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Marie Isabelle Caroline Hilaire

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**ASSESSING HAITIAN WOMEN'S VULNERABILITY TO CERVICAL
CANCER BECAUSE OF SOCIO-DEMOGRAPHIC PREDICTORS OF CARE
ACCESS**

By

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A Thesis Submitted to the Graduate Faculty of Georgia State University in Partial
Fulfillment of the Requirements for the Degree of

MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA

2011

Approval Page

**ASSESSING HAITIAN WOMEN'S VULNERABILITY TO CERVICAL CANCER
BECAUSE OF SOCIO-DEMOGRAPHIC PREDICTORS OF CARE ACCESS**

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Assessing Haitian women's vulnerability to cervical cancer because of socio-demographic predictors of care access

Abstract

This study assesses the vulnerability of Haitian women to cervical cancer by looking at the distribution of socio-demographic factors that might prevent their access to health services. Predictor variables of access to health services and variables known to be directly associated to an increased risk for cervical cancer were derived from the Haitian Demographic Health Survey (2005-2006). Five socio demographic predictors of access to health services were considered: Education, wealth index, distance to health services, type of place of residence and whether or not money was a problem to get medical help. The dependent variable used to categorize women into low risk group and high risk group to cervical cancer was created from three variables: young age at first sexual intercourse, more than two sexual partners and can the woman ask her partners to use condom. To study the association between the socio-demographic and economic predictors to access to health services and high risk group of women to cervical cancer, binary logistic regression was conducted. The univariate analysis performed showed that women who were in the high risk group to cervical cancer were more likely to be uneducated (OR= 2.447; p-value<0.0001), poor (OR=2.372; p-value<0.0001), to have economic barriers that prevent their access to health services (OR=1.566; p-value<0.05) and were more likely to live in rural areas (OR=1.705; p-value<0.0001). However, after running the multivariate analysis to control for the other predictors, only level of education (OR= 1.991; p-value<0.0001) and wealth status (OR=1.727; p-value<0.05) were still associated to the dependent variable. These findings proved that interventions that aimed at controlling cervical cancer among Haitian women should take into consideration these indirect socio-demographic and most important economic factors that might prevent the high risk group of women to benefit from the appropriate screening and treatment services, provided that they are available. Finally recommendations to find a better approach to address the cervical cancer burden in Haiti are made.

INDEX WORDS: Uterine cervical neoplasmas, risk factors, accessibility to health services, developing countries

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ACRONYMS AND ABBREVIATIONS

DHS: Demographic Health Survey

HIV: Human immunodeficiency virus

HPV: Human papillomavirus

JHPIEGO: Johns Hopkins Program for International Education in Gynecology and Obstetrics

IHE: Institut Haitien de l'Enfance

LEEP: Loop electrosurgical excision procedure

MOH: Ministry Of Health

MSPP: Ministry of Public Health and Population

VIA: Visual Inspection with Acetic Acid

VILI: Visual Inspection with Lugol's Iodine

WHO: World Health Organization

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CHAPTER I – Introduction:

According to the World Health Organization (WHO), cancer is a major cause of death and morbidity in developed countries and the second leading cause of death in low and middle income countries (WHO, 2008). By 2020, cancer is expected to overtake heart disease to “become the world number’s one killer” (Varughese & Richman, 2010).

This increasing burden of cancer worldwide disproportionately affects the developing countries and this pattern of health inequity is more striking for gynecological cancers, such as breast cancer and cervical cancer, which claim the lives of millions of women each year in the developing countries. Cervical cancer is the third most commonly diagnosed cancer and the fourth leading cause of cancer death in females worldwide, an estimated 529,000 incident cases and 275,000 deaths among women are due to cervical cancer with over 85% of this burden occurring in developing countries (Jemal et al., 2011).

Recent studies have shown that a virus, the Human Papillomavirus (HPV), is the etiologic factor of this disease (Longworth & Laimins, 2004). The isolation of the human papillomavirus in precancerous and cancerous lesions of the cervix was a significant milestone in the care of cervical cancer and lead to the establishment of efficient screening and treatment modalities. Due to these screening methods the cervical cancer incidence and mortality has declined by 80% in the developed world (Läärä, Day, & Hakama, 1987). A good illustration of this drastic decline can be seen in the United

States of America where cervical cancer incidence has been reduced from 14.2 per 100,000 to 2.4 per 100,000 since 1974 (Jacques Ferlay et al., 2010). However despite the availability of these technological improvements in the developed countries, the developing countries have yet to benefit from them. At this time there is no scientific evidence that suggests that any population defined by race or ethnicity is more susceptible than another to cervical cancer, once all confounding factors such as behaviors, access to screening, and timely follow-up of positive screening results are taken into account (Scarinci et al., 2010).

The difference in the burden of cervical cancer between poor and rich countries may be explained by various socio-demographic and cultural co-factors. Studies have shown that women at high risk for cervical cancer either do not have adequate access to appropriate screening and treatment methods or decide not to use these services for multiple reasons ranging from objective and measurable structural barriers (e.g., transportation) to subjective intrapersonal barriers (e.g., fear of results, mistrust of the healthcare system) (Scarinci et al., 2010).

Among these above mentioned factors, accessibility barriers to health services plays an important role in health inequities, and the effectiveness of any Public Health interventions depends significantly on the presence or absence of these barriers to care. Many people in the developing world don't benefit from the existing health services and the poor are usually less likely to receive the appropriate health care that their health conditions necessitate (O'Donnell, 2007). This situation can play a major role in the disproportionately high burden of cervical cancer in resource-poor countries. Indeed, it is important to recognize that there are two major determinants of cervical cancer incidence

and they are: Persistent carcinogenic HPV infection and lack of access to screening (Scarinci et al., 2010). Since 1999, international advocacy and resources have been dedicated to the control of cervical cancer in developing countries; however these cervical cancer screening programs based on the Papanicolaou test (Pap smear) have failed to be successful in these settings (Varughese & Richman, 2010). And the main reasons of this failure are believed to be embedded in the socio-demographic and economic factors that influence the quality and the accessibility of health services such as: well-trained cytologists and broad coverage of at-risk populations. The recognition of this failure has pushed decision makers to focus their attention on alternative approaches to screening that are believed to be more cost-effective than the traditional Papanicolaou test such as Visual Inspection with Acetic Acid (VIA) and Visual Inspection with Lugol's Iodine (VILI). However, despite the availability of these "new" alternative and cost-effective methods, the "old" socio-demographic barriers to health services will still exist in these poor-resource areas and addressing them will be crucial for the success of any program that aims at controlling cervical cancer (Varughese & Richman, 2010)

1.1. Cervical Cancer Burden in Haiti

Among the developing countries, Haiti seems to experience a major share of this health inequity, according to the International Agency of Research on Cancer (IARC), Haiti has the highest incidence rate of cervical cancer in the world at a rate of 87.3 per 100,000 women, and this rate is significantly high compared to the rate of North America which is 7.7 cases per 100,000. Its cervical cancer mortality rate is ranked third worldwide at of 48.1 per 100,000 women (D Max Parkin, Bray, J Ferlay, & Pisani, 2005). Cervical cancer

is the leading cause of cancer death among women and the Haitian population as a whole, accounting for 63.8% of all female cancer deaths (Parkin, Bray, Ferlay, & Pisani, 2005)

Cervical cancer burden in Haiti does not only affect women's health and their lives by reducing their productivity; it also has a negative impact on the Haitian society as a whole, because women represent important players in the economy of the country and the stability of a household.

The cause of this high rate in the incidence and in the mortality of cervical cancer is not well studied. Scientists believed that the presence and prevalence of certain factors that are known to be directly associated to cervical cancer may explain this high incidence rate, among them we can cite: The use of Oral contraceptives, high number of full-term pregnancies, smoking, diet deficiencies, young age at first sexual intercourse and high number of lifetime sexual partners (Muñoz et al., 2002d); (Moreno et al., 2002b); (Hildesheim, R Herrero, et al., 2001) .

Furthermore, Haiti is one of the poorest countries in the world and the poorest country in the western hemisphere, and this deep and widespread poverty is believed to be at the basis of many health inequities that exist in this country. Therefore, the socio-demographic factors that are well known to have an impact on the provision of health services such as lack of transportation, illiteracy, scarcity of skilled trained health providers, and cultural taboos are predominant in this Haiti and can be at the basis of the high incidence and mortality rates caused by to cervical cancer, or can hinder any intervention that aims at controlling this public health burden. In fact, studies have shown that several of the risk factors that are associated to cervical cancer are also correlated to

the demographic, socio-cultural and economic factors of a specific country (Arrossi, Sankaranarayanan, & Donald Maxwell Parkin, 2003).

Despite this alarming incidence rate of cervical cancer in Haiti the screening coverage in the country is practically inexistent. In a screening assessment that was made in the 1980s it was found that only five percent of women were screened for cervical cancer and it is believed that this rate has not changed since then (Mitacek, 1986). Several reasons that are part of the socio-demographic context of developing countries can explain this failed coverage (see table A).

Some Non Governmental Organizations (NGOs) are currently working in implementing strategies to control the incidence and death rates of cervical cancer in Haiti, but they are few and to date it exists no national cervical cancer prevention strategy in the country. In a survey that was conducted by JHPIEGO in January 2006 to assess the opinions of Haitian physicians regarding the attitudes of government authorities toward a national cervical cancer program, it was revealed that cervical cancer prevention was not a priority health issue within the Haitian Ministry of Public Health and Population (MSPP) (Scheening, 2006).

1.2.Statement of the Problem

Compared to other gynecologic cancers, cervical cancer offers great opportunity for Public Health interventions: First it has a long pre-invasive phase; second, precancerous lesions can be detected and removed from the cervix through appropriate screening and treatment methods; and finally, a new vaccine is now available that can protect against the two most prevalent high risk HPVs. However these interventions may be difficult to implement in Haiti and will most likely take some time before they

produce significant results due to the scarcity of resources and also due to the presence of socio-cultural and economic factors that may represent serious challenges to the success of any programs that will be directed to this public health issue.

Primary Prevention Challenges:

If we consider primary prevention strategies, implementing a national vaccine campaign to reach girls aged 9 to 13 may be a hardship for the stakeholders due to numerous challenges: This vaccine must be administered in several doses and a substantial proportion of girls must be reached in order to obtain a significant reduction in the burden of cervical cancer. With the ongoing political unrest in the country, loss of follow-up can become a huge issue in this regard. In addition the cost of the vaccine must be taken into account for cost-effectiveness purposes.

Secondary Prevention Challenges:

The implementation of screening methods must be administered by skilled health care providers and must be accessible and accepted by the target population. Therefore, on the basis of these potential challenges identifying and understanding the presence and the distribution of specific socio-demographic and economic factors among Haitian women that might increase their vulnerability by hindering their access to health services may be helpful for people interested at controlling this public health issue, and may at the same time help to identify appropriate ways and better logistic means to administer the available screening and treatment options.

For this thesis the emphasis will be put mostly on the variables that may have an impact on the access to health care. Haitian women aged 30 and more (age where women are believed to be at higher risk for cervical cancer) are expected to have more socio-

demographic and economic factors that might increase their vulnerability to cervical cancer in addition to the co-risk factors that are known to be directly associated to cervical cancer.

1.3. Purpose of This Study:

Cervical cancer is not well studied in Haiti despite its very high incidence and mortality rates, but efforts are being made to launch more cost-effective screening tests throughout the country. The purpose of this study is, therefore, to assess the vulnerability of Haitian women aged 30 years and more to cervical cancer by studying the distribution of demographic and socioeconomic factors that are known to have an impact in the utilization of health services. First, a brief overview of the cervical cancer burden in developed and developing countries will be made. Second, an overview of the socio-demographic and economic barriers to access to health services by women in developing countries will be presented. Third the pathogenesis of cervical cancer and its co-risk factors will be discussed. Fourth the study will examine the distribution of selected socio-demographic predictors of health services accessibility among high risk and low risk group of Haitian women aged 30 and more. And finally, based on the findings of this study, specific recommendations will be made

1.4. Research Question:

The interest is to determine whether or not socio demographic predictors of access to health services are also associated to co-risk factors of cervical cancer. The following questions will be addressed:

Main question: Are known socio-demographic predictors of access to health services associated with risk factors for cervical cancer? In other words, are Haitian women who are at high risk of cervical cancer are also at high risk for not seeking health services, provided that these services are available?

- Are Haitian women who are at higher risk to cervical cancer more likely to be uneducated?
- Are Haitian women who are at higher risk to cervical cancer more likely to live in rural areas where access to health services is known to be a major issue?
- Are Haitian women to cervical who are at higher risk to cervical cancer more likely to have economic and geographic barriers to health services?
- Are Haitian women who are at higher risk to cervical cancer more likely to be from lower socioeconomic status?

1.5. Hypothesis:

Hypothesis #1: There will be an association between levels of education and risk factors for cervical cancer.

Hypothesis # 2: There will be an association between wealth status and risk factors for cervical cancer

Hypothesis # 3: There will be an association between economic barriers to care access and risk factors for cervical cancer

Hypothesis# 4: There will be an association between the type of residence with risk factors for cervical cancer.

Hypothesis # 5: There will an association between distance to health care and risk factors for cervical cancer

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CHAPTER II – Review of the Literature

2.1. Cervical Cancer Inequity in Developing Countries

According to the World Health Organization (WHO), cancer is a major cause of death and morbidity in developed countries and the second leading cause of death in low and middle income countries (WHO, 2008). It is also estimated that a substantial proportion of new cases of cancer and about 70% of global cancer cases occur in poor resources settings (Varughese & Richman, 2010). The International Agency for Research on Cancer (IARC), which is a branch of the WHO, predicts that by 2020, the incidence of cancer is expected to rise significantly worldwide with an estimate of 16 million new cases of cancer per year, with cancer surpassing other chronic diseases, such as heart disease, to become the world's leading killer (Varughese & Richman, 2010). This increase will disproportionately affect individuals living in developing and third world countries.

Women in developing countries are particularly touched by this health inequity, since they usually have limited access to screening and treatment due to discrimination and other cultural and behavioral practices (Varughese & Richman, 2010). Cervical cancer is the third most frequently diagnosed cancer and the fourth leading cause of cancer death among women worldwide (Jemal et al., 2011). The impact of this cancer on women in terms of number of years of life lost in low and middle income countries is significant with a loss of 2.4 million years among those aged from 25 to 65, with countries of the Caribbean, Latin American and sub-Saharan Africa being among the most affected areas. Such growing health disparity between developed and less developed

countries is believed to be due to an array of entrenched and complex factors such as: historical background, lifestyles, genetics, environment, economics, politics and behavioral factors (Kanavos, 2006); (Lodge, 2010).

It is worth mentioning that the very low incidence rate of cervical cancer that is observed actually in developed countries is a new pattern. The incidence rate of this disease was similar to the incidence rate observed actually in poor resource countries, and this drastic reduction in this rate was due to the implementation of screening methods during the 1960s and 1970s (Gustafsson, Pontén, Bergström, & Adami, 1997). More recent technological advances have been almost exclusively available to developed countries and many developing countries have not yet benefited from them.

In addition to the unavailability of these screening methods in resource-poor settings, this discrepancy between developed and less developed countries is also believed to be the result of a combination of social factors, economic factors and cultural factors. Indeed, social factors such as sexual behaviors, reproductive factors, literacy, nutritious food, clean water and sanitation can act in synergistic ways with other factors (cultural and economics) to determine the life expectancy of a particular population (Varughese & Richman, 2010).

Cervical cancer shows also higher prevalence and more advanced stage at diagnosis in developing countries than in the developed world. This pattern is also believed to be due to low literacy level, cultural and religious factors, competing health needs, poorly developed health care services, limited information on cancer prevention

lack of infrastructure and provision of treatment at distant health centers which may requires the patient to travel repeatedly or for extend periods of time (Varughese & Richman, 2010). Besides the above mentioned factors, other behavioral factors may explain this difference; for example, studies that have been conducted during the early phase of the global HIV/AIDS epidemic have shown that economically disadvantaged women have the tendency to pay less attention to their symptoms and to rarely use preventive care, seeking care only if they feel sick.

Due to its early detection, its long preinvasive phase and most important, the availability of efficient screening and treatment methods, cervical cancer offers great potential for prevention and understanding the distribution of these indirect factors that may have an impact on the accessibility of these interventions will be crucial for the success of these interventions.

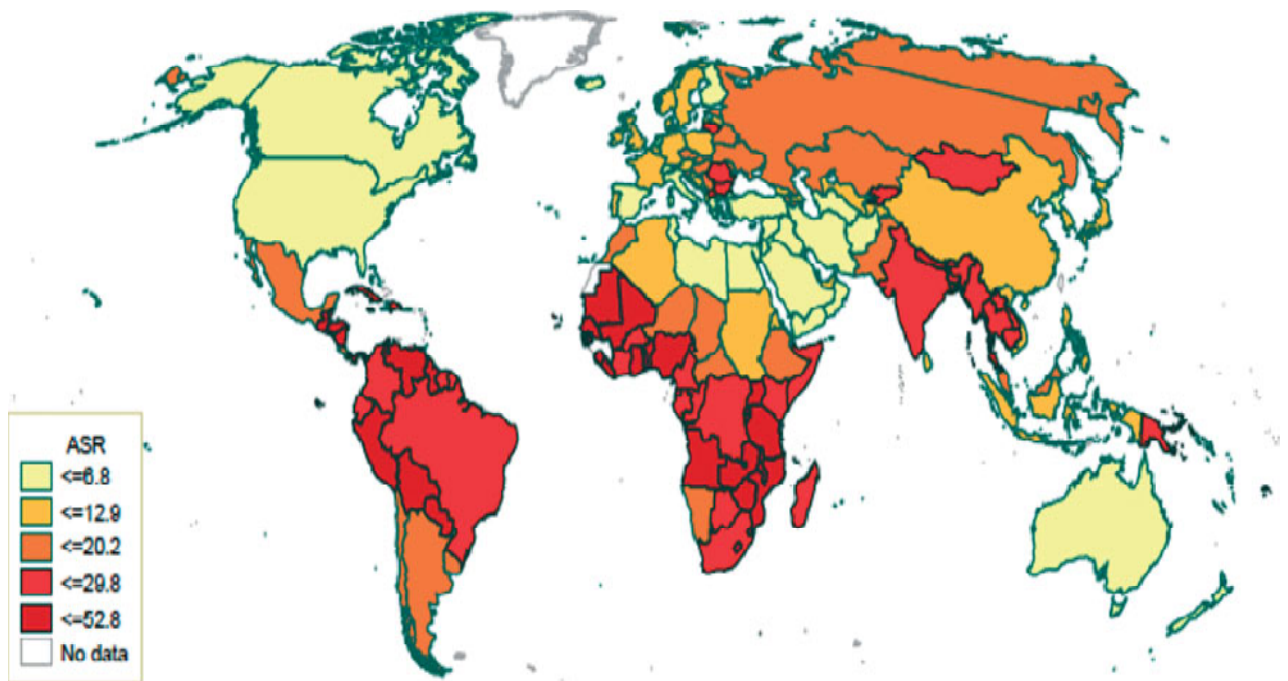


Fig.1: World age-standardized incidence rates of cervical cancer by region .Numbers indicate cases per 100,000 women. Data are from the International Agency for Research on Cancer, GLOBOCAN 2008. **Abbreviations:** ASR, age-standardizedrate

2.2. Socio-demographic predictors of care access in developing countries

The problems linked to the accessibility of care in the developing world are well documented. Studies showed that people fail to seek the health care from which they could benefit greatly (O'Donnell, 2007). In the developing world, the poor people are even less likely to receive the health services that their case necessitates, and yet they are more likely to be sick than the people who can afford these health services (O'Donnell, 2007).

Definition

Access to health services literally means geographic availability, however many studies have defined it into four dimensions: Availability, accessibility, affordability and acceptability (O'Donnell). For this paper only factors that may have an impact on the accessibility and affordability aspects will be considered.

Issues related to accessibility to health care are responsible for an underutilization of effective health care. In a study it was found that a raise of the coverage rates of maternal health interventions to 99% would reduce maternal deaths by three-fourths (World Bank, 2004). Several barriers may prevent women from having access to health care; they can be institutional, educational, economic and cultural.

Institutional barriers to care

Institutional barriers to health care refer to doctor/patient ratio, spatial accessibility, technological interventions, and gender bias issue (Arrossi et al., 2003). In developing countries due to mobility limitations spatial accessibility of health care can be an important issue. Motorized transportation is still a luxury in developing countries and many patients must walk hours before reaching a health center (Ojanuga, 1992). In a study it was shown that per capita utilization falls rapidly with distance from a facility (Stock, 1983). In another study made in Nepal, there was an inverse relationship between contraceptive use and travel time to facility (Tuladhar, 1987). In the case of cervical

cancer, research found that inaccessibility of screening services was a major contributor to poor attendance (Doyle, 1991)

Educational barriers

Educational barriers are another issue in preventing women from getting the care that they need. For example studies have shown that more than any other factors, education have a great influence in health related activities such as family planning. Educated women are more likely to know about and to use contraceptives than their less educated counterparts (Cochrane, 1979). In developing countries educational bias is really pronounced between men and women and the common element among countries with such discrepancies is poverty (Momsen, 1987). Numerous studies showed that lower level of education was associated with a decreased likelihood of cervical cancer screening (Ackerson, 2007). For example in a study conducted by Boyer et al it was found that, in the US, women in the minority groups especially African American and Hispanic women, were not as likely to obtain Pap smear testing when compared to women with more than a high school education (Boyer et al, 2001). In the United Kingdom, it was noticed that the screening coverage for cervical cancer has failed to reach Somalian women who have immigrated there, and research showed that lack of knowledge about cervical screening was the most significant barrier to cervical cancer screening among these women (Abdullahi et al, 2009).

Economic barriers to care

The position of women in certain economic sectors can drive their decision to access health care delivery. Average earnings are much less for women in developing countries which may contribute to poor health outcomes and inaccessibility to health care services, and usually women have no control on the household income in developing countries (Ojanuga, 1992). Studies made in the US to identify factors that prevented African American and Hispanic women from being regularly screened for cervical cancer showed that income and cost were cited by these women as major barriers to get screened for cervical cancer, for example, it was found that the lower the income, the less likely a woman would obtain a pap smear test (Boyer et al, 2001; Jenning-Dozier Y& Lawrence, 2000). In the literature, among the economic factors that were cited as barriers to being screened, out-of-pocket expenses were found to have a negative impact on Pap smear testing, for example, women that had to make out-of-pocket expenses to get screened were less likely to obtain Pap smears (Coronado et al., 2004).

2.3. Pathogenesis and Epidemiology of Cervical Cancer

2.3.1. Human Papillomavirus (HPV)

Cervical cancer has been shown to be strongly associated with infection by the oncogenic types of Human Papillomavirus Virus (HPV) infection. Human papillomaviruses are small double-stranded DNA viruses that infect squamous epithelia.

More than 100 types of HPV have been identified, of them, one-third of which infect the genital tract. Genital HPV infections are subdivided into high risk and low risk types (Longworth & Laimins, 2004). The low risk types are the etiologic agents of genital warts and other hyperproliferative lesions; the high risk types or the oncogenic types are strongly associated with cervical cancer; they include HPV types 16, 18, 31, 33 and 45 (Longworth & Laimins, 2004). The genotype 16 is found in 50 to 70% of cases while the 18 is found in 7 to 20% of cases, these two genotypes are the most common oncogenic types and are believed to cause approximately 70% of all cancers worldwide (Castellsagué, 2008) (Muñoz, Castellsagué, de González, & Gissmann, 2006c). The next most common HPVs worldwide are HPV 33, 45 and 31, except in Asia where HPV type 58, 33 and 52 are the next most prevalent types. However, this prevalence is believed to be underestimated.

2.3.2. Worldwide prevalence of HPV:

Human Papillomavirus infection is a sexually transmitted disease which is highly transmissible and it can be transmitted to both men and women. Studies have proven that most women in the world are infected with genital HPVs. In a cross-sectional study of HPV DNA prevalence conducted in 13 countries it was found that an estimated 6.6% of women with normal cytology aged 15 to 74 were carriers of HPV DNA, making HPV the second most common known sexually transmitted agent worldwide (de Sanjosé et al., 2007e).

However, not all of the women infected with HPV will develop cervical cancer. It is worth noting that at a young age the majority of women who contract the virus become negative within two years, but a small fraction of women (10-20%), mostly older women (30 years and older) will have a persistent infection with the oncogenic HPV types and will be at greatest risk for developing cervical cancer (Castellsagué, 2008). In fact, the inability to shake-off the infection by this virus is strongly associated with the progression to cervical cancer. The prevalence of Human papillomavirus infection among women follows a common pattern worldwide. According to the findings of a meta-analysis in which 78 studies were reviewed, it was estimated that the prevalence of HPV was highest in young women aged 18 to 35. This peak was followed by a decrease of the prevalence in women in their menopausal period (de Sanjosé et al., 2007e). A second peak of HPV was also noticed in women aged 45 or older in Africa, Americas and Europe (de Sanjosé et al., 2007e). The cause of this second peak is not well understood and is believed to be probably due to the association of other factors that may be hormonal or behavioral.

2.3.3. Pathogenesis of Cervical Cancer:

Cervical cancer pathogenesis has four stages: 1) HPV acquisition, 2) HPV persistence (vs clearance), 3) progression of a persisting infection to cervical pre-cancer and 4) invasion (Wright & Mark Schiffman, 2003). In order for HPV infection to take place, micro abrasion of the genital epithelium is required; this leads to the exposition of the basal membrane to which HPV initially binds through a specific receptor. After

binding to the exposed basal membrane it enters the keratinocyte as this latter re-epithelializes the small wound (Roberts, Buck, Thompson, et al., 2007). Once in the cell, HPV changes the cell's normal behavior and immortalizes it. In in-vitro models using mice the infected keratinocyte cell lines do not immediately form invasive tumors, instead they form cysts lined with epithelium histologically comparable to CIN3; in order for this transformation to occur additional insults are required (P. P. Smith, Bryant, Kaur, & McDougall, 1989). The time sequence in these in-vitro models mimics the actual in vivo events, because the evolution of an HPV infection into cervical cancer may take up to 10 to 20 years and necessitates the participation of other factors.

2.3.4. Risk Factors of Cervical Cancer:

It is now well documented that persistent infection with oncogenic human papillomavirus virus (HPV) is a necessary but not a sufficient cause of cervical cancer (Castellsagué & Muñoz, 2003a). Several other factors, exogenous or endogenous, may increase the vulnerability of a woman to the oncogenic types of HPV. These co-factors in conjunction with the oncogenic types of HPV might influence the risk of progression from cervical HPV infection to cervical cancer (Castellsagué & Muñoz, 2003a).

A._ Sexual and Reproductive Behaviors as Co-risk factors for Cervical Cancer

Behavioral determinants of HPV:

Numerous studies have shown that cervical cancer is predominantly transmitted through sexual intercourse. These studies have always been consistent in showing that the key determinants of HPV infection among women are the number of sexual partners, young age at first sexual intercourse and the likelihood that at least one of her sexual partners was an HPV carrier as measured by his sexual traits (Kjaer et al., 2001).

In a longitudinal study conducted with a cohort of 100 virgins and 105 monogamous women, it was showed that all women who were not engaged during the follow-up were consistently negative for both HPV DNA and HPV 16 serum antibodies and only a few virgins who initiated sexual activity became positive for HPV DNA (Kjaer et al., 2001). Moreover, it was found in this study that the most significant determinant of HPV infection was the number of sexual partners the woman had had during the course of this study (Kjaer et al., 2001).

In a study conducted by Drain et al to define the associations between country-specific cervical cancer (CC) rates and predominant religions, sexual behaviors, public health measures, economic indicators and development and demographic characteristics, it was found that: “many sexual and reproductive behaviors, including higher total fertility and early female age at birth of first child, were significantly associated with

increased CC rates, teenage birth rate and females with nonregular sex partners were positively associated with higher incidence. In this same study it was revealed that contraception measures were positively associated with CC rates but these measures were not statistically significant. Another important finding of this study was that countries with higher CC rates had higher percentages of males with nonregular sex partners and a younger female age at first marriage (Drain, Holmes, Hughes, & Koutsky, 2002)

Role of Parity in HPV carcinogenesis:

In many case-control studies conducted to evaluate the role of parity in the progression of (Arrossi et al., 2003)pre-malignant cervical lesions showed a positive association between the number of pregnancies and cervical cancer (Castellsagué & Muñoz, 2003a). According to the results of the IARC-pooled analysis, studies restricted to HPV positive women, showed that women with seven or more full-term pregnancies have a fourfold higher risk to develop cervical cancer compare to those who were nulliparous, and this risk increases linearly with an increasing number of full-term pregnancies (Muñoz et al., 2002d). Again the mechanisms by which parity influences the risk to cervical cancer are not well understood; nutritional, hormonal, traumatic, and immunologic factors have been suspected as plausible explanations.

Oral Contraceptives:

Findings about the potential role of Oral Contraceptives (OC) in the progression of HPV infection into cervical cancer are inconsistent when they adjusted for HPV status. The large pooled analysis of International Agency for Research on Cancer (IARC)

studies showed the strongest evidence for the role of OC in HPV carcinogenesis. It was found that ever use of OC was associated with cancer risk (OR=1.4) and that there was a strong dose-response relationship with increasing years of use (Castellsagué & Muñoz, 2003a). The risk of OC use for longer than 5 years was strongly associated with cervical neoplasia (OR=3.4; 95% CI=2.1 to 5.5) and the use of OC for longer than 5 years was associated with an increase of fourfold of the risk of cervical cancer (OR=3.4; 95% CI=2.1 to 5.5) (Castellsagué & Muñoz, 2003a)

B. Other Co-factors:

Tobacco Smoking in HPV Carcinogenesis

The role of smoking in HPV carcinogenesis has been well studied and documented. Even after controlling for the strong effects of HPV, a moderate and statistically significant association with cervical cancer has been found in many case-control studies. The ORs for ever smoking among HPV-positive women are in the range of 2 to 5. (Castellsagué & Muñoz, 2003a).

Sexually Transmitted Infections:

Studies have shown that coinfection with other sexually transmitted organisms such as *C. Trachomatis*, HIV and Herpes Simplex Virus (HSV) may increase the virulence of HPV. The IARC pooled analysis showed that among HPV-DNA positive women, HSV-2 seropositivity was associated with an increased risk of both squamous cervical cancer (OR=2.0; 95% CI: 1.3-3.0) and adeno or adeno-squamous carcinoma (OR=2.6; 95% CI: 1.3-3.0) (Smith et al; in press). Among the sexually transmitted infections, HIV infection

seems to increase the risk of having cervical Squamous Intraepithelial Lesions (SIL). HIV-positive women had a greater risk of having SIL than their HIV-negative counterparts and the association appears to be positively correlated to CD4+ T-lymphocyte count (Castellsagué, Bosch, & Muñoz, 2002).

2.3.5. Prevention and Treatment strategies for Cervical Cancer

Several screening methods to detect HPV and treatment options to treat women with precancerous or cancerous lesions exist. Cervical cytology also known as Pap-smear is the traditional screening method. It requires three visits before treatment is administered (cytology, colposcopy and treatment) and in order for each step to be realized numerous requirements must be met such as trained providers, reliable transportation of specimens, high quality laboratories and a good quality control system (Wakabi, 2008). All these requirements make this screening method difficult to implement in resource-poor countries.

The other alternative screening methods are Visual Inspection with Acetic Acid (VIA) where you place diluted acetic acid on the cervix in order to detect precancerous lesions, and Human Papillomavirus DNA Testing that identifies the presence of the virus through cervical epithelial cells. These last two methods are considered to be more cost-effective than the traditional Pap test in resource-poor settings (Varughese & Richman, 2010).

A vaccine that protects against HPV is now available, it has more than 90% efficacy for preventing cervical cancer. It offers protection, however, only against 2 types

of the high-risk HPV (16 and 18) and its cost makes it difficult to be used in resource-poor countries. When a woman is diagnosed with cervical cancer a number of treatment methods are available such as: cryotherapy, Loop Electrosurgical Excision Procedure (LEEP) and Cold Knife Cone and Hysterectomy, but all these methods require trained staff and proper equipment to be performed.

CHAPTER III – METHODS AND PROCEDURES

3.1. Data Source:

For this study, the data were obtained from the Measure Demographic and Health Survey (DHS). The Demographic Health Survey (DHS) is a project sponsored by the U.S. Agency for International Development (USAID). This project is recognized worldwide and it has earned its reputation for gathering and disseminating nationally representative data on demographic indicators, health and nutrition (DHS, 2007).

The Demographic and Health Surveys are nationally representative household surveys that provide data about 85 countries for a wide range of monitoring and impact evaluation indicators in diverse topics ranging from education level and specific socio-demographic factors, to women's empowerment factors.

The protocol for this study was reviewed and approved by the Georgia State University Institutional Review Board on April 2010. After approval, permission was requested to the DHS in order to download the data of the household surveys.

The survey used was the 2005-2006 standard survey DHS, phase V and the country of interest was Haiti. This survey was conducted by l'Institut Haitien de l'Enfance (IHE) with the assistance of the Haitian Ministry of Health (MOH)

3.2. Study Population

The datasets without identifiers were extracted from the SPSS files of the “Individual Recode” type of the Haitian DHS survey. This dataset consisted of a sample size of 10,757 women aged 15 to 49 years old.

3.3. Study Design and Measures

This is a cross-sectional study conducted to assess the distribution of socio-demographic and economic predictors among high-risk group women for cervical cancer. Pubmed was used to identify co-risk factors associated to cervical cancer. The following key words were used: Uterine cervical neoplasmas, risk factors. Socio- demographic factors and economic predictors to health services were also identified the key word that was used was: accessibility to health services, developing countries. Based on the findings of the literature review, the most relevant variables were selected and recoded. Since the DHS contains no information about cases of cervical cancer, a new dichotomous proxy variable was created in order to categorize these women into low risk and high risk group to cervical cancer.

A. Predictors Variables:

These were variables informing about the socio-demographic and economic characteristics of the women that might influence their decision to seek access to health services. They were selected based on the findings of the literature review. Five variables were selected and recoded (See table B).

Education: This variable was named “Education attainment” in the original dataset where it was coded into six categories: 0= “No education”, 1= “Incomplete primary” 2=

“Complete primary”, 3= “Incomplete secondary”, 4= “Complete secondary” and 5= “Higher education”

This new variable was recoded into two categories: 0= “No education”, 1= “Educated”.

Due to its small sample size the old category named “Higher education” (5) was combined to the categories: “Incomplete primary education” (2), “Complete primary” (3), “Incomplete secondary” (3) and “Complete secondary” (4). The last category, which in this case was “1”, was considered as the reference group in the univariate analysis.

Wealth: This variable was computed from the variable named “wealth index”. The “wealth index” variable was originally coded into five categories: 1= “Poorest”, 1= “Poorer”, 2= “Middle”, 3= “Richer”, 5= “Richest”. It was recoded into three categories: 0= “Poor”; 1= “Middle” and 2= “Rich”. The “Rich” group was used as the reference group in the univariate analysis.

Money: This is a new variable created from the variable that assessed whether or not money was a big problem for a woman in order to go to the health center. Women who gave “no” as an answer to this question were coded as “0” and women who answer “yes” as an answer were coded as “1”. The first group was used as the reference group in the univariate analysis.

Residence: This variable was computed from the variable named “Type of place residence” and it was recoded into two categories: 0= “Urban” and 1= “Rural”. The first

group which is the “Urban” group was used as the reference group in the univariate analysis.

Distance: This is a new variable that was created from the old variable that assessed if distance was a major problem preventing women from getting a medical advice or treatment. For simplicity purpose it was called “Distance” and was recoded into two categories: 0= “No problem” 1= “Big problem”. The first group was used as the reference group in the univariate analysis.

B. Dependent variable:

The dependent variable was a newly created variable that was called “Risk” it was created to assess whether or not Haitian women were at high or low risk to cervical cancer from three newly created variables (See table C):

- 1) First a new variable called “Young age at first sexual intercourse” was created. This new variable was created from the old variable called: “Age at first sexual intercourse”. Women, who had their first sexual intercourse when they were less than 20 years old, were considered at higher risk for cervical cancer than the women who had their sexual intercourse at an older age. It was recoded 1= “First sex before 20” and 0= “First sex after 20”.
- 2) The second new variable, called “Sex partners”, was created from the old variable called: “Total lifetime number of sexual partners”. Women who had more than 2 lifetime sex partners were considered at higher risk for cervical cancer than women who had no lifetime sex partners or 2 lifetime sexual partners were

considered at low risk. The new variable was therefore coded into 2 categories; 0= “Less or equal to two lifetime sex partners” and 1= “More than two lifetime sex partners”. The cutoff “two” was chosen because the mean number of lifetime sex partners of Haitian women was 2.04.

- 3) The third new variable, called: “Condom use”, was created from the old variable called: “Can woman ask partner to use condom?”, if the woman said “yes” for this question it was recoded as 0= “yes” and if she responds “no” to this question it was recoded as 1= “no”. A woman who is able to ask her partner to use condom can be considered less vulnerable to cervical cancer than a woman who feels that she is not empowered enough to ask this to her partner.

A new variable called “Risk” was computed and recoded into two categories: 0= “low risk to cervical cancer” and 1= “High risk to cervical cancer”. For a woman to be in the first category she had to score “0” for the three above mentioned variables and for a woman to be in the second category she has to score “1” for the three above mentioned categories. This new variable called “Risk” was used as the dependent variable. (See table C)

3.4. Statistical Methods:

The software Statistical Package for the Social Sciences (SPSS 18.0) PASW was used to run the analysis.

The analysis was conducted in two steps:

In the first step the distribution of the selected predictors among the high risk and low risk group of women aged 30 and more was assessed. This group of women was

selected because the findings of the literature showed that women aged 30 and more when infected with HPV are more likely to develop cervical cancer than younger women infected with HPV and this provided a sample size of 4306. Women who were less than 30 of age were excluded from the first group. The purpose of this first step was to study the association of the selected demographic predictors with the dependent variable. Descriptive statistics were performed to assess the distribution of the different socio-demographic predictors in the sample. To compute the degree of association between the dependent variable and the selected predictors, binary logistic regression was conducted. At first a univariate analysis was performed for each of the selected predictor variables to determine the association of each of them with the dependent variable. Finally a multivariate analysis that took into account the contribution of all the predictor variables of interest on the dependent variable was computed. For the univariate and multivariate analyses, the interpretation of the results obtained were provided in accordance to their p-values with a significance level ($\alpha=0.05$)

In the second step, the distribution of the number of sexual partners was assessed by age group (See table 4.1). For this step women of all ages were included in the analysis, which provided a sample size of 10,757 women aged 15 to 49. Women who are at higher risk for cervical cancer are older women and therefore these women will be more likely to have more sexual partners than their younger counterparts. Knowing that an increased number of sexual partners will increase the susceptibility to cervical cancer, and starting from the assumption that the number of lifetime sexual partners will increase with age, the vulnerability of Haitian women to cervical cancer was evaluated according to the increasing number of lifetime sexual partners against the selected predictors.

Therefore in order to assess this, three different definitions of risk group was created and binary logistic regression for the five socio-demographic and economic predictors that were selected was ran against these three definitions of high risk group:

- In the first definition of high risk to cervical cancer women who had more than one sexual partner were considered with the two other variables of our dependent variable held constant (lifetime sex partner>1) (See table D)
- In the second definition of the dependent variable women who had more than two sexual partners were considered and the two other variables that form the dependent variable were held constant (Lifetime sex partner>2) (See table D)
- And in the third definition, women who had more than three sexual partners were considered in the dependent variable and the rest of the two variables were held constant (Lifetime sex partner>3) (See table D).

Then, a univariate and multivariate analyses were computed, from this process two 5 by 3 tables that display the different Odds Ratios for each of the high risk definition were presented. The purpose of this analysis was to study the variation of the odds ratio as the number of lifetime sexual partners is increasing.

CHAPTER IV-RESULTS

4.1. Data Availability:

The main socio-demographic indicators used in this study were selected in the DHS based on the findings of the literature. Variables that were proved to be strongly associated to cervical cancer were reviewed and some were selected and recoded. Variables that were showed to be predictors to access to health services were also selected and recoded. The final indicators can be seen in Table B and Table C

4.2. Descriptives

1) *Dependent variable*

In the first step of the study, women aged 30 and more were studied, because studies showed that it is at this age that women are more vulnerable to develop cervical cancer. On a sample size of 10,757 women aged 15 to 49, 4,306 women were aged 30 and more (40%). These women were divided into two groups according to the presence of certain risk factors to cervical cancer. After computing the variable called “Risk” a frequency analysis was ran to see how many women were considered at low risk for cervical cancer and at high risk for cervical cancer. It was found that 93.9% of the women aged 30 and more had low risk sexual behavior for cervical cancer, and 6.1% were at high risk sexual behavior for cervical cancer (See table 1).

For the second step of this study, women of all age were considered in the descriptive statistics. When the “Risk” variable includes *women who had more than one lifetime sexual partner*: 713 (9.7%) women were from the high risk group and 6638 (58.6%) were in the low risk group (See table 4.2). When it includes *women who had more than two*

lifetime sexual partners, it was found that 321 (3.0%) women were in the high risk group and 7267 (70.9%) were in the low risk group (See table 4.2). When the “Risk” group includes *women who had more than three sexual partners*, it was found that 106 (1.3%) were in the high risk group and 98.7% were in the low risk group (See table 4.2).

2) *Education:*

The frequency distribution for the different categories of this variable was computed. It was found that 1952 women (45.3%) had no education, 2354 (54, 7%) were educated (See table 1).

3) *Wealth:*

The frequency distribution of the different categories showed that 1648 (42.2%) were in the “Poor” category, 784 (20.1%) were in the “Middle” category and 1471 (37.7%) were in the “Rich” category (See Table 1).

4) *Money:*

It was found that 3309 (84.8%) women responded that money represent a major constraint for them in order to access health care, whereas 594 (15.2%) responded that money was not a major problem that prevent them from getting medical help (see Table 1)

5) *Residence:*

The frequency distribution of the two categories of this variable was computed. It was found that 1649 patients (42.2%) were living in the urban areas and 2254 (57.8%) were living in the rural areas (See table 1)

6) *Distance:*

This variable was used to assess whether or not distance was a problem that prevent women from getting health services. It was recoded into two categories: 0= “Not a big problem” 1= “Big problem”. It was found that 1987 women (50.9 %) said that distance was not a problem to seek medical services, 1914 women (49.1%) said that distance was a big problem for them in getting medical help (See table 1)

4.3. Univariate analysis_Studying the effect of each predictor variable on the dependent variable

The results of the univariate analysis can be seen in table 2. For the second step of the study only women aged 30 and more were considered. Before performing the univariate analysis, a test of colinearity between education and wealth index was determined. The degree of correlation between education and wealth was low as indicated by Pearson correlation of 0.385 (p-value<0.001). Hence in this study these two variables were included together in the multivariate analyses.

1) *Education*

Binary logistic regression was computed in order to determine the degree of association of education on the dependent variable called “Risk” (which was used to categorize the women into high risk and low risk sexual behavior). It was found that women with no education were more likely to be in the high risk group compared to women who were educated. And this association was statistically significant

(OR=2.253; 95%CI=1.844-2.754) (See table 2), we therefore failed to reject our first hypothesis.

2) *Wealth:*

The association between “wealth” and the defined high risk behavior to cervical cancer were assessed and it was found that women in the “poor” category were more likely to be in the high risk group for cervical cancer compare to women in the “rich” category and this difference was statistically significant (OR=2.372; 95% CI=1.721-3.268). And also women in the “middle” category were more likely to be in the high risk group compared to women in the “rich” category (OR=1.531; 95% CI=1.020-2.298) (See table 2). Therefore this relationship was consistent to our hypothesis #2

2) *Money:*

The degree of association between the variable “money” and the high risk sexual behavior showed that women who said that money was a big problem were more likely to be part of the higher risk category (OR=1.566; 95% CI=1.025-2.392) (See table 2). This relationship was consistent to our hypothesis#3

3) *Residence:*

When binary logistic regression was computed to study the degree of association between the place of residence and high risk sexual behavior to cervical cancer, it was found that women living in rural area were more likely to be in the high risk group to cervical cancer and this was statistically significant. (OR=1.705; 95% CI=1.285-2.263) (See table 2). This relationship was consistent to our hypothesis # 4

4) *Distance:*

Binary logistic regression was computed to study the degree of association between “Distance” and high risk sexual behavior to cervical cancer. It was found that women who said that distance was a problem to seek medical help were more likely to be in the high risk group category compared to women who said that distance was not a problem to get medical help (OR=1.268; 95% CI=0.974-1.650), however this observation was not statistically significant p-value=0.077 (See table 2). Therefore, we fail to retain hypothesis #5

For the second step of the study, the distribution of the number of lifetime sexual partners by the age group was assessed. It was noticed that the number of sexual partners was increasing as women were getting older, in fact 275 (18.1%) of women aged less than 30 years old had four or more sexual partners and 541 (51.8%) of women aged 30 years and more had four or more sexual partners (Table 4.1).

In the second step, a univariate logistic regression was ran for the five different socio-demographic predictors against the three defined dependent variables. It was found that, for each predictor, as the number of lifetime sexual partners increases from more than one to more than two, the ORs slightly increase, for example, the three odds ratio for education level were: OR1=3.014 (p-value<0.001); OR2=3.574 (p-value<0.001); OR3=3.364 (p-value<0.0001) (see table 4.3.).

4.4. Multivariate Analysis

For the first step of the study where women aged 30 and more were considered, the multivariate analysis performed with the socio-demographic predictors that were significantly associated with the dependent variable, showed that after controlling for the other variables that were showed to be associated to the dependent variable, two predictors: education level and wealth status were still strongly associated to the high-risk group of women. Indeed, women who were not educated were more likely to be in the high risk group and this association was statistically significant (OR=1.991; p-value<0.000) and women who were poor were more likely to be in the high risk group and this association was statistically significant (OR=1.727; p-value<0.000) (See table 3).

For the second step of this study where all women were considered, the multivariate analysis was computed with the predictors that were significantly associated to the dependent variable in the univariate analysis. The same trend in the ORs observed in the univariate analysis was also seen with the multivariate analysis, the ORs slightly increased as the number of partners increase, for example, the ORs for education was for the first definition of the risk variable (women with more than one sexual partner) was: OR= 2.583, p-value<0.0001, for women with more than two sexual partners, the OR=3.028, p-value<0.0001; and for women with more than three sexual partners the OR=2.929, p-value<0.0001 (See table 4.4)

CHAPTER V-DISCUSSION AND CONCLUSION

The findings of this study showed that the five socio demographic and economic factors that were selected and were known to hinder women's access to health care were strongly associated to the three selected factors that put women at high risk for having to cervical cancer. For this thesis, the three main variables were used to assess the level of risk of a woman for contracting cervical cancer were: young age at first sexual intercourse, more than one lifetime sex partners and women who said that they were unable to ask their sex partners to use condom. Five predictors of access to care were considered: Level of education, Wealth index, economic barriers to care access, type of residence, and distance to health services were considered in the analysis.

In the first step of this study, the univariate analysis that was conducted showed that all the selected socio-demographic and economic predictors were found to be associated to the factors that increase the likelihood of a Haitian woman to have cervical cancer.

The findings revealed that education was strongly associated to the defined dependent variable suggesting that women who were in the high risk group were more likely to be uneducated compare to the other women who were in the low risk group. In the literature review it was found that education was an important determinant of access to health services, for example studies have showed that educated women have more knowledge on the use of contraceptives compared to their less educated counterparts (Cochrane, 1979). In the case of a disease like cervical cancer, awareness of the disease and knowledge of the benefits that can result from the screening methods and treatment strategies by Haitian women can be crucial in diminishing the incidence and the death rates of cervical cancer among them.

In the univariate analysis, women who were in the high risk group were more likely to be in the poor category. The literature review showed that economic factors weighted heavily on the decision of women to seek access to health services (O'Donnell, 2007). This observation is illustrated by previous studies conducted with the Demographic Health Surveys; it was found that on average women who were in the richest quintile were 5.2 times more likely to be supervised by a doctor, a nurse or midwife when they were giving birth than the poorest fifth of women (Gwatkin et al, 2003). Previous research showed that the lower the income, the less likely a woman would obtain a Pap smear test (Boyer et al., 2001).

The findings of this study also showed that having money in order to get medical help was a major problem for Haitian women who were in the high risk group for cervical cancer than for those who were in the low-risk group for cervical cancer. This observation can be of great importance, particularly in a country like Haiti where out-of-pocket expenses represent the principal mean of purchasing health services and yet the women who seemed to be at higher risk for cervical cancer were less likely to be able to afford the required health services provided that they are available.

The type of place of residence was also assessed in this study. It was found that Haitian women who were in the high risk group were more likely to live in rural areas where the availability and the accessibility of health services is a major issue in Haiti. This association was significant after computing the univariate analysis. In Haiti, the majority of hospitals or health centers are located in the metropolitan area with a few of them located in other urban areas, and any intervention that aims at reducing the incidence rates of cervical cancer among Haitian women and that is implemented in these

health centers may fail to reach the women who are at high risk for cervical cancer.

In the univariate analysis, although the association was weak and not significant, it was found that Haitian women in the high risk group were more likely to say that distance was a major problem for them to get access to health services compared to those who were part of the low risk group. The literature review showed that per capita utilization falls rapidly with distance from a health facility (Stock, 1983). Therefore, even if cost-effective strategies are available at the health facilities, the high-risk group may not benefit from them because of spatial availability.

In the second step of the study, it was found that as the number of sexual partners was increasing in the defined dependent variable, the association of the predictors to the dependent variable increases slightly, suggesting that the increasing number of partners with age was not a strong predictor of high vulnerability to cervical cancer and that the socio-demographic and economic predictors to accessibility to health services should be given greater attention in the control of cervical cancer in Haiti.

In the multivariate analysis that was computed it was found that after controlling for the other selected predictors, education and wealth status were still associated to the dependent variable defined, showing how strongly level of education and economic factors were associated to the high risk group. Findings in the literature review, showed that lack of education and economic factors can negatively impact the likelihood of a women of getting screened for cervical cancer (Boyer et al; 2001); (Coronado et al; 2004).

In summary, among the selected socio-demographic predictors to the accessibility to health services wealth status and education level were strongly associated to the high-

risk group category that was defined for this study in the univariate analysis as well in the multivariate analysis, illustrating the premise stating that the poor and uneducated people who are less likely to afford health services experience the bigger burden of diseases in a community.

5.1. Study limitations:

Limitations for this study included the use of secondary data. The data collected in Demographic Health surveys did not include data on chronic diseases such as cervical cancer, therefore variables in this study were arbitrarily selected based on the literature findings to create the dependent variable used to categorize women as pertaining to the high risk or low risk group. This dependent variable was restricted to three variables and this probably underestimates the proportion of women who are actually at high risk for cervical cancer.

For the socio-demographic variables used as predictors to access to health services, some important variables were not taken into account in this study, for example cultural or behavioral factors that drive woman's decision to seek medical care were not included in the analysis.

Furthermore, this is a cross-sectional study and it allows only the assessment of the association between the selected predictor variables and the dependent variable, no cause and effect relationships could be established based on the results.

5.2. Recommendations

The findings of this study showed that some important socio-demographic and economic factors that can prevent access to health services are also associated to the likelihood of being at risk for cervical cancer among Haitian women. Decision makers interested in controlling this public health issue must also take into consideration indirect factors that might prevent a woman from benefiting from the newly available cost-effective interventions against cervical cancer.

In the control of cervical cancer, an intervention to be successful should have a significant screening coverage and an adequate follow-up for abnormal tests and socio-demographic factors such as education, wealth status, type of place of residence and other factors may have an impact of these two crucial aspects

The finding of this study showed that poorer women were more likely to be in the high risk group to cervical cancer, therefore, any intervention that aims at reducing the mortality and the incidence rates of cervical cancer in Haiti should consider the fact that economic barriers to health services may annihilate any chance of reaching the women who are at high risk for cervical cancer. In a country like Haiti where a substantial number of people do not have health insurance and where almost all health related expenses made out of pockets, consideration in using the most cost-effective strategies must be made.

Furthermore, the availability of the screening and treatment strategies for cervical cancer does not guaranty that these services will be used if the woman is not aware of the benefits that she could gain in being screened for cervical cancer or in receiving a vaccine potential side effects. This is where education level comes into play. The study showed

that education level was associated to high risk group of women to cervical cancer; therefore interventions must find the appropriate approach that will be the most adaptable to the level of education of the most vulnerable group of women.

Finally, logistic considerations, such as spatial availability of health clinic where these services might be offered must also be taken into consideration. Several pilot projects that aimed at controlling cervical cancer in Haiti are mostly made in hospitals or health centers that are usually concentrated in urban areas and yet the most susceptible women to cervical cancer may live far from these urban areas.

5.3. Conclusion

In summary, the findings of this study showed that socio-demographic and economic factors, including education, weight, money, residence and distance are strongly associated with higher risk to cervical cancer among women from Haiti. Therefore, any intervention aimed at preventing cervical cancer in Haiti should also take into account these indirect factors that might hinder women's access to health services. Appropriate government policies to improve education, wealth, and health care services to rural residence may help to curb the high prevalence of cervical cancer and its associated risk factors in Haiti.

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LIST OF TABLES

Table A: Common Challenges to Cancer Therapy in the Developing World.

Common Challenges to Cancer Therapy in the Developing World
<ul style="list-style-type: none">• Asymptomatic conditions receive little attention in day-to-day struggles
<ul style="list-style-type: none">• Competition with infectious diseases and other health needs for limited resources
<ul style="list-style-type: none">• Educational, religious, and economic barriers
<ul style="list-style-type: none">• Under-reporting in the absence of standardized central registry
<ul style="list-style-type: none">• Infrastructure must be available for transportation of samples (sometimes from remote areas) to high-quality laboratories for processing and interpretation
<ul style="list-style-type: none">• Shortage of diagnosis and treatment centers often requires women with positive screening tests to undergo biopsies and treatment at distant health centers, which require the patient to travel repeatedly or for extended periods of time
<ul style="list-style-type: none">• Lack of computerized database to facilitate the follow-up of incident cases

Source: Varughese, J., & Richman, S. (2010). Cancer care inequity for women in resource-poor countries. *Reviews in Obstetrics and Gynecology*, 3(3), 122-132

Table B: List of the selected socio-demographic predictors to care access

VARIABLE	CODING	TYPE
Education	No education=0 Educated=1	Dichotomous
Wealth index	Poor=0 Middle=1 Rich=2	Categorical
Is money a problem for you to get medical help?	0=No Yes=1	Dichotomous
Type of place of residence	Urban=0 Rural=1	Dichotomous
Is distance a problem for you to get medical help?	0=no Yes=1	Dichotomous

LIST OF TABLES (CON'T)

Table C: List of the variables used to create the dependent variable called “Risk”

Variable	Description	Coding	Type
Sex	Young age at first sexual intercourse	First sex before 20 years old=1 First sex after 20=0	Categorical
Sexpartners	Number of lifetime sexual partners	Less or 2=0 More than 2=1	Dichotomous
Condomuse	Can the woman ask her partner(s) to use condom?	Yes=0 No=1	Dichotomous

Table D: List of the three defined dependent variables

Risk 1	Number of lifetime sexual partners >1	Can the woman ask her partner(s) to use condom=1	Young age at first sexual partners=1
Risk 2	Number of lifetime sexual partners >2	Can the woman ask her partner(s) to use condom=1	Young age at first sexual partners=1
Risk 3	Number of lifetime sexual partners >3	Can the woman ask her partner(s) to use condom=1	Young age at first sexual partners=1

Table 1: Descriptive statistics of the socio-demographic predictors of care access and the dependent variable

Variables		Frequency	Percent	Missing
Dependent variable	Low risk for cervical cancer	3665	93.9%	589 (13.7%)
	High risk for cervical cancer	238	6.1%	
	Total	3903	90.6%	
Predictors variables				
Education	No education	1952	45.3	0
	Educated	2354	54.7	
	Total	4306	100	
Wealth Index (recoded)	Poor	1648	42.2	403 (9.4%)
	Middle	784	20.1	
	Rich	1471	37.7	
	Total	3903	100	
Is money a problem for getting medical help?	Yes	3309	84.8%	403 (9.4%)
	No	594	15.2%	
	Total	3903	100.0	
Type of residence	Urban	2254	57.8%	
	Rural	1649	42.2%	
	Total	3903	100.0	

Table 1: Descriptive statistics of the socio-demographic predictors of care access and the dependent variable (Con't)

Predictors to access to health services		Frequency	Percent	Missing
Is distance a problem for getting medical help?	Yes	1914	49.1%	405(9.4%)
	No	1987	50.9%	
	Total	3901	100	

Table 2: Univariate analysis of the socio-demographic predictors of care access in women with high risk of contracting cervical cancer (women aged 30 and more)

Variables	Odds ratio	95% CI	P-value
Education			
No education	2.447*	1.855-3.227	<0.0001
Educated(Ref.)			
Wealth			
Poor	2.372**	(1.721-3.268)	<0.0001
Middle	1.531*	(1.020-2.298)	0.040
Rich (Ref.)			
Money a problem to get medical help?			
Yes	1.566 *	(1.025-2.392)	0.038
No (reference)			
Residence			
Rural	1.705**	(1.285-2.263)	<0.0001
Urban (Reference)			
Distance a problem to get medical help?			
Yes	1.268	(0.974-1.650)	0.077
No(Reference)			

p < 0.05 level (1-tailed). ** p < 0.01 level (1-tailed).

Table 3: Multivariate analysis of the association between the selected socio-demographic predictors of care access in women with high risk of contracting cervical cancer.

Variables		Odds ratio	95% CI	P-value
Education	No education	1.991**	1.454-2.726	<0.0001
	Educated			
Wealth				
	Poor	1.727*	1.060-2.815	0.028
	Middle	1.263	0.795-2.008	0.323
	Rich(ref.)			
Money a problem to get medical help?				
	Yes	1.059	0.677-1.655	0.803
	No (reference)			
Residence				
	Rural	0.913	0.608-1.371	0.662
	Urban (Reference)			

p < 0.05 level (1-tailed). ** p < 0.01 level (1-tailed)

Second step of the analysis:

Table 4.1: Distribution of lifetime sex partners by age groups for women of all age

Age 5 yrs group	1		2		3		4	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
15-19	661	63.1%	273	26.1%	77	7.4%	36	3.4%
20-24	804	49.3%	537	32.9%	201	12.3%	90	5.5%
25-29	686	42.4%	522	32.3%	261	16.1%	149	9.2%
30-34	466	38.9%	364	30.4%	233	19.4%	135	11.3%
35-39	468	41.3%	314	27.7	216	19.1%	135	11.9%
40-44	390	41.1%	241	25.5%	171	18.0%	147	15.5%
45-49	400	42.3%	229	24.2%	193	20.4%	124	13.1%

Table 4.2: Frequency distribution of the three defined dependent variables.

	Dependent variable	Frequency	Percentage	Missing
More than one lifetime sexual partners	High risk group for cervical ca	713	9.7%	3406 (31.7%)
	Low risk group for cervical ca	6638	58.6%	
	Total	7351	68.3%	
More than two lifetime sexual partners	High risk group for cervical ca	321	3.0%	2809 (26.1%)
	Low risk group for cervical ca	7627	70.9%	
	Total	7948	73.9%	
More than three lifetime sexual partners	High risk group for cervical ca	106	1.3%	2452 (22.8%)
	High risk group for cervical ca	8199	98.7%	

Table 4.3: Univariate analysis showing the association between socio-demographic predictors of care access and number of sex partners for women of all age.

Variables	Odds ratio (1)ⁱ	Odds ratio (2)ⁱ	Odds ratio (3)ⁱ
Education			
No education	3.014 (0.000)**	3.574**(0.000)	3.364**(0.000)
Educated (reference)			
Wealth			
Poor	2.247** (0.000)	2.467**(0.000)	2.340**(0.000)
Middle	1.333* (0.014)	1.348 (0.088)	1.859* (0.027)
Rich			
Money a problem to get medical help?			
Yes	1.666**(0.000)	1.938**(0.000)	1.718 (0.069)
No (reference)			
Residence			
Rural	1.795**(0.000)	1.8880**(0.000)	1.712**(0.009)
Urban (Reference)			
Distance a problem to get medical help?			
Yes	1.294**(0.001)	1.490**(0.001)	1.760**(0.004)
No(Reference)			

p < 0.05 level (1-tailed). ** p < 0.01 level (1-tailed)

ⁱ: OR1= In the dependent variable women with more than one sexual partners were considered

OR2= In the dependent variable women with more than two sexual partners were considered

OR3= In the dependent variable women with more than three sexual partners were considered.

Table 4.4: Multivariate analysis showing the association between socio-demographic predictors of care access and number of sex partners for women of all age

Variables	Odds ratio (1)ⁱ	Odds ratio (2)ⁱ	Odds ratio (3)ⁱ
Education			
No education	2.583*(0.000)	3.028*(0.000)	2.929* (0.000)
Educated (Ref.)			
Wealth			
Poor	1.339*(0.038)	1.367 (0.128)	1.335 (0.406)
Middle	0.998 (0.991)	0.975 (0.897)	1.406 (0.278)
Rich (Ref)			
Money a problem to get medical help?			
Yes	1.211 (0.123)	1.316 (0.153)	-----
No (reference)			
Residence			
Rural	1.103(0.423)	1.015 (0.932)	0.899 (0.716)
Urban (Reference)			
Distance a problem to get medical help?			
Yes	0.907 (0.270)	1.013 (0.921)	1.366 (0.149)
No(Reference)			

p < 0.05 level (1-tailed). ** p < 0.01 level (1-tailed)

ⁱ: OR1= In the dependent variable women with more than one sexual partners were considered

OR2= In the dependent variable women with more than two sexual partners were considered

OR3= In the dependent variable women with more than three sexual partners were considered.