple partners and partners in various age groups.

Satterwhite et al. (2013) conducted a study on eight of the most prevalent STIs in the United States: chlamydia, gonorrhea, syphilis, herpes, human papillomavirus, Hepatitis B, HIV, and trichomoniasis. Satterwhite et al. showed that STIs were common in the United States, with a disproportionate burden among young adolescents and adults. Also, Satterwhite et al. revealed there were about 110 million prevalent STIs among women and men in the United States in 2008, and 20% of the infections (22.1 million) were among females and males aged 15 to 24 years. Among the 19.7 million incident infections in the United States in 2008, about 50% (9.8 million) were acquired by adolescent females and males, including youths aged 15 to 24 years (Satterwhite et al., 2013). Adolescent girls are predisposed to HPV-related STDs due to high-risk sexual behaviors.

Although one in four sexually active adolescent females has an STD caused by HPV (CDC, 2015), the rate of the HPV vaccine use remains low. Jemel et al. (2013) reported an increased incidence of two HPV-associated cancers (oropharynx and anus). In addition, Jemel et al. identified that the HPV vaccination rate was lower among the uninsured in the Southern states of United States where the highest cervical cancer rates were observed. In Georgia, the cervical cancer rate high, and the HPV vaccine coverage

rate is low. Dunne et al. (2014) noted that the challenges in preventing infections and cancers linked to the HPV virus depend on expanding coverage for HPV vaccination.

Insurance coverage is essential in enhancing and influencing how teenagers use health services (KFF, 2011). Before the enactment of the ACA, 88% of teens aged 10 to 18 years of age were covered by private and public insurance (KFF, 2011). About 60% of adolescents were covered by private insurance plans that varied in services offered, such as preventive services (KFF, 2011). About 9.8% of adolescents aged 12-17 lacked health insurance, and 4.7% had no usual source of health care (Pilkey et al., 2013).

For teens from low-income families, Medicaid and CHIP are the public insurance that provide coverage (KFF, 2011). Adolescents with public insurance can receive services from physicians who accept the insurance (KFF, 2011). Pre-ACA, the median eligibility levels for children was 235% FPL (Rudowitz, Artiga, & Arguello, 2014). The preventive coverage under Medicaid was vast due to the Early Periodic Screening Diagnosis and Treatment (EPSDT) program (KFF,2011). EPSDT serves children until age 21 years of age, and it consists of comprehensive coverage (KFF, 2011; Rudowitz et al., 2014). Due to the low reimbursement rate of the program, access could be hindered because of a shortage of providers who accept Medicaid (KFF, 2011).

Many adolescents are from low-income families, and more than 40% of them are either poor or near-poor (KFF, 2011). Low-income youth are more likely to lack financial resources (KFF, 2011). Financial concerns or cost (if the vaccine was not covered or the patient was uninsured) were identified as barriers to receiving the HPV vaccine (Emberger, 2015; Holman et al., 2014).

Under the ACA, about 4.2 million adolescents ages 10-19 who were uninsured qualified for health care coverage from January 1, 2014 (Pilkey et al., 2013). The state determined that 13.3% of the uninsured adolescents aged 10–19 years in Georgia will gain insurance coverage under the ACA (Pilkey et al., 2013). Pilkey et al. (2013) reported that insurance coverage was possible because all the states were required to provide Medicaid coverage for children until 19 years of age who have a family income below 133% of the FPL. Adolescents in families with incomes more than the limits of Medicaid and CHIP who could not afford employer-sponsored insurance qualified for premium tax credits (Rudowitz et al., 2014). Close to half a million uninsured children were eligible for the new subsidies (Rudowitz et al., 2014). Children in families with income above 400% FPL could obtain access to unsubsidized coverage in the marketplaces (Rudowitz et al., 2014).

The cost of the entire three series of HPV vaccine was $390 (KFF, 2015). Private insurance could finance the vaccine, and most of the teens in the target group had private insurance coverage (KFF, 2015). The HPV vaccine was covered by public financing through the VFC program (KFF, 2015). Through a federal program called Immunization Grant Program, the CDC awarded grants to states, local, and territorial public health agencies to aid with vaccine costs (as cited in KFF, 2015). These funds could help extend coverage to adolescents who do not qualify for the VFC program (KFF, 2015).

Although funding and access are available to teens, by 2011, about 47% of females aged 13–17 years did not receive the first recommended dose of the HPV vaccine (Frieden, 2014). In addition, 65% of teen girls did not complete the series or receive the

≥3 doses required (Frieden, 2014). Improvement in delivery and the use of the HPV vaccine have the potential of producing long-term benefits to help adolescents become healthy, productive adults (Frieden, 2014). The ACA offered opportunities to improve the use of clinical preventive services among adolescents through some of the provisions (Yeung et al., 2014).

The KFF (2016) review on the HPV vaccine access and use in the United States reported that an uptake and awareness of the HPV vaccine have slowly improved. The KFF (2015) showed that 39.7% girls aged 13-17 years received all of the three-dose series in 2014, which was up from 37.6% in 2013. Also, 60% of adolescents received a dose of the HPV vaccine in 2014 (KFF, 2015). In addition, the HPV vaccination rates increased in five states, and Georgia was one of the states, between 2013 and 2014 (KFF, 2015). However, the primary concern is the reduction in the completion of the series, despite a higher initiation rate.

Although the HPV vaccine was covered by the ACA to enhance access, cost was noted to be a barrier that hinders vaccination uptake (Bailey et al., 2016). Under the ACA, health plans are required to cover recommended preventive services without copayment or charging deductible (Bailey et al., 2016). The costs that hindered vaccination uptake involved the expenses incurred by providers, such as upfront costs to buy the vaccine, staff, and time needed in administering the vaccine (Bailey et al., 2016). In addition to the expenditures was insufficient reimbursement by insurance, making it difficult for adolescents to obtain the HPV vaccine in the office of the primary care

provider (Bailey et al., 2016). Bailey et al. (2016) reported that providers are displeased with insurance reimbursement, irrespective of insurance type.

The National Vaccine Advisory Committee (NVAC, 2016) reported that, although most of the physician professional organizations preferred for all vaccinations to be given in the medical homes, new strategies are required to improve the use of the HPV vaccine. The American Academy of Family Physicians allowed for subsequent doses of the HPV vaccine to be given in the medical homes if those sites were required to report all doses given to the state registry for vaccine (NVAC, 2016). The primary care physicians chose the pharmacies as the alternative site where the second and third doses could be given to improve the vaccination rate (NVAC, 2016). The NVAC accepted this recommendation and the efforts to administer the vaccine through school-located programs to increase access and vaccination coverage rates. The school site is ideal, as most adolescents are within school age, middle school to high school (NVAC, 2016). In spite of the recommendations, there were barriers to vaccination at the pharmacies, schools, and public health clinics resulting from reimbursement and compensation for the vaccines administered (NVAC, 2016). The NVAC claimed that the alternative settings mentioned often did not qualify as in-network providers and were not eligible for reimbursement for the vaccines administered. Alternative vaccination sites could be used as in-network status for payment to make these programs viable (NVAC, 2016). Although the schools are in-network, another challenge was billing various insurance plans, both public and private, as the students possibly have different insurers (NVAC, 2016). The billing problem should be addressed, including compensating of staff due to

the adding of immunization services to school programs to achieve success (NVAC, 2016).

Moss et al. (2014) assessed the barriers to HPV vaccine provision at school by interviewing staff from 33 school health centers in North Carolina. Moss et al. identified out-of-pocket costs for children for privately purchased vaccines, costs to clinics of ordering and stocking privately purchased HPV vaccine, and difficulty in using the state immunization registry as barriers. Also, Moss et al. reported that many of the schools considered partnering with outside organizations on low-cost interventions to improve the HPV vaccine coverage for adolescents within their schools. Moss et al. revealed that opportunities to enhance the use of the HPV vaccine through school programs is feasible, but the barriers of relating to reimbursement and compensation must be addressed.

Provider Visits and HPV Vaccine Vaccination Rate

Provider visit is a health encounter that can occur in acute settings or well visits, and these are opportunities for vaccination (Stokley et al., 2013). Stokley et al. (2013) argued that every health care visit is an opportunity to assess the immunization status of adolescents and to make recommendation for vaccine. After the approval of the HPV vaccine in 2006, the proportion of females unvaccinated from 2007 to 2012 rose from 20.8% to 84.0% respectively (Stokley et al., 2013). Missed opportunities were noted for HPV vaccination, which, if eliminated, could have increased coverage with ≥1 dose to 92.6 % (Stokley et al., .2013). According to Stokley et al., a missed opportunity was a clinical encounter with the provider that occurred on or after a girl's 11th birthday, when at least one dose of a vaccine was received, except the HPV vaccine. In the United States,

the high rate of HPV vaccination was not achieved yet because of the missed clinical opportunities (National Cancer Institute, n.d.).

The 2012–2013 annual report by the President's cancer panel identified failure to vaccinate at every clinical encounter as the most common reason why the United States has not attained optimal HPV vaccine uptake (National Cancer Institute, n.d.). Many adolescents eligible for vaccine did not get HPV vaccines at the time of providers' visits (National Cancer Institute, n.d.). Often, adolescents were vaccinated with other recommended vaccines on visiting their providers but failed to receive the HPV vaccine (National Cancer Institute, n.d.). Stokley et al. (2013) indicated that using every opportunity adolescents have with an health care encounter to assess vaccination status and vaccinate could limit missed opportunities.

The 2014 NIS-Teen vaccination coverage among teens aged 13–17 years showed ≥1 Tdap was 86.1% for Georgia, while being 87.6% for the United States (CDC, 2015). Compared to Tdap, the ≥1 dose HPV for adolescent females in Georgia was 65.4%, while nationally it was 60.0% (CDC, 2015). HPV≥2 doses and ≥3 doses for this group for 2014 was 56.3% and 47.1% respectively (CDC, 2015). The data depicted missed opportunities for HPV vaccination, as the ≥1 Tdap was more than 20% greater than the ≥1 dose HPV (CDC, 2015). Also, ≥1 HPV vaccine dose uptake was lower than the Tdap and MenACWY rate in 2015, including previous years (Reagan-Steiner et al., 2016). Tdap and MenACWY were two vaccines regularly recommended at ages 11–12 years (Reagan-Steiner et al., 2016). The gaps observed in coverage revealed continued missed

chances for HPV vaccination during provider visits when other vaccines were given (Reagan-Steiner et al., 2016).

Vadaparampil and Perkins (2014) noted that the United States had a low usage rate of the HPV vaccine compared to the other industrialized nations. Vadaparampil and Perkins observed that, although preventive care settings provide a basis for provider recommendation and vaccine usage, only 38% of adolescents had preventive visits. Physicians cited infrequent preventive health care visits as a barrier to vaccination (Stokley et al., 2013). However, nonpreventive care visits increase throughout the adolescence period from ages 11-17.8 years, expanding opportunities for recommendation of vaccine and coverage (Vadaparampil & Perkins, 2014). Adoption of provider practices to use acute or problem visits to initiate and provide catch-up vaccinations has the potential to increase the uptake of the HPV vaccine (Vadaparampil & Perkins, 2014). Using systems such as electronic health records that support efficient review of patients' records and can automatically flag patients not up-to-date for a HPV vaccination could facilitate this effort (Vadaparampil & Perkins, 2014). The timeline recommended for HPV vaccination corresponds to the vaccination series for Tdap and MCV4, and starting the HPV vaccine series during these visits could enhance the opportunities for improving vaccine coverage (Gable, Eder, Noonan, & Feemster, 2016). Gable et al. (2016) suggested that the administration of HPV vaccine during sick and well visits would minimize missed chances of vaccination.

Taking advantage of every health care encounter or provider visit provides opportunities for provider recommendation of the HPV vaccine. Provider

recommendation was identified as influencing the HPV vaccination during provider visits (Ylitalo, Lee, & Mehta, 2013). Ylitalo et al. (2013) showed that adolescents with physician recommendation were often more likely to receive a vaccine (odds ratio = 4.81).

Data from the 2007–2012 NIS-Teen depicted increased missed opportunities for the HPV vaccination while there was higher coverage of other vaccines recommended for adolescents within the same period (Stokley et al., 2013). In addition, 84% of unvaccinated girls had provider visits where another vaccine was given (Stokley et al., 2013). If the HPV 3 dose series were started at these visits, the use for ≥1 dose could have risen to 92.6% (Stokley et al., 2013). Also, enhancing the use of the HPV vaccine is possible with the current infrastructure and health care use in the United States (Stokley et al.,2013).

Providers who service privately insured patients pay for their supply of vaccines out-of-pocket, including the cost of storing and administering vaccines (Gable et al., 2016). Gable et al. (2016) noted that the cost incurred by providers could be a disincentive to recommend or store a vaccine. Also, some of the grandfathered health plans have inadequate coverage and create a financial barrier to this population (Gable et al., 2016). However, the ACA aids in increasing access to vaccinations for underinsured children eligible for VFC vaccines in the CHCs (Curtis et al., 2014; Forsberg et al., 2014).

In order to identify measures that would enhance the HPV vaccine uptake, Farmar et al. (2016) evaluated measures, such as bundling of vaccines, offering vaccines at every

visit, and use of standard orders implemented at Denver Health, an integrated urban safety net health system. The study was conducted from 2004 to 2014 among 11,463 adolescents. In 2013, Farmar et al. showed that HPV coverage of ≥1 dose was 89.8% for female adolescents aged 13 to 17 years, compared to the national rate of 57.3%. Also, the rates of HPV vaccine coverage (≥3 doses) were 66.0% versus 37.6% nationally for the sampled population (Farmar et al., 2016). Bundling of vaccines during each provider visit minimized missed opportunities, which led to a higher vaccination rate in this health clinic (Farmar et al., 2016).

Race / Ethnicity and HPV Vaccination Rate

Race and ethnicity are used to characterize populations or groups based on shared features (Caprio et al., 2008). Race is used to classify populations based on biological traits like genes and skin color, while ethnicity is used to group people based on cultural characteristics, such as shared ancestry and language (Caprio et al., 2008).

In the United States, adolescents made up 13.2% of the population, which was about 42 million in 2014 (Department of Health & Human Services [HHS], 2016). It is projected that this age group will increase to 45 million by 2050 (HHS, 2016). The adolescents vary by race and ethnicity reflecting a diverse population with differed socioeconomic status (HHS, 2016). As of 2014, 54% of adolescents are European American, and this group's population was projected to drop to 40% by 2050 (HHS, 2016). Hispanic Americans and multiracial teenagers will become a larger population of teens while racial and ethnic minorities are predicted to increase (HHS, 2016).

Racial minorities are noted to have less access to health care, experience more severe health conditions, and have higher mortality rates than European Americans (HHS, 2016). People of color are at a higher risk of being uninsured than European Americans (KFF, 2016). The disparity in insurance coverage is higher for Hispanic Americans, who account for 20% of the nonelderly population but nearly a third (32%) of the nonelderly uninsured population (KFF, 2016). Hispanic Americans and African Americans have significantly higher uninsured rates (17.2% and 12.2%, respectively) than European Americans (8.1%; KFF, 2016). Health equity among the diverse adolescent population will be difficult to achieve if racial and ethnic disparities are not addressed (HHS, 2016).

Differences exist in the risk for HPV-related infections and cervical cancers among races (HHS, 2016). Based on the Youth Risk Behavior for 2011, 60% of African American teens reported engaging in sexual intercourse compared to 48.6% of Hispanic Americans and 44.3% of European American teens (Jeudin et al., 2013). In addition, 14% of African American adolescents had first sexual intercourse before the age of13, compared to 7.1% for Hispanic Americans and 3.9% for European Americans (Jeudin et al., 2013). Also, 24.8% of African American teens reported having four or more lifetime partners, compared to 14.8% of Hispanic Americans and 13.1% of European Americans (Jeudin et al., 2013). The data reported a depicted increased risk and predisposition to HPV-related infections and cancers. Cervical cancer is the third most frequent cancer in the United States, with an estimated incidence of about 1,200 new cases and 4,000 deaths annually (Jeudin et al., 2013). The rate of cervical cancer was 53% and 41% higher

respectively for African Americans and Hispanic Americans compared to European Americans (Jeudin et al., 2013). There is a need to improve the HPV vaccination rate with a focus on the high-risk populations to prevent cervical cancer disparities (Jeudin et al., 2013).

Among adolescents, more than 40% of the population live in poverty (KFF, 2011). African American and Hispanic American teens are mostly affected (KFF, 2011). The adolescents who are of low income lack financial resources (KFF, 2011). Financial concerns or cost (if the vaccine is not free or the teen is uninsured) are barriers to providing the HPV vaccine (Emberger, 2015; Holman et al., 2014). A provision of the ACA was the expansion of Medicaid for individuals with incomes below 138% of FPL (Forsberg et al., 2014). About 22% of new Medicaid and CHIP recipients would be children if every state in the United States expanded Medicaid (Forsberg et al., 2014). Georgia was one of the states that opted out from expanding Medicaid and establishing a health market. The potential of limiting access to preventive services among adolescents of varied race, African Americans, and Hispanic Americans could hinder the HPV uptake (KFF, 2011).

Scholars who have examined the HPV vaccination rate based on race/ethnicity observed differences in access (Forsberg et al., 2014). Cook et al. (as cited in Forsberg et al., 2014) identified Hispanic Americans are more likely to initiate the HPV vaccine. On the contrary, European American teens are most likely to complete the three-vaccine series (Forsberg et al., 2014). Jeudin, Liveright, Del Carmen, and Perkins (2014) found that low-income and minority adolescents are more likely to start the HPV vaccination

series than European American and higher-income adolescents, but are less likely to complete the series.

The variation in the rate of the HPV vaccination might result from the pattern of provider recommendation. Ylitalo et al. (2013) examined the provider-verified HPV vaccination (≥ 1 dose) and participant-reported health care provider recommendation for the HPV vaccine. Ylitalo et al. revealed that adolescents were five times more likely to receive the vaccine if recommended by the provider (odds ratio = 4.81; 95% confidence interval = 4.01, 5.77). Ylitalo et al. showed that provider recommendation was less likely among racial/ethnic minorities, which denoted an association between recommendation and vaccination for all racial/ethnic groups. Limited access and health disparities can result in low patient engagement with health providers and subsequent underuse of health services (Washington, 2014). Low patient engagement with health providers resulted from limited access can impact the pattern of physician recommendation for the HPV vaccine.

Race has an impact on the use of health services, and disparities in outcome exist across racial or ethnic groups (Healthy People, 2017). Poor health outcomes are observed among adolescents who are living in poverty, who are African American, American Indian, and or Hispanic American origin (Healthy People, 2017). In the United States, African Americans and Hispanic Americans are less likely to be insured than European Americans (Agency for Healthcare Research and Quality, 2016). However, the gap in insurance coverage decreased between 2010-2015 (Agency for Healthcare Research and Quality, 2016).

There is a relationship between race and ethnicity and the HPV vaccine use (Cates et al., 2010; Niccolai, Mehta, & Hadler, 2011; Wisk, Allchin, & Witt, 2014;). Cates et al. (2010) showed about 91% of parents reported having heard of the HPV vaccine, but non-Hispanic, African American, or other races/ethnicities than non-Hispanic White are less likely to be aware of the HPV vaccine. Awareness was higher among parents with higher income (Cates et al., 2010). Wisk et al. (2014) examined 5,735 parents of preadolescents and adolescents from ages 8 to 17 years with data obtained from the 2010 National Health Interview Survey. Wisk et al. revealed that 62.6% of parents were aware of the HPV vaccines. However, European American parents with older children, English speaking, who were married, more educated, and with higher incomes above 200% of the FPL and living in the Midwest were more aware of the vaccine (Wisk et al., 2014). Not expanding Medicaid under the ACA in Georgia is a potential barrier to having access to the health care provider. In addition, a lack of access to preventive services will prevent the imparting of knowledge of the HPV vaccine and recommendation from a health provider. For health information to be useful and beneficial, it must be accessible, understandable, accurate, and timely (Washington, 2014).

People with higher education and income are predisposed to having access to health resources and engaging in preventive health actions (Feinberg et al., 2016). However, individuals with low income, low educational level, and a lack of English proficiency are prone to having low literacy (Feinberg et al., 2016). These individuals are likely to be African American, Hispanic American, and Native American (Feinberg et al., 2016). A lack of access or insurance coverage can impede the seeking of health

information and contact with a health provider, unlike those who have insurance (Feinberg et al., 2016).

Niccolai et al. (2011) assessed the effects of race/ethnicity, poverty, and year completion of the three-dose HPV vaccine series among those who initiated vaccination. This study was conducted among adolescent females, ages 13 to 17 years, using data from the 2008-2009 NIS-Teen. The sampled population was (n=7606), and analysis was done with logistic regression to adjust for covariates and measures of access to care from 2010-2011 (Niccolai et al., 2011). Niccolai et al. revealed that 55% of adolescent girls completed the three series, but on controlling covariates, variation existed based on race. African American (*AOR*=0.48, 95% *CI*=0.40, 0.57) or Hispanic American (*AOR*=0.75, 95% *CI*=0.64, 0.88) were significantly less likely to complete vaccination than European Americans (Niccolai et al., 2011).

The patterns of HPV vaccine uptake were evaluated by race/ethnicity and poverty status using the NIS-Teen data from 2008 -2011 (Bednarczyk, Curran, Orenstein, & Omer, 2017). Bednarczyk et al. (2017) showed that Hispanic American adolescent females had the highest initiation rate of HPV vaccine (44.4%), followed by African Americans, while the European American adolescents had the lowest uptake. Also, the Hispanic American adolescent females' average increase in HPV vaccine uptake was almost twice more than the European Americans (7.0% vs 3.8%; Bednarczyk et al., 2017).

About 20,589 cases cancers associated with HPV are diagnosed among females annually in the United States (Henry, Stroup, Warner, & Kepka, 2016). These cancers are

preventable if the HPV vaccine is initiated before first sexual intercourse. Risk of exposure to HPV-related infections and subsequent cancers in adulthood is prevalent among adolescents, which result in sexual risk behaviors. The variation in risks and exposure is common among African Americans, Hispanic Americans, and minorities, which depicts race/ethnicity being significant in exposure. Understanding the role of race/ethnicity predisposition to the risk of HPV-related infections and cancers, including socioeconomic factors that hinder HPV vaccine uptake, will guide in developing strategies that will enhance the use of the HPV vaccine among adolescent females in Georgia. It is necessary to improve the HPV vaccine use as this population is projected to continually grow (Jeudin et al., 2014).

Several of the ACA provisions provided opportunities to increase access and quality of preventive services, such as no cost-sharing for adolescents (Forsberg et al., 2014). The ACA also provided funding for CHS, SBHCs, and local health departments to expand and support the infrastructure through which preventive and health care services are offered (Forsberg et al., 2014). All of these provisions have the potential of improving access to a health care provider resulting in health care encounter or visits. Stokley et al. (2013) reported that 84% of adolescent females who had health care encounters or visits in 2012 based on NIS-Teen data did not receive HPV vaccine, while other vaccines were given. Although the ACA provided access and infrastructure, the HPV use rate remains low in Georgia. The focus of this study was on monitoring the trend of HPV vaccination from 2011 to 2015 by exploring if ACA influenced use or coverage.

Conclusion

In Chapter 2, I presented a literature review on ACA and use of the HPV vaccine among adolescent females in Georgia. HPV is associated with latent infections that could cause genital warts and cervical and oropharyngeal cancers in adulthood (CDC, 2015; Dunne et al., 2014; Stokely et al. 2013). Infections caused by HPV could cause cervical, vaginal, and vulvar cancers in women; oropharyngeal and anal cancers, including genital warts in both males and females; and penile cancers in men (Meites et al., 2016).

Georgia's prevailing rate of cervical and oropharyngeal cancers linked to HPV is above the national average of 7.7% and 12.1% respectively (Berzen et al., 2016). The ACA, enacted in 2010, aimed to increase access to HPV vaccine. The HPV vaccine is effective in preventing latent infections that result in various cancers if administered early among teens before initiation of sexual activity. Despite the implementation of this law, the rate of the HPV vaccine use is below the Healthy People 2020 goal for adolescents in Georgia. Scholars who have examined why the underuse exists focused on parental knowledge, attitude, and provider recommendations, but none examined if the ACA influenced use as private insurance and uninsured with cost-sharing. This was the gap this study filled.

The knowledge obtained from this study will improve understanding on why the underuse of the HPV vaccine still exists. Examining the trend in vaccinations from 2011 to 2015 helped in deducing if there was association. Measuring the relationship aided in portraying the level of significance of access in the use of the HPV vaccine among adolescents in Georgia. I conducted logistic regression analysis of the variables within

the periods chosen to determine association and trend. Given the high prevalence of HPV-related infections and cancers in Georgia, it was vital to understand that this is a public health problem. Being able to ascertain if the ACA impacted the use of the HPV vaccine and the most significant factor that influenced the use of the vaccine helped in filling the gap in the existing literature relating to HPV vaccine use and insurance coverage.

In Chapter 3, I will provide the details of the study, research design, and the rationale. I will present a description of the methodology; population; sampling and sampling procedures; recruitment; data collection; permissions to gain access; operationalization; and independent, dependent, and covariate variables. Also, this chapter includes the literature search strategy, inclusion and exclusion criteria for studies and data analysis plan, ethical procedures, summary, and transition to Chapter 4.

Chapter 3: Research Method

Introduction

HPV is the main cause of STDs in the United States (Dunne et al., 2014; National Cancer Institute, 2015; Sun et al., 2013). The infection is found mostly among youths ages 15 to 24 years, who acquire 50% of the 20 million new STDs annually (CDC, 2015). Also, one in four sexually active adolescent girls has an STD, such as HPV (CDC, 2015). Despite the prevalence of HPV-related STDs among adolescent females, underuse of the HPV vaccine, proven to be effective in preventing the infection, still exists, especially in Georgia. Scholars have not examined if insurance coverage under the ACA influenced the use of the vaccine, as adolescents with private insurance and the uninsured had increased odds of vaccination. Given the increased prevalence of HPV-related infections among adolescent females in the United States and the underuse of the HPV vaccine among teenage females in Georgia, determining the degree of association between the ACA and HPV vaccine use will depict the scope and gravity of the problem. The purpose of this study was to explore the association between the ACA and HPV vaccine use among adolescent females in Georgia. The population sample was small, as the focus was only on Georgia. However, observing the trend of vaccination for multiple years after the enactment of ACA and analyzing the results helped in providing knowledge on this issue at the state level.

The first section of Chapter 3 consists of the research design and rationale. The research questions are restated, and I provide an explanation for the use of secondary data analysis of the quantitative survey design. Subsequently, the research sample, process of

selecting the sample and the variables, and the procedures for data collection associated with the study is discussed. Also, data analysis, threats to validity, and a summary of this chapter are described.

Research Questions and Hypotheses

RQ1: Is there any association between ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia?

$H_0$1: There is no association between ACA with no-cost sharing and the HPV vaccination rate among adolescent females in Georgia.

*H*a1: There is a significant association between ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia.

RQ2: Is there any association between ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia?

$H_0$2: There is no association between ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia.

H_a2: There is an association between the ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia.

RQ3: Is there any association between provider visits and the HPV vaccination rate among adolescent females in Georgia?

$H_0$3: There is no association between the provider visits and the HPV vaccination rate among adolescent females in Georgia.

H_a*3*: There is an association between the provider visits and the HPV vaccine vaccination rate among adolescent females.

RQ4: As Georgia did not expand Medicaid under ACA, is there any association between race and the HPV vaccination rate among adolescent females in Georgia?

$H_0$4: There is no association between race and the HPV vaccination rate among adolescent females in Georgia.

H_a4*:* There is an association between race and the HPV vaccination rate among adolescent females in Georgia.

Research Design and Rationale

This research was a secondary data analysis of the U.S. NIS-Teen data from 2011 –2015. The NIS-Teen is a nationally representative, annual survey of adolescents aged 13-17 years living in noninstitutionalized households in the United States, sponsored by the CDC (2015). The NIS-Teen used a random digit dialing telephone survey of households screened for the presence of 13-to 17-year-old adolescents. In 2015, both landline and cellular phone surveys were done. An interview was conducted with an adult who was most knowledgeable about the adolescent's immunization history (Reagan-Steiner et al., 2016). The NIS-Teen also collects information on vaccinations from the teens' health care provider by mailing the questionnaire. The survey ensures comparable vaccination coverage levels within estimation areas at all times due to the use of the same methodology in data collection and survey instruments (Reagan-Steiner et al., 2016). Samples of telephone numbers are drawn independently for each calendar quarter, within selected geographical areas or strata (CDC, 2015). This design enables the annual estimates of vaccination coverage levels for each state or territory (CDC, 2015). The data collected from the 2011–2015 NIS-Teen survey had an average response rate of 58.7%.

In this secondary data analysis, I employed a quantitative design to analyze data pertaining these variables: health insurance (ACA; independent variable), HPV vaccination rate (dependent variable), race (moderator variable), and provider visit as the mediating variable.

I chose this design to statistically quantify if there was an association between the ACA and the HPV vaccination rate among teenage females and to provide insight into the magnitude of relationship and the problem in Georgia. Also, secondary data analysis is cost-effective, as I did not have the resources to collect the needed data with rigor in a timely manner. The NIS is conducted by the National Opinion Research Center (NORC), staffed with skilled professionals, such as epidemiologists, statisticians, and health scientists, who ensured rigor through the instrumentation to minimize the threat to both external and internal validity.

Definition of Key Study Variables

HPV testing history was defined using the question "Has teen ever received any human papillomavirus shots?" Responses of yes were defined as having received an HPV vaccination, while no responses were defined as having never been vaccinated for HPV. Health insurance coverage was assessed by whether there were gaps in health insurance coverage since age 11 (yes and no).

Demographic and health-related covariates included race. Other variables related to provider visits included whether the teen visited the doctor in the past 12 months (yes or no; CDC, 2015).

This study was a secondary analysis of data with no attempt to control or manipulate the variables. The analysis was conducted on the NIS-Teen data from 2011–2015 using questions derived from data that applied to Andersen's (1974) BM of health care use constructs. In the BM, Anderson postulated three factors that result in the use of health services: predisposing, enabling, and need factors. The questions derived were pertinent to the predisposing factors consisting of (race/ethnicity); enabling factors (access to health insurance coverage [ACA]); and provider visits (regular source of care) perceived need (HPV vaccine). The questions on these variables can be recognized from the categorization of data based on survey questions from the NIS from 2011–2015. The weights included in this public use data file permit the conducting of several different types of analysis, depending on interests and aims (CDC, 2017).

The purpose of this study was to determine if the ACA as the independent (predictor) variable had any association with the HPV vaccination rate (dependent variable) among adolescent females in Georgia. This relationship was ascertained by exploring the factors that impacted access to health care and use through secondary analysis of data obtained from the NIS from 2011–2015. Also, I analyzed race and provider visits as covariate variables that could influence relationship. The quantitative design was the appropriate methodology for this research, as I tested the hypotheses using quantitative data. I determine if there was any association, and the degree of association, between the independent and dependent variable from 2011–2015. Using data from multiple years, primarily collected by the National Center for Health Statistics (NCHS) and CDC, provided a more convincing evidence than a single-year data analysis.

Population

The data used for this study were obtained from the NIS-Teen from 2011 to 2015. The NIS-Teen survey is conducted nationally and annually among adolescents ages 13-17 years living in noninstitutionalized households in the United States (CDC, 2015). The purpose is to monitor the progress of vaccination coverage toward achieving the objectives of the Childhood Immunization Initiative (CDC, 2015). The analytical sample was only on female teens aged 13-17 residing in the state of Georgia at the period before the interview (N =1,500). The unweighted sample size for analysis was 1,500, representing an estimated 303,920 girls ages 13 to 17 living in Georgia from 2011 to 2015.

I used the effect size for the analysis to measure the increases in the annual prevalence of girls ages 13 to 17 living in Georgia who reported ever receiving any HPV shots. The prevalence rate from 2011 to 2015 was 36.5%; in 2011, it was 40.3%; in 2012, it was 53.5%; in 2013, it was 58.6%; and in 2014 and 2015, it was 46.7%. Prevalence increased significantly at P value < 0.0002.

Power Analysis

Statistically, a power analysis was performed for sample size estimation, based on data from the 2011-2015 NIS. The purpose of the study was to assess the rate of HPV vaccinations among teenaged girls ages 13-17 living in Georgia and whether the rate increased after the enactment of the ACA from 2011-2015. The total sample size for survey respondents was 1,500. The effect size was calculated by assessing the percentage of teenage girls who reported being vaccinated for HPV as opposed to the rate of girls

who reported never receiving the vaccination (47.0%-yes; 53.1%-no). The *p*-value was derived using the chi-square statistic and was significant at $p = (0.0002)$, thus warranting the subsequent power analysis.

With an alpha=.05 and power=0.80, the projected sample size needed with this effect size was approximately 710 with at least 142 respondents for every year of survey data. The sample size was 1,500 (included 330 [2011]; 240 [2012]; 220 [2013]; 332 [2014]; and 378 [2015]). The sample size was more than adequate for the primary objective of this study. Also, it allowed for expected attrition and the additional objectives of controlling for possible mediating, moderating factors, and subgroup analysis.

Procedures for Recruitment, Participation, and Data Collection

The NIS-Teen used a survey methodology that involved a random digit dialing telephone to identify households to screen for the presence of 13-to 17-year-old adolescents. From 2011, both landline and cellular phone surveys were implemented due to increased usage of cell phones by most households (CDC, 2014). Samples of telephone numbers were selected randomly every quarter, in chosen geographical areas or strata (CDC, 2014). This design allowed for a rough calculation of the level of vaccination coverage for every state or territory annually (CDC, 2014). The process involved interviewing an adult who was most knowledgeable about the adolescent's immunization history (CDC, 2014). Only a teen is randomly chosen for the interview in each household (CDC, 2014).

Upon completion of the phone interview, consent was obtained from the teen's parent or guardian to contact the child's health care providers (CDC, 2014). After, the NIS contacted the health care provider(s) of the teen to request information on vaccinations from the age 11 years by mail (CDC, 2014). The request helped in determining the rate of provider visits. Using the same data collection methodology and survey instruments, the NIS produced comparable vaccination coverage levels within the estimation areas over a period. Data collected from the 2011–2015 NIS-Teen had an average response rate of 58.7%. The analytical sample was restricted to female teens aged 13-17 residing in the state of Georgia at the time before the interview (N = 1,500).

Procedures for Gaining Access to the Data Set

The dataset used for this study was the NIS-Teen data. These data were open to the public and can be accessed from its home page located at https://www.cdc.gov/vaccines/imz-managers/nis/index.html. The NIS public use data file was available in ASCII format. An SAS program (in ASCII format) facilitated the reading of the ASCII data file and in creating an SAS data set. The data were downloaded, and an SAS program was used to convert the data from an ASCII file to an Excel spreadsheet.

Permission to Gain Access to the Data

Permission was sought by sending an e-mail to cdcinfo@cdc.gov. Public Health Service Act (Section 308(d) stipulated that the data collected by the CDC (2015) may be used only for health statistical reporting and analysis.

CDC info responded to the e-mail request and indicated no permission was required to use the data. The response from CDC info is attached to Appendix B. I conducted a health statistical reporting and analysis of a selected portion of these archived data that focused on insurance coverage (ACA), HPV vaccination, social demographic (age and sex), and health care provider visits. Health statistical analysis complied with the Public Health Service Act (Section 308(d).

Instrumentation

The instruments used for the survey were questionnaires that were in two forms (household RDD telephone survey [Computer-Assisted Telephone Interview questionnaire] instrument in both English and Spanish for households) and a mail survey of vaccination providers, known as the Immunization History Questionnaire (IHQ) (CDC, 2017). The NIS Teen survey was included in the NIS for childhood immunization in the fourth quarters of 2006 and 2007 (CDC, 2017). The CDC (200) designed the NIS. These researchers evaluated various survey methodologies that could provide uniform measures in monitoring vaccination coverage levels for states and urban areas in the United States (Zell, Ezzati-Rice, Battaglia, & Wright, 2000). Finally, a RDD telephone survey with a provider record-check study was selected as the best option for the survey (Smith et al., 2001; Zell et al., 2000).

The NIS Teen survey was conducted within 58 estimation areas, where landline telephone and cell phone numbers were sampled within estimation areas in each quarter (CDC, 2014). The method involved selecting a random sample of telephone numbers

from banks of 100 consecutive phone numbers, which were reviewed and updated every quarter (CDC, 2014).

The design and implementation of the NIS-Teen landline sample involved four procedures that used statistical models to predict the number of sample telephone numbers needed in each estimation area to meet the target precision requirements (CDC, 2014). The sample selected was randomly divided into strata after eliminating nonworking and nonresidential phone numbers through an automated procedure (CDC, 2014). The sampled phone numbers were matched against a national database of residential landline phone numbers (CDC, 2014). Also, 2 weeks before the household interview, a letter was sent to identifiable mailing addresses (CDC, 2014). The surveys were supported and conducted by the CDC (2017) and were authorized by the Public Health Service Act. Currently, the NIS are conducted by the NORC at the University of Chicago (CDC, 2017).

For the provider mail questionnaire, a focus group was conducted in 2009 among physicians, nurses, and other nonphysician office staff (DeMaio & Beck, 2009). The aim of assembling a focus group was to comprehend how health care providers would respond to the mailing materials (DeMaio & Beck, 2009). The feedback obtained from this process was incorporated into the provider materials to simplify it (DeMaio & Beck, 2009).

Record checks are done before mailing packets to providers, during a telephone call, editing of returned questionnaires, and during and after data entry (CDC, 2014). During the processing of the returned questionnaires or vaccination records, all records

were examined to look for errors, and corrections were made prior to data entry with a subsequent 100% verification (CDC, 2014). The error rate was estimated, through second verification process, to be less than 1% (CDC, 2014).

Further, the data were edited and cleaned through the CATI system, which enabled reconciliation of potential mistakes while the respondent was still on the telephone (CDC, 2014). More editing and cleaning of data were done post-CATI clean-up stage. The process involved a review of data values, cross tabulations, and the recoding of responses for race and ethnicity, including the creation of numerous composite variables (CDC, 2014).

Finally, to assess the validity of estimates of vaccine coverage from the NIS, the 1995 and 1996 NIS national vaccine estimates were compared with results from the NHIS/NIPRCS for the same years (Bartlett, Ezzati-Rice, Stokley, & Zhao, 2001). Both the NIS and the NHIS/NIPRCS produced similar results, confirming the validity of the instrument (Bartlett et al., 2001).

Operationalization

This study involved conducting a secondary analysis using only a portion of the questionnaires that were applicable from a more extensive NIS-Teen database. The survey questions selected for review were operationalized to apply to the constructs of Andersen's (1974) BM. The applicable survey questions are found in Appendix A.

Measures

A secondary analysis of data from the NIS-Teen survey database was tested to determine if ACA insurance coverage with no cost-sharing for preventive health services

had an impact on the use of the HPV vaccine among adolescent females, ages 13 to 17 years, living in Georgia. The NIS-Teen routinely surveyed a large population of teens to ascertain the level of vaccination coverage, based on stratification and IAP areas. Information about receipt of the vaccine was obtained from the parent who was most knowledgeable about the teen's immunization and provider record check. The secondary analysis included only girls, ages 13 to 17, living in Georgia who reported ever receiving any HPV shots from 2011 to 2015. The sample size for the study was 1,500, representing an estimated 303,920 girls, ages 13 to 17, living in Georgia from 2011 to 2015, extracted from the NIS database.

The NIS-Teen survey monitored various trends that included constructs selected for inclusion in this study. The constructs aligned with the three factors that influence the use of health services based on Andersen's (1974) BM. The constructs are predisposing factors (race/ethnicity), enabling factor (health insurance coverage and provider visit), and perceived need (HPV vaccine). The details of each construct, questions, and responses are discussed.

Predisposing Factors for Race/Ethnicity

Predisposing factors are used to explain the inclination to use health services by individuals, and use occurs when a person is predisposed to receive health services, such as the HPV vaccine, to prevent the risks of contracting HPV-related diseases and cancers. These were represented by NIS Teen survey questions from 2011 to 2015:

- "Is [TEEN] White, Black or African American, American Indian, Alaska Native, Asian, Native Hawaiian or other Pacific Islander"?

These were demographic- and health-related covariates (race). The responses to race for multiple years 2011–2015 helped to generate prevalence estimates of the HPV vaccination history of teenage girls, aged 13-17, living in the state of Georgia from 2011 to 2015 using the SAS-Callable SUDAAN software. I used the responses to determine if race had an influence on the rate of the HPV vaccine. The response to this question helped in answering the RQ4: As Georgia did not expand Medicaid under ACA, is there any association between race and the HPV vaccination rate among adolescent females in Georgia?

Enabling Factors for Health Insurance Coverage (ACA)

These were conditions that enhance or facilitate the use of health services, such as access to health insurance coverage. The represented question from the NIS Teen survey was the following:

- "Since age 11, any time when the teen was not covered by any health insurance?"

This question was used to determine whether there were any gaps in health insurance coverage since age 11 (yes and no). I used the response to this question to answer RQ1: Is there any association between the ACA and the HPV vaccine vaccination rate among adolescent females in Georgia?

Enabling Factors for Provider Visits

I used the responses to the questions below to answer RQ2: Is there any association between insurance coverage under the ACA and the rate of provider visits

among adolescent females in Georgia? and RQ3: Is there any association between the rate of provider visit and the HPV vaccination rate among adolescent females in Georgia?

- “What was the date of this child's most recent visit, for any reason, to this place of practice"?
- "During the past 12 months, how many times has [TEEN] seen a doctor or other healthcare professional about [GENDER2] health at a doctor's office, a clinic, or some other place"? Answered (yes and no).

The need for HPV vaccine prompted provider visit. Also, 100% coverage of preventive services, such as the HPV vaccine, led to increased access, which likely increased provider visits.

Perceived Need for HPV Vaccine

Perceived need is on a person’s view and experience on general health, functional state, and or illness that prompt the use of health services, such as the HPV vaccine. HPV vaccine testing history was defined using the questions listed below:

- **“**Has [teen] ever received HPV shots”?
- **“**How many HPV shots did [teen] ever receive”?

Respondents who answered yes were defined as having received an HPV vaccination. Respondents who answered no were defined as having never been vaccinated for HPV. These questions helped to answer the RQ1: Is there any association between the ACA and the HPV vaccine vaccination rate among adolescent females in Georgia?

No treatment intervention was involved in this study. I focused on the analysis of secondary data obtained from the NIS Teen database, based on a nonexperimental survey

of the randomly selected teen population nationwide. The analysis was limited to adolescent females living in Georgia from 2011–2015 after the enactment of the ACA. The trend of vaccination was compared across these years to ascertain if there was an association between ACA insurance coverage and the rate of HPV vaccine use among adolescent females in Georgia.

Statistical Data Analysis

SAS-Callable SUDAAN software (Release 10.0, Research Triangle Institute, and NC) was used to generate prevalence estimates of the HPV vaccination history of teenage girls aged 13-17 living in the state of Georgia from 2011 to 2015. All analyses accounted for the complex NIS-Teen survey design and data weights. Logistic regression analyses were used to calculate prevalence, prevalence ratios (PRs), and 95% confidence intervals (95% *CI*s) for each independent variable to assess the association with ever being vaccinated for HPV. The multivariable analyses were controlled for all significant study variables ($p<0.05$) to calculate the adjusted prevalence ratios (APRs).

Assessment of Each Research Question

The relationship between the dependent variable (HPV vaccination rate) and independent variable (ACA insurance) including covariates, such as provider visit and race, were evaluated. Logistic regression analyses were used to calculate prevalence, PRs, and 95% CIs for each independent variable to assess the association with ever being vaccinated for HPV. For the multivariable analyses, there was control for all significant study variables ($p<0.05$) to calculate the APRs.

Justification

Logistic regression analyses were used to calculate prevalence, PRs and 95% *CI*s for each independent variable to assess the association with ever being vaccinated for HPV. For the multivariable analyses, there was a control for all significant study variables ($p<0.05$) to calculate the APRs. PRs based on multivariate regression models was used for the hypothesis testing to isolate the association between the outcome variable (i.e., the rate of insurance coverage) independent study variable from background characteristics of the study population. Also, PRs based on multivariate regression model was used in this analysis because it was recommended by the NCHS for the analysis of nationally representative data, which are available in the statistical software package. Multivariate regression is a standard statistical method that relates multiple independent variables to a single dependent variable. When used in conjunction with nationally representative data from the NIS, analytical results can be used to test the null hypothesis for each research question generalizable to the population of teenage girls ages 13 to 17 years living in the state of Georgia from 2011–2015.

Logistic regression analysis models are employed when studying or estimating the relationship between a dependent variable with more than one independent variable (Schneider, Hommel, & Blettner, 2010; Uyanıka & Gülerb, 2013). For multiple regression analysis, the assumptions include (normality) variables must have normal distribution, (linearity) model should be linear, and(homoscedasticity) constant variance across the predicted variables level (Uyanıka & Gülerb, 2013). It was the appropriate model of analysis for this study because it allowed me to examine multiple independent

variables with adjustment of their regression coefficients for possible confounding effects between variables (Schneider et al., 2010).

Threats to Validity

As the research conducted was nonexperimental, there were threats to validity in the measurement. For internal validity, the threats may involve selection and measurement bias. The NIS was designed by researchers at the CDC (2000). The population surveyed were randomly selected. Quality control measures applied included the RDD component of the NIS-Teen and online provider lookups in the database system integrated with the CATI system, which included the names, addresses, and telephone numbers of vaccination providers (CDC, 2014). Also included was automated range-edits and consistency checks, which minimized the threat to internal validity. The external validity threat could result if the results of the study were generalized to the entire population of adolescent females living in Georgia. Another concern for this study was the construct validity. It was necessary to know if the questions asked in the NIS Teen Survey were valid and reliable to apply them to the constructs of Andersen's (1974) BM.

The NIS Teen Survey questions were constructed to be reliable and valid through various processes (CDC, 2000) that included

- The NIS Teen survey was added to the NIS for childhood immunization in the 4th quarters of 2006 and 2007 (CDC, 2017; Jain, Singleton, Montgomery, & Skalland, 2009).
- The NIS was designed by researchers at the CDC (2000).

- These researchers evaluated various survey methodologies before deciding on inclusion and exclusion criteria.
- Scientific validity was the basis for inclusion items in the two forms of questionnaires (household RDD telephone survey CATI instrument) in both English and Spanish for households and a mail survey of vaccination providers (IHQ).
- The inclusion items in both forms of questionnaires demonstrated measurement of population-based constructs in reliable ways and were supported by external evidence that showed the suitability of the measures.
- Pretesting was conducted followed by expert reviews.
- NORC administers the NIS.
- A random sample of both landline and cellphone numbers from banks of 100 consecutive telephone numbers within 58 estimation areas, which were reviewed and updated, every quarter was applied.
- In each estimation area, the target sample size of completed telephone interviews was designed to achieve an approximately equal coefficient of variation of 6.5%, an estimate of vaccination coverage derived from provider-reported vaccination histories, for an actual coverage parameter of 50%.
- Both landline and cellphone sample sizes were selected, so when combined would meet the target coefficient of variation of 6.5%.

- The above measures were taken to maximize response rate, including sending an introductory letter about the interview in advance to households and a telephone call to providers who did not respond, as a reminder to complete the form, then either mail or fax the information.

For this study, the only inclusion criteria for participants were adults in the households with the most knowledge of the teen's (13 years to 17 years) immunization history that responded to the NIS Teen Survey from 2001 to 2015. The potential for a slight error in the selection criteria could occur if an adult not knowledgeable answered the questions. However, the information obtained was matched with the providers' to minimize error. Data collected were edited, entered, cleaned, and merged with the household information from the RDD survey to produce a teen-level record (CDC, 2017). Also, the use of dual-frame weights estimates of both cell and landline phones helped in minimizing bias.

Researchers in various periods after the inception of the NIS Teen survey categorized the questions of the survey with a focus on parental awareness (Wisk et al., 2014). Further categorizations were from provider recommendation (Mohammed et al., 2016) and geographical factors (Henry et al., 2016). However, I measured predisposing factor (race/ethnicity), enabling factors (ACA), and need factors (HPV vaccination rate and the rate of provider visit). All of the questions for these constructs were categorized under sociodemographic race (predisposing), insurance coverage (enabling), and HPV vaccination rate and provider visits (perceived need) in the NIS Teen database. The NIS Teen survey was validated to be reliable as it was an add-on to the NIS. The questions

and measurement instruments for the Teen survey was validated to be reliable based on the outcome of the study for both the NIS and the NHIS/NIPRCS that produced similar results.

Ethical Procedures

Permission to use the NIS Teen data from 2011 to 2015 was sought through the CDC-INFO. The first inquiry was made on July 26, 2017, followed up on August 1, 2017. The response was received back on August 1, 2017 from CDC-INFO that permission was not required for the use of public domain items. Although the data were available for public use, CDC–INFO team members were aware that this research was being conducted. The letter was written, and the response was placed in Appendix B.

Treatment of Human Subjects

Human participants were not accessed, but the secondary data were collected during the NIS-Teen survey from 2011–2015. The data obtained were used just for health statistical reporting and analysis based on the Public Health Service Act (CDC, 2014). The NCHS ensured that the identity of data subjects was not disclosed by omitting direct identifiers and any characteristics that might lead to identification. No attempt was made to access any identifying information. The data were used only for health statistical reporting and analysis after the approval of the institutional review board (IRB) at Walden University.

Institutional Permissions

The request for the study approval was submitted to the Walden University IRB before data collection. Approval was obtained from the Walden IRB before data collection. IRB approval number is 01-31-18-0123614.

Ethical Concerns

This study involved a secondary analysis of existing data. There was no contact with subjects, and no intervention activities were included. Approval was sought through Walden's IRB before data collection.

Treatment of Data

The data were handled in a professional manner. Anonymity was maintained by the NCHS without any identifiable link. The notes and reports were worded professionally, indicating respect for the sampled population who responded to the survey.

Summary

This research was a quantitative study consisting of statistical analysis of secondary data from the NIS-Teen survey conducted from 2011–2015. The NIS-Teen database is a national database open to the public to use for statistical analysis. The purpose of this study was to explore if insurance coverage without cost-sharing for preventive services under the ACA influenced the use of the HPV vaccine among adolescent females in Georgia. The aim was to determine if there was relationship or association, and the level of the relationship, between the ACA and the HPV vaccination rate. The results of this study helped to fill the gap in the literature. The rate of HPV

vaccination was lower among teens in high school who faced out-of-pocket cost with private insurance. Cost incurred was the barrier observed that minimized the HPV vaccine use. Health care insurance reform without out-of-pocket expenses was recommended as a strategy that would increase the use of the HPV vaccine. None of the studies I reviewed examined if ACA with no-costing sharing (new health policy) had an impact on HPV vaccine use among adolescent females in Georgia. Andersen's (1974) BM was the conceptual framework that was applied for this research.

In Chapter 3, I described the research study, research questions, hypotheses, and relevant issues related to secondary data analysis. Secondary analysis of existing data involved two methods: research question-driven and data-driven approaches (Cheng & Philips, 2014). For this research, both approaches were employed. The research questions were formed before searching suitable datasets that would address the research questions. Also, the variables in the NIS Teen dataset were looked at to decide the questions that could be answered by the available data.

This chapter provided information on the target population and the effect size computation, sampling and sampling procedures for recruitment, participation and data collection, and method for gaining access to the data. Also, an explanation was given on the instrumentation and operationalization of constructs, data analysis plan, threats to validity, and ethical procedures. In Chapter 4, I will discuss the collection of data and results of the study.

Chapter 4: Results

Introduction

The primary focus of this secondary data quantitative study was to determine if there was an association between the ACA and the use rate of the HPV vaccine among adolescent females in Georgia. Also, I aimed to discover the most significant factor under Andersen's (1974) BM of health care use that influenced the use of the HPV vaccine. Given the prevalence of STDs and cancers associated with HPV, including the low rate of HPV vaccination among adolescent females in Georgia, it was necessary to create awareness of the level of the problem. Determining the degree of association between health care reforms (ACA) with no cost-sharing with the HPV vaccination rate among adolescent females in Georgia is the first step in developing strategies and interventions that can enhance the use of the HPV vaccine. Effective interventions will yield improvement in the HPV vaccination rate, which will result in the decrease in the rate of HPV-related STDs and cancers while increasing herd immunity. Four research questions were structured to determine the level of association between the ACA and the HPV vaccination rate among adolescent females.

The four research questions and hypotheses involved in this study were

RQ1: Is there any association between the ACA with no-cost sharing and the HPV vaccination rate among adolescent females in Georgia?

$H_0$1: There is no association between the ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia.

*H*a1: There is a significant association between the ACA with no-cost sharing and the HPV vaccination rate among adolescent females in Georgia.

RQ2: Is there any association between the ACA with no-cost sharing and the rate of provider visit among adolescent females in Georgia?

$H_0$2: There is no association between the ACA and the rate of provider visit among adolescent females in Georgia.

H_a2: There is an association between the ACA and the rate of provider visit among adolescent females in Georgia.

RQ3: Is there any association between provider visits and the HPV vaccination rate among adolescent females in Georgia?

$H_0$3: There is no association between the provider visits and the HPV vaccination rate among adolescent females in Georgia.

H_a*3*: There is an association between the provider visits and the HPV vaccine vaccination rate among adolescent females.

RQ4: As Georgia did not expand Medicaid under ACA, is there any association between race and the HPV vaccination rate among adolescent females in Georgia?

$H_0$4: There is no association between race and the HPV vaccination rate among adolescent females in Georgia.

H_a4*:* There is an association between race and the HPV vaccination rate among adolescent females in Georgia.

In this chapter, I focus on analyzing secondary data of the U.S. NIS-Teen data from 2011–2015 obtained from the CDC pertaining to adolescent females living in

Georgia. The sample size for analysis was 1,500. In Chapter 4, I explain the procedures of data collection, statistical results, and summary, including the transition to Chapter 5.

Data Collection

Procedures for Data Collection

The data used for this study were secondary data, obtained from the NIS-Teen from 2011 to 2015. The NIS-Teen survey was conducted nationally and annually among adolescents ages 13-17 years living in noninstitutionalized households in the United States (CDC, 2015). Data collected from the 2011–2015 NIS-Teen survey had an average response rate of 58.7%. Also, it was noted that 31.8% of responses missed answering questions regarding health insurance. The data were open to the public and were accessed from the CDC home page. The NIS public-use data file was available in ASCII format. The data were downloaded using the SAS program to convert the data from an ASCII file to a readable format. The data were grouped by state, gender, race, HPV vaccination rate, insurance, provider visits, and demographics. The measures and instrumentation applied during data collection by the CDC minimized the risk to the reliability and validity of the secondary data used for this study.

For this study, only females ages 13 to 17 living in Georgia who reported ever receiving any HPV shots from 2011 to 2015 were sampled. The sample size for the study was 1,500, representing an estimated 303,920 girls ages 13 to 17 living in Georgia from 2011 to 2015, extracted from the database. With an alpha=.05 and power=0.80, the projected sample size needed with this effect size was approximately 710, with at least 142 respondents for every year of survey data. The sample size was 1,500, which

included 330 from the year 2011, 240 from the year 2012, 220 from the year 2013, 332 from the year 2014, and 378 from the year 2015. The sample size was more than adequate for the objective of this study. It also allowed for expected attrition and the additional objectives of controlling for possible mediating moderating factors and subgroup analysis. There were no discrepancies in data collection from the plan presented in Chapter 3.

Definition of Key Study Variables

HPV testing history was defined using the question "Has teen ever received any human papillomavirus shots?" Respondents who answered yes were defined as having received the HPV vaccination. Respondents who answered no were defined as having never been vaccinated for HPV. Additional demographic information included age (13-17) and race/ethnicity (non-Hispanic White, non-Hispanic Black, other non-Hispanic race or multiple races, and Hispanic). Health-related covariates included current health insurance coverage (yes and no) and whether the teen visited the doctor (provider visits) in the past 12 months (yes and no).

Statistical Analysis

The SAS-Callable SUDAAN software (Release 10.0, Research Triangle Institute, and NC) was used to generate prevalence estimates of health insurance coverage, HPV vaccination history, and doctor visits of teenage girls aged 13-17 living in the state of Georgia from 2011 to 2015. All analyses accounted for the complex NIS-Teen survey design and data weights. Logistic regression analyses were used to calculate prevalence, PRs, and 95% CIs for each independent variable to assess the association with every

outcome measures of this study. For the multivariable analyses, all significant study variables were controlled ($p<0.05$) to calculate the adjusted APRs.

PRs derived from multivariate logistic regression models were used to test the null hypotheses for the four research questions. Covariates included in the multivariate models were selected based on statistically significant associations with the outcome variable at $p <0.05$, as described in the methods section. The 95% CI was used in determining statistically significant differences within response categories of independent covariates. Within the context of each variable, I included the multivariate model being significant at $p < 0.05$. It was more appropriate to use the 95% CI to determine statistically significant differences between response categories to test the null hypothesis.

Also, chi-square was used to test bivariate associations between key study variables that included insurance coverage, provider visit, race/ethnicity, and HPV vaccination. These variables were categorical and were not adjusted for other covariates in a multivariate model. The chi-square test was appropriate to use for these analyses given the structure of the data and the parameters needed to substantiate the statements made in the results section below.

Results

Participants Characteristics

I examined the NIS-Teen data sets from 2011 to 2015 of adolescent females who were residents of Georgia within this period. The total population sampled was 1,500 from ages 13 to 17 years. Table 1 presents selected the sociodemographic characteristics

of adolescent females who were residents of Georgia from 2011 to 2015. The overall sample size and weighted percentages were included. For the years the study was conducted, the sampled population for the years were 330 from 2011, 240 from 2012, 332 from 2014, and 378 from 2015. Cumulatively, the 5 years of data collected among the sampled population of adolescent females ages denoted that many of the participants were 14-years-old (331, 22.0%) and 16-years-old (319, 21.3%). The CI was applied to determine if the sample size used was reflective of the population**.** The 95% CIs refer to the degree of error attributed to the proportion of the weighted sample populations for each year of the NIS-Teen.

Table 1

Sociodemographic Characteristics of Adolescent Females Residing in Georgia Ages 13 - 17

Sociodemographic variables	Adolescent female Georgia residents (*N*=1,500)		
	N	%	95% *CI*
Age			
13	285	18.9	16.4 - 21.6
14	331	22.0	19.4 - 24.8
15	280	18.9	16.4 - 21.7
16	319	21.3	18.8 - 24.1
17	285	18.9	16.5 - 21.6
Race/Ethnicity			
Hispanic	150	12.6	10.4 - 15.1
Non-Hispanic white	839	45.5	42.3 - 48.7
Non-Hispanic black	406	35.1	31.9 - 38.5
Non-Hispanic other/multiple races	105	6.8	5.4 - 8.7
Survey year			
2015	378	20.4	18.5 - 22.4
2014	332	20.2	18.2 - 22.4
2013	220	19.9	17.7 - 22.3
2012	240	19.7	17.3 - 22.3
2011	330	19.8	17.8 - 22.0

Note. Data derived from the NIS-Teen 2011 – 2015

According to Table 1, a greater proportion of adolescent females were non-Hispanic White (839, 45.5%), followed by non-Hispanic Black (40, 35.1%), Hispanic (150, 12.6%) and non-Hispanic other/multiple races (105, 6.8%; 95% CI, 5.4–8.7). Accounting for a 95% degree of possible error, the proportion of non-Hispanic White females could be between 42.3% and 48.7%.

Research Question 1

For this research question, the independent variable was ACA (insurance), and the dependent variable was the HPV vaccination rate. The association of ever being vaccinated for HPV was examined while adjusting for health insurance coverage under ACA and other significant covariates (Table 2). As shown in Table 2 from 2011 to 2015, 47.7% (APR= 1.27, 95% *CI*: 0.76 -1.49) of adolescent females were insured, while 37.9% were uninsured among the sampled population. The rate of HPV vaccination trended up from 36.5% in 2011 to 46.7% in 2015. Most gains in HPV vaccination occurred in 2013 (53.5%) and 2014 (58.6%). Further, Table 2 below shows the rate of HPV vaccination after the implementation of the ACA, which was significantly associated with increasing age: age 14 (APR=1.36, 95% *CI*=1.01 – 1.85), age 16 (APR=1.49, 95% *CI*=1.10 – 2.01), and age 17 (APR=1.65, 95% *CI*=1.23 – 2.20).

Table 2

HPV Vaccination Rate Adjusted for Insurance Coverage After ACA Enactment

		Ever Been Vaccinated for HPV			
Sociodemographic variables	Prevalence %	PR	PR (95% *CI*)	APR	APR (95% *CI*)
Age					
13	37.2	Reference		Reference	
14	43.5	1.17	0.89 - 1.53	1.36	1.01 - 1.85
15	44.0	1.18	0.89 - 1.57	1.33	0.97 - 1.82
16	53.1	1.43	1.11 - 1.84	1.49	1.10 - 2.01
17	56.4	1.52	1.18 - 1.95	1.65	1.23 - 2.20
Race/Ethnicity					
Hispanic	43.5	0.90	0.70 - 1.16		
Non-Hispanic white	48.2	Reference			
Non-Hispanic black	47.0	0.97	0.82 - 1.16		
Non-Hispanic other/multiple races	44.3	0.92	0.67 - 1.26		
Survey year					
2015	46.7	1.28	1.01 - 1.62	1.42	1.08 - 1.87
2014	58.6	1.60	1.28 - 2.02	1.72	1.33 - 2.23
2013	53.5	1.46	1.14 - 1.89	1.42	1.05 - 1.91
2012	40.3	1.10	0.82 - 1.48	1.06	0.76 - 1.49
2011	36.5	Reference		Reference	
Health insurance status					
Insured	47.7	1.26	0.87 - 1.81	1.27	0.88 - 1.82
Uninsured	37.9	Reference		Reference	

Note. Data obtained from the NIS-Teen 2011–2015*Note*: Reference is the category used in comparing other categories in the table.

In Table 2, the PR was calculated using the logistic regression model. Predicted marginal (prevalence) estimates were averaged over the possible response categories and compared to a reference category in the bivariate analysis. Covariates that were significantly associated in the bivariate were included in the multivariate analysis. The resulting PRs were a better alternative than using odds ratios because of their increased precision and ease of interpretation**.** The covariates included, as found in the sociodemographic variables, were age and race/ethnicity, while insurance was the independent variable and HPV vaccine was the dependent variable. Table 3 reports the health insurance coverage of the sampled population. Table 4 shows the results for RQ1.

Table 3

Prevalence and Adjusted Prevalence Ratios of Adolescent Females with Health Insurance; NIS-Teen 2011-2015

		Have Health Insurance			
Sociodemographic variables	Prevalence %	PR	PR (95% *CI*)	APR	APR (95% *CI*)
Age					
13	91.3	Reference			
14	92.5	1.01	0.95 - 1.08		
15	90.5	0.99	0.91 - 1.08		
16	89.1	0.98	0.90 - 1.05		
17	85.2	0.93	0.84 - 1.03		
Race/Ethnicity					
Hispanic	72.1	0.76	0.66 - 0.89	0.76	0.66 - 0.89
Non-Hispanic white	94.3	Reference		Reference	
Non-Hispanic black	91.4	0.97	0.92 - 1.02	0.97	0.92 - 1.02
Non-Hispanic other/multiple races	85.9	0.91	0.79 - 1.04	0.91	0.80 - 1.04
Survey year					
2015	90.7	1.03	0.94 - 1.12	1.04	0.95 - 1.13
2014	87.3	0.99	0.90 - 1.09	1.06	0.98 - 1.15
2013	93.1	1.06	0.98 - 1.14	1.06	0.98 - 1.15
2012	90.6	1.03	0.94 - 1.12	1.04	0.95 - 1.13
2011	88.1	Reference		Reference	
Health insurance status					
Insured	47.7	1.26	0.87 - 1.81	1.27	0.88 - 1.82
Uninsured	37.9	Reference		Reference	

Table 4

Hypothesis Test for Research Question 1 Insurance and HPV Vaccine for the Sampled Years 2011-2015

Hypothesis Test			
Test Statistic	*DF*	Value	*P*-Value
CHISQ (Obs - Exp)			
Wald-*F*	1	1.8487	0.1739

Chi-square was used to test the bivariate association between insurance and HPV vaccine in RQ 1. The test result denoted a *p*-value of 0.1739 ($p > 0.05$) significance level as found in Table 4. The result of the chi-square supported the null hypothesis. $H_0 1$: There is no association between ACA (insurance) and the HPV vaccination rate among adolescent females in Georgia. The *p*-value of 0.1739 indicated that there was a probability of 0.1739 that the sample statistic that I recorded could have occurred given my null hypothesis. Due to the probability being high in comparison to the significance level, there was not sufficient evidence to denote that a significant difference existed.

Based on the years surveyed, the insurance coverage after the implementation from 2011 was 88.1%, 2012 was 90.6% (APR =1.04, 95%; *CI* [0.95 – 1.13]), 2013 was 93.1% (APR= 1.06, 95% *CI* [0.98 -1.15]), but fell in 2014 to 87.3% (APR= 1.06, *CL* [0.98 -1.15]), and rose in 2015 to 90.7% (APR= 1.04, *CI* [0.95 – 1.13]). Most of the adolescent females had health insurance (89.9%, 95% *CI*, 87.2 – 93.1). Figure 1 illustrates the rate of HPV vaccination by health insurance status.

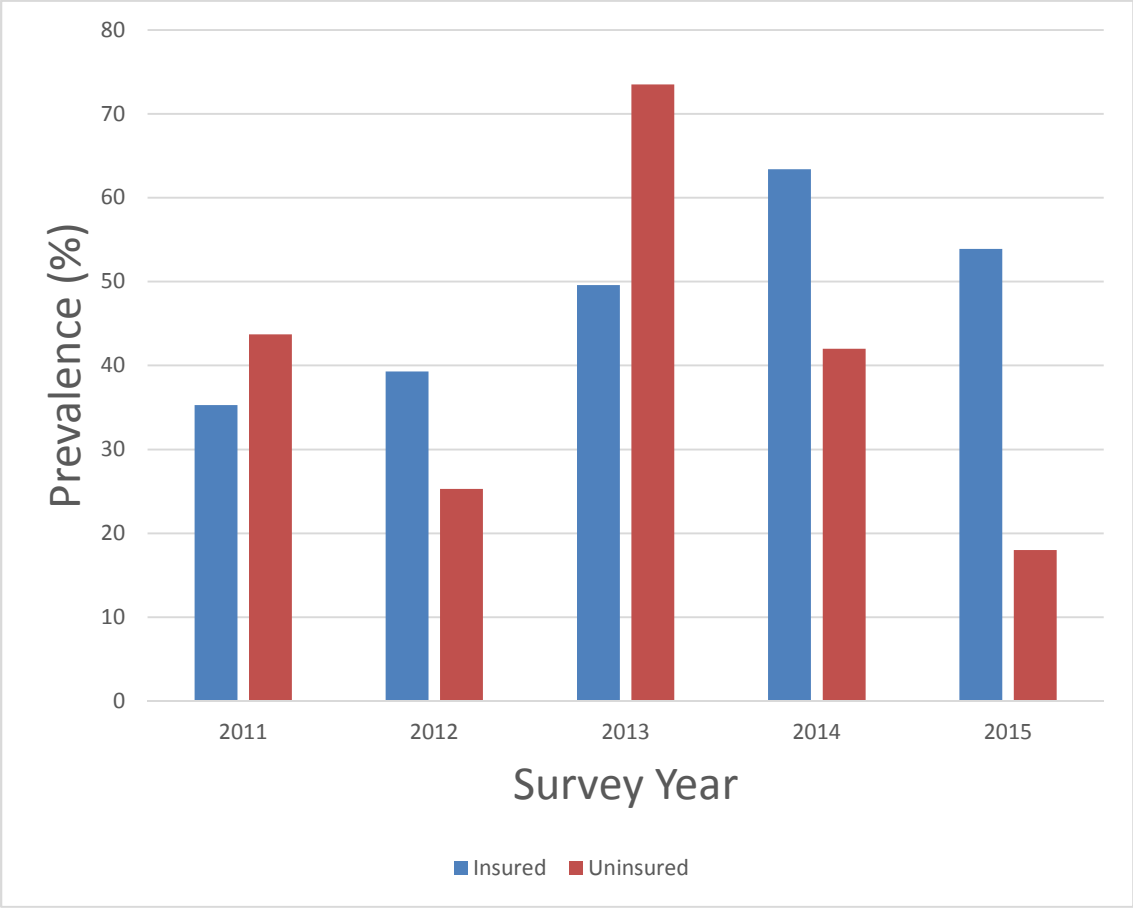

Figure 1. Prevalence of HPV vaccination by insurance status from 2011-2015.

Compared to the baseline year of 2011, the rate of HPV vaccination increased among insured adolescent females residing in Georgia from 35.3% to 53.9% in 2015. The highest increase occurred between 2014 and 2015 when HPV vaccination by insurance status was higher than the uninsured.

The result based on *p*-value suggested that ACA (health insurance) was not significantly associated with the HPV vaccination rate. However, the percentage of adolescent females who were vaccinated for HPV increased from 36.5% in 2013 to 58.6% in 2014, and for each year after 2012, adolescent females were more likely to be

vaccinated for HPV: 2013 (APR=1.42, 95% *CI* [1.05–1.91]), 2014 (APR=1.72, 95% *CI* [1.33 2.23]), 2015 (APR=1.42, 95% *CI* [1.08 – 1.87]). However, in 2013, the most significant increase in vaccination was among the uninsured but fell below the insured in both 2014 and 2015 steadily. HPV vaccination during the implementation of the ACA was also significantly associated with increasing age: age 14 (APR=1.36, 95% *CI* [1.01–1.85]), age 16 (APR=1.49, 95% *CI* [1.10–2.01]), age 17 (APR=1.65, 95% *CI* [1.23–2.20]).

Research Question 2

The percentage of adolescent females who visited a health care provider varied by insurance status from 2011 to 2015 (Figure 2). Adolescent females with health insurance consistently had a higher rate of health care provider visits than those without health insurance after the enactment of the ACA as found in Table 4. From 2011 to 2015, 87.2% (APR =1.49, 95% *CI* [1.21-1.85]) of insured adolescents and 54.5% of the uninsured adolescent females visited the health providers. Table 5 illustrates the rate of provider visits by the adolescent females residing in Georgia after the implementation of the ACA in 2011. Table 6 shows the association between insurance and provider visit.

Table 5

Prevalence and Adjusted Prevalence Ratios of Provider Visits; NIS-Teen 2011- 2015

	Health Care Provider Visits				
Sociodemographic variables	Prevalence %	PR	PR (95% CI)	APR	APR (95% CI)
Age					
13	87.3		Reference		
14	82.2	0.94	0.87 - 1.02		
15	83.4	0.96	0.87 - 1.05		
16	84.1	0.96	0.89 - 1.04		
17	81.4	0.93	0.85 - 1.02		
Race/Ethnicity					
Hispanic	65.8	0.75	0.64 - 0.87	0.87	0.76 - 0.99
Non-Hispanic white	88.0		Reference		Reference
Non-Hispanic black	83.7	0.95	0.89 - 1.01	0.97	0.89 - 1.05
Non-Hispanic other/multiple races	87.5	0.99	0.91 - 1.08	1.06	0.98 - 1.15
Survey year					
2015	81.0	1.00	0.93 - 1.14	1.02	0.93 - 1.13
2014	85.3	1.05	0.96 - 1.15	1.04	0.94 - 1.14
2013	87.0	1.07	0.97 - 1.17	0.99	0.88 - 1.12
2012	83.5	1.03	0.93 - 1.14	1.03	0.93 - 1.15
2011	81.4		Reference		Reference
Health insurance status					
Insured	87.2	1.60	1.26 - 2.03	1.49	1.21 - 1.85
Uninsured	54.5		Reference		Reference

Table 6

Hypothesis Test for Research Question 2 Insurance and Provider Visit for the Sampled Years 2011-2015

Hypothesis Test			
Test Statistic	*DF*	Value	*P*-Value
CHISQ (Obs - Exp)			
Wald-*F*	1	16.9608	0.0000

During subsequent years, the rate of provider visits was the following: 2012 was 83.5% (APR =1.03, 95% *CI* [0.93-1.15]); 2013 was 87.0% (APR = 0.99, 95% *CI* [0.88 - 1.12]); 2014 was 85.3 % (APR = 1.04, 95% *CI* [0.94 -1.14]); and 2015 was 81.0% (APR= 1.02, 95% *CI* [0.93 – 1.13]). Most of the adolescent females visited the doctor in the past 12 months before the interview (83.6%, 95% *CI*, 81.0– 86.0) and had health insurance (89.9%, 95% *CI*, 87.2 – 93.1).

The result denoted a *p*-value of 0.0000 ($p < 0.05$) significance level, which was statistically significant. The $p < 0.05$ indicated a strong association between ACA and provider visit, thereby supporting the alternative hypothesis. H_a2**:** There is an association between the ACA and the rate of provider visit among adolescent females in Georgia. Figure 2 shows the significant association between the ACA and the rate of provider visit.

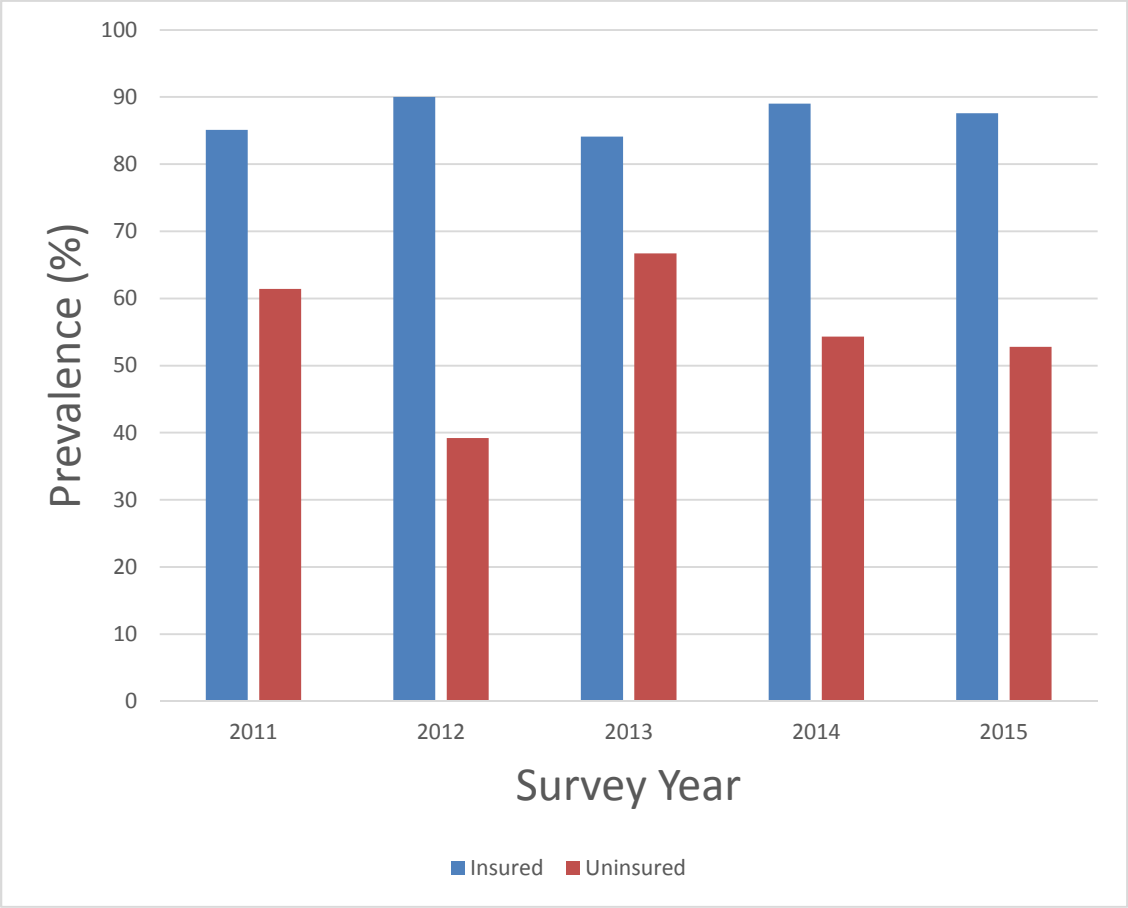

Figure 2. Prevalence of provider visits by insurance status from 2011-2015.

Research Question 3

After adjusting for significant study variables, adolescent females with health insurance were 1.49 times more likely (APR=1.49, 95% *CI* [1.21–1.85]) to visit their health care provider than those without health insurance. The HPV vaccination was significantly associated with health care provider visits as well (Table 7 and Figure 3). In addition, 50% of adolescent females who visited their health care provider in the past 12 months were vaccinated for HPV and were 56% more likely to receive the HPV vaccination than those who did not visit their health care provider (APR=1.56, 95% *CI*

[1.20 – 2.03]). Also, 50% (APR=1.56, 95% *CI* [1.20 -2.03]) of the sampled population indicated that they visited their provider in the past 12 months.

Table 7

Prevalence and Adjusted Prevalence Ratios for HPV Vaccination Adjusted for Provider Visits; NIS-Teen 2011-2015

	Ever Been Vaccinated for HPV				
Sociodemographic variables	Prevalence %	PR	PR (95% *CI*)	APR	APR (95% *CI*)
Age					
13	37.2		Reference		Reference
14	43.5	1.17	0.89 - 1.53	1.24	0.95 - 1.61
15	44.0	1.18	0.89 - 1.57	1.21	0.92 - 1.60
16	53.1	1.43	1.11 - 1.84	1.47	1.15 - 1.89
17	56.4	1.52	1.18 - 1.95	1.59	1.25 - 2.02
Race/Ethnicity					
Hispanic	43.5	0.90	0.70 - 1.16		
Non-Hispanic white	48.2		Reference		
Non-Hispanic black	47.0	0.97	0.82 - 1.16		
Non-Hispanic other/multiple races	44.3	0.92	0.67 - 1.26		
Survey year					
2015	46.7	1.28	1.01 - 1.62	1.29	1.03 - 1.61
2014	58.6	1.60	1.28 - 2.02	1.59	1.28 - 1.98
2013	53.5	1.46	1.14 - 1.89	1.44	1.14 - 1.83
2012	40.3	1.10	0.82 - 1.48	1.11	0.83 - 1.47
2011	36.5		Reference		Reference
Visited the doctor within the past 12 months					
Yes	50.0	1.57	1.20 - 2.03	1.56	1.20 - 2.03
No	32.0		Reference		Reference

Table 8

Research Question 3: Provider Visit and HPV Vaccination for Years 2011-2015

Hypothesis Test			
Test Statistic	*DF*	Value	*P*-Value
CHISQ (Obs - Exp)			
Wald-*F*	*1*	*14.3670*	*0.0002*

I used a chi-square to test the association between provider visit and the HPV vaccination. I found denoted a *p*-value (*p* 0.0002), which was statistically significantly lower than ($p < 0.05$). The result of the hypothesis test ($p = 0.0002$) supported the alternative hypothesis**.** H_a3: There is a significant association between the provider visit and the HPV vaccination rate among adolescent females in Georgia. $P < 0.05$ was statistically significant, denoting a strong association between provider visit and the HPV vaccination rate.

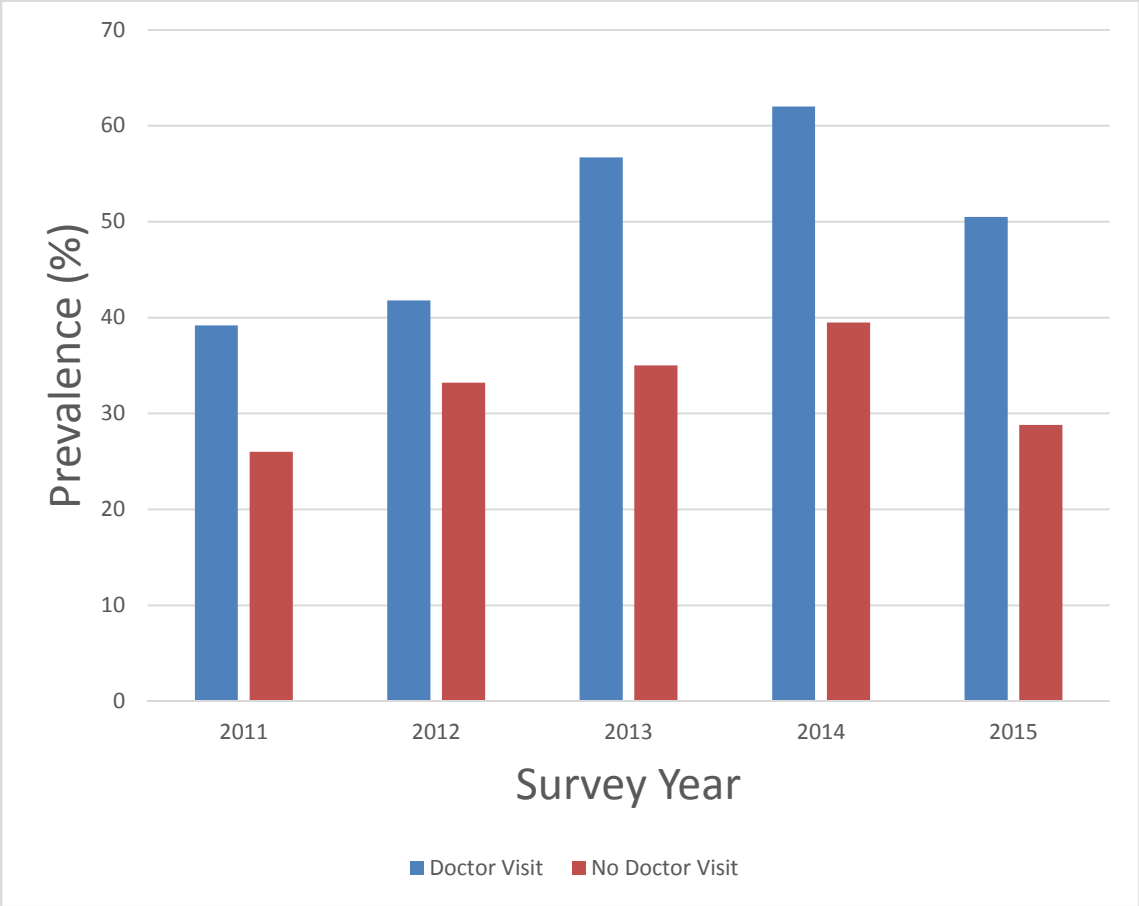

Figure 3. Prevalence of HPV vaccination and provider visits from 2011–2015.

Research Question 4

The health insurance coverage for non-Hispanic White was 94.3% (ref), non-Hispanic Black was 91.4 % (APR= 0.97, *CI* [0.92 – 1.02]), and non-Hispanic other/multiple races was 85.9% (APR= 0.91, *CL* [0.80 -1.04]). After adjusting for significant study variables, Hispanic adolescent females were less likely to be insured compared to non-Hispanic adolescent females (APR=0.76, 95%, *CI* [0.66 – 0.89]). Hispanic females were less likely to visit their health care provider (APR=0.87, 95%, *CI* [0.87 – 0.99]) compared to non-Hispanic Whites.

The rate of adolescent females who received HPV vaccination increased for each racial/ethnic group from 2011 to 2015 (Figure 4). The most substantial increase occurred among Hispanic and non-Hispanic Black females, in which the HPV vaccination rate rose from 26.1% and 41.7% in 2012 to 65.5% and 58.4% in 2013 for Hispanics and non-Hispanic Black females, respectively. There was a general increase in HPV vaccination from 39.2% in 2011 to 50.5% in 2015 among adolescent females regardless of race. Table 9 shows the results for RQ 4. Figure 4 shows the prevalence of HPV vaccination by race/ethnicity from 2011-2015.

Table 9

Research Question 4: Race/Ethnicity and HPV Vaccination the Years 2011-2015

Hypothesis Test			
Test Statistic	*DF*	Value	*P*-Value
CHISQ (Obs - Exp)			
Wald-*F*	*3*	*0.2845*	*0.8366*

I found that the *p-value* was (*p* 0.8366) was greater than (*p* >0.05) statistical significance level. This result indicated that race/ethnicity was not strongly associated with the HPV vaccination rate. The output result supported the null hypothesis. $H_0$4: There is no association between race/ethnicity and the HPV vaccination rate among adolescent females in Georgia.

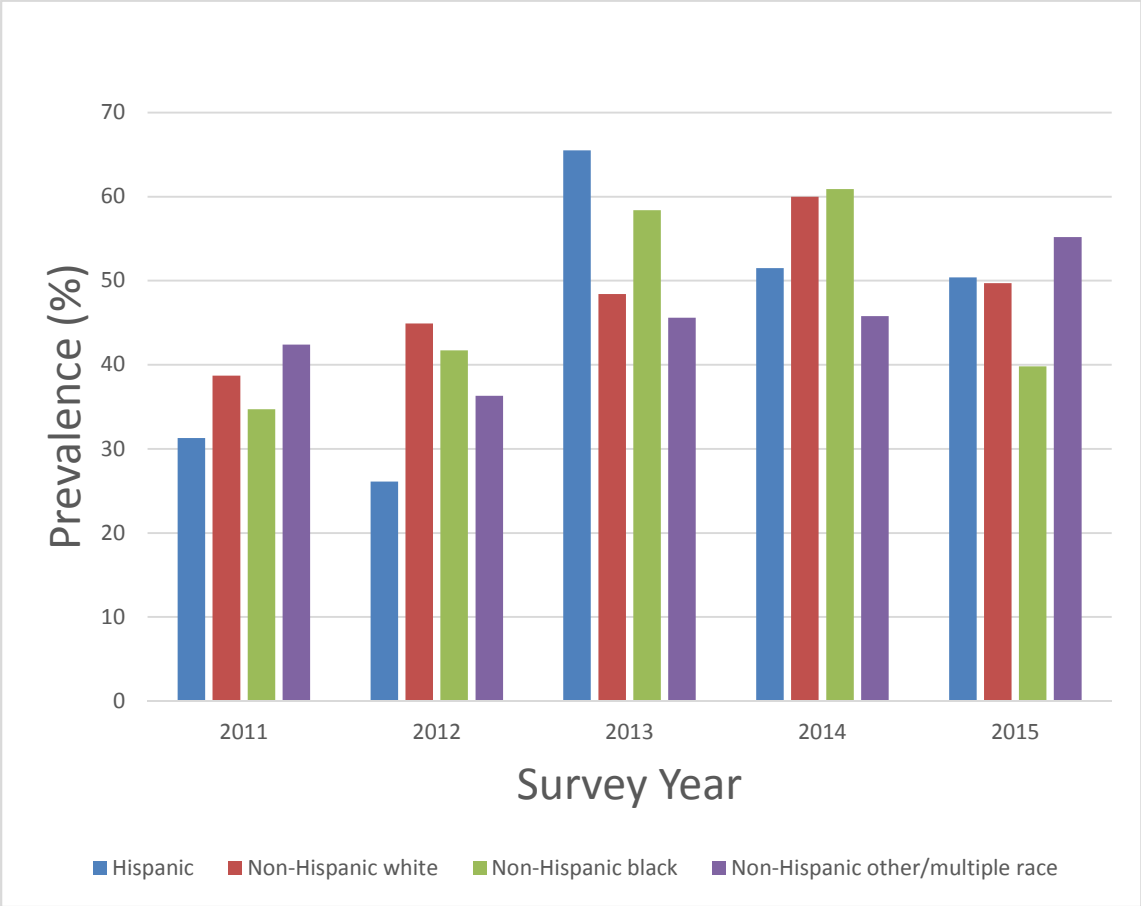

Figure 4. Prevalence of HPV vaccination by race/ethnicity from 2011-2015.

Summary

Chapter 4 contained the introduction that comprised of the purpose, research questions, hypotheses and preview of the organization, and data collection. Descriptive statistics that characterized the sampled population were presented based on variance estimation computed using the Taylor linearization method. Linear regression was run on NIS-Teen data individually and collectively to compare the dependent variable to the independent variables. Logistic regression was used to calculate the prevalence, PRs, and 95% *CI*s for each independent variable to assess the association with the outcome

measures of this study. For the multivariable analyses, all significant study variables were controlled ($p<0.05$) to calculate the APRs.

The data analysis for this study was generated using SAS-Callable SUDAAN software (Release 10.0, Research Triangle Institute NC, 2012) of the NIS-Teen data from 2011–2015. The analysis of the results was presented and discussed in sequence, which consisted of the demographics, each research question, hypotheses, and the data analysis pertinent to each question. Discussion involved the analysis of each independent variable in determining whether or not the results supported either the null or alternative hypothesis.

Four research questions and independent variables, including hypotheses, were examined through chi-square tests. Two of the research questions and hypotheses supported the alternative hypotheses: RQ2: Is there any association between ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia? RQ3: Is there any association between provider visits and the HPV vaccination rate among adolescent females in Georgia? On the contrary, RQ1 supported the null hypothesis: Is there any association between ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia? However, it was noted that 31.8% of responses missed answering questions regarding health insurance. Finally, RQ4 supported the null hypothesis indicating that there was no association between race/ethnicity with the HPV vaccination rate. I found that the prevalence of adolescent females who received the HPV vaccination increased for each racial/ethnic group from 2011 to 2015. The interpretation

of findings, limitations of the study, recommendations, implication for social change, and conclusion are found in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The use of the HPV vaccine remained below the Healthy People 2020 target for adolescent females in Georgia, although the HPV virus is the most prevalent cause of STDs among teenage females in the United States (CDC, 2015; Satterwhite et al., 2013) and cancers in adulthood (Dunne et al., 2014). HPV is associated with cervical and oropharyngeal cancers, which are prevalent in Georgia and are above the national average (Berzen et al., 2016). Also, the mortality rate for cervical cancer, oral cavity, and pharynx cancers are 2.6% (National Cancer Institute, n.d.). The potential barrier noted for the decreased use of the HPV vaccine was cost resulting from out-of-pocket expenses for those with private insurance and the uninsured. This quantitative secondary data analysis of NIS-Teen data was conducted to explore if there was an association between the ACA and the use rate of the HPV vaccine among adolescent females in Georgia after its enactment.

I found that there was a strong association between the ACA and provider visits (83.6%, 95% *Cl*, 81.0–86.0), and 89.9% of adolescent females had health insurance. The provider visit was statistically significantly associated with increased rate of HPV vaccination $p=0.0002$ ($p<0.05$).

Compared to the baseline year of 2011, the rate of HPV vaccination increased among the insured adolescent females in Georgia from 35.3% to 53.9% in 2015. From 2011–2012, HPV vaccinations among the uninsured decreased from 43.7% to 25.3%, rose sharply to 73.5% in 2013, and then declined to 18.0% in 2015.

There was no significant association between the ACA and the HPV vaccination rate based on the analysis. However, the analysis of the other covariates in this study denoted a steady increase in HPV vaccination rate, such as provider visit and race/ethnicity, including age. I found an increase in the HPV vaccination rate from 39.2% in 2011 to 50.5% in 2015 among adolescent females, regardless of race/ethnicity. The most gain occurred among Hispanic and non-Hispanic Black females, in which the rate of HPV vaccination rose from 26.1% and 41.7% in 2012 to 65.5% and 58.4% in 2013 respectively.

The results of the increased use of HPV vaccine suggested that 31.8% of the missed responses to the questions about health insurance likely distorted the outcome result of the association between the ACA and the HPV vaccine. The missing data for the health insurance questions were due to the failure of respondents to complete the sections of the interview pertaining to insurance.

Interpretation of the Findings

The findings of this quantitative secondary data analysis relating to the independent variables and the dependent variable of HPV vaccination rate, including whether the results supported the alternative or null hypothesis of each research question, were reported in Chapter 4. The interpretation of the findings of this secondary data analysis can be compared with the findings of the literature review in Chapter 2 by discussing the four research questions.

Research Question 1

Is there any association between the ACA with no cost-sharing and the HPV vaccination rate among adolescent females in Georgia?

I found that there was no statistically significant association between the ACA and the rate of HPV vaccination ($p = 0.1739$, $p > 0.005$). However, the logistic regression analyses showed that adolescent females in Georgia were 1.42 times more likely to be vaccinated in 2013 (95% *CI*, 1.05–1.91), 1.72 times in 2014 (95% *CI*, 1.33–2.23), and 1.42 times in 2015 (95% *CI*, 1.08–1.87). Also, adolescent females were 1.36 times more likely to be vaccinated at age 14 (95% *CI*, 1.01–1.85), 1.49 times at age 16 (95% *CI*, 1.10 –2.01), and 1.65 times age 17 (95% *CI*, 1.23–2.20).

Although I found that there was no significant association between the ACA and the HPV vaccination rate, I found that the rate of HPV vaccination steadily increased for the insured teens and fluctuated among the uninsured. Further, among the uninsured teen females, the highest increase in HPV vaccination occurred in 2013. Also, the 95% *CI* showed the positive effect of the ACA on the HPV vaccination rate. The result was likely skewed because 31.8% of responses missed the questions about health insurance, which probably impacted the result.

These findings conflicted with the literature in Chapter 2. Shen et al. (2014) estimated how immunization rate might improve if cost-sharing was removed. Shen et al. focused on changes in vaccination rates and spending associated with extending first-dollar coverage to privately insured children for four childhood vaccines. Shen et al. revealed that 36.9% of adolescents with private insurance received at least one dose of

the HPV vaccine. Eliminating cost-sharing had an estimated effect of 40,000 additional HPV immunizations (Shen et al., 2014). Shen et al. suggested that vaccination rates would increase modestly, and the increases would be more substantial for those currently facing cost-sharing. The data analysis on RQ1 in Chapter 4 revealed that, compared to the baseline year of 2011, the rate of HPV vaccination increased among insured adolescent females in Georgia from 35.3% to 53.9% in 2015.

Also**,** the KFF's (2016) review on HPV vaccine access and use in the United States reported that the uptake and awareness of the HPV vaccine have slowly improved. The KFF noted that the HPV vaccination rates significantly increased in five states, and Georgia was one of the states, between 2013 and 2014. The result was confirmed by the analysis in Chapter 4 on RQ1 that showed that the rate of adolescent females who were vaccinated for HPV increased from 36.5% in 2013 to 58.6% in 2014. Also, for each year after 2012, adolescent females were more likely to be vaccinated.

Both findings in the literature disconfirmed the null hypothesis but confirmed an increase in HPV vaccination rate, mostly among the insured in this study. I found out that the missing values relating to insurance coverage of the respondents likely distorted the outcome**.** However, the remaining data for health insurance coverage were sufficient to produce estimates representative of the state of Georgia, as noted in the analysis of RQ1.

Further, the outcome of the analysis of RQ1 extended knowledge. I found that the HPV vaccination was significantly associated with increasing age. I found that adolescent females were 1.36 times more likely to be vaccinated at age 14, 1.49 times at age 16, and 1.65 times at age 17 years. Reijneveld et al. (2014) assessed the use of care among 2,230

adolescents by type and age. Reijneveld et al. identified that the overall use of services increased with age (predisposing factor).

Research Question 2

Is there any association between the ACA with no cost-sharing and the rate of provider visit among adolescent females in Georgia?

I found that the insurance coverage after the implementation of the ACA rose from 88.1% in 2011 to 90.6% (APR = 1.04, 95% *CI* [0.95–1.13]) in 2012, 93.1% (APR= 1.06, 95% *CI* [0.98 1.15]) in 2013, but fell in 2014 to 87.3% (APR= 1.06, *CI* [0.98-1.15]) and increased in 2015 to 90.7% (APR = 1.04, *CI* [0.95 – 1.13]). The proportion of adolescent females with health insurance was between 87.2%-93.1% based on 95% *CI*. From 2011 to 2015, adolescent females with health insurance were 1.49 times more likely (95% *CI*, 1.21–1.85, $P < 0.0001$) to visit their health care provider than the uninsured. I found a statistically significant degree of association between the ACA and provider visits. I found that 50% (APR= 1.56, 95% *CI* [1.20 2.03]) of the sampled population visited their provider in the past 12 months.

This finding is similar to Tebb et al. (2015) who examined the level of the health care of teens during the implementation phases of the ACA. Tebb et al. revealed that the proportion of adolescents and children who were uninsured dropped from 10% to 5.5% in 2012 after the implementation of the ACA. The increase in insurance rates among the teens was credited with increased access to provider visits (Tebb et al., 2015).

Also, Weller et al. (2003) conducted a cross-sectional study on CSHCN to determine how sociodemographic factors and type of insurance influence use of medical

and health-related services. Weller et al. identified that enabling factor (insurance) was associated with the use of health services. This finding is similar to the result of RQ2 that showed that adolescent females with health insurance (enabling factor) were 1.49 times more likely to visit their health care provider.

Hall and Lord (2014) noted that the significant achievement of the ACA was the expansion of Medicaid to low-income families near the poverty line and the provision of subsidies for those above the poverty threshold to buy insurance from the established marketplace or insurance exchanges. Also, Curtis et al. (2014) reported that the ACA aimed at expanding access to preventive services by establishing a mandatory fund for CHCs and SBHCs to provide health care services to the uninsured and underserved populations. These provisions of the ACA increased access to the providers, as depicted in the result of this analysis for RQ2.

Research Question 3

Is there any association between provider visits and the HPV vaccination rate among adolescent females in Georgia?

I found that adolescent females with health insurance were 1.49 times more likely (95% *CI*, 1.21–1.85) to visit their health care provider than those without health insurance. In addition, 50% (APR=1.56, 95% *CI* [1.20 -2.03]) of the sampled population visited their provider within 12 months. Also, 50% of adolescent females who visited their health care provider in the past 12 months were vaccinated for HPV and were 56% more likely to receive an HPV vaccination (APR =.56, 95% *CI* [1.20 – 2.03], p <0.0002).

I found a statistically significant strong association between provider visits and the rate of HPV vaccination. A high degree of association was noted based on the 95% *CI*.

This finding was confirmed by Farmar et al. (2016) who examined the effects of implementing bundling of vaccines, offering vaccines on every visit and using standard orders in an integrated urban safety net health system among teen females. Farmar et al. found an increased rate of HPV coverage of ≥1 dose of 89.8% for females between 13 to 17 years, compared to national rates of 57.3% (Farmar et al., 2016). Also, the rates of HPV coverage (≥3 doses) were 66.0% for the sampled population compared to the national rate of 37.6% at the same period (Farmar et al., 2016). Farmar et al. revealed that bundling of vaccines during each provider visit minimized missed opportunities, which led to a higher vaccination rate in this health clinic.

Stokley et al. (2013) examined the rate of HPV vaccination among adolescent females using the data from 2007–2012 NIS-Teen survey depicted increased missed opportunities for HPV vaccination. Stokley et al. identified that 84% of unvaccinated girls had provider visits where another vaccine was given. Stokley et al. noted that if the HPV 3 dose series was started at these visits, the use of ≥1 dose could have risen to 92.6%.

Also, Vadaparampil and Perkins (2014) indicated that the adoption of provider practices to use acute or problem visits to initiate and provide catch-up vaccinations has the potential to increase the uptake of the HPV vaccine. Further, Gable et al. (2016) reported that the timeline recommended for the HPV vaccination corresponds to the vaccination series for Tdap and MCV4. Starting the HPV vaccine series during every

health care encounter can enhance the opportunities for improving vaccine coverage. Taking advantage of every health care encounter or provider visit provides opportunities for provider recommendation of the HPV vaccine. I found in the analysis of RQ3 that 50% of adolescent females who visited their health care provider in the past 12 months were vaccinated for HPV and were 56% more likely to receive the HPV vaccination.

The Georgia Health Policy Center (2012) reported that the funding for the ACA provided community-based prevention, clinical prevention, infrastructure, and workforce, including research and data collection. Part of the funding was used in establishing SBHCs in three counties in Georgia based on the need assessment: Ware, Berrien, and DeKalb counties (Georgia Health Policy Center, 2012). All of these infrastructures aim at improving access and quality of preventive services for adolescents (Curtis et al., 2014). The infrastructures created a regular source of care that was linked with increased use of health services (Babitsch et al., 2012). Expanding access with no cost-sharing with the infrastructures subsequently increased provider visits and usage of the HPV vaccine, as denoted in the analysis of RQ3. Dixon and Hertelendy (2014) noted that the implementation of the ACA increased access to insurance and preventive services coverage.

Research Question 4

As Georgia did not expand Medicaid under ACA, is there any association between race and the HPV vaccination rate among adolescent females in Georgia?

I found in the results of RQ4 that there was no association between race and HPV vaccination rate, although Georgia did not expand Medicaid. The rate of adolescent

females who received the HPV vaccination increased for each racial/ethnic group from 2011 to 2015, with (p = 0.8366) *(*p >0.05). The most substantial increase occurred among Hispanic and non-Hispanic Black females where HPV vaccination rose from 26.1% and 41.7% in 2012 to 65.5% and 58.4% in 2013. The general increase in HPV vaccination from 39.2% in 2011 to 50.5% in 2015 occurred among adolescent females regardless of race. Although Georgia did not expand Medicaid, race/ethnicity did not have a statistical significance on the HPV vaccination rate, as there was a general increase in all races/ethnicities.

Bednarczyk et al. (2017) evaluated the patterns of the HPV vaccine uptake by race/ethnicity and poverty status using the NIS-Teen data from 2008 -2011. Bednarczyk et al. indicated Hispanic females had the highest increase in initiation and uptake of HPV vaccine by 2011, 44.4% and 20.6 % respectively. However, the findings in this current study showed that the most increase occurred among Hispanic and non-Hispanic Black females where HPV vaccination rose from 26.1% and 41.7% in 2012 to 65.5% and 58.4% in 2013 respectively. Also, there was an increase in HPV vaccination from 39.2% in 2011 to 50.5% in 2015 among adolescent females regardless of race in Georgia.

Niccolai et al. (2011) assessed the effects of race/ethnicity, poverty, and completion of the three-dose HPV vaccine series among those who initiated vaccination. The study was conducted among adolescent females, ages13 to 17 years, using data from the 2008-2009 NIS-Teen. The sampled population was (n=7606), and analysis was done with logistic regression to adjust for covariates and measures of access to care from 2010-2011 (Niccolai et al., 2011). Niccolai et al. revealed that 55% of adolescent girls

completed the three series, but on controlling covariates, variation existed based on race. Black (AOR = 0.48, 95% *CI* [0.40, 0.57]) or Hispanic (AOR= 0.75, 95% *CI* [0.64, 0.88]) were significantly less likely to complete vaccination than Whites (Niccolai et al., 2011). ACA expanded access and provided infrastructures to improve access irrespective of race or ethnicity. However, some states', including the state of Georgia, refusal to expand Medicaid has the potential of hindering access to preventive services such as HPV vaccine, resulting from disparity associated with race. However, the infrastructures and funding the ACA provided, and the VFC program, could enhance the use of the HPV vaccine. The foundations could explain the current finding on RQ4 that showed an increase in HPV vaccination among adolescent females regardless of race and non-Medicaid expansion from 2011–2015 in Georgia.

The result of the analysis of RQ4 was different from previous studies on race/ethnicity and HPV vaccination. Forsberg et al. (2014) assessed the HPV vaccination rate based on race/ethnicity on adolescent females and observed differences in access. Forsberg et al. identified that Hispanics were more likely than Whites or Blacks to initiate the HPV vaccine. However, White teens were most likely to complete the three-vaccine series (Forsberg et al., 2014). Also, Jeudin et al. (2014) reported that low-income and minority adolescents were more likely to start the HPV vaccination series than White and higher-income adolescents but were less likely to complete the series. Although the series of HPV vaccination was not included in the analysis of the current study, I found that HPV vaccine uptake increased among all races from 39.2% in 2011 to 50.5% in 2015. The results of RQ4 supported the null hypothesis that race did not have an association

with HPV vaccination rate, although Georgia did not expand Medicaid, and the minorities (Hispanic and Blacks) are economically disadvantaged.

Interpretation of the Findings in the Context of the Theoretical Framework

Andersen's BM of health care use was applied to this study. Andersen (1968) described health care use as the use of health care services by individuals for preventing, curing diseases, health promotion, and maintenance. Andersen initially postulated this behavioral model in 1968, where a three-stage model consisting of predisposing, enabling, and need components were used to expound on the divergent use of medical care services by families. Andersen developed this framework to determine situations of factors that aid or hinder individual's use of health services. This BM evolved as a multilevel model that incorporated both individual and contextual determinants of the use of health services (Babitsch et al., 2012). The BM consists of three factors: predisposing, enabling, and need factors (Andersen, 1968).

As this behavioral model evolved, Anderson (1995) defined access in multidimensional terms using potential access as the existence of enabling resources that enhance the use. Realized access is the use of services. Equitable access is dependent on demographic characteristics and needs factors (Lo & Fulda, 2008), while inequitable access results when the social structure, health belief, and enabling resources demarcate medical usage (Andersen, 1995). In using the BM in fostering equitable access, a variable must point to changes in policy that could cause a change in behavior (Andersen, 1995). I focused on a policy change, which was the ACA, to ascertain if the change in policy could have influenced the use of HPV vaccine.

For this study, the variables analyzed were within the three factors that Andersen proposed that influence health care use. The variables examined were race/ethnicity (predisposing factor); insurance/ACA, usual source of care/rate of contact with the provider (provider visits) (enabling factor); and HPV vaccine (need factor).

Race/Ethnicity for Predisposing Factors

Race/ethnicity is a social factor that predisposes the use of health care services. The adolescents vary by race and ethnicity reflecting a diverse population with differed socioeconomic status (HHS, 2016). Racial minorities have less access to health care (HHS, 2016). Blacks are at higher risk of being uninsured than Whites (KFF, 2016). The disparity in insurance coverage was higher for Hispanics, who accounted for 20% of the nonelderly population but nearly a third (32%) of the nonelderly uninsured population (KFF, 2016). Hispanics and Blacks have significantly higher uninsured rates (17.2% and 12.2%, respectively) than Whites (8.1%; KFF, 2016**).**

Scholars who examined the HPV vaccination rate based on race/ethnicity observed differences in access (Forsberg et al., 2014). Also, Jeudin et al. (2014) evaluated the uptake of HPV vaccine among adolescent females and identified that Hispanics were more likely than Whites or Blacks to initiate the HPV vaccine. However, White teens were most likely to complete the three-vaccine series (Forsberg et al., 2014). Limited access and health disparities associated with race/ethnicity can result in low patient engagement with health providers and underuse of health services (Washington, 2014). Washington (2014) noted that lack of access or insurance coverage can impact the use of health care services among this group.

In this study, although Georgia did not expand Medicaid, race/ethnicity did not have statistical significance on the HPV vaccination rate. The highest increase occurred among Hispanic and non-Hispanic Black females. In both races, the HPV vaccination rate rose from 26.1% and 41.7% in 2012 to 65.5% and 58.4% in 2013 respectively. Also, there was an increase in the HPV vaccination from 39.2% in 2011 to 50.5% in 2015 among adolescent females regardless of race in Georgia. The outcome could result from the expanded access provided by the ACA through the infrastructures established, no cost-sharing for preventive services, subsidies for families to purchase health insurance in the market place, and **S**CHIP. I found that race/ethnicity (predisposing factor) was not the most significant factor that enhanced use of the HPV vaccine.

Insurance (ACA) and Provider Visits as Enabling Factors

Enabling factors enhance the use of health services. The enabling factors applicable to this study were health insurance coverage (ACA) and provider visit (a regular source of care).

Insurance (ACA)

Being insured enhances the potential for significant use of health services while preventing delay in service in varied groups or population (Babitsch et al., 2012). The ACA aimed at making health care more accessible and affordable, while improving quality (Obama, 2016). The ACA was credited with reducing the uninsured rate from 16.0% in 2010 to 9.1% in 2015, down by 43% (Obama, 2016).

Before the ACA, a significant barrier to immunization was financial that involved out-of-pocket costs, and about 7% of individuals with private insurance encountered cost-

sharing (Shen et al., 2014). Shen et al. (2014) reported that the rate of HPV vaccination was lower among adolescents who encountered cost-sharing. Shen et al. suggested that eliminating cost-sharing will increase compliance and vaccine uptake. In 2009, prior the enactment of the ACA, the vaccination rate for adolescents ages 13–17 years who received ≥1 HPV dose series in Georgia was 38.6% (Dorell et al. 2010).

Underwood et al. (2015) investigated the receipt of the HPV vaccine series 1 and 3 on both female and male adolescents, parental attitudes, and correlation of vaccine initiation and completion. Underwood et al. revealed that adolescents in high school with private insurance who encountered out-of-pocket expenses were at increased odds of completing three doses compared to those with Medicaid coverage. After the enactment of the ACA in 2010, the ≥1 HPV dose series coverage among teen females ages 13 to 17 years increased from 53.1% and 65.4% between 2013 and 2014 (CDC, 2015).

Based on the data analysis of RQ1, the ACA was not statistically significantly associated with HPV vaccine use. I found that, compared to the baseline year of 2011, the rate of HPV vaccinations increased among insured adolescent females in Georgia from 35.3% to 53.9% in 2015. Also, from 2011–2012, the HPV vaccination rate among the uninsured decreased from 43.7% to 25.3%, rose sharply to 73.5% in 2013, and then declined to 18.0% in 2015. The outcome could be attributed to 31.8% of responses that missed questions regarding health insurance, which introduced bias to this result. However based on the 95% *CI*, adolescent females were significantly more likely to be vaccinated for HPV (ref = 2011): 2013 (APR=1.42, 95% *CI* [1.05–1.91]), 2014 (APR=1.72, 95% *CI* [1.33–2.23]), 2015 (APR=1.42, 95% *CI* [1.08–1.87]).

Provider Visits (Enabling Factor)

Provider visit is a health encounter that can occur in acute settings or well visits, and these are opportunities for vaccination (Stokley et al., 2013). A regular source of care was associated with increased use of health care services (Babitsch et al., 2012). Stokley et al. (2013) argued that every health care visit, for acute problems or back-to-school evaluations, is an opportunity to assess the immunization status of adolescents

Stokley et al. (2013) reported there was increased missed opportunities for HPV vaccination while there was higher coverage of other vaccines recommended for adolescents within the same period after the evaluation of data from 2007–2012 NIS-Teen survey. Stokley et al. noted that 84% of unvaccinated girls had provider visits where another vaccine was given. Stokley et al. identified that starting the HPV 3 dose series at these visits could have increased the use of ≥1 dose to 92.6%. Also, enhancing the use of the HPV vaccine in the United States was possible with the current infrastructure and health care use (Stokley et al., 2013).

The ACA provided funding for CHCs, SBHC, and local health departments as a means of increasing and sustaining the infrastructure that offers safety net preventive and health care services (Curtis et al., 2014; Forsberg et al., 2014). The Georgia Health Policy Center (2012) reported that this funding was used to establish community-based prevention, clinical prevention, infrastructure, and workforce, including research and data collection in Georgia. The infrastructures the ACA aimed at improving access and quality of preventive services for adolescents (Curtis et al., 2014). These infrastructures created a regular source of care that was linked with increased use of health services (Babitsch et

al., 2012). Expanding access with no cost-sharing with the infrastructures subsequently increased provider visits and usage of HPV vaccine, as denoted in this analysis.

Based on the findings of RQ2, the ACA was statistically significantly associated with provider visit ($P < 0.0001$), and provider visit in RQ3 was statistically significantly ($p < 0.0002$) associated with increased HPV vaccination rate among adolescent in Georgia. In addition, 50% (APR=1.56, 95% *CI* [1.20-2.03]) of the sample population visited the provider in the past 12 months. Also, 56% of adolescent females were more likely to receive an HPV vaccination than those who did not visit their health care provider.

HPV Vaccine as Need Factor

The individual perceived need is based on view and experience on general health, functional state, and illness that prompt the use medical services (Babitsch et al., 2012). Anderson (1995) explained that perceived need is not primarily a gauge of disease, but health beliefs and social structure can expound a social phenomenon if adequately modeled.

Andersen's BM was used to design and request information about adolescent interactions with the health care system and health providers (Massey et al., 2012). Massey et al. (2012) denoted that perceived need for well-care visits influenced the use of health care services. Massey et al. noted that most of the teens visited a provider only when they were ill or needed a sports physical. Although these adolescents had insurance coverage, underlying factor like perceived need could influence the use of the HPV vaccine, despite having access to a provider.

For this study, the perceived need for HPV vaccine was assessed by the rate of provider visit and the HPV vaccination rate. The need for HPV vaccine prompted the visit to the provider. In addition, 50% (APR = 1.56, 95% *CI* [1.20 -2.03]) of the sampled population visited the provider in the past 12 months, and 50% of adolescent females who visited their health care provider in the past 12 months were vaccinated for HPV and were 56% more likely to receive an HPV vaccination than those who did not visit their health care provider.

Andersen (1995) identified that in promoting equitable access to health care use, a variable must point to changes in policy that could cause a change in behavior. I focused on a policy change (ACA) to determine if the change in policy influenced the use of HPV vaccine. I found there was a change in behavior, showed by increased provider visits and HPV vaccination rate. The rate of HPV vaccination increased among insured adolescent females in Georgia from 35.3% to 53.9% in 2015. Also, from 2011–2012, the HPV vaccination rate among the uninsured decreased from 43.7% to 25.3%, rose sharply to 73.5% in 2013, and then declined to 18.0% in 2015**.**

Among the three factors, predisposing, enabling, and need factors discussed under the Andersen's BM, provider visit was statistically significantly associated with the ACA ($P < 0.0001$). Also, provider visit was statistically significantly associated with increased HPV vaccination rate ($p < 0.0002$) among adolescent females in Georgia. I found that the ACA had a positive effect on HPV vaccination and significant effect on the rate of provider visit. However, the provider visit was the most significant influencing factor that impacted the use of the HPV vaccine usage among adolescent females in Georgia.

Limitations of the Study

The limitations are discussed under the threats to validity, which consist of construct, internal, and external validity.

Construct Validity

The threat to the construct could arise from the structuring of the research questions based on available data, including inferring the result of RQ1 in the outcome finding. Nonresponse bias was noted, as 31.8% of the respondents did not respond to the question about health insurance. The bias was minimized through the multivariate analysis with a 95% *CI*.

Internal Validity

The internal validity referred to the validity of association with the result of this study. The threat to internal validity resulted from the data analysis on multiple years, 2011 to 2015, population mobility from the relocation of residence, or scattering of records due to the use of more than one provider could result in underreporting of immunization records by providers. Also, a decrease in response rate can increase nonresponse bias. Nonresponse rate bias was noted in RQ1, where 31.8% of the respondents did not respond to the question pertaining to health insurance. The nonresponse rate introduced bias to the result, although the sampled population for analysis was n=1,500. However, the 95% *CI* indicated a positive association between the ACA and the HPV vaccination rate.

For this study, only a small set of variables was applied to Andersen's BM. Also, there were variations on how the variables were categorized and assessed, such as provider visit (enabling factor) and HPV vaccine (dependent variable and need factor).

Educational and income levels were among the variables that were not assessed and analyzed in this study. A threat to the validity of association with the result of this study resulted from applying a small set of variables to the Andersen's BM.

External Validity

The threat to external validity stemmed from having no indication if the sampled population included both rural and urban areas. The data were partly exported from the NIS-Teen data. The definition of adequate provider data used for 2014 NIS-Teen estimates was revised. This revision might affect vaccination coverage estimates, although the sampled population was 1,500. The outcomes of this study cannot be generalized.

Recommendations

This research was conducted because scholars have not examined if there was an association between health care reforms (ACA) with no cost-sharing for preventive services and HPV vaccination rate among adolescent females in Georgia. This study was necessary because underuse of HPV vaccine still exists in Georgia after the implementation of the ACA. Cost of the vaccine was noted to be a barrier, and no researcher explored if the ACA with no cost-sharing for preventive services had an impact on HPV vaccine usage. As lack of information existed regarding whether the ACA impacted the use of the HPV vaccine among adolescent females in Georgia.

This quantitative secondary data analysis has generated the need for future research. I recommend that another scholar statistically quantify if there is a real association between the ACA with the HPV vaccination rate among teenage females or provide insight into the magnitude of relationship and the problem in Georgia. This study should extend to both rural and urban Georgia adolescent females. The review should include the rate of vaccination based on dose series to determine the percentage of completion of the doses, which was not covered in this current study.

Also, I used only a few variables that were applied to Andersen's BM of health care use. Future researchers need to evaluate multiple variables from the predisposing (such as education level), enabling (such as income level), and need factors to determine the most influencing factor as stipulated in the BM. A more comprehensive study of the application and operationalization of the BM that will minimize the variations on how the variables are categorized will provide a real picture of factors influencing the use of health services.

Implications for Social Change

I filled the gap identified in the literature, which was the primary focus of this study. This quantitative secondary data analysis of NIS Teen data from 2011–2015 provided a broader view of the association between ACA (a new health policy) and the HPV vaccination rate among adolescent females in Georgia. In analyzing 5 years of data, I filled the literature gap by providing a statistically significant level of association**.**

Further, I demonstrated the magnitude of the association between the ACA and provider visits, as well as the strong association between provider visits and the HPV

vaccination rate among adolescent females in Georgia. The research is the initial step in determining the factor based on Andersen's BM that has the most influence on health care use (HPV vaccine) among female teens in Georgia. Information on the degree of the association of the ACA on provider visits and the HPV vaccination rate is beneficial in creating awareness of the most effective means of enhancing the use of the HPV vaccine among this group to achieve 80% coverage and align with Healthy People's 2020 goal for this population**.** Also, monitoring the trend of HPV vaccination from 2011 to 2015 helped in showing the underuse of the HPV vaccine among adolescent females in Georgia, despite the risk that HPV posed.

HPV is the most frequent cause of STD in the young population that is sexually active (CDC, 2015). Latent effect of infections can result in genital warts and cervical and oropharyngeal cancers, which can be prevented through HPV vaccination during adolescence (Dunne et al., 2014). Other cancers that could result later are vaginal and vulvar cancers in women, anal types of cancer, and penile cancers in men (Meites et al., 2016). In Georgia, the prevalence rate of cervical and oropharyngeal cancers linked to HPV was above the national average of 7.7% and 12.1% respectively (Berzen et al., 2016). Also, the mortality rate for cervical cancer, oral cavity, and pharynx cancers were 2.6% (National Cancer Institute, n.d.). Despite the higher incidence and mortality of both cervical and oropharyngeal cancers in Georgia, the HPV vaccination rate is still below the Healthy People 2020 goal of 80%.

Effecting positive change will involve disseminating the results of this study, which can result in measures to be taken by policymakers, health care organizations, and

health care providers**.** The goal is to formulate an integrated approach that will include public policy, public health, and clinical medicine to develop strategies that will improve the use of the HPV vaccine among adolescent females to help attain the Healthy People 2020 goal of 80% for this group**.** The social change implications resulting from this study will include creating awareness of the seriousness of the underuse of the HPV vaccine and the most effective factor identified by this study, which is offering the vaccine at every health encounter**.** This knowledge can enhance the ability of the health care providers to implement policies, protocols, and procedures that will optimize usage.

The recommendations resulting from the findings of this study include healthcare providers formulating policies, protocols, and guidelines for screening for childhood immunization including HPV vaccine. Health care providers should create awareness and education on the risks associated with the HPV virus and the beneficial effect of the HPV vaccine to parents on every health encounter. Providers should offer/recommend the HPV vaccine at every health encounter, well or sick visits, to prevent missed opportunities.

Policymakers should formulate policies that ensure the provisions of the ACA on no cost-sharing, infrastructures, preexisting conditions, and subsidies to purchase insurance at the marketplace and expand Medicaid to broaden access are not repealed. All of these measures will aid in the optimal use of the HPV vaccine to achieve 80% coverage and herd immunity.

Achieving herd immunity through 80% of HPV vaccination coverage will result in the prevention of HPV-related infections, cancers, and the economic burdens associated with HPV. Having healthy adolescents will result in future healthier,

productive adults, community, and the entire population, which are outcomes of herd immunity.

Conclusion

HPV is the most frequent cause of STDs in the United States (Dunne et al., 2014). The youths ages15 to 24 accounts for half of the 20 million new STIs yearly, and one in four sexually active adolescent females have an STD associated with HPV (CDC, 2015). Latent effect of infections caused by HPV can result in genital warts and cervical and oropharyngeal cancers, which can be prevented through HPV vaccination during adolescence (Dunne et al., 2014).

In Georgia, the prevalence rate of cervical and oropharyngeal cancers was above the national average at 7.7% and 12.1% respectively (Berzen et al., 2016). The mortality rate for cervical cancer, oral cavity, and pharynx cancers were 2.6% (National Cancer Institute, n.d.). Despite the higher incidence and mortality of both cervical and oropharyngeal cancers in Georgia, the HPV vaccination rate is below the Healthy People 2020 goal of 80% after the implementation of the ACA.

The ACA expanded access and allowed no cost-sharing for preventive services such as the HPV vaccine. In this quantitative secondary data analysis, there was a statistically significant strong association between the ACA and provider visits, subsequently provider visits and HPV vaccination rate. I recommend for health care providers to follow guidelines for screening for childhood immunization including HPV vaccine. Health care providers should create awareness and education on the risks associated with the HPV virus and the beneficial effect of the HPV vaccine to parents on

every health encounter. Providers should offer or recommend the HPV vaccine at every health encounter, well or sick visits, to prevent missed opportunities. Policymakers should formulate policies that will ensure the provisions of the ACA, such as no cost-sharing, infrastructures, preexisting conditions, and subsidies to purchase insurance at the marketplace and expand Medicaid to broaden access. All of these measures will aid in the optimal use of HPV vaccine to achieve 80% coverage and herd immunity.

The long-term outcome would include decreasing the rate of HPV-related infections and cancers, such as cervical cancer, and minimizing the financial burden related to HPV-related diseases and cancers. An additional outcome will be improved health and prosperity of individuals, including various communities in Georgia resulting from herd immunity.

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Appendix A: NIS-TEEN Hard Copy Questionnaire Q4 2013

Applicable sections are copied. See link for full hard-copy.

Section S

TIS_S1ADK

Is there anyone in your household who knows how many people in this household who are less than 18 years old?

NEW PERSON COMES TO PHONE ..... 1 GO TO TIS_DKINTRO

NO..... 2 GO TO TIS_S1TERM

TIS_SELECTION_INSTRUCTIONS1

(1) IF YAGE_x >12 months and < 3 years THEN GO TO TIS_S2Q02A before going to S3_INTRO in NIS

(2) ELSEIF ANY YAGE_x >12 and <18, THEN RANDOMLY SELECT ONE OF THE CHILDREN BETWEEN 13 AND 17 TO BE THE SELECTED CHILD FOR THE TEEN SURVEY AND GO TO TIS_S3INTRO

(3) ELSE GO TO INSTRUCTION1

TIS_S4

Is the child born [insert month and year of birth] male or female?

Male ..... 1 GO TO CP_TISS5

Female..... 2 GO TO CP_TISS5

DON'T KNOW..... 77 GO TO CP_TISS5

REFUSED..... 99 GO TO CP_TISS5

Section A

TIS_AHPV_RECOM

Has a doctor or other health care professional ever recommended that [TEEN] receive HPV shots?

YES……..... 1 GO TO TIS_AHPV_AGE

NO……..... 2 GO TO TIS_AHPV2

DON'T KNOW…..... 77 GO TO TIS_AHPV2

REFUSED……..... 99 GO TO TIS_ AHPV2

TIS_AHPV_AGE

At what age did the doctor or health care professional recommend that [TEEN] should start receiving the HPV shots?

(01) BEFORE AGE 11

(02) 11 OR 12 YEARS OF AGE

(03) 13 OR 14 YEARS OF AGE

(04) 15 OR 16 YEARS OF AGE

(05) 17 OR 18 YEARS OF AGE

(06) AFTER 18 YEARS OF AGE

(07) NO SPECIFIC AGE WAS RECOMMENDED OR DISCUSSED

(77) DON'T KNOW

(99) REFUSED

TIS_AHPV2

Looking at the shot record, please tell me how many times [TEEN] has received HPV shots?

SHOTS……..... ___ GO TO TIS_AHPV_DATE_X

NONE……..... 0 GO TO TIS_AHPV_RECALL

DON'T KNOW…..... 77 GO TO TIS_AHPV_RECALL

REFUSED……. ..... 99 GO TO TIS_AHPV_RECALL

TIS_AHPV_RECALL

Did [TEEN] ever receive an HPV shot that is not on the shot record?

YES…… ..... 1 GO TO TIS_AHPV_DOSE

NO……. ..... 2 F TIS_AHPV2 = (1-9, 50, 77, 99), GO TO TIS_AHPV_LOCATION; ELSE IF TIS_AHPV2 = 0, GO TO TIS_AHPV_INTENT.

DON'T KNOW…. ..... 77 IF TIS_AHPV2 = (1-9, 50, 77, 99), GO TO TIS_AHPV_LOCATION; ELSE IF TIS_AHPV2 = 0, GO TO TIS_AHPV_INTENT.

REFUSED……. ....99 IF TIS_AHPV2 = (1-9, 50, 77, 99), GO TO TIS_AHPV_LOCATION; ELSE IF TIS_AHPV2 = 0, GO TO TIS_AHPV_INTENT.

TIS_AHPV_DOSE

How many HPV shots did [TEEN] receive that are not on the shot record?

SHOTS…… ..... ___

ALL SHOTS……. 50

DON'T KNOW…. 77

REFUSED……. 99

IF TIS_S4 = 02, 77, 99, THEN DO:

IF TIS_AHPV_DOSE=0 AND TIS_AHPV2 = (1-9, 50, 77, 99), GO TO TIS_AHPV_LOCATION; ELSE IF TIS_AHPV2 = 0, go to TIS_AHPV_INTENT IF TIS_AHPV_DOSE IN (1-9, 50, 77, 99), GO TO TIS_AHPV_REC_WHICH

IF TIS_S4=01, THEN DO:

IF TIS_AHPV_DOSE=0 AND TIS_AHPV2 = (1-9, 50, 77, 99), GO TO TIS_AHPV_LOCATION; ELSE IF TIS_AHPV2 = 0, go to TIS_AHPV_INTENT IF TIS_AHPV_DOSE IN (1-9, 50, 77, 99), GO TO TIS_AHPV_LOCATION

Section B

TIS_BHPV_AGE

At what age did the doctor or health care professional recommend that [TEEN] should start receiving the HPV shots?

(01) BEFORE AGE 11

(02) 11 OR 12 YEARS OF AGE

(03) 13 OR 14 YEARS OF AGE

(04) 15 OR 16 YEARS OF AGE

(05) 17 OR 18 YEARS OF AGE

(06) AFTER 18 YEARS OF AGE

(07) NO SPECIFIC AGE WAS RECOMMENDED OR DISCUSSED

(77) DON'T KNOW

(99) REFUSED

TIS_BHPV2

Has [TEEN] ever received HPV shots?

YES…… ..... 1 GO TO TIS_BHPV_DOSE

NO……. ..... 2 GO TO TIS_BHPV_INTENT

DON'T KNOW…. ..... 77 GO TO TIS_BHPV_INTENT

REFUSED……. ..... 99 GO TO TIS_BHPV_INTENT

TIS_BHPV_DOSE

How many HPV shots did [TEEN] ever receive?

SHOTS…… ..... ____

ALL SHOTS……. 50

DON'T KNOW…. 77

REFUSED……. 99

(1) IF TIS_S4=02,77,99, THEN DO:

IF TIS_BHPV_DOSE=0, GO TO TIS_BHPV_INTENT

IF TIS_BHPV_DOSE IN (1-9, 50, 77,99), GO TO TIS_BHPV_WHICH

(2)ELSE IF TIS_S4=01 THEN DO:

IF TIS_BHPV_DOSE = 0, GO TO TIS_BHPV_INTENT

IF TIS_BHPV_DOSE IN (1-9, 50, 77,99), GO TO TIS_BHPV_LOCATION

TIS_BHPV_WHICH

Which of the two HPV vaccines did your child receive?

Gardasil-The vaccine that protects against most cervical cancers, genital warts, and some other less common cancers ..... ……...……..... .....……..1

Cervarix--The vaccine that protects against most cervical cancers…….....2

BOTH GARDASIL AND CERVARIX…….. ...3

DON'T KNOW…..... 77

REFUSED……. 99

ALL GO TO TIS_BHPV_LOCATION

TIS_BHPV_LOCATION

At what kind of place(s) did [TEEN] get [FILL: his/her] first HPV shot?

[READ ONLY IF NECESSARY]

(01) DOCTOR'S OFFICE

(02) EMERGENCY ROOM

(03) HEALTH DEPARTMENT

(04) CLINIC OR HEALTH CENTER

(05) HOSPITAL-BASED CLINIC

(06) WHILE HOSPITALIZED

(07) OTHER MEDICALLY-RELATED PLACE – GO TO TIS_BHPV_LOC_OTHER

(08) PHARMACY, DRUG STORE, OR SUPERMARKET PHARMACY

(09) WORKPLACE

(10) ELEMENTARY/MIDDLE/HIGH SCHOOL

(11) OTHER NONMEDICALLY-RELATED PLACE – GO TO

TIS_BHPV_LOC_OTHER

(12) MALL OUTREACH [DISPLAY ONLY IF IAP=105]

(13) VILLAGE OUTREACH [DISPLAY ONLY IF IAP=105

(77) DON'T KNOW

(99) REFUSED

TIS_BHPV_LOC_OTHER

Other location: _____

IF TIS_BHPV_DOSE > 1, THEN GO TO TIS_BHPV_LOCATION2. IF

TIS_BHPV_DOSE < 1, GO TO TIS_BHPV_INTENT 52

TIS_BHPV_LOCATION2

Did [TEEN] receive all doses at the same location?

(1) YES IF TIS_BHPV_DOSE >= 3, GO TO TIS_BHPV_SAFE. IF F <3,

GO TO TIS_BHPV_INTENT

(2) NO GO TO TIS_BHPV_LOCATION3

(77) DON'T KNOW IF TIS_BHPV_DOSE >= 3, GO TO TIS_BHPV_SAFE. IF <3,

GO TO TIS_BHPV_INTENT

(99) REFUSED IF TIS_BHPV_DOSE >= 3, GO TO TIS_BHPV_SAFE. IF

<3, GO TO TIS_BHPV_INTENT

TIS_BHPV_LOCATION3

At what kind of place(s) did [TEEN] get [FILL his/her] second and third HPV shot(s)?

[MAY GIVE MULTIPLE RESPONSES]

[READ ONLY IF NECESSARY.]

(01) DOCTOR'S OFFICE

(02) EMERGENCY ROOM

(03) HEALTH DEPARTMENT

(04) CLINIC OR HEALTH CENTER

(05) HOSPITAL-BASED CLINIC

(06) WHILE HOSPITALIZED

(07) OTHER MEDICALLY-RELATED PLACE GO TO

TIS_BHPV_LOC3_OTHER

(08) PHARMACY, DRUG STORE, OR SUPERMARKET PHARMACY

(09) WORKPLACE

(10) ELEMENTARY/MIDDLE/HIGH SCHOOL

(11) OTHER NONMEDICALLY-RELATED PLACE GO TO

(12) MALL OUTREACH [DISPLAY ONLY IF IAP=105]

(13) VILLAGE OUTREACH [DISPLAY ONLY IF IAP=105

(77) DON'T KNOW

(99) REFUSED

TIS_BHPV_LOC3_OTHER

Other location: _____

IF TIS_BHPV_DOSE >=3 THEN GO TO TIS_BHPV_SAFE; ELSE GO TO

TIS_BHPV_INTENT.

TIS_BHPV_PLAN_AGE

At what age do you plan to have [TEEN] receive the HPV shots?

_____ YEARS

(1) NEVER/NO AGE GO TO TIS_BHPV_KNOWLEDGE

(2) IT WILL BE MY CHILD'S DECISION IN THE FUTURE

(77) DON'T KNOW

(99) REFUSED

TIS_BHPV_WHEN

What is the MOST important factor that [FILL determined/will determine] WHEN [TEEN] [received/receives] the HPV shots?

(1) DOCTOR RECOMMENDATION

(2) BECOMES COMMON PRACTICE/BEEN STANDARD FOR YEARS/COMFORTABLE WITH RECOMMENDATION

(3) WHEN I KNOW ENOUGH ABOUT HPV DISEASE AND THE VACCINE

(4) MY TEEN ABOUT TO BECOME SEXUALLY ACTIVE

(5) TEEN DECIDES AND WILLING TO RECEIVE VACCINE

(6) TEEN AND I DECIDE TOGETHER TO GET VACCINE

(7) INSURANCE COVERS THE COST/ NO COST CONCERNS

(8) ENOUGH INFORMATION ABOUT VACCINE SAFETY

(9) CONVENIENT TO GO GET VACCINE/FIND TIME TO DO SO

(10) SCHOOL REQUIREMENT

(11) TEEN WILL NOT GET HPV VACCINE IN FUTURE

(12) TEEN WILL NOT GET ANY VACCINES IN FUTURE

(13) ALREADY SCHEDULED APPOINTMENT/ALREADY PLANNED

(14) OTHER GO TO TIS_BHPV_WHEN_OTHER

(77) DON'T KNOW

(99) REFUSED

TIS_BHPV_WHEN_OTHER.

_____

GO TO TIS_BHPV_KNOWLEDGE

Section E

TIS_INS_11

Since age 11 was there any time when [TEEN] was not covered by any health insurance for any reason?

YES 1

NO..... 2 GO TO TIS_INS-13

DON'T KNOW ..... 77 GO TO TIS_INS-13

REFUSED..... 99 GO TO TIS_INS-13

TIS_C4

"Is [TEEN] White, Black or African American, American Indian, Alaska Native, Asian, Native Hawaiian or other Pacific Islander"?