2011

Human Papillomavirus Knowledge And Awareness Among North Carolina College Students

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HUMAN PAPILLOMAVIRUS KNOWLEDGE AND AWARENESS AMONG NORTH CAROLINA COLLEGE STUDENTS

by

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A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE

Department: Biology
Major: Biology
Major Professor: Dr. Doretha B. Foushee

North Carolina A&T State University
Greensboro, North Carolina
2011

School of Graduate Studies

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North Carolina Agricultural and Technical State University

Greensboro, North Carolina
2011

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BIOGRAPHICAL SKETCH

Aliza T. Alston was born on September 23, 1987 in Greenville, North Carolina to William McKinley Alston Jr. and Deborah Arrington. She received her Bachelor of Science in Biology from East Carolina University in May 2009. As an undergraduate, Aliza received numerous awards and honors. Those awards included the Chancellor's List, the Honor Roll and the Deans' List. She also served her community by volunteering at the Ronald McDonald House, Operation Sunshine and J.A.S. Aliza is also a member of Gamma Beta Phi a National Honor Society, and served as the Vice President of the Kappa Sigma Chapter of Delta Sigma Theta Sorority, Incorporated in 2009.

In August 2009, Aliza enrolled in the Master of Science in Biology Program at North Carolina Agricultural and Technical State University. Her determination, dedication, and excitement about her research project led to her completing the requirements for the Master of Science degree in two years. Upon completion of the Master of Science Degree, Aliza will utilize her knowledge in the workforce, before returning to school to earn a doctorate in Public Health or Public Health Policy.

ACKNOWLEDGEMENTS

It is with great pleasure that I thank all those who have made this thesis possible. I will first thank God, for placing me in the hands of many kindhearted encouraging, guiding, supporting individuals. Thank you to my advisor Dr. Doretha B. Foushee and my committee members Dr. Vinaya A. Kelkar, and Dr. Gregory D. Goins for their endless hours of assistance. Thank you to all of the students who took the time out of their day to complete my survey. I would like to thank my family for instilling in me the importance of receiving an education. Lastly, I would like to thank my lovely classmates for their emotional support.

TABLE OF CONTENTS

LIST OF FIGURES

FIGURES **PAGE**

LIST OF TABLES

TABLES **PAGE**

LIST OF ABBREVIATIONS

CDC	Center for Disease Control and Prevention
CPRV	Cottontail Rabbit Papillomavirus
ECU	East Carolina University
FDA	Food and Drug Administration
HPV	Human Papillomavirus
IRB	Institutional Review Board
NCAT	North Carolina Agricultural and Technical State University
NCCU	North Carolina Central University
OMB	Office of Management and Budget
PAP	Papanicolaou
PRB	Retinoblastoma Protein
P53	Protein 53
UNCG	University of North Carolina Greensboro
VAERS	Vaccine Adverse Event Reporting
VLP	Virus-Like Proteins

ABSTRACT

Alston, Aliza T. HUMAN PAPILLOMAVIRUS KNOWLEDGE AND AWARENESS AMONG NORTH CAROLINA COLLEGE STUDENTS. **(Major Advisor: Dr. Doretha B. Foushee),** North Carolina Agricultural and Technical State University.

The objective of the present study is to ascertain overall knowledge, attitude and awareness of students at select North Carolina Universities about HPV, the HPV vaccine Gardasil and the connection between HPV and various cancers. Five hundred and two university students (NCAT, NCCU, ECU and UNCG), 303 females and 199 males, ages 18 or older (89.6% were between the ages of 18-22) participated in a cross-sectional study by completing a survey. Students at these universities were randomly selected based on their enrollment in introductory biology courses for non majors. Other students were chosen randomly by face to face contact in heavily populated areas on the campuses, such as the cafeterias, computer labs, libraries, and Student Unions. The survey participants were asked questions about their gender, ethnicity, age, classification, hometown, major, sources from which they receive information on sexually transmitted diseases, sexual activity, sexual partners and date of last physical examination. Participants were then asked a series of knowledge and awareness questions about the human papillomavirus. Questions followed to ascertain if participants had been diagnosed with HPV, their awareness of the HPV vaccine Gardasil, and whether or not participants had been vaccinated with the Gardasil vaccine. A knowledge scale from 0-18 was designed to look at the overall knowledge of college students. The mean knowledge score was 8.79. About 65% of the students scored a nine or less. More

than half of the students answered 50% of the questions incorrectly showing poor knowledge of HPV. Close to 75% of the population scored a 14 or less representing an unsatisfactorily level of knowledge. The population was divided into thirds by either wanting to be vaccinated, not being interested in receiving the vaccine, or having been vaccinated with the Gardasil Vaccine. The majority of the students who had not been vaccinated with Gardasil reported that it was due to a lack of information on the vaccine and the disease. More emphasis should go towards the development of educational materials that educate young adults on the benefits of the HPV vaccine Gardasil.

CHAPTER 1

Introduction

Human papillomavirus (HPV) is a member of the Papovaviridae family. More than 100 types of HPV, a double stranded DNA tumor virus, exist and are directly related to numerous health conditions such as cancer and genital warts. The viruses of the Papovaviridae family are all small and nonenveloped, meaning that they have no lipid bilayer surrounding their capsid, the protein coat surrounding the genome. "Their capsid is an icosahedron, or a polygon with 20 faces and is 55-nm in diameter" (Baldwin, Edwards, Grace, Hayakawa, Huh, Nguyen, Münger, & Owens, 2004; Greenblatt, 2005; Sinal & Woods, 2005). The most common types of Human Papillomavirus are types 6, 11, 16, and 18. The development of genital warts is primarily induced by HPV types 6 and 11, while HPV types 16 and 18 are associated with the development of approximately 70% of all cervical cancers (Bosch, Castellsague, Diaz, de Sanjose, Hammouda, Shaw, Meijer, & Munoz, 2004; Lowy, Kirnbauer & Schiller, 1994). The human papillomavirus is as regular as the common cold. Currently, it is estimated that 20 million Americans are infected with HPV and that another 6 million will become infected each year (Centers of Disease Control and Prevention [CDC], 2010). The Center for Disease Control and Prevention (CDC) has estimated that 50% of sexually active individuals will acquire a general human papillomavirus infection during their lifetime. Human papillomavirus statistics indicate that the chance of a sexually active individual becoming infected with HPV during his or her lifetime is 75% or higher. Human

papillomavirus spreads by intimate skin to skin contact, and by sexual activity, including oral sex. Although there are treatments for the clinical manifestations of HPV infection, there is no cure for the infection (Akers, Andraos-Selim, Bondzi, Edwards, Gollim, Hagan, Heron, Jones, E.A., Jones, J., Moss, Smith, Taioli, Thurman, & Ragin, 2009).

Almost twenty years ago, researchers discovered a link between HPV and cervical cancer (CDC, 2010). Cervical cancer is the second most common cancer among women world-wide and is the leading cause of female cancer deaths in developing countries (Parkin, 2005). Women usually receive the Papanicolaou (Pap) Smear Test yearly in developed countries. If the test is abnormal, additional cytological test are implemented to determine if the individual has cervical cancer (Beusterien, Dixon., Fleurence, & Milanova, 2007). "Potential cell findings can range from atypical squamous cells of undetermined significance; atypical squamous cells cannot exclude high-grade squamous intraepithelial lesion; atypical glandular cells; high-grade squamous intraepithelial lesion; and low-grade squamous intraepithelial lesion" (Cox, Massad, Twiggs, Wilkinson, & Wright, 2002). Research has indicated that 99% of all cervical cancers, are caused by high risk HPV virus types 16 and 18 (CDC, 2010). In most cases the body is able to clear the HPV infection; however, if the infection is not cleared, an accumulation of abnormal cells could develop in the cervix. The abnormal cells caused by HPV are directly linked to cervical cancer.

Currently, thirty types of the HPV are linked to anal or penile cancers in men. Less than one percent of the males in the United States were estimated to have been diagnosed with penile and anal cancer in 2007 (CDC, 2010). Men have less prevalence

and incidence of cancers induced by HPV than women. However, the risk of anal cancer is seventeen times more likely for bisexual or homosexual men in comparison to men who are heterosexual (CDC, 2010).

There is no cure for HPV, simply treatment for the irregularities caused by HPV. Maintaining abstinence from sexual activity is the only certain way to prevent HPV. The usage of condoms reduces the risks of contracting HPV; however, areas that are not covered by the condom are open to exposure to HPV. Individuals can lower their risk of HPV by limiting sexual partners, staying in monogamous relationships, and selecting a partner with limited previous partners. Before individuals become sexually active, or after becoming sexually active and before being exposed to the HPV, it is imperative that individuals receive the HPV vaccine. This will decrease the spread of HPV, and the number of cases of genital warts and cancers linked to HPV.

Recently, the United States (US) Food and Drug Administration (FDA) approved Gardisil, the first vaccine which is effective against human papillomavirus types 6, 11, 16, and 18, for young men and women between the ages of 9 to 26. The vaccine, manufactured by Merck Pharmaceutical Company, was originally approved for women in June 2006 and for men on October 9, 2009 (CDC, 2010). Gardasil is currently being offered for approximately $120 per single dose. Gardasil requires three doses during the duration of 6 months, a total cost of $360. Additionally, some physicians charge office visit and injection fees at the time of vaccination. Though another vaccine, GlaxoSmithKline's Cervarix, was approved by the FDA in 2009 to protect against strains 16 and 18, the focus of this research will be specifically on Gardasil. Gardasil is the most

popular vaccine in the United States, as it has been on the market the longest and its familiarity to society is greater.

We hypothesize that college students will be aware of HPV overall, but that there will be misconceptions about the virus and only a few students will have been vaccinated. We further hypothesize that qualitative factors will correlate directly to the amount of knowledge and awareness about HPV and the attitude of students towards the Gardasil vaccine.

Students at four universities in North Carolina were administered a twenty-seven question survey. Data was analyzed using SPSS Software.

CHAPTER 2

Literature Review

2.1 Papillomavirus Discovered

The first papillomavirus, the cottontail rabbit papillomavirus (CRPV), was discovered in the 1930s by Richard Edwin Shope. Cottontail Rabbits in northwestern Iowa and southern Kansas were described by hunters as having, "numerous horn-like protuberances on the skin of various parts of the body" (Shope, 1933). The protuberances are now referred to as "warts." Peyton Rous and Joseph Beard exposed "the cancerous potential of the wart virus in 1935, by showing it failed to replicate and produce warts in the domestic rabbit, but instead induced the formation of skin carcinomas after an extended period of time" (Beard & Rous, 1935). The first known tumor virus, CPRV became an important model for showing the progression of carcinomas. Not until 30 years later, when HPV infection was connected to human cancer, would the significance of work done by Richard Shope, Peyton Rous and Joseph Beard be recognized for its upmost importance (Butel & Javier, 2008).

2.2 Classification and Structure of HPV

The human papillomavirus is classified as a member of the Papovaviridae family. This is a large family of double stranded DNA tumor viruses (Baldwin et al., 2004; Doorn, Kleter, Molijin, & Quint, 2005; Greenblatt, 2005; Sinal & Woods, 2005). The HPV genome contains 8 kb of double stranded circular DNA. Currently, over a hundred

different strains of this virus have been identified that directly infect human beings. The viruses of the Papovaviridae family are all small and nonenveloped, meaning that they have no lipid bilayer surrounding their capsid, the protein coat surrounding the genome. The shape of the capsid is an icosahedron with 20 faces, and is 55-nm in diameter (Baldwin et al., 2004; Greenblatt, 2005; Sinal & Woods, 2005). The genome has eight open reading frames coding for early proteins (E1, E2, E4, E5, E6, and E7) and late capsid proteins (L1 and L2). Early proteins E1 and E2 participate in viral replication. The E4 protein contributes to controlling the host cell cycle, and E5 assists in cell transformation and viral replication. Oncoproteins E6 and E7 take part in malignant transformation of cervical cells; they also form specific complexes with tumor suppressor gene products tumor protein 53 (p53) and retinoblastoma (pRb).

The human papillomavirus is categorized into high risk types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73, and 82), probable high risk types (26, 53 and 66) and low risk types (6, 11, 40, 42, 43, 44, 54, 61, 70, 72, 81, and CP6108) (Bosch et al., 2004Gnanamony, 2007). High risk types of HPV 16 and 18 cause growth on the cervix that are usually level and out of sight, when contrasted to the external warts caused by low-risk types HPV 6 and 11 (Human Papillomaviruses and Cancer: Questions and Answers, 2010). High risk types 16 and 18 cause cervical cancer, severe cervical dysplasia, anogenital cancers, in addition to head and neck cancers (Rapose, 2009). It is important to mention, that a great majority of high risk HPV infections go away on their own and do not cause cancer (Castle, Rodriguez, Schiffman, & Wacholder, 2007).

2.3 Life Cycle of HPV

The introduction of HPV into the human body is a controversial issue. Scientists suggest the accessibility of HPV is permitted through a break in the stratified epithelium cell layer (Doorbar, 2005). However, there is still a debate over the specific cell surface receptor that allows the initial attachment of the virus. Scientists also suggest a dependence on the presence of the linear polysaccharide, heparin sulphate (Cook, Janesn, Joyce, Keller, Lehman, Przysiecki, Sands, & Tung, 1999). Heparin sulphate attaches to different protein ligands to normalize numerous biological activities, including tumor metastasis.

The human papillomavirus has been shown to penetrate through the host cell by different pathways, namely clathrin-mediated endocytosis, caveolar endocytosis, and clathrin- and caveolae-independent endocytosis. "In the course of the clathrin-mediated endocytosis pathway, the binding of a ligand to a specific receptor clusters the ligand-receptor complexes in the coated pits on the plasma membrane. This pit invaginated and pinched off from the plasma membrane forms intracellular clathrin-coated vesicles in progress to early endosomes before being fused to form late endosomes or lysosome" (Letian & Tianyu, 2010). The caveolar endocytosis pathway is used a lot less than the clathrin- mediated endocytosis pathway. Research shows that HPV-31 uses caveolar endocytosis by passing through the caveosomes, avoiding the endosomes, and moving to the endoplasmic reticulum or the golgi apparatus (Campos, Ozbun, & Smith, 2007; Holthusen, Laniosz, & Meneses, 2008). Clathrin- and caveolae-independent endocytosis are the pathways used by HPV-16. Evidence is provided by "the transmembrane domain-

containing proteins tetraspanins that are able to interact laterally with each other and with other transmembrane proteins to form tetraspanin-enriched microdomains (TEMs) , within which tetraspanins can control and modulate complicated activities including adhesion, migration, and synapse formation, as well as endocytosis and exocytoses" (Hemler, 2003; Levy & Shoham, 2005). The life cycle of human papillomavirus is still not completely understood, considering the virus has over 100 different known strains which take different pathways.

2.4 HPV and Cancer

Almost twenty years ago, researchers determined an association between HPV and cervical cancer (CDC, 2010). Cervical cancer is the second most common cancer among women world-wide and is the leading cause of female cancer deaths in developing countries (Parkin, 2005). Sexually active women usually receive the Papanicolaou (Pap) Smear Test as a part of their yearly physical examination in developed countries. If the test is abnormal, different cytological test are implemented to determine if cancerous cells are present on the cervix (Beusterien et al., 2007). "Potential cell findings can range from atypical squamous cells of undetermined significance (atypical squamous cells cannot exclude high-grade squamous intraepithelial lesion); atypical glandular cells; high-grade squamous intraepithelial lesion; and low-grade squamous intraepithelial lesion" (Cox et al., 2002). Research has indicated that 99% of all cervical cancers are caused by high risk HPV types 16 and 18 (CDC, 2010). However, other high risk types of HPV 18, 31, 33, 45 are also linked to cervical cancer. In most cases the body is able to

clear the infection of the system by HPV; however, if the infection is not cleared, an accumulation of abnormal cells could still be present in the cervix. The abnormal cells caused by HPV are directly linked to cervical cancers.

Currently, thirty types of the HPV are linked to anal and penile cancers in men. The high risk cancers associated with anal cancers in men are HPV types 16, 18, 31, 33 and 45. Less than one percent of the males in the United States were estimated to have been diagnosed with penile or anal cancers in 2007 (CDC, 2010). Men have less prevalence and incidence of cancers induced by HPV than women. Research also indicates that men who have been circumcised have a lesser chance of developing HPV. However, the risk of anal cancer is seventeen times more likely for bisexual or homosexual men in comparison to men who are heterosexual (CDC, 2010).

In 2007, a case-control study showed that individuals with high numbers of oral sex partners were three times as likely to develop Oropharyngeal cancer caused by HPV 16 (Gypsyamber, 2007). Also, the study indicated a higher risk of throat cancer by eightfold for individuals with more than six oral sex partners. A review of the literature also showed that HPV 16 and 18 were also linked to head and neck cancers. Head and neck cancers are extremely rare, affecting below one percent of Americans a year. However, the incidence of head and neck cancers is increasing.

2.5 Gardasil and Cervarix

Currently on the market are two vaccines, Gardasil and Cervarix, that provide immunity against HPV types 16 and 18. Gardasil is a quadrivalent vaccine, because it also provides immunity for HPV types 6 and 11 which are linked to genital warts and respiratory papillomatosis. Gardasil has been on the market the longest and provides protection for young males and females between the ages of nine and twenty-six. Cervarix is a bivalent vaccine that provides protection for women between the ages of ten and twenty-five. Both vaccines are made using recombinant DNA technology. Cervarix contains inactive purified L1 proteins of HPV types 16 and 18; Gardasil contains purified L1 proteins of HPV types 6, 11, 16 and 18. A cell that has been engineered to contain the L1 gene allows the vaccines to produce the L1 protein. The proteins assemble to form virus like particles. Both vaccines have an adjuvant system containing an aluminum compound. Adjuvants are used to help stimulate a better immune response to vaccination.

Many clinical trials have been conduct on these two vaccines. A head to head clinical trial study sponsored by the Cervarix manufacturer, GlaxoSmithKline, indicates that Cervarix also generates cross protection against high risk HPV types 31, 33, and 45. It was also reported that Cervarix induces larger serologic responses against HPV types 16 and 18 in comparison to Gardasil. Overall, the two vaccines efficiently protect women against cervical cancer. Close to thirty million doses of Gardasil were administered in the United States in 2010. Gardasil is the popular vaccine in the United

States, as it has been on the market the longest and its familiarity to women and doctors is greater. This is the primary reason that our research will focus solely on Gardasil.

2.6 Immune Response to the Gardasil Vaccine and HPV Infections

The Gardasil vaccine is injected into the upper arm or upper thigh of the body. A total of three injections of the Gardasil vaccine must be administered within a six month period. The virus-like proteins (VLPs) in Gardasil are very similar to the HPV virus. "Virus-like particles (VLPs) are multiprotein structures that mimic the organization and conformation of authentic native viruses but lack the viral genome, potentially yielding safer and cheaper vaccines" (Alves, Carrondo, Castilho, & Roldão, 2010). The proteins have the ability to activate the innate (birth) and adaptive (acquired) immune response (Mariani, & Venuti, 2010). When Gardasil is injected into the body, the immune system realizes the VLPs found in Gardasil are foreign. Then the immune system starts to develop antibodies against the VLPs to provide immunity. If the body is exposed to HPV after vaccination, the body will be prepared to fight off the infection. Currently, research is being conducted to see how long the vaccine provides immunity and determine if a booster shot should be administered to induce the development of a more robust immune memory.

Genital HPV infection is primarily a sexually transmitted infection but penetrative vaginal or anal sexual intercourse is not a prerequisite for infection. Virus is also transmitted by skin to skin contact via intimate contacts of the genitalia or other mucosal

surfaces (Kjaer, Moscicki, Schiffman, & Villa, 2006). Almost immediately after becoming sexually active one is at their peak period for acquiring an HPV infection and their chances increase with the number of sexual partners (Binns, Coleman, Deacon, Desai, Elanko, Evans, Gilham, Haywod, Peto, Taylor, & Yule, 2004; Koutsky, 1997). According to M. Stanley, many infected individuals mount an effective immune response, becoming DNA negative with subsequent sustained clinical remission from disease. Effective immunity requires a cell mediated response to proteins E2 and E6, which is essential for lesion regression, accompanied by sero-conversion and antibody to the major capsid protein L1 (Coleman, Crawford, Kwappenberg, Stanley, van der Burg, van den Hende, & Woo,2010; Stanley, 2010). The immune response to HPV infection is still not completely understood in its entirety.

2.7 Safety of the Gardasil Vaccine

The US Vaccine Adverse Event Reporting System (VAERS) reported a total of 12,424 adverse events after immunization with Gardasil in the United States between June 2006 and December 2008 (Chustecka, 2009). At this time, an estimated 23 million doses of Gardasil has been dispersed throughout the United States (Chustecka, 2009). Seven hundred and seventy-two reports (6.2% of the total) were described as serious, including 32 reports of death (Chustecka, 2009). The most frequently reported adverse reactions were local injection site reactions, nausea, dizziness, and fainting (Agorastos, Brotherton, Chatzigeorgiou, & Garland, 2009). In 2008 a meeting was held by the Advisory Committee on Immunization Practices (ACIP) , an independent panel of health

expert (CDC, 2008), this committee found no epidemiological evidence of a link between Gardasil and any serious adverse effects (Agorastos et al., 2009). The review of the literature shows the risks associated with the vaccine are general when compared to that of any vaccine currently on the market.

2.8 Knowledge and Awareness of HPV Studies

A survey was distributed to college students from Florida State University (FSU) and Florida Agricultural & Mechanical State University in 2007. The purpose of the study was to assess the awareness, knowledge, and beliefs about human papillomavirus in a racially diverse sample of young adults. A total of 124 students participated in the 20 question survey. The study participants were of black or African-American descent by 57%, 32% white, 5% biracial, 3% Asian and 3% Latino/Latina (Gerend & Magloire, 2008). The results provided evidence that 75% of the students had heard of the human papillomavirus, though there were misconceptions about the virus, general knowledge of HPV was high (Gerend & Magloire, 2008). In their study, women had more knowledge and awareness of the HPV than men. Participants with a high number of sexual partners and those who were sexually active had a higher perception of risks associated with the virus. The study participants who were less educated about the virus were younger in age. The minority population, African Americans and sexually active participants reported immense interest in HPV education. This is one of the first published documents discussing the knowledge and awareness of a racially diverse group of young college students in the United States.

The University of Pittsburgh surveyed 202 adults in the general population of Pittsburgh, Pennsylvania, and Hampton, Virginia. The survey was used to evaluate knowledge about HPV and the HPV vaccine, and the perception of the vaccines efficiency and safety (Akers, et al., 2009). The methods used to distribute the surveys were face to face or by mail. In Hampton, Virginia the participants were recruited through flyers posted at churches, community centers, outpatient clinics, health fairs, school events, libraries, the local newspapers, and the University of Pittsburgh Medical Center newsletters (Akers, et al., 2009). The Hampton population consisted of participants from Hampton and surrounding communities, such as the local plasma donation center, churches, the local police station, and also students and staff members from the Hampton University campus (Akers, et al., 2009). The ethnicity of survey participants evaluated were 55% white, 45% black and 1% other for the two populations. It was determined that the overall population 93.6%; Pittsburgh: 95%; Hampton: 90% had heard of the human papillomavirus (Akers, et al., 2009).

The literature is very limited regarding the overall knowledge and awareness of the HPV vaccine in young adults in the United States. Many Americans do have some knowledge and awareness of HPV through internet sources, doctor visits, television commercials and billboards. Research shows that around the world in Signapore, Malyasia, Australia, and the Netherlands HPV vaccination programs are currently ongoing. Surveys were conducted in these areas to test the current knowledge and awareness of the human papillomavirus, to develop measurements to further educate their citizens.

2.9 Young Men's and Women's Attitude towards HPV

Prior to the Gardasil vaccine being made available to males, a private university in the Northeast assessed the attitude towards the human papillomavirus in 2009. Six focus groups composed of a total 45 men aged 18-22, participated in discussions that were audio taped and transcribed verbatim, and initial coding categories were developed (Allen, Fantasia, Fontenot, Flaherty, & Santana, 2009). It was found that the men had a lot of misconceptions about the human papillomavirus. The majority acknowledged that infection could be serious for women, and referred to HPV as a woman's disease (Allen, et al., 2009). Unfortunately, science reveals that this is not the case, because HPV is an equal opportunity offender. They asked their participants if they would receive the vaccine if it became available to them. In turn apprehension was voiced about the cost, accessibility, safety and side effects (Allen, et al., 2009). Many males were hesitant to receive the vaccination for themselves, men considered the vaccination of women would be very beneficial (Allen, et al., 2009).

A study was conducted to see why only ten percent of young women in the United States had been vaccinated against the human papillomavirus. One hundred and eighty five non-vaccinated women aged 19-26 participated in the 2007 study. Most respondents agreed that cervical cancer is a devastating disease (93.5%) and that genital warts are an embarrassing condition (90.0%) (Good, Vichnin, Weiss, & Zimet, 2010). The common perceived barriers to vaccinations was that the women were married or felt as if they were in a true monogamous relationship. About a third of the respondents thought the vaccine was too new or that they did not have enough information about it

(Good, et al., 2010). There was also the concern about whether insurance companies would cover the vaccination.

The attitude of both men and women seem to stem from a limited access to information about the human papillomavirus infections, vaccine safety, and insurance coverage.

2.10 Urban and Rural Defined

After reviewing the literature, it was determined that many different definitions are used to define urban and rural. The Census Bureau divides "urban" into two different categories either “urban cluster” or “urbanized area. Urban clusters have a population of at least 2,500 but is less than 50,000. Urbanized areas have an urban nucleus of 50,000 or more people (U.S. Census Bureau, 2000). The Office of Management and Budget (OMB), a federal agency that helps to advise the president on federal spending, has a definition of “urban” based on Census data. The federal government has created many different methods for defining rural America, which are used to delegate how government funds are allocated to the public (Judge & Wingrove, 2004). There is no universally accepted definition of “rural” across Federal Agencies (Judge & Wingrove, 2004). The Census defined "rural" as areas comprising open country and settlements with fewer than 2,500 residents (U.S. Census Bureau, 2000).

2.11 North Carolina Demographics

In 2000, the United States Census Bureau reported that North Carolina was one of the most rapidly growing states from the previous decade. According to the North Carolina State Demographer, a majority of the population lived in 16 of the state's 100 counties (Mecklenburg, Wake, Guilford, Forsyth, Cumberland, Durham, Buncombe, Gaston, New Hanover, Union, Onslow, Cabarrus, Johnston, Davidson, Pitt, and Catawba). Despite the growing populations, over a million North Carolinians are left uninsured. Sadly, the highest groups of uninsured citizens are young adults ages 9-26. To decrease this devastating statistic, the North Carolina University System mandated that all college students who registered for classes in the fall of 2010 have health insurance. The effects of the mandate should enhance vaccination rates and increase awareness of the human papillomavirus.

2.12 Knowledge Gaps to be Addressed

The survey of the general populations of Pittsburgh, Pennsylvania, USA and Hampton, Virginia, USA failed to explore proper assessment of one's attitude towards the HPV vaccine. The study focused more on perceptions towards the efficacy and safety of the Gardasil vaccine. The survey of the two historically black universities in Florida should have tested the majority populations (whites) as well for statistical purposes. My research is intended to fill gaps of prior research studies, by looking at a greater number of diverse populations by surveying racially diverse students at select North Carolina Universities. The populations selected to be surveyed are East Carolina University,

North Carolina Agricultural & Technical State University, North Carolina Central University, and the University North Carolina at Greensboro. North Carolina Central University and North Carolina Agricultural & Technical State University are historically black public universities. East Carolina University and the University North Carolina at Greensboro are two public universities that are historically white. The attitude and knowledge of HPV will be addressed in men and women. Also we will look at the hometown communities of survey participants, to determine if urban or rural areas have more individuals who have received the Gardasil vaccination. The information gathered from this research study will provide insight that will be used in the development of educational materials designed to increase the knowledge and awareness of HPV and HPV vaccinations, among college students.

2.13 Significance of this Research

Surveying diverse populations could generate data that will help with research in the fields of marketing, preventive medicine, and clinical trials. Comparisons made from the quantitative and qualitative analysis will contribute toward improved knowledge of the relative importance of educating people on HPV and HPV vaccinations. Hence, this knowledge will help decrease the number of infections and diseases caused by this virus.

CHAPTER 3

Materials and Methods

3.1 Survey Development and Design

The survey study was designed to ascertain knowledge and awareness of students at select North Carolina Universities about HPV, the HPV vaccine Gardasil, and the connection between HPV and various cancers . This study also sought to determine if qualitative factors such as gender and ethnicity will influence the knowledge, awareness, and attitude of students about HPV and the Gardasil vaccine. The survey participants were asked questions that described their gender, ethnicity, age, classification , hometown, major, sources from which they receive information on sexually transmitted diseases, sexual activity, sexual partners and date of last physical examination. For the purpose of my study, "urban" is defined as those populations with more than 50,000 inhabitants. "Rural" is defined as those populations with less than 50,000 people. Participants were then asked a series of knowledge and awareness questions about the human papillomavirus. Followed by questions to ascertain if participants had been diagnosed with HPV, their awareness of the HPV vaccine Gardasil, and whether or not participants had been vaccinated with the Gardasil vaccine. The survey was pretested on a small group of students and faculty members at North Carolina Agricultural & Techinical State University and modified as necessary. We determined that the survey instrument was validated to achieve the objectives of this study.

3.2 Study Participants

College students attending East Carolina University (ECU), North Carolina Agricultural & Technical State University (NCAT), North Carolina Central University (NCCU), and the University of North Carolina at Greensboro (UNCG) were asked to participate in this study. These schools were selected because they are all public universities in the State of North Carolina. Two of the institutions, NCA&TSU and NCCU, are historically black universities and two of the universities, ECU and UNCG, are historically white. This voluntary survey was distributed to students at these universities randomly selected based on their enrollment in introductory biology courses required for non majors. This is a course required for all students regardless of their major. Other students were chosen randomly by face to face contact in heavily populated areas on the campuses, such as the cafeterias, computer labs, libraries, and Student Unions.

3.3 Research Compliance

The survey entitled, "Human Papillomavirus (HPV) Knowledge and Awareness among North Carolina College Students" and an informed consent form was reviewed by the Institutional Review Board (IRB) at North Carolina Agricultural & Technical State University, and was determined to be exempt from further review according to 45 CFR 46.101(b) (Appendix). The seal of approval was granted on October 5, 2010 by NCAT. The North Carolina Agricultural & Technical State University seal of approval was then recognized and accepted at East Carolina University, North Carolina Central University,

and the University of North Carolina at Greensboro in the Fall semester of 2010 (Appendix).

3.4 Survey Administration Protocols

Participants were asked to read the Informed Consent Letter. They were also made aware of the potential risks and benefits of participation in this survey. Participants who voluntarily provided Informed Consent were asked to respond to survey questions. Students required approximately 10 minutes to complete the survey responses. To protect the privacy of study participants, surveys were collected by having students put them in an envelope.

3.5 Statistical Analysis

The statistical computer software SPSS (V 18.0) was used to analyze the collected survey data. Initially, descriptive analysis of the quantitative variables was conducted. The relationship between students' knowledge of HPV and the independent variables (age, ethnicity, gender, major, and school) was determined using the chi-square test. The significance level for this study was set at 5% (alpha = .05)

CHAPTER 4

Results and Discussions

4.1 Characteristics of the Study Population

A total of 502 surveys were collected from students attending East Carolina University, North Carolina Agricultural & Technical State University, North Carolina Central University, and University of North Carolina at Greensboro (Figure 1.1). The largest number of survey participants attended the University of North Carolina at Greensboro (30.5%). North Carolina Agricultural & Technical State University represented 27.3% and East Carolina followed closely at 24.3%. The lowest number of respondents attended North Carolina Central University (17.9%). Each university contributed between 17.9% to 30.5% towards the total population. In this study 60.4% of the participants were female and 39.6% were males. This gender distribution was also reflected within each school.

Past research studies in Florida compared students from a historically white university (Florida State University) and a historically black university (Florida Agricultural & Mechanical State University) as reported by Gerend and Magloire in 2008. The current study consisted of two historically white universities (ECU and UNCG) and two historically black universities (NCAT and NCCU) in the state of North Carolina. The current study surveyed four times as many students compared to the Florida study which only surveyed 124 students.

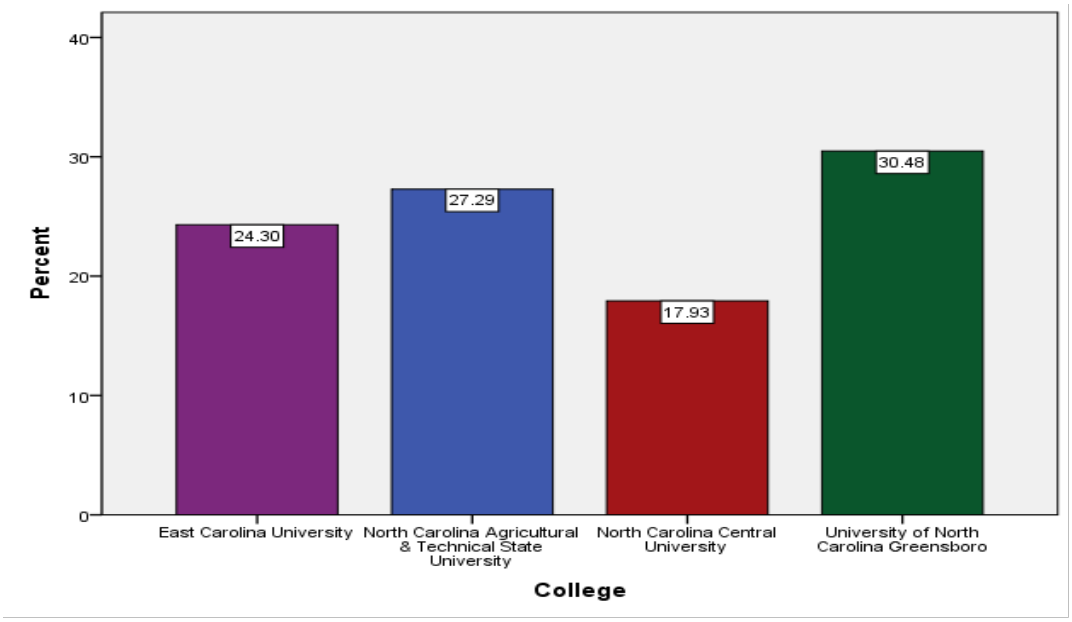

Figure 1.1 Distribution of Participants at the Four Selected Universities. The percentage of survey respondents that attended East Carolina University was 24.30%, North Carolina Agricultural & Technical State University 27.29%, North Carolina Central University 17.93% and University of North Carolina at Greensboro 30.48%.

4.1.1 Ethnicity. The largest ethnic groups were black and white as reflected in Table 1.1. Less than 1% of the respondents identified themselves as Other or Native American. Asian American, Southeast Asian /Asian and Hispanic/Latino were 2.2% of the population. Individuals who classified themselves as multi- racial represented 6.6%, 54.4 % were of African American/Black/African Descent, and 33.5% were Caucasian/White. All other ethnic groups together made up only about 10% and were not included in further analyses. Therefore, we focused on African American/Black/African Descent and Caucasian/White in this study.

Table 1.1 Ethnic Distribution of the Participants

Ethnicity	Percent %
Asian American/ Southeast Asian/ Asian	2.2
African American/ Black/African Descent	**54.4**
Caucasian/ White	**33.5**
Hispanic/ Latino	2.2
Multi-Racial	6.6
Native American	0.6
Other	0.6
Total	100

4.1.2 Age Group. The vast majority of respondents (89.6%) were between the ages of 18-22 (Figure 2.1). Less than 7% of the respondents were between the ages of 23-26 and only 3.4 % were older than 26. We expected that the majority of our population would be between the ages of 18-22, because we were sampling colleges with majority undergraduate students.

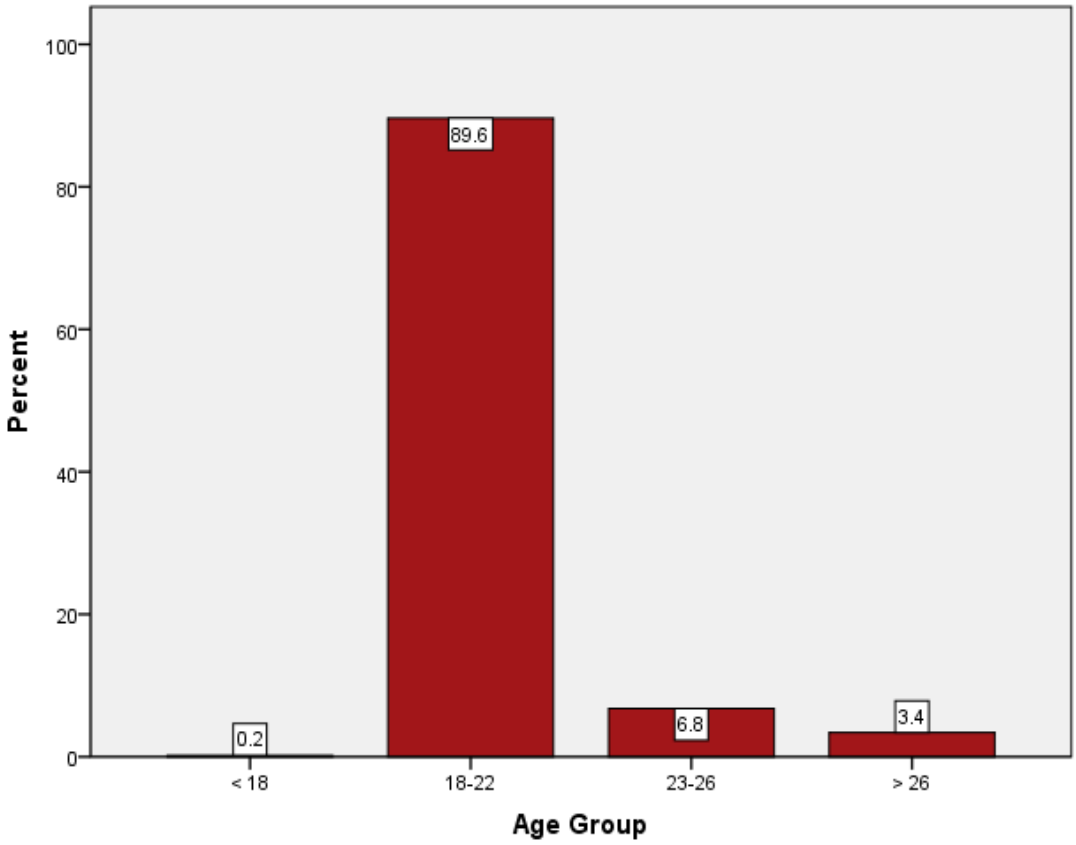

Figure 2.1 Age Group Distribution of Survey Participants. Respondents according to age were less than 18, 18-22, 23-26, or older than 26.

4.1.3 Classification. Nearly 60% of all survey participants were freshmen or sophomores. Juniors represented nearly 20% of the population and seniors 16%. Graduate students were least represented in this sample (3.8%). We had student representation from all classifications (Figure 3.1).

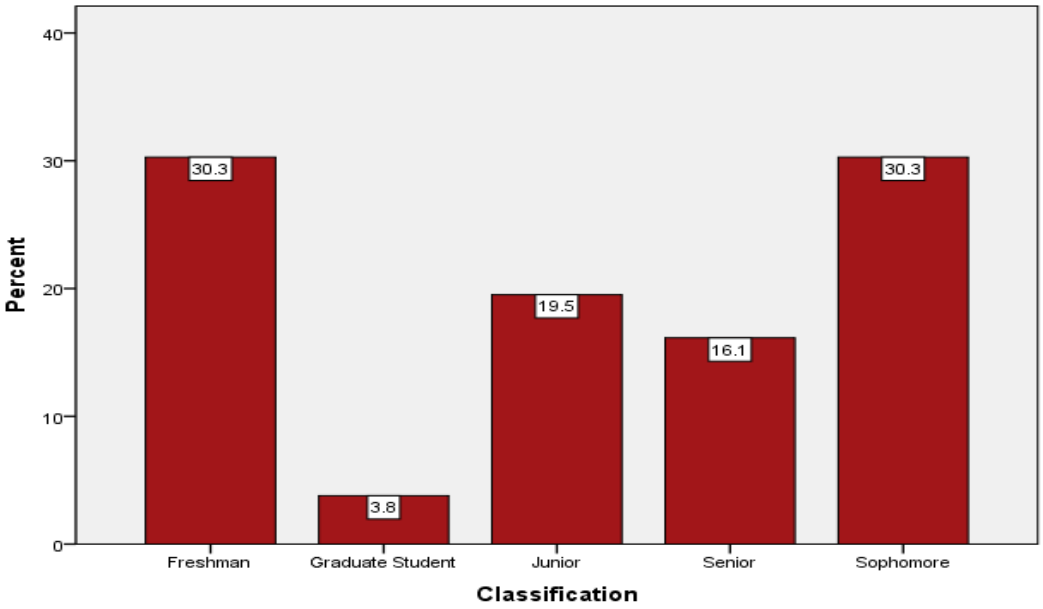

Figure 3.1 Distribution of Participants' Classification

Majority of survey respondents were sophomores or freshmen 60.6%, juniors represented 19.5%, seniors 16.1% and graduate students 3.8%.

4.1.4 Major. Students of different majors participated in this survey. The most common majors among the public universities were Economics/Business 15.3%, Nursing 8.96%, Civics/Social sciences 8.37% and Education 8.17% of the population. Other majors represented in this study were Math/ Physics, Biology/Chemistry, Agriculture, Animal Science, Athletic Training and Pre-Law. Although these majors were represented in this study, they were not as well represented as the above mentioned majors. A larger representation of biology and chemistry majors would have allowed us to determine if there is a significant difference in the knowledge and attitudes of students in majors typically considered to be more closely aligned with biomedical sciences. Overall, a very diverse sample of majors was obtained from the study population.

4.2 Sources of Receiving Information on Sexually Transmitted Diseases

The most common ways college students receive information on STDs and STIs is through the Physician or from the Student Health Center (74.5%); followed by the internet (71.5%) (Table 2.1). Over 60% of the participants received information on STDs and STIs by watching television or by word of mouth from parents, guardians or friends. Less than 50% of the participants received information by reading magazines, books and newspapers.

Table 2.1 Participants were asked for their Sources of Receiving Information Related to Sexual Health and STDS

Sources of Information	Percentage of those Receiving Information
Physician or Student Health Center	74.5%
Television	63.1%
Internet	71.5%
Health Classes	68.9%
Magazines, Books and Newspapers	44.0%
Word of Mouth (Parents/Guardian, Friends, Teacher)	61.6%

4.3 Physical or Gynecological Examinations

Fifty-four percent of the survey respondents had received a physical or gynecological exam six months ago and 22.7% had received an examination within the last year. Only 15% reported that they had received a physical examination more than a year ago, and less than 10% of the population had never received a physical or gynecological exam.

Overall, close to 90% of blacks had been examined by their physician within the last year compared to 66.5% of whites. Almost two times as many blacks reported that they had been examined by their physician six months ago in comparison to whites.

There are dramatic differences between the regularity of physician visits of whites and blacks (Table 3.1). This data differs from a research study conducted by the CDC which interviewed households from 1997-2009. Their research study showed no significant difference between blacks (46.5%) and whites (46.8%) who reported visiting their physician one to three times in 2009. The difference in the current study could be because blacks have a higher risk for contracting such diseases like HIV. The Center for Disease Control and Prevention reported that 52% of African Americans were diagnosed with HIV in 2008; whereas only 29% of whites were diagnosed with HIV.

Table 3.1 Physical Examinations amongst Blacks and Whites

	African American/Black	Caucasian/White
Never	5.5%	11.9%
More than a year ago	8.4%	21.4%
A year ago	**19.4%**	**29.2%**
Six months ago	**66.7%**	**37.5%**
Total	**100%**	**100%**

4.4 Sexually Activity and Sexual Partners

Overall, 79.1% of the survey participants reported being sexually active, and 20.9% reported that they were not sexually active. Females (77.6%) and males (81.4%) reported being sexually active. Almost an equal proportion (37%) had 0-1 or 2-3 sexual partners in the last three years (Figure 4.1). Whereas 10.6% of the population had 4-5 sexual partners, and 16.3% had more than 5 sexual partners. Further analysis shows a difference in sexual partners according to ethnicity and between white and black males.

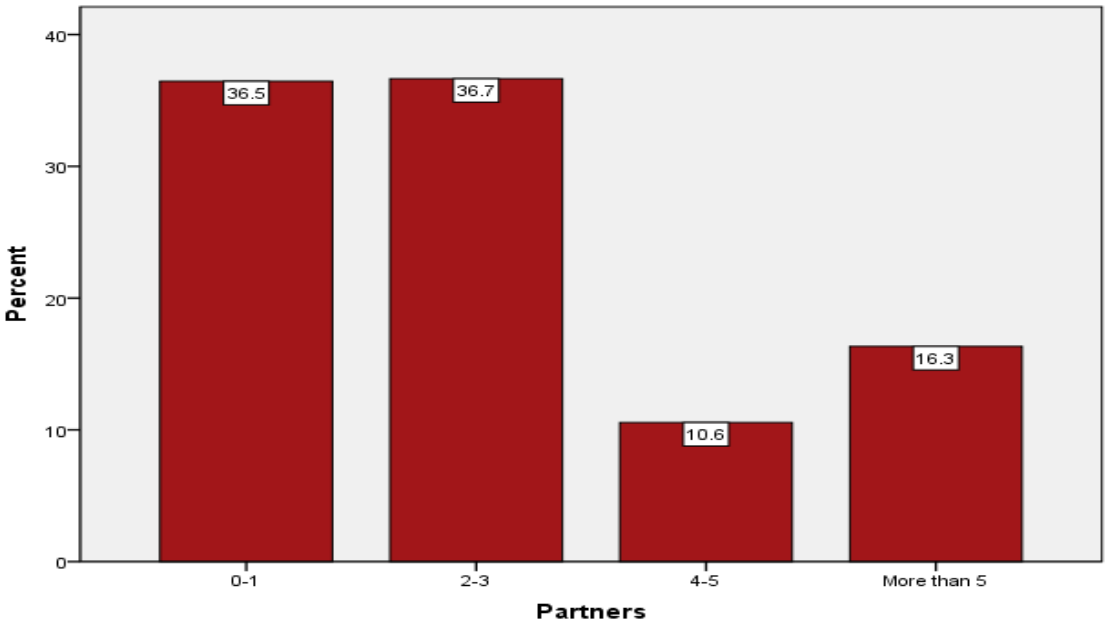

Figure 4.1 Distribution of Sexual Partners in the Last Three Years
Respondents reported the number of sexual partners they had within the last three years. Students who reported zero to one were 36.5%, two to three 36.7%, four to five 10.6% and more than 5 sexual partners were 16.3%.

4.4.1 Sexual Activity by Gender and Ethnicity. Of those sampled, 84.6% of the blacks reported being sexually active; while 70.8% whites were more likely to be in a monogamous relationship when compared to blacks. As seen from Table 4.1 the highest percentage of blacks (41.0%) reported they had two to three sexual partners in the last three years. Blacks reported having four or more sexual partners at a higher rate than Causasians/Whites.

Joy Kinnon, a reporter for Ebony Magazine, said "the bad news is that the number of black married couples is only half the number of married whites, and the situations is getting worse." Kinnion also explained that blacks marry at a lower rate and at an older age. The Joint Center for Political and Economic Studies reports that by the age 30, 81%

of white women will be married, and only 52% of black women were married. Research has proven that whites marry at a younger age than blacks. This may be a reason why almost 50% of whites were more likely to be in a monogamous sexual relationship for the last three years.

Table 4.1 Sexual Partners among Blacks and Whites

Number of Partners	Blacks	Whites
0-1	**28.2%**	**47.6%**
2-3	41.0%	30.4%
4-5	11.4%	8.9%
More than 5	19.4%	13.1%
Total	100%	100%

4.4.2 Sexual Partners by Gender and Ethnicity. The highest percentages of individuals reporting having more than five sexual partners in the last three years were black males (37.5%). On the other hand, the majority of the white males (43.5%) were in monogamous relationships with 0-1 sexual partners in the last three years (Table 5.1). Thirty percent of black and white males reported having only two to three sexual partners. There was not a significant difference in sexual partners between white and black females. Both reported having zero to three sexual partners in the last three years at nearly 80%.

Table 5.1 Sexual Partners in the last three years

Number of Partners	Black Males	White Males	Black Females	White Females
0-1	**20.5%**	**43.5%**	33.5%	50.0%
2-3	30.4%	30.6%	48.4%	30.2%
4-5	11.6%	8.1%	11.2%	9.4%
More than 5	**37.5%**	**17.7%**	6.8%	10.4%

4.5 Knowledge of Human Papillomavirus

A total of 10 questions were used to determine the knowledge of college students. Responses from Table 6.1 indicate that only 36.7% of the college students correctly recognized that human papillomavirus is not a bacterial disease. More than half of the students knew that human papillomavirus was the most common sexually transmitted infection in the United States (58%). Survey participants also recognized the chance of contracting human papillomavirus correctly at 52.2%. Of those students, 36.1% answered that he/she has a 50% chance of contracting human papillomavirus in his or her lifetime, which was the recognized percent from the Center for Disease Control. The other 16.1% answered that there is a 75% chance of contracting human papillomavirus in one's lifetime which correlated with the data from Merck & Company. Respondents correctly answered that between 30-40 types of human papillomavirus infect the genital tract (63.7%).

Only 28.5% of survey participants correctly answered that males and females are infected equally with the HPV. A majority of the respondents 64.5% believed that human papillomavirus infected females more than males. Only 7.0% answered that males are usually infected with HPV more than females. When asked, "Does a condom prevent transmission of human papillomavirus between partners," 63.7% believed a condom would prevent the transmission of HPV. Few answered correctly that a condom would not prevent transmission of HPV between partners. Lastly, the vast majority of the respondents, 68.3%, recognized that it would be acceptable for a person under age 26 to receive the human papillomavirus vaccine before becoming sexually active or after becoming sexually active, and after being exposed to the human papillomavirus. There was no significant difference in the amount of knowledge in the white and black populations.

Nearly 60% of males and females believe that a condom will prevent the transmission of HPV; however, areas that are not covered by the condom are able to contract the virus during sexual intercourse. Young adults also seem to be naïve to the fact that HPV is an "equal opportunity offender" it does not infect females more than males or vice versa according to the CDC. Less than 40% of the population correctly responded that HPV is not a bacterial disease.

Table 6.1 Knowledge and Transmission on Human Papillomavirus

Knowledge Test Questions	Correct Response %	Correct Response %	
		M	F
HPV is a bacterial disease? (T/F)	36.7	32.2%	39.6%
HPV is the most common Sexually Transmitted Infection (STI) in the United States? (T/F)	58	41.7%	42.2%
What is the chance that one will contract HPV in his or her lifetime?	52.2	46.7%	55.8%
How many types of HPV infect the genital tract?	63.7	60.3%	66.0%
Which sex does HPV usually infect?	28.5	34.1%	24.8%
Does a condom prevent transmission of HPV between partners? (T/F)	36.3	30.2%	40.3%
When could a person under 26 receive the HPV vaccine?	68.3	66.8%	69.3%

4.6 Knowledge of HPV Symptoms

College students were asked to check all of the symptoms associated with human papillomavirus infections. The symptoms were genital warts in males, genital warts in females, cervical cancer in females and throat and penis cancers in males. More than 50% of the students associated HPV with genital warts in females and cervical cancer in females (Table 7.1). Fewer recognized that HPV was related to genital warts in males (44%). Only a small number of respondents were aware that HPV was found in throat and penis cancers in males (18.3%); and anal and oral cancers in both sexes (23.9%).

Table 7.1 Knowledge on HPV Associations

HPV is associated with….	Correct Response %	Correct Response% M	F
Genital warts in males	44	**53.8**	**37.6**
Genital warts in females	52.6	55.8	50.5
Cervical cancer in females	76.7	**62.3**	**86.1**
Throat and penis cancers in males	18.3	**23.6**	**14.4**
Anal and oral cancers in males and females	23.9	26.1	22.4

The study in Florida by Gerend and Magloire showed that survey participants knew that some types of HPV can lead to cervical cancer (92%) and genital warts (69%). The current study is showing that only 76.7% of college students knew that HPV was associated with cervical cancer. More participants knew about symptoms in females than those in males. The Greensboro Public Health Department also found that many people believe that HPV is a "female disease." There has to be a reason why there is a higher rate of knowledge on HPV being associated with cervical cancer and genital warts in Florida college students in comparison to that of North Carolina college students. Further research needs to be done to evaluate educational measures pertaining to the human papillomavirus in Florida in comparison to that of North Carolina.

4.6.1 Black and White Males (Knowledge of HPV Associations). White males were more aware that HPV is associated with genital warts in males and females, than were black makes and black and white females (Table 8.1). White and black females were equally aware of HPV being associated with cervical cancer in females in

comparison to black and white males. Black males were nearly 10% more aware of throat and penis cancer in males than any other group, and white females and black males had the highest knowledge of anal and oral cancers being related to HPV. Overall, there seems to be a gender difference in students' knowledge of the link between HPV and genital warts and different cancers in males and females.

Table 8.1 Knowledge of HPV Associations between Black and White Males

HPV is associated with….	Males Correct Response		Females Correct Response	
	Black	White	Black	White
Genital warts in males	48.2%	**62.9%**	35.4%	41.5%
Genital warts in females	50%	**66.1%**	51.6%	50.9%
Cervical cancer in females	**66.1%**	**59.7%**	**87.6%**	**84.9%**
Throat and penis cancers in males	**26.8%**	16.1%	13.0%	15.1%
Anal and oral cancers in males and females	**26.8%**	16.1%	16.8%	**27.4%**

4.7 Knowledge of HPV Infections

A large number of respondents were not aware that most types of HPV infections are able to clear on their own and responded that they are unable to clear on their own and require medical attention (74.3%). Only 18.9% of the respondents believed HPV infections sometimes clear on their own (Table 9.1). Only 6.8% correctly answered, that most types of HPV usually clear on their own. The responses from males and females showed no gender difference in the knowledge of HPV associations. There was also no

significant difference between white and black males knowledge on HPV associations. The previous research study by Gerend and Magloire showed that less than 30% of respondents knew that most types of HPVs clear on their own. Participants in this study were asked if the statement was true or false, while participants in the present study were asked in a multiple choice format. We believe the multiple choice format is more reliable, because one does not have a 50% chance of guessing the correct answer.

Most students in this study had a higher perceived misconception of HPV infections, because nearly 90% of HPVs clear on their own. Only 10% of the population with HPV will develop symptoms and the strain of HPV is irrelevant. The students probably associated HPV and related diseases with other sexually transmitted diseases and infections most of which require medical attention. Diseases such as Gonorrhea, Chlamydia, Syphillis and infection with human immunodeficiency virus always require medical attention.

Table 9.1 Knowledge of HPV Infections

Most types of HPV infections….	**Response %**	**Females Response %**	**Males Response %**
Usually clear on their own **(Correct Response)**	6.8	6.6	7.0
Sometimes clear on their own	18.9	19.8	17.6
Are unable to clear on their own and require medical attention	**74.3**	**73.6**	**75.4**
Total Response	n=502	n=303	n=199

4.8 Knowledge of HPV Transmission

Based on survey responses, 95.8% of the participants correctly answered, that HPV cannot be transmitted by holding hands (Table 10.1). There were few respondents that recognized that HPV could be transmitted by French kissing (15.9%) and intimate skin to skin contact (32.9%). Most respondents correctly identified that HPV can be transmitted by oral sex and sexual intercourse. A comparison of male and females response rate to HPV transmission was similar. Further analysis determined that knowledge of HPV transmission was not different between black and white populations.

Table 10.1 Distribution of Knowledge of HPV Transmission

HPV can be transmitted through…	Correct Response %	Correct Response %	
		Males	Females
Holding hands	95.8	94.5	96.7
French kissing	15.9	20.1	13.2
Intimate skin to skin contact	32.9	**27.6**	**36.7**
Oral Sex	72.9	75.9	71.0
Sexual Intercourse	95.8	91.5	98.7

4.9 Knowledge Scale

A knowledge scale was created 0-18 to look at the overall knowledge of college students (Figure 5.1). Participants received one point for every correct response and zero points for every incorrect response. The average knowledge score was 8.79. Nearly 65% of the students scored a nine or less showing poor knowledge of HPV. Close to 75% of the population scored a 14 or less representing a lack of adequate knowledge. Only 1.2% of the population scored between 15 and 16. No one received a perfect score out of 502

survey participants. Overall, the HPV knowledge score of survey participants was very poor. This differs from a similar study by Gerende and Magloire, which had evidence that 75% of the students had heard of the human papillomavirus, though there were misconceptions about the virus, general knowledge of HPV was high in Florida. The current study showed no gender difference in the knowledge scale; even though females had a slightly higher mean and median (Table 11.1). Further analysis was completed to determine if knowledge scale depended on factors such as university, classification, or ethnicity.

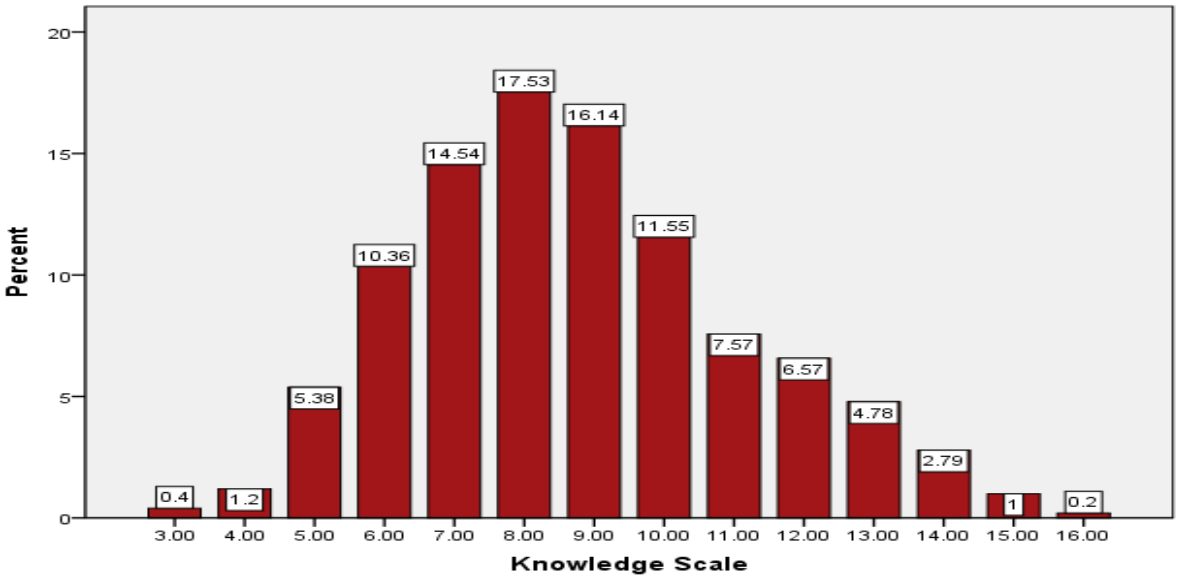

Figure 5.1 Distribution of Knowledge Scores

Students knowledge distribution on the human papillomavirus (n=502) was overall low and graph is skewed to the right.

Table 11.1 Knowledge Scale by Gender

Gender	Mean/ Std. Deviation	N	Median
F	8.87/(s=2.47)	303	9.00
M	8.67/(s=2.36)	199	8.00
Total	8.79/(s=2.43)	502	9.00

4.9.1 Knowledge Scores by University. A comparison of means examined the knowledge scores of the universities sampled (Table 12.1). The highest scoring universities were UNCG (8.95) and NCAT (8.93). The other two universities followed closely behind ECU (8.76) and NCCU (8.37). Anova test showed there was no significant difference between the knowledge scores between universities (p = .280). All of the knowledge score means and medians for universities were between eight and nine out of a possible 18 points. The averages seen at each university were similar to that of the overall study population.

Table 12.1 Distribution of Knowledge Scores by University

College	Mean/Std. Deviation	N	Median
East Carolina University	8.76/(s=2.44)	122	**8.00**
North Carolina Agricultural & Technical State University	8.93/(s=2.38)	137	**9.00**
North Carolina Central University	8.37/(s=2.59)	90	**8.00**
University of North Carolina Greensboro	8.95/(s=2.35)	153	**9.00**
Total	8.79/(s=2.43)	502	**9.00**

4.9.2 Knowledge Scores by Classification. Graduate Students had a slightly higher knowledge scores than freshmen, sophomores, juniors and seniors (Table 13.1). However the graduate students (n=19) were a very small portion of our respondents and were not considered a representative sample. Juniors had the lowest average knowledge score. Sophomores had slightly more knowledge than freshman. In spite of this, there is no significant difference between classification and knowledge scores. The Anova test had an extremely high (p value = .379).

Table 13.1 Knowledge Scores by Classification

Classification	Mean/Std. Deviation	N	Median
Freshmen	8.82/(s=2.60)	152	8.00
Sophomore	8.89/(s=2.87)	152	9.00
Junior	8.45/(s=2.38)	98	8.00
Senior	8.80/(s=2.53)	81	8.00
Graduate Student	9.58/(s=2.87)	19	9.00
Total	8.79/(s=2.43)	502	9.00

4.9.3 Knowledge Scores by Ethnicity. A comparison of knowledge scores by ethnicity showed that Asian American/Southeast Asian/Asian and Hispanics had the highest scores (Table 14.1). However, they represented a very small portion of our sample (n=22, .08). There was no significant difference of knowledge scores in African American/Black/African Descent ethnicities to that of Caucasian/ Whites. Multi-racial survey participants had a average knowledge score over nine. Native Americans scored the lowest on the knowledge scale. They also had low representation in this study (n=3).

Gerend and Magloire 2008 also found no difference between knowledge scores across ethnicity. However, it does differ from a study completed in Pittsburg by Akers et al in 2009. Their study indicated that blacks were less aware of HPV than whites (Black 89% vs. Whites 97%, $p > 0.1$). Their survey was used to evaluate knowledge about HPV and the HPV vaccine, and the perception of the vaccine‘s efficiency and safety (Akers, et al., 2009).

Table 14.1 Comparison of Means by Ethnicity * Knowledge Score

Ethnicity	Mean/ (Std. Deviation)	N	Median
Asian American/ Southeast Asian/ Asian	9.8/ (s=2.79)	11	9.00
African American/ Black/African Descent	8.66/(s=2.47)	273	8.00
Caucasian/ White	8.90/(s=2.42)	168	9.00
Hispanic/ Latino	9.27/(s=2.76)	11	8.00
Multi-Racial	9.06/(s=1.90)	33	9.00
Native American	7.33/(s=1.15)	3	8.00
Other	8.00/(s=2.65)	3	9.00
Total	8.79/(s=2.43)	502	9.00

4.10 Perception

Over 80% of our sample viewed their knowledge as average or poor (Figure 6.1). Their actual knowledge scores supported their perception. It is interesting to note that the way students perceived their knowledge was correct, because 75% of the population scored poorly (knowledge score below 14) on HPV knowledge. Less than five percent of the population perceived themselves to be well informed. Nearly a third of the population perceived their knowledge as average.

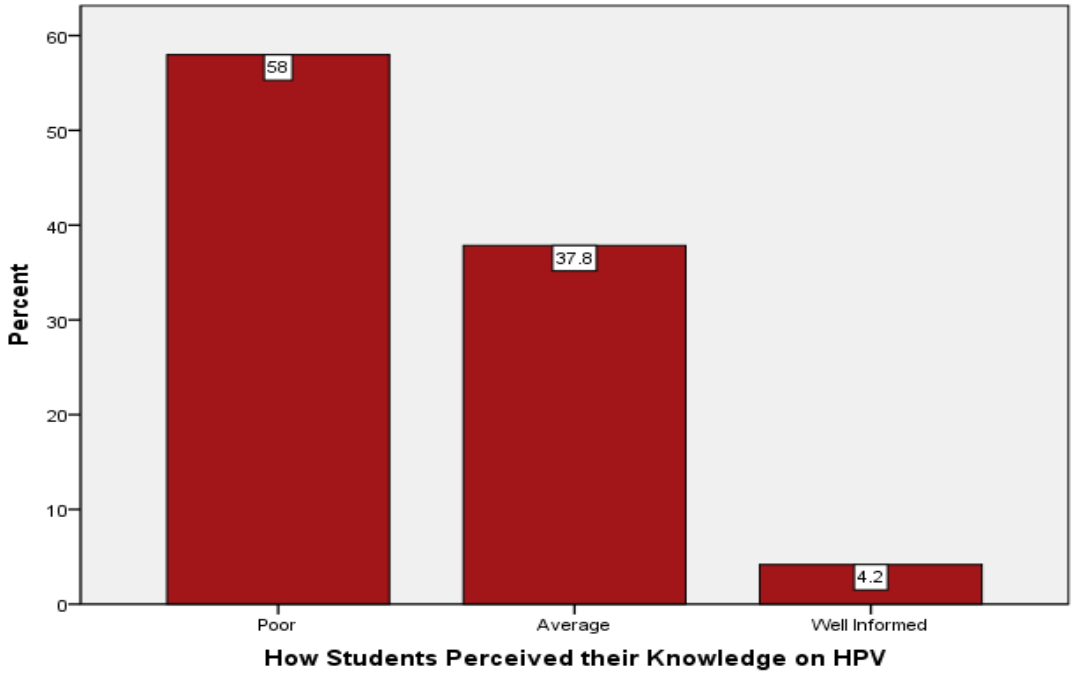

Figure 6.1 Distribution of How Students Perceived their Knowledge of HPV
Based on survey responses 58% perceived their knowledge on HPV as poor, 37.8% average, and 4.2% as well informed.

4.10.1 Perception by Gender. A higher percentage of males perceived their knowledge of HPV as poor than females (Table 15.1). More females thought their knowledge of HPV was average. The actual mean knowledge score was higher in females than males. The median for females was nine, and the median score for males was eight. Overall, the perceived knowledge of males and females was similar to that of actual knowledge (poor).

Table 15.1 Distribution of Perceived Knowledge by Gender to Actual Knowledge

	Poor	Average	Well Informed	Actual Score Mean/ Median
Females	53.1%	41.9%	5.0%	8.87/9.00
Males	65.3%	31.7%	3.0%	8.67/8.00

4.10.2 Perception in Blacks and Whites. Students' perception of knowledge of HPV was different between blacks and whites. Blacks had a higher perceived knowledge of HPV to that of their white counterparts. Few survey participants reported that they were well informed on the human papillomavirus. The actual mean knowledge score showed that both populations actually had poor knowledge of HPV. Whites were slightly more knowledgeable about HPV than blacks. However, there is no significant difference between the knowledge score of the two populations.

Gender comparison by ethnicity in Table 16.1 showed that white females had the highest actual knowledge score. However, all scores were very close together showing a

tenth of a point difference. Median scores were highest in the all white sample and the sample of white females. More white females perceived their knowledge as poor when compared to black females. In general by gender and by ethnicity the overall knowledge scores were still relatively low.

Table 16.1 Perception of Actual Knowledge by Gender and Ethnicity

Population	Poor	Average	Well Informed	True Knowledge Score (Mean/Max score)
All Black	**52.0%**	**42.1%**	**5.9%**	**8.66/18**
Females	47.8%	44.7%	7.5%	8.69/18
Males	58.0%	38.4%	3.6%	8.63/18
All White	**64.9%**	**32.7%**	**2.4%**	**8.89/18**
Females	60.4%	37.7%	1.9%	9.00/18
Males	72.6%	24.2%	3.2%	8.71/18

4.11 Attitude towards the HPV Vaccine Gardasil

Over 60% of the population wanted more information on the HPV vaccine Gardasil (Figure 7.1). Nearly fifteen percent of the population did not know about the vaccine and were not interested in receiving more information on Gardasil. Whereas, fourteen percent of respondents believed that they knew everything about Gardasil. There were gender differences between males and females (Figure 8.1). More than 50% of the males did not know about Gardasil but would like more information. Nearly half of the females reported they had heard of Gardasil but would like more information. The findings of the current study were similar to that of Gerend & Magloire who found that 64% of their study population was interested in HPV education. A cross tabulation was performed to see if there was a difference between white and black populations; and white and black males. There was no significant difference to report. Since more than half of the population was interested in learning more about the HPV vaccine, methods of educating students about HPV and the vaccine should be implemented.

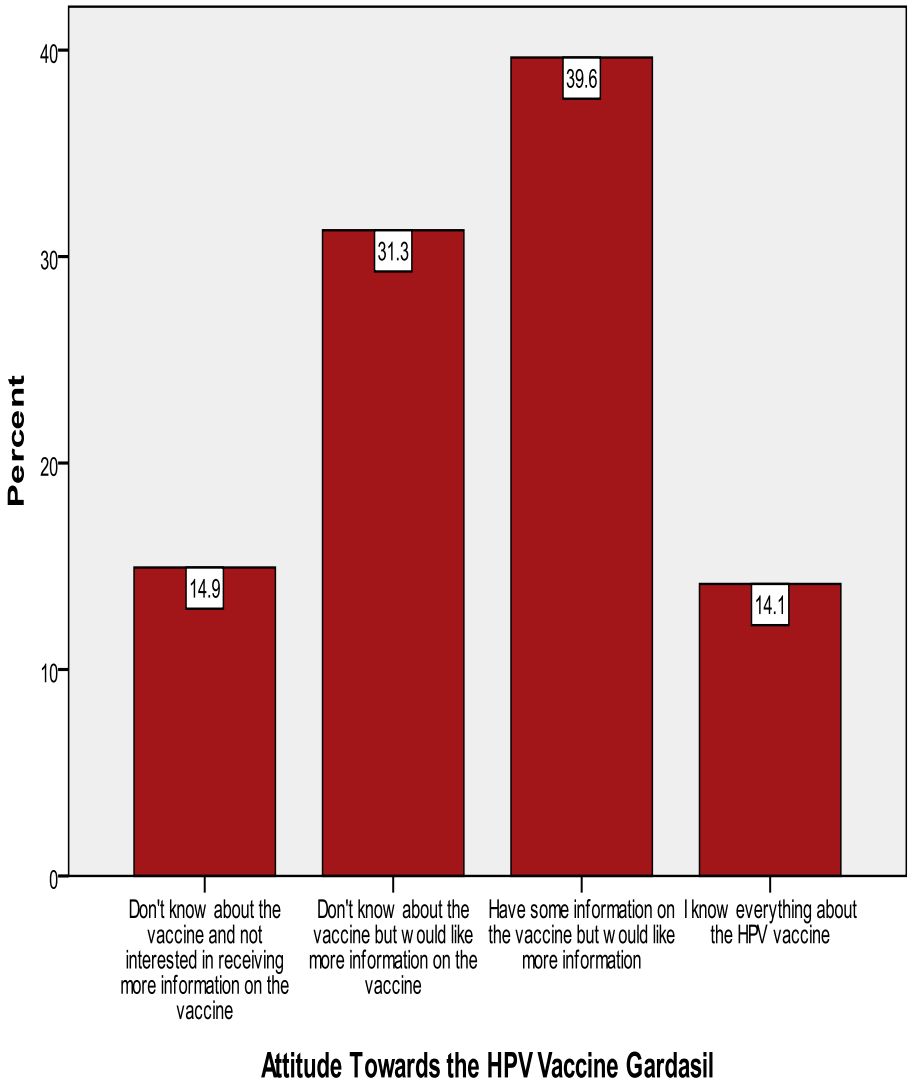

Figure 7.1 Distribution of Students' Attitude towards Gardasil

The percentage of survey respondents who did not know about the vaccine and were not interested in receiving more information on the vaccine were 14.9%, 31.3% did not know about the vaccine but would like more information, 39.6% had some information on the vaccine but would like more information, and 14.1% knew everything about the HPV vaccine Gardasil.

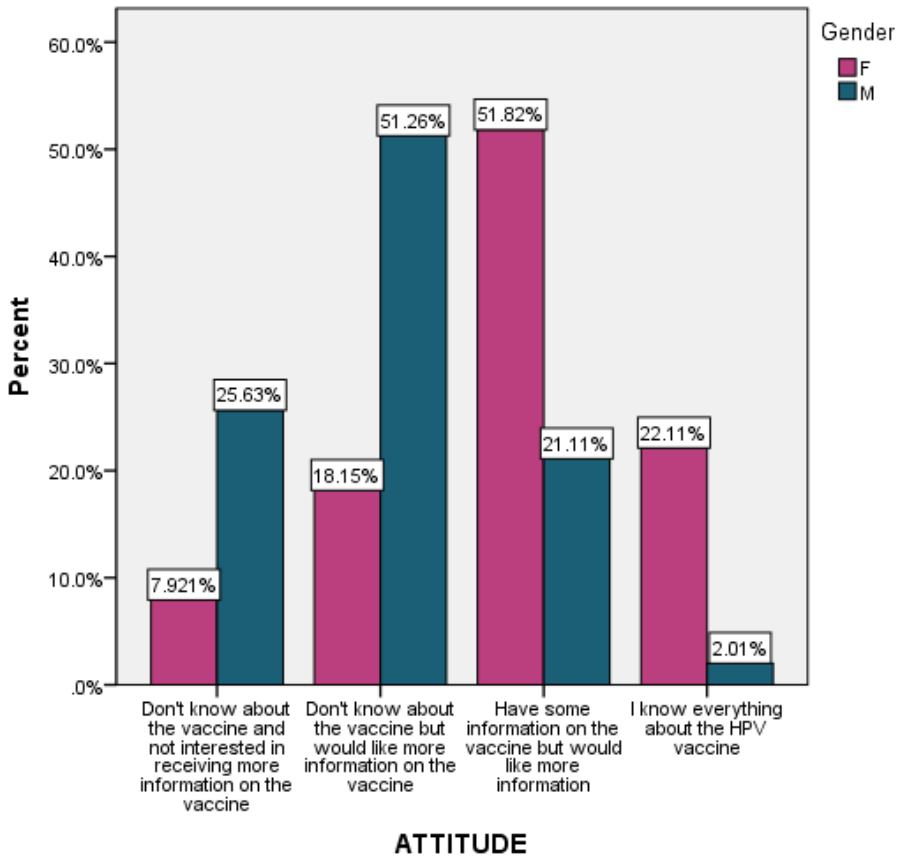

Figure 8.1 Attitude towards Gardasil Vaccinations by Gender

The distribution of attitudes on Gardasil Vaccinations by Gender showed that 51.26% of males did not know about the vaccine but would like more information and 51.82% of females had some information on the vaccine but would like more information.

4.12 The HPV Vaccine Gardasil

The response to vaccinations was evenly divided with 31.87% of respondents having been vaccinated, 34.26% having not been vaccinated but would like to be, and 33.86 % having not been vaccinated and do not want to be vaccinated (Figure 9.1). Further analysis was done to see if gender, university and ethnicity played a role in Gardasil vaccination rates.

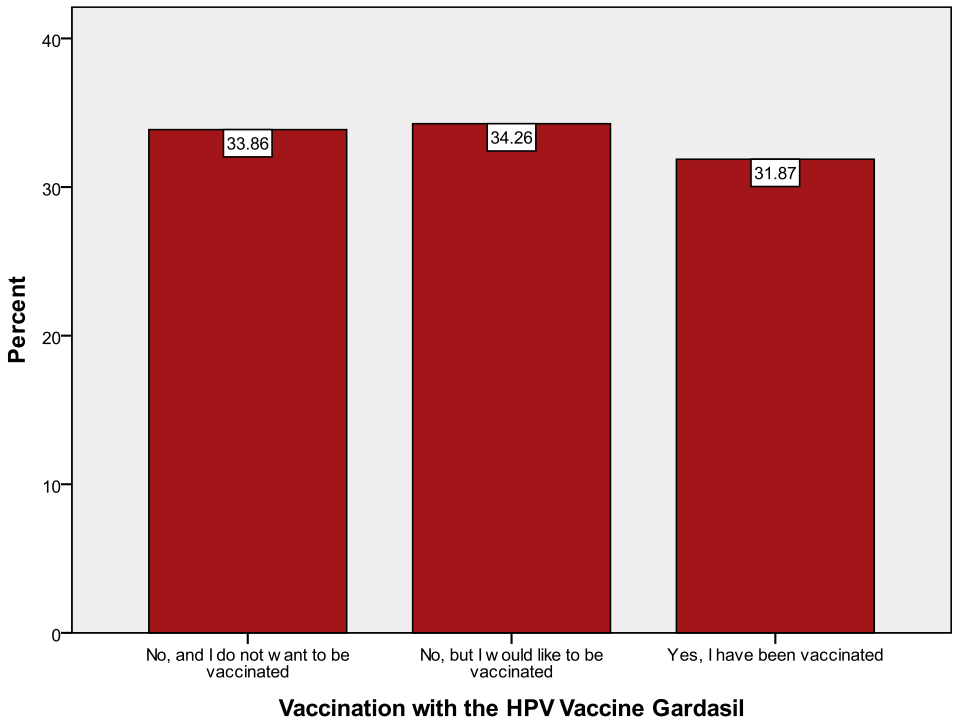

Figure 9.1 Distribution of Gardasil Vaccination

The percentage of students who did not want to be vaccinated 33.86%, those who would like to be vaccinated 34.26%, and those that had been vaccinated 31.87%.

4.12.1 Gardasil Vaccination by Gender. A cross tabulation was performed to determine the rate of Gardasil vaccination according to gender (Table 17.1). More than half of the female participants had been vaccinated; whereas only 1% of male participants had been vaccinated. The majority of the males had not been vaccinated and was not interested in receiving the Gardasil vaccine. There is a statistically significant difference in the Gardasil vaccination rates based on gender ($x^2 = 149.633$, p=.001). Nearly 80% of females had been vaccinated or would be interested in receiving the Gardasil vaccine Figure 10.1. Less than a quarter of females were not interested in receiving the Gardasil

vaccine. On the other hand, more males (54.3%) were not interested in being vaccinated with Gardasil, but a large portion (44.7%) would consider being vaccinated.

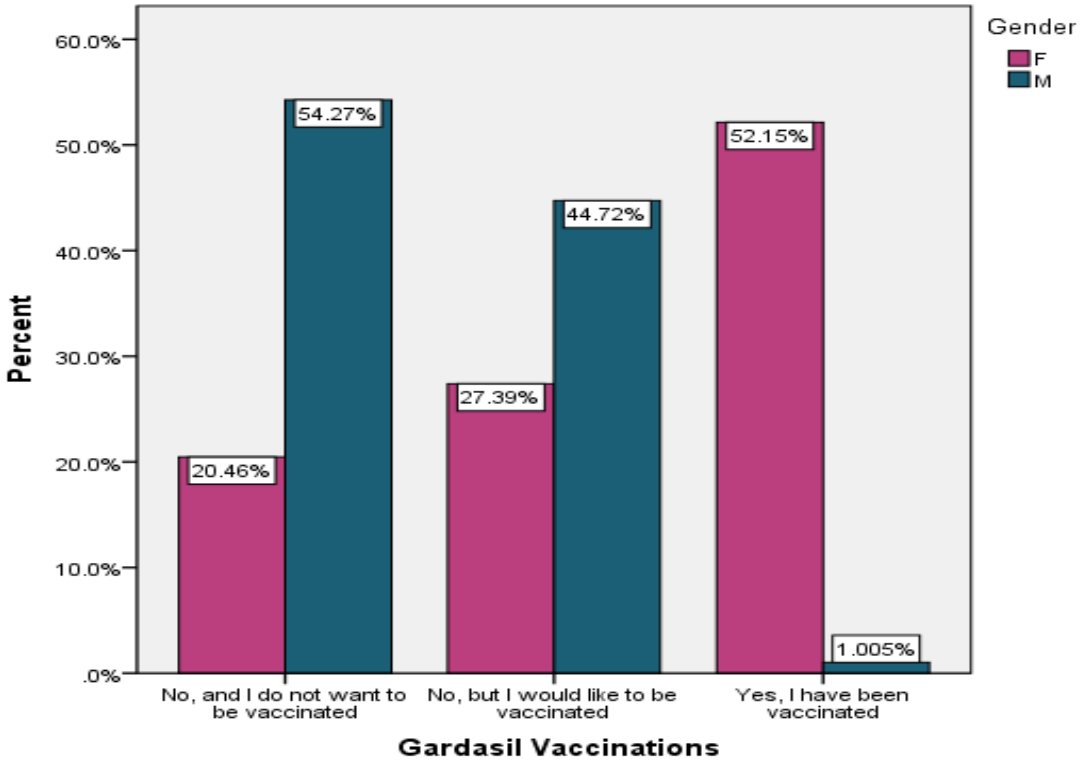

Figure 10.1 Gardasil Vaccinations by Gender
The graph shows the percentage of students who did not want to be vaccinated, those that would like to be vaccinated, and those that have been vaccinated according to gender.

Gardasil was originally approved (June 2006) for females and recently approved three years later for males (November 2009) by the Food and Drug Administration. More efforts have been made to target females, since the vaccine has been available for females longer. Even though Gardasil was approved for males, few campaigns or advertisements have been promoting the vaccination of males. Numerous Gardasil

advertisements show the faces of women and young females in their campaigns. This could be the reason that 50% of males are hesitant to receive the Gardasil vaccine.

Table 17.1 Gardasil Vaccination based on Gender

		Gender	
		F	M
Gardasil	No, and I do not want to be vaccinated	62 20.4%	108 54.3%
	No, but I would like to be vaccinated	83 27.4%	89 44.7%
	Yes, I have been vaccinated	158 52.1%	2 1.0%
Total		303 100%	199 100%

4.12.2 Gardasil Vaccination by University. There was a statistically significant difference between Gardasil Vaccinations between universities (x^2 =28.39, p value = .001; Figure 11.1). The University of North Carolina at Greensboro had the highest percentage of students who had been vaccinated and the highest number of students who did not want to be vaccinated. North Carolina Agricultural & Technical State University had the most students (n=65, 47.45%) who indicated that they would like to be vaccinated with the Gardasil vaccine.

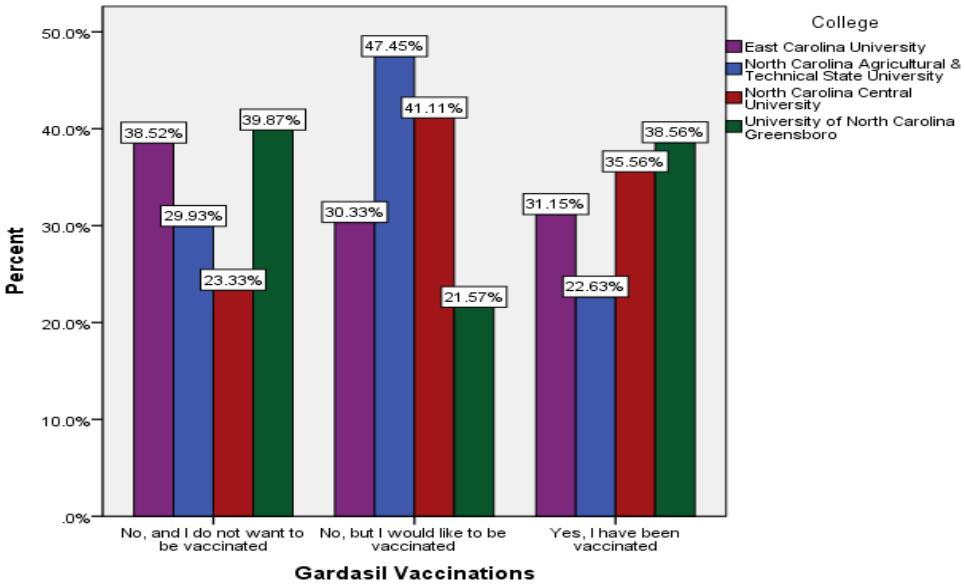

Figure 11.1 Gardasil Vaccinations by University

Graph shows Gardasil vaccinations by university NCAT 22.63%, NCCU 35.6%, ECU 31.5%, and UNCG 38.56.

Further analysis was conducted that observed Gardasil vaccination rates by gender at each university (Table 18.1). More than half of the females at NCCU and UNCG had been vaccinated with the Gardasil vaccine. Less than fifty percent of the females at ECU and NCAT had been vaccinated. Almost 80% of females in all schools have or would like to be vaccinated and almost 20% have no interest in receiving the vaccination. Eighty percent of males from UNCG and 70% of males from ECU were not vaccinated and expressed no interest in being vaccinated. Over, 60% of males that attended NCAT and NCCU showed interest in receiving the Gardasil vaccine.

Males that attend the historically black colleges (NCAT and NCCU) were more likely to have interest in being vaccinated with Gardasil. Males that attended universities which were historically white (UNCG 81.9% and ECU 68.9%) had almost no interest in vaccination. This means that the approach for increasing vaccination rates in males may

need to be different according to ethnicity. In females, it is interesting that half of the females from NCCU and UNCG had been vaccinated. Considering that NCCU is historically black and UNCG is historically white. Females that attended NCAT and ECU had less than 50% vaccination rates. There may be no major difference in vaccination rates between women according to ethnicity because Merk Pharmaceutical Company has spent millions of dollars to advertise Gardasil to a diversified group of women between the ages of 9-26.

Table 18.1 Gardasil Vaccinations by University and Gender

	ECU		**NCA T**		**NCCU**		**UNCG**	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**
No, and not interested	**68.9%**	20.8%	38%	21.2%	38.0%	16.7%	**80.9%**	21.7%
No, but interested in vaccine	31.1%	29.0%	**62.0%**	31.8%	**62.0%**	25.9%	17.0%	23.6%
Yes, I have been vaccinated	.0%	**49.4%**	.0%	**47.0%**	.0%	**57.4%**	2.1%	**54.7%**
Total (Frequency)	45	77	71	66	71	54	47	106

4.12.3 Gardasil Vaccination by Classification. Next, we looked at Gardasil vaccination across classification (Table 19.1). Freshmen and sophomores had the highest percentage of respondents vaccinated with Gardasil. The majority of junior respondents had not been vaccinated and did not want to be vaccinated with the vaccine. All students showed interest in receiving the Gardasil vaccine. The different classifications showed that students were divided by a third wanting the vaccine, a third not interested in the vaccine and those that had been vaccinated. Chi-square test showed that there was no significant difference in Gardasil vaccination rates based on the classification of students.

Table 19.1 Gardasil Vaccinations by Classification

	Freshmen	**Sophomores**	**Juniors**	**Seniors**	**Graduate Students**
No, and I do not want to be vaccinated	29.6%	33.6%	37.7%	35.8%	42.1%
No, but I would like to be vaccinated	36.2%	29.6%	32.7%	39.5%	42.1%
Yes, I have been vaccinated	34.2%	36.8%	29.6%	24.7%	15.8%

4.12.4 Gardasil Vaccination and Community. Gardasil vaccinations were compared to community. However, one hundred and fifty-five students failed to identify their hometown (Table 20.1). Of the 350 students who did report their hometown, students from rural communities were more likely to report that they did not want to be vaccinated with Gardasil at a higher rate than students from urban communities. Higher vaccination rates were seen in college students from urban communities. However, more interest in Gardasil vaccination was seen in students from rural areas.

There is some difference in the communities and Gardasil vaccinations (x^2=8.715, p =.069). However due to the fact that half of the population failed to report their hometown, it is difficult to draw definite conclusions. Further research needs to be implemented to examine vaccination rates of students from rural and urban communities. This information will further aid in the development of educational materials on HPV and the Gardasil vaccine.

Table 20.1 Gardasil Vaccinations by Community

	Rural	Urban	Non-Reported
No, and I do not want to be vaccinated	37.0%	29.0%	38.1%
No, but I would like to be vaccinated	36.9%	38.3%	26.5%
Yes, I have been vaccinated	26.2%	32.7%	35.5%

4.12.5 Gardasil Vaccinations among Gender in Blacks and Whites. We also looked at two ethnicities, Caucasian/White and African American/Black/African Descent, to Gardasil vaccinations. Analysis showed that differences in responses of the two ethnicities are statistically significant ($x^2 = 40.856$, $p = .001$) (Table 21.1). Black males (59.8%) would like to be vaccinated at a higher percentage of white males (19.4%). White males (80.3%) showed no interest in receiving the Gardasil vaccine in comparison to black males (38.4%). More than half of the black (52.2%) and white (58.5%) females had been vaccinated with Gardasil. Nearly 80% of the females had been vaccinated or would like to be vaccinated.

Of the students who had received the Gardasil vaccine, whites were more likely to receive all three shots (80.3%); compared to blacks (67.8%). However, 20.8% of blacks reported that it was not time for the next injection compared to whites (9.8%). The reasons for not receiving all three shots of Gardasil differed between the two populations. Blacks reported that they had not received all three vaccinations because of monetary reasons or they just simply forgot to go back for other injections. Whites reported that they had not received all three injections because of bad reactions and that they just decided not to finish the series of vaccinations. The two populations had other reasons that were similar for not receiving all of the injections, such as time conflicts, phobia of needles, and being away from home at the time for the next injection.

Table 21.1 Gardasil Vaccination based on Ethnicity and Gender

		African American/ Black/African Descent N=273		Caucasian/ White N=168	
		M	**F**	**M**	**F**
Gardasil	No, and I do not want to be vaccinated	38.4%	17.4%	**80.6%**	20.7%
	No, but I would like to be vaccinated	**59.8 %**	30.4%	19.4%	20.8
	Yes, I have been vaccinated	1.8%	**52.2%**	0%	**58.5%**
Total		**n=112**	**n=161**	**n=62**	**n= 106**

4.13 Perceived Barriers to Gardasil Vaccination

Based on the responses from college students, most had not been vaccinated with Gardasil (66.3%), due to a lack of information on the vaccine and the disease. Financial reasons, time conflicts, and personal reasons seemed to be common reasons students had not been vaccinated. A moderate amount of college students reported that they had not been vaccinated, because they were not concerned with contracting HPV (28.7%). These students explained that they were mostly in committed monogamous relationships. Other factors, such as religious reasons, not having a physician, and not feeling the need to be vaccinated were of lesser concern (Table 22.1). There was not a major difference in the reasons for non-vaccination among female and male respondents. More males responded that they did not have enough information on the vaccine and disease, also they were not concerned with contracting HPV in comparison to females. Females reported that they have not been vaccinated due to personal reasons at a higher rate than males.

Overall, lack of information on the vaccine and disease seems to be the major reason that two thirds of the population had not been vaccinated with Gardasil. If more efforts were made to educate people on the human papillomavirus and the Gardasil vaccine, maybe there would be higher vaccination rates and lower incidence of related diseases.

Table 22.1 Reasons for not being vaccinated

Reasons for not being Vaccinated	**% of Females Responses**	**% of Males Responses**	**Percentage of Population %**
Lack of information on the vaccine and disease	**58%**	**72.3%**	**66.3%**
Financial Reasons	18.2%	15.9%	16.9%
Time Conflicts	**22.4%**	15.9%	18.6%
Religious Reasons	2.1%	6.2%	4.4%
Personal Reasons	19.6%	8.7%	13.3%
I am not concerned with contracting HPV	17.5%	**36.9%**	28.7%
I do not have a physician	8.4%	5.6%	6.8%
I do not think the vaccine is safe	**22.4%**	12.3%	16.6%
Other reasons	12.6%	9.2%	10.7%
No, because it would benefit women only	0%	5.7%	3.3%
Total	145	197	342

CHAPTER 5

Conclusions

Most would think that college students would be lined up, as they did for the latest Apple gadget, the "iPad", if they could acquire a vaccine to protect against the number one sexually transmitted infection (STI) in the United States of America, the human papillomavirus (HPV). However, our research showed that college students in North Carolina are divided into thirds when it comes to the Gardasil vaccine. A third of the population had been vaccinated, a third was interested in receiving the vaccine, and a third was not interested in receiving the Gardasil vaccine. The most common perceived barrier to vaccination by both men and women was a lack of information on the vaccine and the associated diseases. The Merck Pharmaceutical Company, public health agencies, universities, and communities must come together to educate young adults on the benefits of being vaccinated with Gardasil.

A comparison of knowledge scores to ethnicity showed that Asian American/Southeast Asian/Asian and Hispanics had the highest scores. Unfortunately, we did not have significant numbers to represent the full population (n=22). This group represented less than 5% of the total population. A larger sample of Asian American/Southeast Asian/Asian and Hispanics would allow us to see if their higher knowledge scores are significant. There may be a way these specific ethnic groups are receiving more information about HPV that could benefit other ethnic groups.

The survey used in this study also should have asked females if they received a Papanicolaou Test (Pap Smear) in the last year, and if so, if it were normal or abnormal.

Abnormal cell changes on the cervix could be an indicator of cancerous cells on the cervix or cells that could become cancerous in later years if not removed. It is important for women who are sexually active to receive a pap smear, yearly, because cervical cancer is the number two killer of women worldwide.

Another limitation to this study is that 155 students failed to report their hometown. More research needs to be done to see if students from rural or urban communities are more likely to be vaccinated. This may lead to a decision that there needs to be a different approach in the development of educational materials for young adults who are from the city than those who are from the country. Also, only 502 college students were surveyed from North Carolina; this cannot fully represent all of the college students in North Carolina. This study also failed to sample students that attended private colleges.

This study should have asked participants, if they were currently single, in a monogamous relationship/married, or dating numerous partners. The data is showing that white males are in a monogamous relationship at a higher rate than black males. By asking the study participants what type of relationship they are in currently would have provided more insight into the trending data.

Future surveys should sample a diverse group of ethnicities, religions, and geographic locations as researchers continue to assess the knowledge, awareness and perception of HPV in North Carolina, the United States, and the world. More public health initiatives need to be implemented to educate men and women on the possible benefits of the HPV vaccine Gardasil.

Physicians should encourage students to contact the student health center at their university for follow up injections; so that being away from home is not a reason for students not receiving all three shots of Gardasil. The UNC system mandated that all North Carolina college students be insured. If they were not on their parents or family guardian's insurance, they had the option of school insurance. There should not be any females enrolled in college who are unable to receive Gardasil vaccinations due to monetary reasons. The student health insurance policies need to explain to students so that students are aware that a certain amount of money is allotted to students' general "Well Being." To assure that well being, students should be informed that they can receive the vaccination for close to no cost.

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APPENDIX A. SURVEY INSTRUMENT

Human Papillomavirus (HPV) Knowledge and Awareness Among North Carolina College Students

This study will explore the knowledge and awareness of North Carolina college students about the human papillomavirus (HPV). The study is being conducted by a Master's Candidate in the Department of Biology at North Carolina Agricultural & Technical State University. Participation in this survey is completely voluntary. The identity of survey participants will be kept confidential and anonymous. The responses collected will be used solely for research purposes.

Directions: Please select the best single response to each question below, except where asked for multiple responses. Please do not write your name anywhere on this form, so that your information will remain anonymous.

1. What is your sex? Male ☐ Female ☐

2. What is your ethnicity?
   - ☐ African American/ Black
   - ☐ Asian American
   - ☐ Caucasian/ White
   - ☐ Hispanic/Latino
   - ☐ Native American
   - ☐ Other Please Specify _____

3. What is your age?
   - ☐ 18-22
   - ☐ 23-26
   - ☐ Older than 26

4. What is your classification?
    - □ Freshman
    - □ Sophomore
    - □ Junior
    - □ Senior
    - □ Graduate Student

5. What do you consider to be your "home" (before coming to college)? (Please print)
   City: _____ State: _____

6. What is your major?
    - □ Biology/ Chemistry
    - □ Economics/ Business
    - □ Education
    - □ Engineering
    - □ Humanities/ Foreign Language
    - □ Mathematics/ Physics
    - □ Civics/ Social Sciences
    - □ Communication
    - □ Music/Theatre/Art
    - □ Nursing
    - □ Other Please Specify _____

7. What are your sources for receiving information regarding sexually transmitted diseases (STD's) or infections (STI's)? (**Check all that apply**)
    - ☐ Physician or Student Health Center
    - ☐ Television
    - ☐ Internet
    - ☐ Health Classes
    - ☐ Magazines, Books or Newspapers
    - ☐ Word of Mouth **Please Circle** (Parent/Guardian, Friends, Teacher, Mentor)

8. When was your last annual physical or gynecological examination?
    - ☐ 6 months ago
    - ☐ A year ago
    - ☐ More than a year ago
    - ☐ Never

9. Are you sexually active?
    - ☐ Yes
    - ☐ No

10. How many sexual partners have you had in the last 3 years?
    - ☐ 0-1
    - ☐ 2-3
    - ☐ 4-5
    - ☐ More than 5

Please answer the following questions about your knowledge of HPV and the Gardasil HPV vaccine.

11. HPV is a bacterial disease?
    - ☐ True
    - ☐ False

12. HPV is the most common Sexually Transmitted Infection (STI) in the United States?
    - ☐ True
    - ☐ False

13. HPV is associated with (**Check all that apply**)
    - ☐ Genital warts in males
    - ☐ Genital warts in females
    - ☐ Cervical cancer in females
    - ☐ Throat and penis cancers in males
    - ☐ Anal and oral cancers in males and females

14. Most types of HPV infections……
    - ☐ Usually clear on their own
    - ☐ Sometimes clear on their own
    - ☐ Are unable to clear on their own and require medical attention

15. What is the chance that one will contract HPV in his or her lifetime?
    - ☐ 25% chance
    - ☐ 50% chance
    - ☐ 75% chance
    - ☐ 100% chance

16. How many types of HPV infect the genital tract?

- □ Only 1
- □ Between 30-40
- □ More than 100

17. Which sex does HPV usually infect?

- □ Males more than females
- □ Females more than males
- □ Both are infected equally

18. A condom will prevent transmission of HPV between partners.

- □ True
- □ False

19. HPV can be transmitted through (**Check all that apply)**

- □ Holding hands
- □ French Kissing
- □ Intimate skin to skin contact
- □ Oral sex
- □ Sexual intercourse

20. When could a person under 26 receive the HPV vaccine?

- □ Before becoming sexually active
- □ After becoming sexually active
- □ After being exposed to the HPV virus
- □ All of the above

21. How do you rate your knowledge of the human papillomavirus?

- □ 1-2 Poor
- □ 3-4 Average
- □ 5-6 Well Informed

22. Have you ever been diagnosed with HPV?

- □ Yes
- □ No

23. The HPV Vaccine Gardasil has been approved to protect against genital warts and cervical cancer. What is your attitude toward the vaccine?

- □ Don't know about the vaccine and not interested in receiving more information on the vaccine
- □ Don't know about the vaccine but would like more information on the vaccine
- □ Have some information about the vaccine but would like more information
- □ I know everything about the HPV vaccine

24. Did you know that the Gardasil vaccine has been approved for males?

- □ Yes
- □ No

25. Have you been vaccinated with the HPV vaccine Gardasil?

- □ Yes (**CONTINUE TO QUESTION 26)**
- □ No, but I would like to be vaccinated (**SKIP TO QUESTION 26)**
- □ No, and I do not want to be vaccinated (**SKIP TO QUESTION 26)**

26. Have you received all three injections of the Gardasil vaccine?

- ☐ Yes
- ☐ No, because it is not time for the next injection
- ☐ No, because of another reason (explain) _____

Stop here……. Thank you for your participation!

27. If you answered **NO** to question **24,** please check the reasons for not receiving the Gardasil vaccine. Check your top **3** R**easons**.

- ☐ Lack of information on the vaccine and disease
- ☐ Financial reasons
- ☐ Time conflicts
- ☐ Religious reasons
- ☐ Personal reasons _____
- ☐ I am not concerned with contracting HPV
- ☐ I do not have a physician
- ☐ I do not think the vaccine is safe
- ☐ I do not feel I need the vaccine because _____
- ☐ No, because it would benefit women only

……THE END…..……..

Thank you for participating in this survey. The information gathered will be used in the development of educational materials to increase students' awareness on the Human Papillomavirus the Gardasil vaccine and its link to various cancers. Some questions were obtained from the Guilford County Public Health Department. If you have any questions regarding this survey, please email Aliza Alston at atalsto1@ncat.edu or contact Dr. Doretha B. Foushee at foushee@ncat.edu or (336) 285-2160.

APPENDIX B. INFORMED CONSENT

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Study Title: Human Papillomavirus (HPV) Knowledge and Awareness Among North Carolina College Students
PI: Aliza Alston

Dear Respondent,

I am inviting you participate in a research project to study the Human Papillomavirus. Along with this letter is a short questionnaire that asks a variety of questions about Human Papillomavirus. I am asking you to look over the questionnaire and, if you choose to do so, complete it and return it to me. This should require about ten minutes of your time. You must be 18 years of age to participate in this study.

The results of this project will be analyzed. Through your participation I hope to understand the knowledge of HPV on college campuses. I hope that the results of the survey will be useful for use in designing materials to be used in educating college students on the Human Papillomavirus in the future. I hope to share my results, by publishing them in a scientific journal.

I do not know of any risks to you if you decide to participate in this survey, and I guarantee that your responses will not be identified with you personally. I promise not to share any information that identifies you with anyone outside my research group which consists of my advisory committee. If you do not feel comfortable handing in your survey to me, you may also mail it to the Biology Department at North Carolina Agricultural & Technical State University.

I hope you will take the time to complete this questionnaire and return it. Your participation is voluntary and there is no penalty if you do not participate. Regardless of whether you choose to participate, please let me know if you would like a summary of my findings. To receive a summary, email me at atalsto1@ncat.edu.

If you have any questions or concerns about completing the questionnaire or about being in this study, you may contact me at atalsto1@ncat.edu. You may also contact my research advisor at foushee@ncat.edu. This project has been approved by the Institutional Review Board (IRB) at North Carolina A&T State University.

If you have any questions about your rights as a research study participant, you may contact the chair of the IRB through the North Carolina A & T State University Compliance Office at (336) 334-7995 or rescomp@ncat.edu.

If you agree to participate, you may keep this form and complete the survey.
If you wish, you may skip any question or stop at any time.

Sincerely.

Aliza Alston

ECU CONSENT FORM

Title of Research Study:

Human Papillomavirus (HPV) Knowledge and Awareness Among North Carolina College Students

Principal Investigator:	Aliza Alston
Contact Faculty Member:	Dr. Jason Bond, Department of Biology
Institution:	East Carolina University
Address:	Howell Science Complex, Greenville, NC 27858

INTRODUCTION

You are invited to participate in a research project to study the Human Papillomavirus. My name is Aliza Alston, and I am a graduate student at North Carolina Agricultural & Technical State University (NCA&TSU) currently pursuing a Master's degree in Biology. This study constitutes the research aspect of my Master's thesis. I obtained my BS degree in Biology in 2009 from East Carolina University. Dr. Bond was my field zoology teacher.

PLAN AND PROCEDURES

If you decide to participate, you will be asked to fill out a questionnaire assessing various aspects of demographic information, knowledge and awareness of HPV and its vaccinations. We expect that your participation today will take approximately 10 minutes to complete. I do intend to publish my results in a scientific journal.

METHODS

This survey will be administered face to face to willing participants. Students will be recruited to participate in this study by several methods. Areas of surveillance include dining halls, student unions, plots, and the surrounding areas outside of the libraries. Secondly, an email will be sent to professors with students from different majors (Health, Biology 100, Psychology, English, etc.) informing them of an important study being conducted by a NCA&TSU graduate student. The email would simply ask professors, "If I may come to their classrooms at their convenience." Lastly, I plan to contact organizational leaders on campus. I plan to do this to see if it is possible to pass out my survey during a group function.

POTENTIAL RISKS AND DISCOMFORTS

We anticipate that this study poses no potential risks. However, in the event that you are uncomfortable answering any question, please feel free to leave the question(s) blank.

POTENTIAL BENEFITS

Participation in the study will be used to design educational materials to educate college students on the Human Papillomavirus.

SUBJECT PRIVACY AND CONFIDENTIALITY OF RECORDS

Participation in this survey is completely voluntary. The identity of survey participants will be kept confidential and the responses collected will be used solely for research purposes. Information obtained in this study, will be known only to the principal investigator, researcher, and my advisory team. The results of the study will be reported in summary format, and no personally identifying information will be included on the survey form or with the results of the study. Completed surveys will be kept in a safe place and destroyed in 2017.

COSTS OF PARTICIPATION

There will be no additional costs to you resulting from participation in this study.

VOLUNTARY PARTICIPATION

Participating in this study is voluntary. There is no penalty if you do not participate. Regardless of whether you choose to participate, please let me know if you would like a summary of my findings. To receive a summary, email me at atalsto1@ncat.edu.

PERSONS TO CONTACT WITH QUESTIONS

The investigator will be available to answer any questions concerning this research, now or in the future. You may contact the investigator, Aliza Alston, by email at atalsto1@ncat.edu. If you have questions about your rights as a research participant you may call the ECU Chair of the University and Medical Center Institutional Review Board at phone number 252-744-2914.

CONSENT TO PARTICIPATE

I have read all of the above information, and have received satisfactory explanations in areas I did not understand, if any. (A copy of this signed and dated consent form will be provided to you if desired).

_____

Participant's Name **(PRINT)** Signature Date Time

PRINCIPAL INVESTIGATOR: I confirm that the participant has read the contents of this consent document, the participant has indicated all questions have been answered to his or her satisfaction, and the participant has signed the document.

_____

Principal Investigator's Name **(PRINT)** Signature Date Time

APPENDIX C. INSTITUTIONAL REVIEW BOARD APPROVAL

NC A&T DIVISION OF RESEARCH AND ECONOMIC DEVELOPMENT
1601 East Market Street
Greensboro, NC 27411
(336) 334-7314
Web site: http://www.ncat.edu/~divofres/compliance/irb/index.php
Federalwide Assurance (FWA) #00000013

To: Aliza Alston

104 barnes hall

From: Behavioral IRB

Date: 10/05/2010

RE: Notice of IRB Exemption
Exemption Category:
Study #: 10-0108

Study Title: Human Papillomavirus (HPV) Knowledge and Awareness Among North Carolina Students

This submission has been reviewed by the above IRB and was determined to be exempt from further review according to the regulatory category cited above under 45 CFR 46.101(b).

Study Description:

The information gathered will be used in the development of educational materials to increase students awareness on the Human Papillomavirus the Gardasil vaccine and it's link to various cancers

Investigator's Responsibilities:

If your study protocol changes in such a way that exempt status would no longer apply, you should contact the above IRB before making the changes. The IRB will maintain records for this study for 3 years, at which time you will be contacted about the status of the study.

Tuesday, November 02, 2010

Susan Peacock, PhD
Chairperson, Institutional Review Board
North Carolina Central University

Aliza Alston,
Principal Investigator

Dear Ms. Alston:

As required by University policy the Institutional Review Board (IRB) has reviewed your application for a research protocol entitled, "Human Papillomavirus (HPV) Knowledge and Awareness Among North Carolina College Students." The IRB has determined that the activities described in this application meet current criteria for research that is exempt from federal regulations governing human participants. As such, your project is not subject to the requirement for continuing review. You are, however, required to obtain IRB approval for any revisions or modifications to your original project description prior to implementation of those changes. You are responsible for reporting any unanticipated events involving risks to research participants or others. You are responsible for notifying the IRB when the research study is completed or discontinued.

Your IRB approval number is 1200969.

If additional information is needed, please contact the IRB office at IRB@nccu.edu. A hard copy of this letter will be held in the Office of Research Compliance (309 Hubbard-Totton Building). We wish you the best in your endeavor.

Sincerely,

Susan Peacock

Susan Peacock, PhD
Chairperson

Cc: Dr. Doretha Foushee
Dr. Undi Hoffler

THE UNIVERSITY of NORTH CAROLINA
GREENSBORO

Office of Research Compliance

2718 Beverly Cooper Moore and Irene Mitchell Moore
Humanities and Research Administration Building
P. O. Box 26170, Greensboro, NC 27402-6170
336.256.1482 *Phone* 336.256.1482 *Fax*

October 25, 2010

Aliza Alston
104 Barnes Hall

Dear Ms. Alston:

The IRB for the Protection of Human Participants in Research at The University of North Carolina at Greensboro (UNCG) is willing to accept the approval of project entitled "Human Papillomavirus (HPV) Knowledge and Awareness Among North Carolina Students" by A& T University. Access to participants on this campus must be cleared through the appropriate department prior to you collecting data on the UNCG campus.

If you have any questions, please contact me at ecallen@uncg.edu or (336) 256-1482.

Sincerely,

Eric Allen, Director
Office of Research Compliance