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Predictors of HPV Knowledge and Awareness in Rural America

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PREDICTORS OF HPV KNOWLEDGE AND AWARENESS IN RURAL AMERICA

by

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ABSTRACT

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by

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Prior research has shown that overall awareness of HPV is low among women in America. Yet limited research exists as to the awareness of HPV among rural U.S. women. The goal of this study was to determine the factors that predict women's knowledge and awareness of HPV in rural America. Secondary data was utilized from the National Cancer Institute Health Information National Trends Survey (HINTS) of 2005. The sample consisted of 788 adult women over the age of 18 from rural areas of the U.S. Results indicated younger age, increased education, receipt of a Pap exam in over three years, and having read health sections of newspapers and magazines to be predictors of HPV awareness among rural women in America.

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CHAPTER ONE

INTRODUCTION

Background

The human papillomavirus (HPV) is the virus responsible for one of the most common sexually-transmitted infections (STIs) in the world (Centers for Disease Control and Prevention [CDC], 2009). Astoundingly, over 400 million people globally are currently infected with HPV and approximately 291 million of those cases are women (World Health Organization [WHO], 2009). The linkage of HPV to the etiology of cervical cancer has been well established and documented by the scientific community (National Cancer Institute [NCI], 2007); and 99% of cervical cancer cases have been associated with HPV infection (WHO, 2009).

Research has shown that rural regions of the U.S. have higher cervical cancer mortalities than the rest of the country (Yabroff et al., 2005). This fact is disconcerting, especially since it has been established that cervical cancer is one of the most preventable diseases in women (NCI Office of Women's Health, 2007). Medical science has demonstrated that a highly effective method to prevent cancer of the cervix is by having regular Papanicolaou (Pap) tests (Solomon, et al., 2007). Yet, a recent study reported that rural areas have lower rates of Pap exams than more urbanized regions of the U.S. (Coughlin, et al., 2002). Therefore, having adequate knowledge of the virus that contributes to cervical cancer and available detection strategies are essential components

in reducing its incidence and prevalence. However, research indicates a significant lack of awareness and knowledge of HPV exists among women. For example, a recent national study reported that approximately 60% of women over the age of 18 had never heard of HPV (Tiro, et al., 2007). Further, of those who had heard about HPV, 50% were not aware that it caused cervical cancer (Tiro et al., 2007).

In addition to higher rates of cervical cancers and lower rates of screenings than urban America (Coughlin et al., 2002), it has been reported that rural areas consist of more aging populations and experience later stages of cancers (Engleman, et al., 2005; Gosschalk & Carozza, 2003). These statistics are important to note, because most cervical carcinomas occur in women who are over the age of 45 (Schiller, 2007). Considering the higher rates of cervical carcinoma mortality and lower rates of screenings, establishing the factors that increase rural U.S. women's awareness of HPV would contribute positively to public health efforts. Therefore, identification of these predictors will form the foundation for this thesis project.

Although previous research has been conducted to explore knowledge of HPV in various populations, this particular study is unique in that it is the first to utilize a national database to examine the variables associated with HPV awareness in rural U.S. women. The results of this research will contribute to improved public health policies and programs that will ensure adequate knowledge of HPV in rural populations, thus increasing women's ability to make appropriate cervical cancer prevention decisions.

For this study, the data examined were drawn from a secondary database and were focused on rural women over the age of 18 who had not been previously diagnosed with cervical cancer. These data were derived through a random-digit-dial telephone survey

that was conducted in 2005 as part of the NCI Health Information National Trends Survey (HINTS) (NCI, 2005). The HINTS program collects information pertaining to American adult health behaviors and patterns that may reveal their need for, and use of, cancer-related information (NCI, 2005).

The data for this study were collected prior to the massive HPV vaccine media campaign initiated after the approval of the vaccine in 2006. Therefore, the results of this study provide a baseline for future research focused on post-campaign data. Additionally, although comparisons may be noted throughout the paper, this study is not a comparative analysis between rural and urban areas but explores HPV awareness in rural American women, exclusively.

Research Question and Hypotheses

Research Question: What are the sociodemographic and cervical cancer screening variables associated with knowledge and awareness of HPV among women who live in rural areas of the U.S.?

Hypothesis 1: Women over the age of 50 who live in rural America have increased knowledge and awareness for HPV than younger women between the ages of 18-34 who reside in those geographical locations.

Hypothesis 2: Women with a college education or more who live in rural America have increased knowledge and awareness for HPV than women with less than a high school graduation who reside in those geographical locations.

Hypothesis 3: Women with an annual income over $25,000 who live in rural America have increased knowledge and awareness for HPV than women with an annual income less than $25,000 who reside in those geographical locations.

Hypothesis 4: Women who live in rural America who have received a Pap exam in over three years will have increased knowledge and awareness for HPV than women who have never received a Pap exam and reside in those geographical locations.

Hypothesis 5: Non-minority women in rural America will have increased knowledge and awareness for HPV than minority women who live in those geographical locations.

CHAPTER TWO

LITERATURE REVIEW

History of HPV/Cervical Cancer Research

Although recently determined as the etiologic agent in cervical cancer, the human papillomavirus has contributed to disease in populations throughout history. Medical documentation from the ancient Greek and Roman civilizations revealed evidence of a genital disease which closely resembled that of HPV (Jay and Moscicki, 2000). Centuries later, scientists began to speculate that sexual activity may somehow play a roie in cancer of the cervix, when in 1842 a Florence physician first noted that the disease occurred in married women and prostitutes, but not in nuns (NCI, 2000). During this time, researchers also reported that cervical cancer occurred in the second wives of men whose first wives died of the disease (NCI, 2000). Later, in the 1950s and 1970s, smegma in the foreskins of men and the sexually-transmitted herpes virus, respectively, were theorized as being the cause of the disease (McNeil, 2006).

Although early civilization first noted diseases similar to those caused by HPV, it wasn't until 1933 that a scientist with the University of Rochester, Richard E. Shope, was the first to isolate what is now referred to as the papillomavirus (McNeil, 2006). According to McNeil (2006), Shope was intrigued by the presence of supposed "horns" on wild rabbits. After obtaining this foreign matter, he ground, filtered, and injected the product into healthy laboratory rabbits. Consequently, similar growths developed on

those vertebrates. Although this experiment used animals instead of humans, it contributed to the research that would eventually substantiate the connection between the papillomavirus and disease in humans, particularly genital warts and cervical cancer.

As previously noted, significant strides were made throughout history as to the etiology of cervical cancer. However, it wasn't until the 1970s at the Institute of Virology in Freiburg and with DNA amplification, that a German virologist, Harald zur Hausen, successfully linked HPV to cervical cancer (McIntyre, 2005). After various research efforts, zur Hausen and his research team finally isolated HPV DNA types 11, 16, and 18 from cervical cancer biopsies (McIntyre, 2005). Although originally rejected by the scientific community, zur Hausen's work was finally supported in 1991 by other microbiologists who were working on similar efforts (McIntyre, 2005). Ultimately, zur Hausen's research played a direct role in the recent scientific advancement to prevent cervical carcinoma through an HPV vaccine (McIntyre, 2005). The HPV vaccine will be discussed further in the 'Prevention' section.

Another victory in the fight against cervical cancer can be attributed to studies conducted in the 1940s by Dr. George N. Papanicolaou, a Greek physician, who developed a cytological method for the effective early detection of malignant uterine cervical cells, now widely known as the Pap smear (Vilos, 1998). As a result of Papanicolaou's research efforts, cervical cancer is no longer the number one killer of U.S. women (Salsow et al., 2002). Unfortunately, the disease continues to affect an enormous health and financial burden on society.

Burden of HPV and Cervical Cancer

HPV is not a routine screening for sexually-active individuals nor is it a reportable STI with state health departments. Therefore, establishing an accurate assessment as to the exact number of cases in America is limited (Gerberding, 2004). However, in a report to the U.S. Congress, Gerberding (2004) reported that in America, an estimated 20 million adults presently harbor the HPV infection, close to 6 million adults contract it on an annual basis, and 1.4 million adults currently have genital warts. The prevalence of this pathogen is also considerably high among adolescents and young adults as approx. 9.2 million in this age group are currently infected with HPV (Gerberding, 2004). Moreover, approx. one-half of college students in America have the infection, and approx. 80% of women over the age of 50 will have acquired HPV at some point in their lives (Gerberding, 2004). In addition to the morbidities created by this ubiquitous STI, society is substantially burdened by various costs associated with HPV.

Primarily due to the HPV infection, worldwide approximately 510,000 women develop cervical cancer and around 288,000 women die from the disease on an annual basis (WHO, 2009). In America, although there has been a 70% decline in cervical cancer mortalities over the past five decades (Solomon, et al., 2007), the disease continues to be a major public health issue. For example, the American Cancer Society (ACS) (2008) estimated that in 2008, approx. 11,070 cervical cancer cases would be diagnosed and 3,870 mortalities would occur in the U.S. as a result of the disease. Additionally, of the total cervical cancers that were diagnosed in the U.S. in 2000-2004, approx. 84.4% occurred in women over the age of 35 (NCI SEER, 2007).

In terms of economic costs to society, Soper (2006) reported that the U.S. spends an estimated $3.4 billion annually on costs related to the diagnosis and treatment of HPV. Moreover, NCI (2007) indicated that in 2004 an estimated $72.1 billion was spent in America on treating cervical malignancies. In addition are the indirect costs of cancer, such as reduced productivity, time lost from work, and job loss. These financial burdens are further compounded by the non-tangible costs, including the pain, grief, and depression that so many cancer patients often struggle with (NCI CCRHD, 2004).

Unfortunately, various subgroups in the U.S suffer disproportionately from cervical cancer. For example, minority women experienced more incidence and mortality from the disease during 2000-2004 than the white population (NCI SEER, 2007). Among all racial populations in the U.S., Hispanic and African American women, respectively, have the highest rates of cervical cancer-related diagnoses and deaths (NCI SEER, 2007).

Another subpopulation that is at a higher risk for cervical cancers and related mortalities is older women, especially those over the age of 65 (Celantano, et al., 1988.) According to Remington et al. (1990), nearly half of the women who die from the disease are older than 65. Further, Celantano et al. (1988) revealed that older women who had invasive cervical cancer were more likely than younger women under the age of 65 to not have received any Pap tests or regular cervical screenings for cancer.

The focus of this paper is on a specific population that experiences a considerable disparity relative to cervical cancer, namely, rural women. This sector of America has significantly higher mortality rates from the disease than those who reside in more urbanized and metropolitan locations (Yabroff et al., 2005). Furthermore, as discussed later, rural women may be at a particular risk for cervical cancer and its associated

mortality. To understand the pathogen that contributes to cancer of the cervix, an overview of HPV is presented.

HPV Characteristics

Burd (2003) reported that various higher vertebrates have been known to develop various diseases from the papillomaviruses, and these pathogens are part of the *Papovaviridae* family. The virus has an icosahedral shape, is approximately 55 nm in size, and lacks an outer envelope (Burd, 2003). Also noted by Burd (2003) is that HPVs have a genome with circular double-stranded DNA consisting of ~8,000 basepairs and transcription occurs on only one strand. Additionally, the genome has three distinct regions and functions, and they include 1) the long-control region (LCR) for regulation of DNA replication and transcription; 2) an early region (E1-E7, excluding E3) that encodes proteins for viral replication and has a major role in oncogenesis; and 3) a late region (L1 and L2) that encodes major and minor proteins, respectively, for the structure of the capsid (Burd, 2003). Each pentamer of the capsid is composed of L1 and L2 virus-like particles, and it is the L1 portion that is the basis for the HPV vaccine (Schiller, 2007). Further, these viruses assemble and replicate in the host nucleus of basal squamous epithelial cells (Burd, 2003). Over 100 different genotypes of HPV have been identified and of the well-known types over 40 have been shown to infect the anogenital tract (Saslow et al., 2007).

Burd (2003) and Naylor (2000) reported that HPV lesions can be further classified into two different category types, and they include the cutaneous and the mucosal. The cutaneous variety tends to replicate in the epidermis portions of the body whereas, the mucosal types prefer epithelial areas, such as the mouth, throat, anogenital, and

respiratory tract (Burd, 2003). A unique aspect of HPV is that it manifests as tumors that form into buds or "papillomas" (NCI, 2008). According to Naylor (2000), these viral lesions, more commonly known as "warts", may be raised with a cauliflower-like appearance, or they may be flat. Many of the flat variety are non-visible to the human eye. Additionally, these warts may 1) be white or flesh-colored, 2) appear in singular or cluster formations, and 3) occur on the cervix and/or anogenital area (known as condyloma acuminata) or non-anogenital locations of the body (Naylor, 2000). Naylor (2000) also indicated the lesions that manifest on the cervix are usually of the flat variety and may be non-visible.

HPV DNA strains are also classified according to their risk for causing cervix dysplasia and cancer and are referred to as high risk (HR) and low risk (LR) types (Burd, 2003). The HR HPVs include 16, 18, 31, and 35, in addition to several others, with types 16 and 18 as the ones most commonly associated with cervical cancers throughout the world (Touze et al., 2001). Schiller (2007) reported that 15 different HPV genotypes have been detected in cervical carcinomas. Importantly, persistent cervical infections with HR types may lead to low-grade squamous intraepithelial lesions (LSIL), high-grade squamous intraepithelial lesions (HSIL), and/or cancer (CDC, 2005). Gerberding (2004) also indicated that approximately 40% of cases with anogenital cell abnormalities caused by HR types regress spontaneously.

In contrast, the LR genotypes are usually associated with visible anogenital warts, and include 6, 11, 42, and 43, among others, with 6 and 11 being the most common in this category (Naylor, 2000). Also, the LR HPVs are often associated with LSILs, and on

rare occasions, can cause respiratory papillomatosis (Datta, 2007). Importantly, over 60% of LSIL cases associated with LR types spontaneously regress (Gerberding, 2004).

Burd (2003) reported that HR types infect the anogenital areas more often than the LR variety. Additionally, it is possible for more than one type of HPV to concurrently infect an individual (Burd, 2003). Interestingly, HR types also vary according to region in the world. For example, the more prevalent types associated with cervical cancer in Latin America are 33, 39, 58, and 59 (Touze et al., 2001).

HPV Role in Cervical Cancer

Burd (2003) reported that a stronger association exists between HPV and cervical cancer than between smoking and lung cancer. However, infection with the virus doesn't necessarily mean cancer will develop. According to Datta (2007), after a woman is anogenitally infected with HR HPV, its natural progression may involve one or more outcomes, including resolving on its own within a year (most cases), remaining persistent for up to five years or more and possibly causing cervical intraepithelial neoplasia (CIN) 1 with potential clearance, and persisting for up to 20 years or more and developing into CIN 2/3 or cervical cancer.

Fakhry and Gillison (2006) reported that the propensity for HPV HR types to be carcinogenic may partially be explained by the two oncoproteins contained in their genome, namely E6 and E7. These two oncogenes target and bind the host cell tumor-suppressor genes, p53 and pRb. Essentially, E6 produces a protein which inactivates p53, and E7 has a similar effect on pRb. These actions can initiate detrimental results, as both p53 and pRb genes have major roles in the host cell-cycle regulation (Fakhry and Gillison, 2006). The consequent binding of these tumor-suppressor genes may lead to a cascade of

host cell events, including uncontrolled cell replication, mutations, and instability within the chromosomes (Fakhry and Gillison, 2006). Thus, it is important for women to know that due to the oncoproteins that exist in HR types (Fakhry and Gillison, 2006) persistent HPV infections increase their risk for developing high-grade cervical intraepithelial neoplasia or cancer (CDC, 2005).

Risk Factors for HPV Infection

According to Burd (2003), various behavioral and biological factors may increase an individual's vulnerability to HPV infection, including:

- Sexual activity with multiple partners or with someone who has had multiple partners
- Being infected with other STIs
- Previous abnormal Pap tests
- A history of cervical cancer
- A compromised immune system

Burd (2003) further reported that sexual activity in puberty and at first pregnancy also places a person at a greater risk for HPV infection. This increased risk is because the squamocolumnar junction between the endocervix (section closest to uterus) and the ectocervix (area adjacent to the vagina) have a high level of metaplastic activity during these stages of development, thus increasing susceptibility to the pathogen.

HPV Co-factors for Cervical Cancer

As previously indicated in the 'Characteristics' section, a woman is a risk for cervical cancer if she is infected with HPV, particularly the high-risk types. Burd (2003)

suggested various factors potentially work synergistically with the papillomavirus in the development of cervical cancer, and they include:

- Multiple parity
- Long-term use of oral contraceptives
- Infection with other STIs
- Genetic predisposition

Additionally, studies have suggested that environment may have a role with HPV in the etiology of carcinomas of the cervix. Kjellberg et al. (2000) reported in their study that, "after taking HPV into account, smoking appeared to be the most significant environmental risk factor for cervical neoplasia."

Transmission and Symptoms of HPV

HPV is highly infectious and can manifest on various parts of the body (Naylor, 2000). The main route for transmission of HPV is through skin-to-skin contact, most commonly through sexual-related activity (Burd, 2003). However, because the virus is somewhat resistant to desiccation and heat, exposure may also occur through virus-contaminated fomites (Burd, 2003; Rintala et al., 2005). Additionally, studies have indicated vertical transmission of HPV can occur between a mother and her fetus (Burd, 2003), horizontal (nonsexual) transmission is possible between family members (Rintala et al., 2005), and autoinoculation of the virus from one part of the body may also occur (Rintala et al., 2005; Hernandez et al, 2008). Interestingly, butchers have the potential to develop warts after handling animal meat that has been infected with the papillomavirus (Naylor, 2000).

As previously mentioned, HPV infection may cause lesions to form; and depending on the location of the growths, there may be some pain or discomfort involved (CDC, 2008). However, HPV is generally an asymptomatic disease and the majority of people who have contracted the infection are unaware of its presence (CDC, 2008). A unique aspect of the human papillomavirus is that it has the ability for long periods of latency, with the clinical manifestation often not occurring for weeks, months, or even years; this may be another explanation as to why individuals may be infected with the virus, yet not even know it (Burd, 2003). Consequently, once the disease is finally evident, identification of the exact date and source of exposure is difficult (American Social Health Association, 2006). It is important to note that being infected with HPV rarely leads to malignancy (Burd, 2003). However, as cited above, persistent forms of the high-risk types can lead to cervical cancer.

Treatment

According to the CDC (2008) there is essentially no cure for HPV and available treatments only consist of eliminating the lesions or warts caused by the virus. Burd (2003) indicated that for cervical dysplasias caused by HPV approx. 90% will most likely resolve on their own within 12 to 36 months. For the cell abnormalities that remain persistent, or for the removal of lesions, Kodner and Nasraty (2004) indicated the common methods include the use of the following:

- Chemicals
- Interferon
- Cryotherapy
- Lazer therapy

- Surgical removal

However, even though the lesions or precancerous cells may be removed, the virus still lingers in the system and may resurface (Burd, 2003). Burd (2003) also reported that individuals with weak immune systems are more prone to the recurrence of anogenital warts or abnormal cells after their removal, and women infected with HIV have the highest recurrence rate at 87%.

Primary Prevention

Preventing the human papillomavirus primarily consists of reducing exposure to the virus. The NCI (2008) reported refraining from genital contact is one way to prevent contracting the infection. For those who opt for sexual activity, NCI (2008) recommends a long-term monogamous relationship with a non-infected partner and/or limiting the number of sexual partners will reduce one's risk for exposure to the virus. The CDC (2008) suggests the use of condoms may help in reducing the transmission of HPV, but their protection is limited to the surface area they cover. Therefore, skin-to-skin contact with areas of the body that are non-covered and infected with the virus may still occur (CDC, 2008).

As previously mentioned, and according to the CDC Vaccines and Immunizations web page (2008), a new method in the fight against cervical cancer has been approved and exists in the form of a prophylactic vaccine. In June of 2006, the Advisory Committee on Immunization Practices (ACIP) voted to recommend the first vaccine developed to prevent cervical cancer and other diseases in females caused by HPV types 6, 11 (responsible for 90% of genital warts), and types 16 and 18 (the cause of 70% of cervical cancer) (CDC, 2008). The U.S. Food and Drug Administration (FDA) licensed

the vaccine for use in girls and women between the ages of 9-26, with the recommended age for vaccination being 11-12 years of age and is given in a series of three injections over a six-month period (CDC, 2008). It is important to note that the vaccine will be most effective if administered prior to HPV infection exposure through sexual activity resulting in the young age guidelines for vaccination (CDC, 2008). Although the vaccine may have some side effects, such as soreness at the site of injection, the CDC (2008) states that the negatives are considerably outweighed by the benefits of the vaccine. Furthermore, the vaccine has been to shown to be 100 percent efficacious against the HPV strains previously mentioned if the individual has not been previously exposed to those types (CDC, 2008). Although the vaccine is an important step in the prevention of cervical cancer, it is not meant to replace regular gynecological exams and Pap tests because it only vaccinates against four genotypes of HPV (CDC, 2008). However, the vaccine has not been without controversy.

A limitation that may exist in receiving the HPV vaccine may involve its cost. Currently, completion of the series may cost approx. $360. Some insurance companies may pay for the vaccine, and for those without insurance and limited financial means, the federally-funded program, Vaccines for Children, will cover the cost of the injections for females under the age of 19 (CDC, 2008).

Another limitation with the HPV vaccine in the U.S. is that it is not for boys and men, although research is currently being conducted in this area (CDC, 2008). It has been proposed that if the male population is vaccinated against HPV, it may reduce their chances for contracting rare diseases, such as penile and anal cancers, and may also have an indirect effect on women's health (CDC, 2008). In a recent study by Hernandez et al.

(2008), it was reported that the male scrotum passively transmitted HPV to adjacent genitalia and suggested the "scrotum may be an important reservoir of infection for penile infections that can subsequently be transmitted to partners."

Another issue with the vaccine is that it excludes a vast population of women, those over the age of 26, because it hasn't been approved for that age group in the U.S. However, it has been proposed that vaccinating older women against HPV may be beneficial. Research is currently being conducted to determine if the vaccine will be efficacious for women >26 years of age.

Secondary Prevention

In addition to the primary prevention of HPV and cervical cancer, women may regularly engage in secondary means of prevention and consists of early detection methods. One way HPV may be detected is through visual observation of lesions on the anogenital area or the cervix by a clinician during a routine gynecological exam (NCI, 2008). The cervix is part of the female sexual organs, and is located between the uterus and the vagina. During the exam, a Pap test (smear) is usually conducted to detect cervical-cell abnormalities that may progress to cancer. This exam may also find noncancerous conditions, including infections and inflammation (NCI, 2008). The Pap smear is performed by inserting a speculum in the vagina and then swabbing, brushing, or scraping cells from both the ectocervix and the endocervix and submitting for laboratory analysis (NCI, 2008). If abnormal cells are observed at the time of the Pap test, or if the woman is at a higher risk for developing cervical cancer, an additional FDA-approved HPV DNA liquid hybridization test may be performed. This test can identify DNA from 13 high-risk strains of HPV collected from samples of cervical cells (NCI, 2008). For

women over the age of 30, the HPV test is recommended as an adjunct to the regular Pap test (ACS, 2008) (Table 1).

Table 1: *American Cancer Society Cervical Cancer Screening Guidelines (ACS, 2008)*

Age	Frequency
Beginning 3 yrs. after vaginal intercourse or by age 21, whichever comes first	Every year (conventional Pap test), or, every 2 yrs. with liquid-based Pap
30 yrs. and older	Every 2 – 3 yrs if 3 Pap tests in a row are normal, or, no more than every 3 yrs. with conventional or liquid-based Pap plus the HPV DNA test. Every year if DES daughter, HIV infection, or weak immune system due to organ transplant, chemotherapy, or chronic steroid use.
70 yrs. and older	Discontinue if 3 normal Paps in a row and no abnormal Paps in past 10 yrs. Continue if cervical cancer history, or high risk for the disease, or had a hysterectomy but still have cervix.

Unfortunately, many women are not are not participating in secondary methods to prevent cervical cancer; this is particularly true for rural areas as their rates are significantly less than their urban counterparts (Coughlin, et al., 2002). Thus, to have a clearer understanding of the issue, a brief overview of rural America and the factors that may place rural women at a greater risk for HPV and cervical cancer is provided.

Aspects of Rural America

The Economic Research Service of the U.S. Dept. of Agriculture (ERS) (2007) reported that in 2000, 21 percent of the total U.S. population was rural and includes 59

million residents. According to Ricketts (1999), rural communities embody specific population density, sociodemographic, and geographical characteristics that separate them from urban populations. The U.S. Census Bureau defines rural areas as settlements with fewer than 2,500 residents and consists of all territories located outside of urbanized areas (ERS, 2007). For various policy and funding purposes, the Office of Management and Budget (OMB) classifies urban and rural as 'metro' and 'nonmetro' counties, respectively, and are further divided into 10 groups according to rural-urban continuum codes (ERS, 2007). Based on population density, proximity to, and economic ties with metropolitan areas, rural areas with more than 20,000 residents, and if adjacent to a metropolitan area or areas with fewer than 2,500 people, and if not adjacent to a metropolitan area, can be considered non-metro areas (ERS, 2007).

In addition to fewer residents than urban areas, rural populations are also faced with many barriers to improved health and some of these may be attributed to geographical issues. For example, it has been reported that accessing specialized physicians, treatment centers, and screening facilities is a challenge for many rural residents who must travel long distances to obtain these services (Acury et al., 2005; Devesa et al, 1999; Leighton et al., 2006; Yabroff et al, 2005). Other barriers to better health may involve sociodemographic factors. For example, research has shown that when compared to urban areas, rural populations are less likely to have health insurance, be of an older age, have less education, and live in more poverty (Casey et al., 2001; ERS, 2007; Engleman et al., 2005; Ormond et al., 2000; Reschovsky and Staiti, 2005; Wilhide, 2002; Zhang et al, 2000). Wilhide (2002) indicated additional obstacles for rural communities include having limited access to health care services, fewer resources, and many residents

experiencing more chronic conditions. Moreover, these barriers to health are even more pronounced among rural minorities (Strickland and Strickland, 2008). Indeed, all of these factors contribute negatively to health outcomes of those who live in rural areas.

Potential Factors for Cervical Cancer in Rural Areas

As cited above, studies have demonstrated that rural women in the U.S. have higher rates of cervical cancer (Yabroff et al., 2005) and lower rates of Pap testing than urban areas (Coughlin et al., 2002). Various factors can increase a women's risk for cancer of the cervix and also limit their participation in Pap exams. For example, Casey et al. (2001) noted that rural populations are less likely than urban areas to engage in preventive health behaviors as a result of 1) longer distances to travel for services, 2) having lower income and education levels, and 3) lacking health insurance. Arcury et al. (2005) also reported that rural spatial factors, such as travel to obtain services, was associated with less participation in regular or "discretionary" health care. This may also imply that cervical cancer screenings would be lower as well.

As indicated in the 'Aspects of Rural America' section, rural areas also consist of older populations. This is notable because cervical cancer occurs more frequently in women over the age of 45 (Schiller, 2007). Further, Gosschalk and Carozza (2003) reported that rural residents are diagnosed at later stages of cancer. However, Larson and Fleishman (2003) indicated that residents in the most rural areas of the U.S. participated in fewer visits to their health care provider than those in metropolitan areas. This is important because rural health care providers can encourage women during routine visits to obtain their female screenings, and many also perform those services. Thus, by having

fewer visits to their health care provider, early and more treatable stages of cancer, such as precancerous cervical cells, may go undiagnosed in rural women.

Therefore, it is imperative for this particular population to know about HPV and cancer screening. By establishing these predictors, more focused prevention efforts will result, and hopefully fewer women of rural America will die from cervical cancer.

CHAPTER THREE

METHODOLOGY

Study Design

The knowledge and awareness of HPV in rural America was investigated with quantitative research methods utilizing secondary data from a national survey dataset. An extensive literature search was conducted to determine the current science regarding HPV knowledge of rural America. The data gathering and analysis portions of the study were initiated after receiving "exempt" approval from the UNLV IRB (Number 0711-2534) on December 17, 2007.

This research project utilized data from NCI's 2005 HINTS, a program that collects nationally-representative data on the U.S. public's need for, access to, and use of cancer information. According to NCI (2005), the HINTS 2005 telephone survey employed a list-assisted, random digit dial (RDD) method to randomly sample all telephone exchanges in the 50 United States producing a nationally-representative sample of U.S. households. Additionally, minority populations were oversampled to ensure adequate sample size (NCI, 2005). HINTS 2005 was conducted from February through August 2005 (NCI, 2005). Response rates were 34% at the household screening level (i.e., the initial contact with the household) and 61% at the extended interview level (i.e., completion of the interview by the sampled respondent) (NCI, 2005). A total of 5,586

extended interviews were conducted during the HINTS 2005 survey process (NCI, 2005). During the household screening, one adult per household was sampled and recruited for participation in the extended interview (NCI, 2005). Sampling weights were assigned to each of the participants and through mathematical computations were determined to be sufficient to produce statistically sound and nationally representative estimates and valid standard errors (NCI, 2005). Additional information regarding the HINTS 2005 procedures can be found at http://hints.cancer.gov/.

Research Question and Hypotheses

This study posed the following question: What are the sociodemographic and screening factors associated with knowledge and awareness of HPV among women who live in rural areas of the U.S.? To identify the variables that may be correlated with knowledge and awareness of the human papillomavirus of women who reside in rural America, the following hypotheses were examined:

(H1) Women over the age of 50 who live in rural America have increased knowledge and awareness for HPV than younger women between the ages of 18-34 who reside in those geographical areas.

(H2) Women with a college degree or more who live in rural America have increased knowledge and awareness for HPV than women with less than a high school graduation who reside in those geographical areas.

(H3) Women with an annual income over $25,000 who live in rural America have increased knowledge and awareness for HPV than women with an annual income less than $25,000 who reside in those geographical areas.

(H4) Women who live in rural America who have received a Pap exam in over three years will have increased knowledge and awareness for HPV than women who had never received a Pap exam and reside in those geographical areas.

(H5) Non-minority women in rural America have increased knowledge and awareness for HPV than women of minority who reside in those geographical areas.

Study Sample Characteristics

The data for this particular study were from the HINTS 2005 dataset and included 813 women of various racial ethnicities who were over 18 years old, who did not have a history of cervical cancer, and who resided in rural counties of America at that time. According to Waldron (2009), "The rural boundaries of the HINTS 2005 correspond to the 2003 Rural/Urban Continuum Code (county level) from the Economic Research Service/United States Department of Agriculture". Further information may be found at http://hints.cancer.gov/.

Statistical Analyses

The primary variable for this study was awareness of HPV in rural America. In addition to sociodemographic and screening factors, other variables were considered in association with HPV awareness, including, access to healthcare, HPV history, religious behavior, smoking status, and exposure to/trust in health in health information sources. The statistical package utilized to conduct the analyses consisted of SAS-callable SUDAAN, Version 9.0. This statistics program was used because of the complex survey design and to calculate appropriate standard errors and 95% confidence intervals. The crosstabulation with chi square method was used to examine associations of sociodemographic and other variables with HPV awareness. The variables that were

significantly associated with HPV awareness in the chi square procedure were included in a logistic regression model to assess independent associations.

Survey Instrument

Participants in the HINTS 2005 survey were asked a multitude of questions from various categories (http://hints.cancer.gov/). Within these categories, the topics of greatest interest for this study included sociodemographics, HPV awareness, cervical cancer screenings, healthcare access, exposure to/trust in health information sources, religious behavior, and smoking status. The focal point for this study included the following main question: Have you ever heard of HPV? During the HINTS 2005 survey, this particular question was followed with an explanation that HPV meant the human papillomavirus (http://hints.cancer.gov/).

To determine associations with HPV awareness, the previously mentioned variables were examined. The specific demographics assessed in this study from the HINTS 2005 dataset included marital status, age, education, income, and race (Table 2).

Within the cervical cancer category (http://hints.cancer.gov/), this study evaluated the Pap exam history, based on options of within 3 years, over 3 years, or never.

With regards to the healthcare access category (http://hints.cancer.gov/), two questions were most relevant to this study:

1) Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?

2) Have you seen a healthcare provider within the last year?

Table 2: Demographics Questions (HINTS 2005)

Demographics	Options
Marital status	Marrried/living with partner Not married
Age	18-34, 35-49, 50-64, 65-74, or 75+
Highest level of school completed	Less than high school High school graduation/some college College graduation or beyond
Combined pre-tax annual income	$0-<$25,000, $25,000-<$50,000, $50,000-<$75,000, or $75,000+
Race/ethnicity	White non-Hispanic, Hispanic, Black non-Hispanic, Other

Within the exposure to/trust in health information sources category (http://hints.cancer.gov/), the questions of greatest interest for this project, included the following:

1) In the past twelve months, have you read the health sections of a newspaper or magazine?

2) In the past twelve months, have you watched health segments on the local news?

3) Have you read unsolicited health information on the Internet in the past 12 months?

4) How much trust in health information do you have from the following sources: a) health care professional, b) family or friends, c) newspapers, d) magazines, e) radio, f) internet, or, g) television? For this question options for extent of trust included, a lot/some/a little, or, none at all.

One factor evaluated was related to a participant's social networks. Within this category (http://hints.cancer.gov/, attendance at religious services during the past year was of greatest interest for this study. A participant's frequency of religious attendance was examined based on the options of never/a few times a year, or, every week/twice a month.

The last category deemed most applicable to this study was in regards to a participant's cancer risk, based on reported tobacco-use behavior (http://hints.cancer.gov/). Within this category, the options of never smoked, former smoker, or currently smoke were evaluated.

CHAPTER FOUR

RESULTS

The first section of this chapter will provide the descriptive analysis, followed by the crosstabulation with chi square summary of the independent variables examined to determine association with the dependent/outcome variable. The second section will provide the research question, including an overview of the variables deemed significant through the crosstabulation procedure. Finally, the last portion of this chapter will list the hypotheses, followed by the results of the logistic regression analysis. It's important to note that values for 'don't know' or 'refused to answer' were forced into the analyses, and missing values were treated as 'missing'. Although the number of respondents vary depending on the question asked and missing data on some variables, the overall sample size was (n=813).

Descriptive Statistics

As a means to determine the population sociodemographics, five different characteristics from the HINTS dataset were examined. To facilitate the analysis process, the continuous variables were combined into ordinal groups. The first sociodemographic category assessed was that of age. During the survey, participants were asked to identify their age; the categories included the following: 18-34, 35-49, 50-64, 65-74, and 75 and older (Table 3). Over 55% of the participants indicated they were between the ages of 18 and 49. Although this age range had the highest percentage of women, those over the age

of 50 had the highest number of respondents. Of all the age groups, 218 individuals reported being in the 50-64 age range; this represented the highest number of respondents of any category.

Table 3: Age Distribution by Frequency and Weighted Percentage
Rural U.S. Women (n = 788); HINTS 2005

Age Distribution	Frequency	Percentage
18-34	126	27%
35-49	196	29%
50-64	218	24%
65-74	124	11%
75+	124	9%

The second demographic characteristic assessed was that of educational status. Survey respondents were asked to identify the highest level of education they had completed. The options included the following: less than high school, high school graduation or some college, and college graduation or beyond (Table 4). Over 67% of the participants indicated they had graduated from high school or had attended some college. However, a substantial number of respondents, over 14%, reported they had less than a high school education. Participants with an education beyond that of a college degree comprised 17% of the study sample population.

Table 4: Education Distribution by Frequency and Weighted Percentage
Rural U.S. Women (n = 769); HINTS 2005

Education	Frequency	Percentage
Less than High School	113	15%
High School or Some College	490	68%
College Graduation or Beyond	166	17%

The third demographic factor evaluated pertained to income level. Respondents were asked what their annual income was from all sources; the categories included: <$25,000, $25,000 - <$50,000, $50,000 - <$75,000, and $75,000+ (Table 5). The majority of the participants, greater than 56%, indicated their income was less than <$50,000. The smallest percentage of respondents, less than 20%, revealed their income was over $75,000. Notably, there is a discrepancy between the <$25,000 and the $25,000-$50,000. Although the observations (n=180) in the less than $25,000 income level represented fewer respondents than those (n=210) in the $25,000-$50,000 income range, this category showed a higher percentage at over 29%. This percentage discrepancy may be due to weighting of the data (L. Finney-Rutten, personal communication, March 6, 2009). According to Finney-Rutten (personal communication, March 6, 2009), "income is one of the census variables used to weight the data to be more representative of the population distribution of income".

Table 5: Income Distribution by Frequency and Weighted Percentage
Rural U.S. Women (n = 630); HINTS 2005

Income Distribution	Frequency	Percentage
<$25,000	210	28%
$25,000 - <$50,000	180	29%
$50,000 - <$75,000	132	24%
$75,000+	108	19%

The fourth demographic characteristic assessed was that of race/ethnicity. Participants were asked to identify what they believed their race to be; the categories included the following: White non-Hispanic, Hispanic, Black non Hispanic, and Other (Table 6). By far, the majority of the respondents, more than 81%, indicated they were White non-Hispanic. Over 17 % of the individuals who took part in the survey identified themselves with one of the minority groups.

Table 6: Race/Ethnicity by Frequency and Weighted Percentage
Rural U.S. Women (n = 761); HINTS 2005

Race/Ethnicity	Frequency	Percentage
White non-Hispanic	656	82%
Hispanic	32	6%
Black non-Hispanic	41	7%
Other	32	5%

The last demographic characteristic assessed pertained to companionship; specifically, participants were asked identify their marital status. Original survey options included the following: married, divorced, widowed, separated, never been married, or living with a partner. However, due to the small sample size of this study, the categories were collapsed to the following categories: married or living with partner, and not currently married (this category included those who were divorced, widowed, separated, and never been married (Table 7). More than 66% of the respondents of this study indicated they were married or living with a partner. Almost one third of the participants revealed they were not currently married.

Table 7: Marital Status by Frequency and Weighted Percentage
Rural U.S. Women (n = 770); HINTS 2005

Marital Status	Frequency	Percentage
Married or Living with Partner	468	67%
Not Currently Married	302	33%

As a means to assess trust in sources of health communication, participants were asked to identify the amount of trust they had in those sources for health-related information. The respondents were offered seven source categories, including, healthcare providers, family, newspaper, magazines, radio, internet, and television. Participants were also asked to quantify the extent of trust in those sources; these were grouped into the following two composite categories: 1) a lot, or 2) some, a little, not at all (Table 8). Of all the sources, more than 66% of the participants indicated having the most trust in

their healthcare provider as a source for health and medical information. Conversely, of all the options, over 86% of the respondents had the least amount of trust in the radio as a source for health-related information.

Table 8: Trust in Sources for Health Information by Frequency and Weighted Percentage Rural U.S. Women; HINTS 2005

Source of Health Info/Extent of Trust	Frequency	Percentage
Healthcare Provider (n = 784)		
A lot	528	67%
Some, a little, not at all	256	33%
Family (n = 785)		
A lot	194	29%
Some, a little, not at all	591	71%
Newspaper (n = 689)		
A lot	148	23%
Some, a little, not at all	541	77%
Magazine (n = 685)		
A lot	157	23%
Some, a little, not at all	528	77%
Radio (n = 662)		
A lot	71	13%
Some, a little, not at all	591	87%
Internet (n=367)		
A lot	86	22%
Some, a little, not at all	281	78%
Television (n=762)		
A lot	159	23%
Some, a little, not at all	603	77%

To determine where individuals seek health communication, participants were asked to identify the media sources where they had received health-related information during the previous 12 months. Sources included three categories: 1) health sections of a newspaper or magazine, 2) health segments on the local news of television, and 3) unsolicited health information on the internet (Table 9). The majority of the participants, over 79% had received health information in the past 12 months from the health sections of newspapers while 77% received their information from utilized the Internet for health-related issues.

Table 9: Sources for Health Information by Frequency and Weighted Percentage Rural U.S. Women; HINTS 2005

Sources for Health Information in Past 12 Months	Frequency	Percentage
Read Health Sections of Newspaper or Magazines (n = 695)		
Yes	562	80%
No	133	20%
Watched Health Segments on TV Local News (n = 760)		
Yes	590	77%
No	170	23%
Unsolicited Health Information on the Internet (n = 374)		
Yes	261	66%
No	113	34%

A question pertaining to a potential co-factor with HPV in causing cervical cancer was assessed. Respondents were asked to indicate their smoking status; the categories included, never smoked, were former smokers, or were current smokers (Table 10). The

majority of the participants, over 59%, reported they had never smoked. Current smokers comprised over 21% of this study's respondents.

Table 10: Smoking Status by Frequency and Weighted Percentage
Rural U.S. Women (n = 786); HINTS 2005

Smoking Status	Frequency	Percentage
Never Smoked	463	59.33%
Former Smoker	179	19.35%
Current Smoker	144	21.32%

Social networking behavior related to religiosity was assessed. Participants were asked to identify the extent of their religious attendance. The categories included: 1) every week or once or twice a month, and 2) a few times a year or never (Table 11). Of the 769 respondents, the majority of the participants, over 64%, indicated regular attendance at some type of religious service. Conversely, the least number of respondents (n = 256) reported limited, if any, religious attendance.

Table 11: Religious Attendance by Frequency and Weighted Percentage
Rural U.S. Women (n = 769); HINTS 2005

Religious Attendance	Frequency	Percentage
Every week or once or twice a month	513	65%
A few times a year or never	256	35%

To explore healthcare access issues, survey respondents were asked to identify if they had any healthcare coverage, including health insurance, prepaid plans such as health maintenance organizations (HMOs) or government plans, such as Medicare (Table 12). Over 82% of participants indicated they had some type of healthcare coverage, and 17% reported not having any type of healthcare insurance.

Table 12: Healthcare Coverage, i.e., Insurance or Govt. Plans, by Frequency and Weighted Percentage. Rural U.S. Women (n = 772); HINTS 2005

Healthcare Coverage	Frequency	Percentage
Yes	682	83%
No	90	17%

As part of examining participants' access to healthcare, the extent of visits to their healthcare provider was assessed. Survey respondents were asked to identify if they had seen their healthcare provider in the past year (Table 13). Over 87% of this study sample indicated they had seen their healthcare provider in the past year.

Table 13: Healthcare Provider Annual Visits by Frequency and Weighted Percentage Rural U.S. Women (n = 790); HINTS 2005

Healthcare Provider Visits	Frequency	Percentage
Yes	705	88%
No	85	12%

The last variable assessed was pertinent to routine preventive screenings for the early detection of cervical cancer. Participants were asked how recent their Pap exam had been, with the options including, within 3 years, over 3 years, or never (Table 14). Over 79% of the respondents indicated receipt of Pap testing within the past 3 years. Conversely, it had been over 3 years since their last Pap test in over 13% of the participants and 6% had never received any Pap exams.

Table 14: Recent Pap Exams by Frequency and Weighted Percentage
Rural U.S. Women (n = 781); HINTS 2005

Recent Pap Exams	Frequency	Percentage
Within Past 3 Years	614	80%
Over 3 Years	145	14%
Never	22	6%

Research Question and Chi Square Analysis

What are the sociodemographic and cervical cancer screening variables associated with knowledge and awareness of HPV among women who live in rural areas of the U.S.?

Through crosstabulation with chi square, associations of sociodemographic and cervical cancer screening variables with HPV awareness were examined. Additionally, other correlates of HPV were assessed, including, healthcare access, religiosity, sources of health information, and smoking status.

The first sociodemographic variable examined in association with HPV awareness was related to age. Of the 788 women who responded to this question, 274 were aware

of HPV (Table 15). Crosstabulation with chi square results indicated that of all the women who were aware of HPV, 70% were below the age of 49. Conversely, of all the sample respondents, the majority of rural women (n = 514) were not aware of HPV. Further, of all the age categories of women without awareness of HPV, the 50-64 age range represented the highest amount (n = 144). Of all those who were not aware of HPV, over 52% were 50 years of age and older.

Table 15: Awareness of HPV by Age
Rural U.S. Women; HINTS 2005

Age (n =788)	Aware (n)	Aware (Percent)	Not Aware (n)	Not Aware (Percent)
18-34	61	33%	65	23%
35-49	88	37%	108	25%
50-64	74	21%	144	27%
65-74	28	5%	96	14%
75+	23	4%	101	12%
Total	274	100%	514	100%

The next sociodemographic variable assessed in association with HPV pertained to level of educational attainment. The results indicated that of the 270 women who were aware of HPV, close to one fourth (over 24%) had graduated from college or received a an even higher level of education (Table 16). Conversely, of those who were not aware of HPV, less than 12% had attained a college education or beyond.

Table 16: Awareness of HPV by Education
Rural U.S. Women; HINTS 2005

Education (n=769)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
Less than high school graduation	17	7%	96	20%
High School graduation or some college	165	68%	325	68%
College graduation or beyond	88	25%	78	12%
Total	270	100%	499	100%

Another sociodemographic variable assessed in association with HPV awareness was relative to annual income. The results indicated that of those who were aware of HPV, over 58% had an annual household income of over $50,000 (Table 17). In contrast, of those that were unaware of HPV, the highest percentage (>33%), earned less than lowest annual income range of $25,000.

Table 17: Awareness of HPV by Income
Rural U.S. Women; HINTS 2005

Income (n=769)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
<$25,000	47	18%	163	34%
$25,000-<$50,000	64	23%	116	33%
$50,000-<$75,000	63	33%	69	18%
$75,000+	56	26%	52	15%
Total	230	100%	400	100%

The last sociodemographic variables assessed through crosstabulation with chi square were related to race/ethnicity and marital status and their correlation with HPV awareness. Results indicated the majority of the respondents were of the White non-Hispanic race (n = 656) (Table 18); this ethnic category also represented the highest percentage of those who were aware of HPV (>86%). However, of all those who responded to the race/ethnicity question, the majority were unaware of HPV. With respect to marital status, results indicated that of those with an awareness of HPV (Table 19), over 73% were married or living with a partner.

Table 18: Awareness of HPV by Race/Ethnicity
Rural U.S. Women; HINTS 2005

Race/Ethnicity (n=761)	Aware		Not Aware	
	(n)	Percent	(n)	Percent
White non-Hispanic	239	87%	417	79%
Hispanic	9	3%	23	8%
Black non-Hispanic	12	5%	29	8%
Other	10	5%	22	5%

Table 19: Awareness of HPV by Marital Status
Rural U.S. Women; HINTS 2005

Race/Ethnicity (n=761)	Aware		Not Aware	
	(n)	Percent	(n)	Percent
Married or living with partner	190	74%	278	63%
Not currently married	80	26%	222	37%
Total	270	100%	500	100%

Awareness of HPV by trust in health information sources and source of health information was also assessed. Of those who were aware of HPV, the highest percentage, over 72%, expressed a lot of trust in their healthcare provider as a source of health information (Table 20). Conversely, those who were aware of HPV had the least amount of trust in the radio as a source of health information. Results of the crosstabulation with chi square and the variable of source of health information indicated that of those who were aware of HPV, more than 89% read health information in the health segments of magazines and newspapers (Table 21).

Table 20: Awareness of HPV by Trust in Health Information Sources
Rural U.S. Women; HINTS 2005

Trust in Health Information Sources	Aware		Not Aware	
	(n)	(Percent)	(n)	(Percent)
Healthcare provider (n=784)				
A lot	198	73%	330	64%
Some, a little, not at all	77	27%	179	36%
Total	275	100%	509	100%
Family (n=785)				
A lot	62	30%	132	28%
Some, a little, not at all	213	70%	378	72%
Total	275	100%	510	100%
Newspaper (n=689)				
A lot	59	25%	89	21.5%
Some, a little, not at all	187	75%	354	78.5%
Total	246	100%	443	100%
Magazines (n=685)				
A lot	62	25%	95	21%
Some, a little, not at all	182	75%	346	79%
Total	244	100%	441	100%

Table 20 continued. . .

Table 20 continued. . .

Radio (n=662)				
A lot	28	12%	43	14%
Some, a little, not at all	215	88%	376	86%
Total	243	100%	419	100%
Internet (n=367)				
A lot	37	19%	49	24%
Some, a little, not at all	136	81%	145	76%
Total	173	100%	194	100%
Television (n=762)				
A lot	48	19%	111	25%
Some, a little, not at all	216	81%	387	75%
Total	264	100%	498	100%

Table 21: Awareness of HPV by Source of Health Information
Rural U.S. Women; HINTS 2005

Source of Health Information	Aware		Not Aware	
	(n)	Percent	(n)	Percent
Read health sections of newspapers or magazines (n=695)				
Yes	227	90%	335	73%
No	21	10%	112	27%
Total	248	100%	447	100%
Watched health segments on local tv news channel (n=76)				
Yes	218	80%	372	75%
No	45	20%	125	25%
Total	263	100%	497	100%
Read unsolicited health information on the Internet (n=374)				
Yes	137	74%	124	59%
No	39	26%	74	41%
Total	176	100%	198	100%

Smoking status and religiosity as they related to HPV awareness was also assessed through crosstabulation with chi square analysis. Results indicated that of those who were aware of HPV, over 59% had never smoked (Table 22). Over 39% of the respondents who were aware of HPV were former or current smokers. With respect to religiosity, results indicated that of those who were aware, the highest percentage, over 64%, attended religious services every week or once or twice a month (Table 23).

Table 22: Awareness of HPV by Smoking Status
Rural U.S. Women; HINTS 2005

Smoking Status (n=786)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
Never smoked	162	60%	301	59%
Former smoker	60	18%	119	20%
Current smoker	53	22%	91	21%
Total	275	100%	511	100%

Table 23: Awareness of HPV by Religiosity
Rural U.S. Women; HINTS 2005

Religiosity (n=769)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
Every week or once or twice a month	180	65%	333	65%
Never or a few times a year	91	35%	165	35%
Total	271	100%	498	100%

Another variable assessed relative to HPV awareness pertained to healthcare coverage such as health insurance, prepaid plans (i.e. HMOs, or government plans, such as Medicare). Chi square results indicated that of those who were aware of HPV, over 88% had some type of healthcare coverage (Table 24).

Table 24: Awareness of HPV by Healthcare Coverage (i.e., health insurance, HMOs, government plans, such as Medicare)
Rural U.S. Women; HINTS 2005

Healthcare Coverage (n=772)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
Yes	250	89%	432	80%
No	21	11%	69	20%
Total	271	100%	501	100%

The last two variables assessed were recent Pap exams and annual healthcare provider visits as they related to HPV awareness. Through crosstabulation with chi square, results indicate that of the total respondents on the Pap exam question, the majority of them (n=506) were not aware of HPV (Table 25.) Of those who were aware of HPV, over 84% had received a Pap exam in less than three years. Regarding the annual healthcare provider visit variable, results showed that of those who were aware of HPV (Table 26), more than 90% had visited their healthcare provider in the previous 12 months.

Table 25: Awareness of HPV by Recent Pap Exam
Rural U.S. Women; HINTS 2005

Recent Pap Exam (n=781)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
Within 3 years	240	85%	374	76%
Over 3 years	29	8%	116	18%
Never	6	7%	16	6%
Total	275	100%	506	100%

Table 26: Awareness of HPV by Healthcare Provider Visits (past year)
Rural U.S. Women; HINTS 2005

Healthcare Provider Visits (past year) (n=790)	Aware (n)	Aware Percent	Not Aware (n)	Not Aware Percent
Yes	248	90%	457	87%
No	27	10%	58	13%
Total	275	100%	515	100%

Through chi square test of independence, eight variables were determined significant with HPV awareness (Table 27); these included, 1) age, 2) education, 3) income, 4) marital status, 5) trust in healthcare provider as an information source, 6) receipt of health information through the newspaper or magazine, 7) healthcare coverage, and 8) recent Pap test. As will be discussed in the next section, the aforementioned variables were included in the logistic regression analytical procedure.

Table 27: Chi Square Test of Independence for HPV Awareness
Rural U.S. Women; HINTS 2005

Variable	Chi Square	Degrees of Freedom	P-value
Age	33.31	4	0.0000
Education	27.20	2	0.0000
Income	32.25	3	0.0000
Marital Status	4.25	1	0.0385
Trust in Provider as Health Info. Source	6.01	1	0.0178
Obtained Health Information in Newspapers or Magazines	17.41	1	0.0001
Healthcare Coverage	4.18	1	0.0462
Recent Pap Test	10.33	2	0.0091

Logistic Regression Analysis

Variables that were significantly associated with HPV awareness in the chi square procedure were included in a logistic regression model to assess independent associations. Notably, the overall logistic regression model, which included only those variables that were significantly associated with the outcome through the crosstabulation with chi square procedure, was significant, F (16) (degrees of freedom) = 2.66 (adjusted Wald F), $p<.01$ (p-value, adjusted Wald F). Certain variables shown significant in the chi square procedure did not remain so in the logistic regression procedure. However, several independent variables remained significantly associated with the dependent/outcome variable through the logistic regression analysis (Table 28). Notably,

some confidence intervals (CIs) may appear inflated, thus suggesting an insufficient sample size in that cell. However, the overall model ran and was not over-parameterized. The following will first outline the hypotheses results, followed by the results of the logistic regression analysis.

Hypothesis 1

Women over the age of 50 who live in rural America have increased knowledge and awareness for HPV than younger women between the ages of 18-34 who reside in those geographical locations.

Results indicate that older women over the age of 50 who live in rural America do not have increased knowledge and awareness of HPV than younger women between the ages of 18-34 and reside in those geographical areas (respective age groups, 50-64, 65-74, and 75+; OR=0.28, 0.13, and 0.25; 95% CI [0.13, 0.59; 0.05, 0.35; and 0.08, 0.78]); hence reject H1 (Table 28).

Hypothesis 2

Women with a college education or more who live in rural America have increased knowledge and awareness for HPV than women with less than a high school graduation who reside in those geographical locations.

Results indicate that rural U.S. women who have education above a high school graduation have more knowledge and awareness than those who didn't graduate from high school (HS) and reside in those geographical areas (respective education levels, HS graduation or some college, and college graduation or beyond) (OR=3.56 and 5.96; [1.12, 11.31; 1.53, 23.16]); hence fail to reject H2 (Table 28).

Hypothesis 3

Women with an annual income over $25,000 who live in rural America have increased knowledge and awareness for HPV than women with an annual income less than $25,000 who reside in those geographical locations.

Results indicate that rural U.S. women who have higher income levels do not have increased knowledge for HPV than women with lower levels of income who reside in those geographical areas (respective income levels, $25,000-$50,000; $50,000-$75,000; and $75,000+) (OR=0.88, 0.95, and 0.1.19; [0.40, 1.93; 0.38, 2.42; and 0.55, 2.57]); hence reject H3 (Table 28).

Hypothesis 4

Women who live in rural America who have received a Pap exam in over three years will have increased knowledge and awareness for HPV than women who have never received a Pap exam and reside in those geographical locations.

Results indicate that rural U.S. women who have received a Pap exam in over three years had more awareness of HPV than those who had never received a Pap exam and resided in those geographical areas (OR=0.08; [0.01, 0.75]); hence fail to reject H4 (Table 28).

Hypothesis 5

Non-minority women in rural America will have increased knowledge and awareness for HPV than minority women who live in those geographical locations.

Results indicate that rural women in America who are non-minority do not have increased knowledge and awareness of HPV than women of minority who reside in those

geographical areas of the U.S. (χ^2 =7.20, p=0.0788, d.f.=3, n=761); hence reject H5 (Table 28).

Further Finding

In addition to the aforementioned significant findings, results of this study indicate that rural women in America who read health sections of newspapers and magazines are 4.88 times more likely to be aware of HPV than those who don't (Table 28).

Table 28: Odds Ratios and CIs for Sociodemographics, Trust in Healthcare Provider as Source of Information, Healthcare Coverage, Receipt of Health Information from Newspapers/Magazines, and Pap testing by Awareness of HPV. Rural U.S. Women; HINTS 2005.

Independent Variables	Odds Ratios	Lower 95% CI	Upper 95% CI
Age			
18-34	1.00	1.00	1.00
35-49	0.50	0.24	1.06
50-64	0.28	0.13	0.59
65-74	0.13	0.05	0.36
75+	0.25	0.08	0.78
Education			
Less than HS Graduation	1.00	1.00	1.00
HS Graduation or Some College	3.56	1.12	11.31
College Graduation or Beyond	5.96	1.53	23.16
Income			
<$25,000	1.00	1.00	1.00
$25,000-<$50,000	0.88	0.44	1.93
$50,000-<$75,000	0.95	0.38	2.42
$75,000 or more	1.19	0.55	2.57
Marital Status			
Married or Living with Partner	1.74	0.92	3.29
Not Currently Married	1.00	1.00	1.00
Trust in Healthcare Provider as Information Source			
A lot	1.16	0.62	2.16

Table 28 continued. . .

Table 28 continued. . .

Some, or a little, or not at all	1.00	1.00	1.00
Healthcare Coverage, i.e. insurance, HMOs, or Government Plans			
Yes	1.21	0.42	3.47
No	1.00	1.00	1.00
Read Health Sections of Newspapers or Magazines in Past 12 months			
Yes	4.88	1.98	12.01
No	1.00	1.00	1.00
Recent Pap exam			
Within 3 years	0.11	0.01	1.02
Over 3 years	0.08	0.01	0.75
Never	1.00	1.00	1.00

CHAPTER FIVE

DISCUSSION

A major finding of this study was that rural women in the U.S. with more than a high school graduation are significantly more likely to be aware of HPV than those who don't graduate from high school. This is an important finding because previous research indicates 1) rural residents tend to have less education than urban populations (Engelman et al, 2005), and 2) less educated residents of rural America are at an increased risk for cancer (Gosschalk and Carozza, 2003). It is presumed a greater risk exists for cervical cancer among this population, especially when considering the evidence revealed in this study. Therefore, as a means to reduce the risk of developing cancer of the cervix, increasing HPV awareness among rural U.S. women who have less than a high school education needs to be a high priority.

Previous research has indicated more HPV awareness exists among older women (Waller et al, 2003). Therefore, it was hypothesized that a similar result would be found among rural American women. However, this was not the case. The results of this study demonstrated that rural U.S. women who are younger than 34 are more aware of HPV than those who are over the age of 50. This finding may lend support to that of Tiro et al (2007) who reported U.S. women under the age of 29 are more aware of HPV than those who are older than 29 years of age. Therefore, knowing that older women of rural areas

are less likely to be aware of HPV highlights the importance of educating this particular population about this potentially lethal virus.

Results of this study also suggest that rural women of America who have had a Pap test in over three years were more likely to be aware of HPV than those who had never been screened for cervical cancer. This finding is somewhat similar to Tiro et al's (2007) study that reported regular Pap testing among adult U.S. women was associated with having heard of HPV. The connection between regular cervical cancer screenings and HPV awareness is an important finding because having less knowledge of this virus may partly explain why rural women have lower rates of Pap tests (Coughlin et al, 2002). Therefore, increasing HPV awareness among rural women may contribute to an increased uptake of Pap exams, and thus decrease their cervical cancer risk.

Interestingly, one result of this study indicates that rural U.S. women who read health sections of newspapers and magazines are significantly more likely to be aware of HPV than those who don't. This is a highly notable finding because if many rural women are receiving HPV information from these sources, it raises additional questions, such as, 1) Why do rural women prefer these sources over other forms of media? 2) What specific magazines are they reading? 3) What are women learning from these sources? and 3) Do these sources provide accurate and thorough information regarding the human papillomavirus? Although the media (i.e. magazines and newspapers) are a valuable source of information, they may have various limitations as to the type and amount of information they provide. In a recent article by Anhang et al. (2004), it was stated, "Given different motivating and constraining factors, presentation of HPV information varies considerably across information sources. . ."

Another reason why it is important to know that a link exists between women who read health sections of newspapers/magazines and having HPV awareness is the implication that rural women who are less literate may be less likely to learn about HPV through the these locally-available media sources. In a study by Lindau et al (2002), it was reported that literacy among a multiethnic cohort of women was significantly associated with knowledge of cervical cancer screening. Consequently, rural women with limited ability to read and understand English may be less likely to make appropriate decisions regarding preventing HPV infection and the early detection of its related symptoms.

Although status of marriage, trust in healthcare provider as a source of information, and healthcare coverage were significant with HPV awareness leveling the crosstabulation with chi square procedure, they lost significance through logistic regression.. Further, it was hypothesized that non-minority women of rural America and those with higher incomes would have more awareness of HPV. However, significance was not demonstrated in these areas.

Within the 'sources of media for health information' category, the results of this study indicate that the lowest percentage of rural U.S. women chose the Internet for health-related information. This is important because if many rural women are not using the Internet for health-related information, it raises the issue as to the possibility that there may be limited or no access to this resource. Currently, there are a multitude of credible websites for information regarding HPV. However, if this service is either limited or not available, rural women may make less informed decisions about their health with respect to the human papillomavirus.

With respect to the sources rural U. S. women trust to receive their health information from, the results of this study revealed the highest percentage of rural American women trusted their healthcare provider. This finding is particularly important because it reveals the valuable role that rural health providers may play in providing HPV-related education. However, the lowest percentage of women trusted the radio as a source for health information. Therefore, less emphasis needs to be placed on providing HPV information through the radio medium, and concentrate more on channeling education through sources such as rural healthcare providers.

Based on the age distribution results, a higher number of women in this study were over the age of 50. This finding supports previous research that indicates rural areas of the U.S. consists of older residents (Ricketts, 1999; Reschovsky and Staiti, 2005; Larson and Fleishman, 2003; Harris and Leininger, 1993; Ormond et al, 2000). According to Celentano et al (1988), cervical cancer screening is not a routine practice among older women. Furthermore, the median age of mortality in the U.S. as a result of cancer of the cervix is 57 (NCI SEER, 2001-2005). Therefore, considering the higher age demographic of this study, the importance of HPV awareness education among older rural American women cannot be emphasized enough.

The race/ethnicity distribution of this study showed that the majority of the women were Caucasian. This characteristic was not surprising as it has been previously reported that White non-Hispanics comprise 82% of rural U.S. communities and rural African Americans represent the highest percentage of minorities at 13% (Jones et al., US ERS, 2007). However, the Hispanic population in rural America has been steadily increasing

over the past several years (US ERS, 2005), and the implications this may have in terms of HPV awareness for rural populations will be discussed in the next chapter.

The results of the smoking distribution indicated that most of the rural women are non smokers; however, over 20% currently smoke. According to the American Lung Association (2008), in 2006 the U.S. percentage of women smokers was 17.8%. Thus, based on the results of this study, the percentage of rural women who smoke is 2% higher than the national rate. Although this study did not show an association between smoking and HPV awareness, the fact that many rural women do indeed smoke is a definite public health issue. Because HPV infection is a co-factor with smoking in causing cervical cancer, many rural women of America may be at an increased risk for the disease.

Based on the results of this study, a large percentage of rural U.S. women attend some type of religious service on a regular basis. Although this study did not show an association between religious attendance and HPV awareness, knowing that many rural women have a strong connection to this social network is an important issue to consider, especially when planning HPV-related outreach and education programs.

The health insurance distribution results of this study indicate that the majority of rural U.S. women have some type of health insurance, including government-based programs. This finding is somewhat contrary to research that indicates rural women of the U.S. are less likely to have health insurance (Reschovsky and Staiti, 2005; Hawkins and Curtiss, 1997; Harris and Leininger, 1993.) However, this study did show that 17% of rural women did not having any type of healthcare coverage. This percentage is actually higher than the 15.8% national rate that was reported by the Rural Assistance Center (2007), based on 2006 figures. A lack of health insurance is an important issue

because without it, many women are less inclined to receive health care services, let alone those that are of a preventive nature, such as screening for HPV and cervical cancer.

The results of this study indicated that the majority of rural women in America engage in regular visits to their healthcare provider. From a prevention perspective, this is critical to know because doctors can play a highly important role in educating these women about HPV during their regular visits. However, over 11% of rural women reported not having annual visits to their healthcare provider. Therefore, to reach that sector of the rural population, HPV-related programs need to include interventions that include not only clinician education, but methods that will target this subpopulation through other channels, such as social networks.

The distribution of rural women who participate in regular Pap testing indicates that a large percentage do in fact receive this important preventive healthcare service. However, 6% of the women who responded to this question reported never receiving a Pap exam. This percentage is considerably lower than the national non-Pap tested rate of 11% (National Cervical Cancer Coalition, 1997-2008). It is also contrary to what was reported by Coughlin et al. (2002) who indicated that rural areas have lower rates of Pap smear uptake than urban locations. However, because cervical cancers are diagnosed more often in those who have never received a Pap exam (NCI, 2005), rural healthcare educators and providers need to ensure that this subpopulation receives adequate education regarding cervical cancer screening services and the resources that are available to obtain Pap testing. Although this study demonstrated that the majority of rural women receive their Pap exams, educators need to remain vigilant in their educational efforts to ensure this sector of the population continues with this important

preventive healthcare measure. Rural healthcare education should also provide information about the HPV vaccine, especially for those women who are under the age of 26.

CHAPTER SIX

CONCLUSION

The goal of this study was to identify the factors that predict awareness of HPV among women who live in rural areas of America. Rationale for this particular goal was based on previous evidence that indicates 1) knowledge and awareness of HPV is limited among adult women in the U.S. (Tiro et al., 2007), and 2) when compared to urban areas of the U.S., rural women have higher rates of cervical cancer (Yabroff et al., 2005) and lower rates of Pap testing (Coughlin et al., 2002). The final results of this study showed the predictors of HPV awareness among rural women in America to be younger age, increased education, and having read health sections of newspapers and magazines in the past year. Therefore, educational strategies among this population should be aimed more towards those who are at an increased risk for lacking information about this highly infectious virus.

As previously mentioned in this paper, rural areas of the U.S. are more vulnerable to serious disease and poor outcomes due to various factors, including remote locations and limited health resources (Ricketts, 1999). Furthermore, funding for national public health programs is inadequate (Association of American Medical Colleges, 2008), especially in rural areas, thus highlighting the importance of focusing educational efforts. To ensure the most efficient use of limited resources, HPV programs should be particularly concentrated on segments of rural America that may have less awareness of

the virus. The subpopulations in greatest need of increased HPV education include women who may be older, are less educated, and who may not obtain health information from print forms of media.

Although important findings resulted from this research, various limitations exist that must not be overlooked. For example, because of the small sample size for the study, certain variables from the HINTS 2005 database were not examined due to reducing the numbers beyond statistical power. The evaluation of specific factors would have contributed significantly to this study, particularly those related to extent of knowledge of HPV, such as, knowing if the virus causes cervical cancer.

Another limitation included the fact that the data were drawn from a telephone survey. Although surveys provide valuable information, they are limited because of self-report responses. Thus, various factors may interfere with providing accurate information, such as, incomplete memory, distrust in those conducting the survey, and wanting to portray personal circumstances either positively or negatively. Consequently, surveys are limited by the extent of accurate reporting of the respondents.

As a cross-sectional, quasi-experimental study, this research was also limited by lacking an experimental design. Research that randomly assigns participants to controls and tested groups to observe both a treatment and outcome carry more validity (i.e., internal, rather than one that draws from a secondary data base). Essentially, cross-sectional studies only provide prevalence data and do not establish cause-and-effect information. Therefore, this study only provided information on associations between HPV awareness and certain variables.

This study evaluated women's answers from randomly-selected households in rural areas of America. Thus, the results of this study cannot be generalized to all female populations of America, nor can it be applied to women who live in rural areas in countries outside of the U.S.

When HINTS was conducted in 2005, people in America were less reluctant to participate in phone surveys due to the onslaught of telemarketing. Further, they had more options to screen phone calls, and landlines were used less often than previous years due to other forms of communication, such as cell phones (HINTS, 2005). Although the overall response rate for HINTS 2005 was 5,586 (HINTS, 2005), the resulting rural sample drawn for this study analysis (n=813) was a drastic reduction in size, thus limiting the statistical strength to fully explore specific questions in detail, such as those related to knowing if HPV caused cervical cancer.

Despite the limitations previously mentioned, this study also held strengths that are important to discuss. For example, although several studies have been conducted to examine HPV knowledge among various populations (Anhang et al., 2004; Dell et al., 2000; Friedman et al., 2007; Holcomb et al., 2004; Ingledue et al., 2004; Marlow et al., 2007; Pitts and Clarke, 2002; Tiro et al., 2007; Waller et al., 2003; and, Yacobi et al., 1999), this research is the first to utilize a national database to assess the predictors of HPV awareness in rural areas. For this reason alone, the results of this study provide unprecedented information that contributes invaluably to science and the field of public health.

Another important strength involves both the timing of the study. During the past few years, several scientific advancements have transpired towards the early detection

and prevention of HPV. In 2003, the FDA approved the HPV DNA test (USFDA, 2003), and in 2006 they gave approval for the first vaccine to immunize against HPV (USFDA, 2006). The HINTS 2005 data utilized in this study were collected between the years of the HPV test and vaccine approvals. Based on these two events, it would be assumed that media's exposure of the new HPV test and the pending vaccine would have increased awareness of HPV. However, the overall results of this study revealed that the total number of rural women who are not aware of HPV is considerably higher than those who are aware of the virus.

Combined with the introduction of the HPV vaccine into the U.S. was the importance of increasing awareness of the virus among female populations. Yet, little is known as to the extent of HPV knowledge and awareness since the implementation of the vaccine. An important strength with this study is that it provides a timely understanding of the current level of awareness of HPV in rural America and also forms a critical base for assessing trends of knowledge about the virus among this population.

This study had a unique strength in that it revealed an interesting finding as to where rural women obtain their health information. Through this assessment it was determined that health sections of newspapers and magazines were important sources for HPV information among rural women. It was suggested by Anhang et al. (2004) that rural women, especially those who are economically disadvantaged, older, and lacking in health literacy, have a particular need for cervical cancer prevention information. This study supports that perspective by demonstrating that rural women are turning to sources that may not be accurately and adequately fulfilling their health prevention and educational needs, especially with regard to HPV.

As a society we have a serious responsibility to ensure that the least advantaged among us have equal access to services and information that promote good health and prevent disease. This author knows from past experience that when states receive funding, rural issues are often the last on the list to be addressed. Many state programs are evaluated and re-funded based on the 'numbers' that are produced. Unfortunately, massive numbers just are not possible from rural areas. However, is it right to neglect certain populations of America because program quotas can be achieved from more populated areas? Clearly, the time has arrived to change the paradigm of thinking in this country. Although 'quantity' is an important aspect of reporting, 'quality' needs to be a major component in the planning and evaluation of health-based programs. Thus, there needs to be more focus on 'how' and 'what' can be done to reach and educate rural women on HPV. With this in mind, the following recommendations are proposed:

1. First of all, every rural area of America is different and what works in one community may be completely ineffective in another. Therefore, in order to reach rural women with the information they need, various community leaders should be mobilized and united regarding the issue of low awareness of HPV. These individuals are usually highly respected among their respective populations, and include people from various organizations and auxiliaries, such as, senior centers, city and county agencies, tribes and ethnic groups, chambers of commerce, medical and health services, local schools, businesses, and civic and religious clubs and organizations. Through the cooperative and collaborative efforts of key individuals, the framework to effectively increase HPV knowledge in rural communities and counties can be formulated. Universities can play a collaborative and supportive role

by providing skills and expertise in planning programs that are more theory based, thus increasing the likelihood of success.

2. This study identified women with education levels of a high school degree or less to have less awareness of HPV. With the help of those from the first recommendation, rural women with the greatest need for education can be identified. Subgroups to consider for outreach might include those in various ethnic populations. According to the US ERS (2005), the Hispanic/Latino population has doubled in rural communities of the U.S. from 1.4 million to 2.7 million, and is the fastest growing population in non-metro areas. Many of these individuals are less educated than non-Hispanic Whites (ERS, 2005). Thus, efforts to increase HPV awareness among these women will most likely require indigenous workers and those who are bilingual.

3. As reported in this assessment, older rural women are more at risk for lacking HPV knowledge. Through collaborative efforts with individuals from the first recommendation, effective strategies can be identified to reach this population. For example, efforts may include providing educational sessions at social events, such as, luncheons and activities at senior centers; quilting, sewing, and craft get-togethers; recreational and holiday events; community educational workshops; church bazaars, religious socials and health fairs. Social networking groups can also be a great resource for identifying volunteers who would be willing to participate in the outreach and educational efforts.

4. Health sections of newspapers and magazines contribute to increased HPV awareness among rural women. Therefore, future research efforts could explore 1) what women know about HPV from these sources, 2) why they turn to these sources

for information, and 3) how accurate these sources are regarding HPV. However, factors, such as literacy and financial means, may prevent many rural women from learning about HPV through these sources. Therefore, educational efforts should be provided through other means. For example, most everyone in rural areas receive some form of utility bill. Through collaborative efforts with those in Recommendation 1, HPV inserts could be developed that would be both informative and understandable to all women in their communities. Additional educational materials could also be developed and displayed at places where many women may frequent, such as grocery stores, laundry mats, and gasoline pumps.

5. Continued research is also needed to explore the trends of HPV knowledge among rural U.S. women, especially since the implementation of the HPV vaccine. These studies could include surveys, focus groups, and community/faith-based interventional designs. Studies could also be developed that would demonstrate the effect of various HPV educational programs within rural communities. The author of this paper developed an example of a potential study utilizing the Precaution Adoption Process Model (PAPM) as the basis for an intervention to increase both HPV awareness and Pap testing among two rural populations in America (Increasing HPV Awareness and Pap testing in Rural America) (Appendix II). In addition to identifying trends and the effect of educational programs, further research would contribute significantly to policy development. For example, local community policies could be developed that would require signage at the point of cigarette sales, indicating that smoking is a potential co-factor with the human papillomavirus in causing cervical cancer. Through local policy development, similar national policies

would eventually transpire, thus providing critical support for programs and efforts that would increase HPV knowledge and awareness among rural U.S. women.

APPENDIX

INCREASING HPV AWARENESS AND PAP EXAMS IN RURAL AMERICA

Hypothetical target population:

The target population will be adult women over the age of 18 who live in two separate rural communities.

Hypothetical theoretical design:

Hypothetically speaking, two random digit dial surveys were conducted among women who live in rural/nonmetro counties of America, i.e., one before the massive HPV media campaign and one after, to explore the extent of their knowledge of HPV. The results concluded that although there was some increase in knowledge, surprisingly, a large percentage still had never heard of HPV and half of those were unaware that it caused cervical cancer. Based on these findings, and hypothetically speaking, funding was received to work with two rural communities on this issue. By utilizing the Community-Based Participatory Research method (Agency for Healthcare Research and Quality, 2003), researchers mobilized two coalitions of key members to address the lack

of HPV knowledge among women over the age of 35 who reside in their communities. With the coalitions spearheading the project, and with recommendations and guidance from the researchers, a united consensus determined that the best theoretically-based approach for interventions would be the Precaution Adoption Process Model (PAPM) (Glanz et al., 2002).

According to Glanz et al. (2002), similar to other stage-based theories, the PAPM maintains the premise that human behaviors develop through a series of stages, and over a period of time. Unique to this theory, however, is the provision for individuals who may have a complete lack of awareness of the issue (Glanz et al., 2002). Within the PAPM, including stage theories in general, are four important concepts: 1) A category for each stage; 2) A progressive order for each stage; 3) Each stage has common barriers for *all* individuals in that stage; and 4) Every stage has unique barriers to *each* individual within that stage (Glanz et al, 2002). The PAPM is usually more appropriate for adopting 'precautionary' or preventive behaviors, or stopping unhealthy actions, rather than decreasing habitual behaviors, such as unhealthy eating (Glanz et al., 2002). The components of the PAPM theory consist of seven stages that transition from a complete lack of awareness to the maintenance of the behavior, and they include 1) unawareness of issue, 2) unengaged by issue, 3) deciding about acting, 4) decided not to act, 5) decided to act, 6) acting, and 7) maintenance (Glanz et al., 2002). Depending on the stage of the individual, interventions can be implemented as a means to facilitate their behavioral transition to the next stage (Glanz et al., 2002).

Most studies that have utilized the PAPM have relied on secondary data; this method is considerably less valid when considering the main concept of the theory is to apply

stage-based interventions over a period of time as the individual progresses to the desired action (Weinstein et al., 1998). A more appropriate use of this theory was demonstrated during a study by Weinstein et al., (1998) when they incorporated the PAPM to increase radon testing in homes. In this study, participants were randomly placed into four groups, including a control group, based on stage 3, *undecided about testing*, or stage 5, *decided to test*. The results showed that the intervention to increase risk perception in the *undecided* was more effective at persuading them to make the decision to test than in convincing the *decided* to order a test; and the intervention to increase perception of the ease in obtaining a test kit was more effective in persuading the *decided* to order test kits, than in swaying *undecided* participants to make the decision to test (Weinstein et al., 1998). Although this study showed effectiveness in persuading individuals to take action, the research ultimately revealed the effectiveness of applying interventions, based on the stage of the participant, to progress to the next stage; this stage advancement, according to Weinstein et al. (1998), was deemed just as much of an achievement as progression to action.

Hypothetically speaking, the HPV lack of knowledge project will utilize the PAPM in a research design to advance participants from one stage to the next, with the *ultimate* outcome being receipt of a Pap test. Due to limited funds, and with the help of the coalitions and indigenous workers, participants will be recruited through strategically placed information, and will include the number to call if interested in participating. Because the initial outreach methods will contain basic facts about HPV, participants will have advanced past the first stage of unawareness. Respondents will then be sent introduction letters, consent-to-participate forms, additional information about

HPV/cervical cancer, the importance of Pap tests, and the number to call for testing. The difference will be that the control group, one community, will not receive pre-intervention questionnaires, nor will they receive the intervention that will consist of the educational sessions. However, in both communities, the introduction letter will also mention that the participants will be receiving a follow up call within three months to determine extent of HPV knowledge increase and receipt of Pap test. The returned pre-intervention questionnaires from the intervention community will be used to determine those who have made a decision not to receive Pap tests (stage 4), and the stage of the remaining participants. The eligible participants will then be sent an invitation with an R.S.V.P to attend an educational session, based on their stage of either being 'undecided' about Pap testing, or 'decided' to receive a Pap test. It's important to note that having 'decided' to receive a cervical cancer screening does not mean that testing will actually occur; therefore, this information will be obtained in the follow-up phone calls to the intervention participants. The following will be the particular educational sessions for the intervention to increase HPV knowledge and Pap testing receipt in rural American women.

Question: Will HPV and cervical cancer educational sessions increase HPV knowledge and Pap testing?

Hypothesis I: When compared to a rural community that doesn't receive educational sessions, women of a rural community who receive HPV and cervical cancer educational sessions will increase in HPV knowledge.

Hypothesis II: When compared to a rural community that doesn't receive educational sessions, women of a rural community who receive HPV and cervical cancer educational sessions will increase in Pap testing receipt.

Study design: Quasi-experimental, non-randomized, and interventional.

Statistical method: A t-test analysis will compare the means between the two groups. The extent of HPV and cervical cancer knowledge increase will be determined through the number of questions that are correctly answered in the post-intervention phone calls. Pap testing receipt will be based on self-report answers.

Intervention:

Educational session I

Subject	Details
Lesson Topic	HPV Overview
Target Population	Women in rural community, age 35 and older. If any are Hispanic and only understand Spanish, an interpreter will be provided. • *Assumptions:* 1) They have consented to be a part of the research; they realize this is the first of a two-part, same-day session. 2) These women may be conservative/religious in beliefs and care should be taken to respect their opinions. 3) They have heard of HPV but are unengaged by issue. • *Rationale for target population:* Older women are at greater risk for cervical cancer (ACS, 2008). By being informed on the subject, these women will be more empowered to educate others in the community, including young girls.
Theoretical Constructs	Through the Precaution Adoption Process Model (PAPM), the two constructs that will be addressed in this Lesson Plan are: • Stage 2—Unengaged by issue (participants will increase in HPV knowledge to advance to stage 3.) • Stage 3—Undecided about issue (participant will receive awareness of seriousness of HPV and their susceptibility to the infection and cancer; at which point, will either advance to Stage 4, decided not to have Pap test, or Stage 5, decided to have Pap test.)

	(Glanz, Rimer, & Lewis, 2002)
Session Setting	Various classrooms in local churches, schools, and library. (Sessions may take place on various days.)
Facilitators	Indigenous community workers, identified by the Coalition members, and who received prior training and instruction as facilitators, including the lesson plans and materials.
Timeline	1.25 hours
Materials Needed	• Pre and Post tests • Pencils • Attendance sheet for name/contact info. (placed on a clipboard with a pen) • PowerPoint capability/equipment/jumpdrive with HPV presentation • Table with cloth/flowers (for aesthetics) • Snack tray with snacks/napkins/forks/water/cups (expression of appreciation for their participation)
Learning Objectives	At the conclusion of this 1.25 hour session, 80% of participants will be able to correctly: • Interpret the abbreviation or meaning of HPV • Know HPV is common in women • Know one symptom or sign of HPV • Understand how HPV is transmitted • Know type of cancer HPV causes • Identify one way to prevent HPV • Identify one way to early-detect HPV
Introduction (5 minutes)	Facilitator/participants will introduce self and discuss one personal interest; the attendance sheet will be sent around at this time.
Pre-test (5 minutes)	Facilitator hands out pre-tests and pencils and asks them to put their name or initials on it. Questions on pre-test will include: 1. What does HPV mean and/or stand for? 2. How does a person contract HPV? 3. Is HPV common in women? 4. What type of cancer does HPV cause? 5. Name one way to prevent HPV. 6. Name one way to early detect HPV. Facilitator collects pre-tests when they're finished.
PowerPoint Presentation (20 minutes)	*Theoretical strategy:* Will increase perception of seriousness of HPV—Stage 2 of PAPM. Facilitator provides overview of the following: • HPV meaning (human papillomavirus)

	• History of HPV • Statistics on HPV—annually worldwide—1) >400 million adults are infected; 2) ~291 million women are infected. Annually in U.S., 1) ~20 million are infected; 2) ~6.2 million people contract infection; 3) Accounts for most of sexually-transmitted infections. (CDC, 2008) • Symptoms (There is a latency period; may surface in a few days, few months or years; there are few, if any symptoms; may be some pain or discomfort with lesions; may manifest as warts—also known as 'papillomas') • Different types of HPV—explain that 'types' is like 'strains', such as different 'flu strains' --(over 100 different types; ~40 sexually transmitted; also characterized by risk for cancer; high risk include 16, 18, 31, 33, 45 (among others); low risk include 6, 11, 42, 43, 44 (among others) (NCI, 2008) • Explain it's link to cervical cancer—conclusively determined as being the cause in >90% of cervical cancers; WHO, 2009) • Provide cervical cancer statistics: Worldwide-- ➢ Cancer of cervix is 2nd most common cancer ➢ ~500,000 new cases, 250,000 mortalities (annually) (WHO, 2009) In U.S.-- ➢ Although burden of cervical cancer has been decreasing, was est. in 2007 >11,000 new cases of cervical cancers were diagnosed and >3,700 deaths occurred as result of disease ➢ Compared to urban locations, rural areas have higher cervical cancer rates (Yabroff et al., 2005) CDC, 2008
Local Presenter (15 min.)	*Theoretical strategy:* Will increase perception of susceptibility—Stage 3 of PAPM. A local woman who was previously diagnosed with cervical cancer will discuss her experiences.
PowerPoint Presentation (20 minutes)	*Theoretical strategy:* This part of the presentation will prepare participants to mentally advance to Stage 5 of PAPM—deciding to have Pap test.

	Facilitator continues with PowerPoint presentation. Will discuss the following: • Treatment of HPV ➢ **No cure for HPV**--treat warts and lesions ➢ Treatment depends on lesion category and location and include: ➢ Chemicals ➢ Interferon ➢ Cryotherapy ➢ Lazer therapy ➢ Surgical removal ➢ Infections may clear on their own—or may get worse--persistent ones more prone to cancer (CDC, 2008) • Prevention of HPV Recommendations for limiting exposure to virus: ➢ Abstinence (CDC, 2008) ➢ Long-term monogamous relationship with a non-infected partner (NCI, 2008) ➢ Condoms (not very reliable) Most effective for preventing HPV: ➢ Receive HPV vaccine prior to onset of sexual activity (recommended for females, ages 9-26) ➢ June 2006 --FDA--first vaccine to prevent four types of HPV-- Gardasil (by Merck) ➢ Prevents high-risk types of 16, 18 and low-risk types of 6 and 11 ➢ Recommended--girls/women 9-26 ➢ 3 shots over 6 months ➢ Safe; 100% effective against those types • Detection of HPV HPV may be detected through ➢ Regular gynecological exams and Pap smears (visual observations of lesions and cell abnormalities) ➢ HPV DNA testing: -- Women < age 30--Due to transient nature of HPV in young women, not standard procedure—may be exceptions (such as abnormal Pap tests) --Women > age 30--HPV testing is recommended as adjunct to regular Pap smear exams • Prevention of cervical cancer ➢ Early detection through regular gynecological exams, Pap smears **For girls/women between the ages of 9-26:**

	➢ Obtain the three-series vaccine--prevents 70% of cervical cancers and 90% of anogenital warts However—**important to emphasize!** It only prevents those four types, even though there are more types that cause cervical cancer. Additionally, if the woman has already contracted one of the types in the vaccine, then the vaccine won't prevent that type and she may be at risk for cervical cancer. Therefore, it's **critical that regular Pap testing continues.** (ACS, 2008)
Questions (5 minutes)	Facilitator discusses any questions participants may have.
Post Test (5 minutes)	Facilitator administers post test; questions from pre-test are the same on post test. Facilitator collects tests.
Educational Session Adjourns for 10 minutes	Participants are invited to take a break, enjoy refreshments, and socialize. The facilitator utilizes this time to prepare for Session II

Educational session II

Subject	Details
Lesson Topic	Cervical Cancer Screening
Target Population	Women in rural community, age 35 and older. Based on questions in previously-conducted survey, if any are Hispanic and only understand Spanish, an interpreter will be provided. • *Assumptions:* 1) They have consented to be a part of the research; they realize this is the second of a two-part, same-day session. 2) They are more knowledgeable about HPV and its connection to cervical cancer, and have decided to obtain a cervical cancer screening. • *Rationale for target population:* Older women are at greater risk for cervical cancer (ACS, 2008). Also, by being informed on the subject, these women will be more empowered to educate others in the community, including young girls.
Theoretical Constructs	Through the Precaution Adoption Process Model (PAPM), the construct that will be addressed in this Lesson Plan is: • Stage 5--Decided to take action (obtain a Pap test.) (Glanz, Rimer, & Lewis, 2002)
Session Setting	Various classrooms in local churches, schools, and library. (Sessions may take place on various days.)
Facilitators	Indigenous community workers, identified by the

	Coalition members, and who received prior training and instruction in facilitating lessons, including plans and materials.
Timeline	1.25 hours
Materials Needed	• Refer to Lesson Plan I Materials • Pre and Post tests • Pencils • Flip chart or poster board (if dry-erase/chalk board isn't available) • Marker (dry-erase marker or chalk if dry-erase/chalk board is available) • Attendance/contact info. sheet with a pen on a clipboard • Decorative magnetic cards with phone numbers to call for Pap test
Learning Objectives	At the conclusion of this 1.25 hour session, 80% of participants will be able to correctly: • Identify the purpose of a Pap test • Locate the cervix on anatomical drawing of a woman • State one location where a Pap test may be obtained • Discuss how to overcome one barrier to obtaining a Pap test
Welcome Back (2 minutes)	Facilitator welcomes back the participants to the second part of the educational session; they are encouraged to put their name and contact information on the attendance sheet (facilitator passes it out at that time.)
Pre-test (5 minutes)	Facilitator hands out pre-tests and pencils and asks them to put their name or initials on it. Questions on pre-test will include: 1. State what the Pap test is for. 2. Locate where the cervix is on the drawing. 3. State one location where a Pap test might be obtained. 4. Identify one barrier to obtaining a Pap test.
Guest Speaker (30 minutes)	*Theoretical Strategy:* This part of the session will help alleviate any fears about the Pap test procedure, thus reaffirming 'decision to act'—stage 5 of PAPM, 'decided to act' (Glanz, Rimer, and Lewis, 2002). Introduce physician, gynecologist, or public health nurse. He/she will speak to the group about the purpose of a Pap test, the cervix, the procedure, how often women should be screened, and where Pap tests may be obtained; plus, the doctor will answer questions and help alleviate any concerns there might be. Doctor may have own PPT slides or

	brochures on the topic.
Barriers to Pap test, and Overcoming Barriers (25 minutes)	*Theoretical Strategy:* This part of the session will open up discussion on the perceived barriers; then solutions will be offered, thus reaffirming they're making the right decision to have a Pap test—Stage 5 of PAPM, 'decided to act'. Facilitator will ask the participants what their barriers might be to obtaining a Pap test. The barriers will be written on a board or flip chart (depending on setting.) Barriers may include: • No insurance • Limited insurance • No transportation • No babysitter • Work during the days • Husband may not approve • Fear of cancer • What if cancer? Then what? (especially if no money and no insurance) Facilitator will then offer solutions to the barriers. These may just spoken, or they can be written, and might include: • No insurance and limited insurance— **one solution**--provide information on CDC's (2007) National Breast and Cervical Cancer Early Detection Program • No transportation—**one solution**--offer information on local free or low-cost transportation options; some communities provide rides that are donated by volunteers and community members (these resources will be previously identified in the Coalition meetings.) • No babysitter—**one solution**--offer information on free or low-cost babysitters or those who may be willing to donate babysitting services for this specific purpose (these resources will be previously identified in the Coalition meetings.) • Work during the day—**one solution**--perhaps an evening or weekend Pap test clinic may be arranged with providers (this will be worked out with the Coalition and providers prior to the educational sessions.) • Husband won't approve—**one solution**--offer to meet with both her and her husband to help alleviate his concerns (if enough interest, a separate class could be provided for these particular individuals.)

	• Fear of cancer—what if cancer?--**one solution**—1) facilitator acknowledges their concerns and discusses exact fears, i.e., cost, how it might impact family—if it's a cost issue, discuss that there are organizations and foundations who provide financial assistance for those who are diagnosed with cancer (identified in Coalition meeting.) If it's an issue on how it might impact the family, tell them it would be even more devastating on the family if they lost their mother/wife as a result of cervical cancer; 2) provide information that out of so many Pap tests, only a very small number are diagnosed (doctor may provide that information.) Facilitator tries to talk through their fears and concerns and addresses them, if possible.
Sign up for a Pap test/Numbers to Call for a Pap test (8 minutes)	*Theoretical Strategy:* This part of the session will provide the information the participants need in order to sign up for a Pap test or to make the call to sign up for a Pap test—Stage 5 of PAPM, 'decided to test'. For those interested, a health worker from one of the Pap testing clinics will be at the close of the meeting to sign women up for a Pap test. The facilitator then hands out pre-made decorative magnets the participants can place on their fridge (perhaps made by volunteers—also worked out in the Coalition meetings.) These handouts will have the numbers of where they can call to sign up for a Pap test.
Post test (3 minutes)	Facilitator administers post test before they leave, requesting their name or initials on the test. Questions are the same as those in the pre-test.

Post intervention:

Follow up calls will be made to participants in both the control and intervention communities within six months after the sessions conclude to determine the outcome of obtaining Pap tests.

Outcome expected:

HPV knowledge and Pap testing will increase in community that received educational sessions.

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