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Ethnic Disparities in the Reproductive and Sexual Health Screening Practices of Ecuadorian Women

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ETHNIC DISPARITIES IN THE REPRODUCTIVE AND SEXUAL HEALTH-SCREENING
PRACTICES OF ECUADORIAN WOMEN

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Ruth Castillo

2015

ETHNIC DISPARITIES IN THE REPRODUCTIVE AND SEXUAL HEALTH-SCREENING
PRACTICES OF ECUADORIAN WOMEN

by

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Abstract

Background: Evidence suggests that reproductive and other health disparities disproportionately affect Indigenous and Afro-Hispanic ethnic minority groups throughout the Latin American and Caribbean (LAC) region. Factors associated with reproductive health disparities in LAC countries include low social economic status (SES), poor health care access, racial and gender discrimination, machismo, health beliefs and low perceived risk for breast cancer, cervical cancer, sexual transmitted infections (STIs) and other conditions. Preventive measures such as health education and early screening is vital for disease prevention and detection. However, screening rates for breast cancer, cervical cancer, and STIs are lower in most LAC countries compared to the United States (USA), Canada, and other high-income countries. Likewise, the low prevalence of modern contraceptive use (e.g., condom, intrauterine device (IUD), contraceptive pills, Norplant, etc.) is another important public health challenge facing many LAC countries. Ecuador is a middle-income Andean country that displays high rates of fertility and reproductive cancers as well an increasing population burden of human immunodeficiency virus (HIV) and other STIs. The country also has one of the largest ethnic minority populations in the LAC region. Persons of indigenous and African descent constitute an estimated 7-25% and 3-10% of the population of 14 million inhabitants. Ethnic disparities in poverty-linked indicators and some chronic and infectious health outcomes have been reported for indigenous and Afro-Ecuadorian groups but little is known those related to reproductive health. A better understanding of reproductive health disparities and the factors that influence them including health-seeking is useful for improving programs and policies that serve ethnic minority groups in Ecuador. **Aims:** This study aimed to compare ethnic differences in reported sexual and reproductive health knowledge and practices including health-seeking of reproductive-aged Ecuadorian women. The

main objectives were to describe the prevalence of reproductive and sexual health screening behaviors among reproductive-aged Ecuadorian women with respect to cervical cancer, breast cancer, contraception use and sexually transmitted infections and to identify ethnic differences in knowledge and screening practices prevalence of contraceptive use, breast cancer, cervical cancer, HIV and STIs among the three major Ecuadorian ethnic groups. **Methods:** The ENDEMAIN 2004 national survey was carried out by the *Centro de Estudios de Poblacion y Desarrollo Social* (CEPAR) with technical assistance from the U.S. Centers for Disease Control and Prevention (CDC). The nationally-representative survey used a multistage clustering design. One reproductive aged woman (15-49 years) per household selected from 10, 814 Ecuadorian households completed a questionnaire on her sexual and reproductive health. The data was analyzed with IBM-SPSS Version 21 database management and analysis software. Univariate analysis was conducted for continuous variables (mean and standard deviation) and categorical variables (frequencies and percentages). Unadjusted bivariate analysis were conducted using Pearson Chi-Square test for categorical variables and ANOVA for continuous variables for majority Mestizo versus minority Indigenous and Afro-Ecuadorian women. Logistic regression was used to compare the prevalence ratio among the three groups (Mestizo versus Indigenous and Afro-Ecuadorian) while adjusting for other covariates. **Results:** The results from this study demonstrate the health knowledge disparity between Mestizo, and Indigenous women. Indigenous women reported the lowest knowledge percentage for most of contraceptive methods and were less likely than Mestizo women to use a contraceptive method. No statistically significant difference was found between Afro-Ecuadorian and Mestizo women in regards to any lifetime contraceptive method use. As expected, Indigenous and Afro-Ecuadorian women were less likely than Mestizo women to ever hear about breast and cervical cancer and sexual transmitted infections. **Discussion:** The study results suggest

a high need for tailored interventions for reproductive health to include breast and cervical cancer screening and HIV and STIs screening for the most neglected ethnic groups, Indigenous and Afro-Ecuadorians. Although higher HIV screening rates and knowledge rates are reported for Afro-Ecuadorian women in comparison to Indigenous women still the rates are not as high as the majority Mestizo women. Policy development for Ecuador must focus on making health education available to those groups in rural areas in order to reduce the health disparity existing between Mestizo women and Indigenous and Afro-Ecuadorian women. The study findings have implications for reproductive health promotion and intervention design in rural, low income settings and for minority populations.

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Chapter 1: Background and Significance

Overview of Health Disparities and Health Equity

Health disparities are defined as preventable and unjust inequalities in health distribution between groups (Carter-Pokras & Baquet, 2002). The expanded concept of health inequity developed by Margaret Whitehead is defined as, “differences in health which are not only unnecessary and avoidable but, in addition, are considered unfair and unjust” (Whitehead, 1991). Whitehead specified seven major determinants of health disparities, three of which are considered unavoidable and unfair: biological characteristics; self-chosen health damaging behavior; the temporary health advantage of one group when adopting a health-promoting behavior over other group. The other four determinants she considered as avoidable and unfair are: health damaging behavior chosen with restricted options; exposure to a stressful and unhealthy social environment; inadequate access to essential health services and essential services; health related social mobility, involving the propensity of ill people to move down the social level (Whitehead, 1991). Although, she solidifies the basis for health disparities, additional factors at the individual and community levels have been associated with health disparities.

It has been well established that genetics, collective lifestyles, health practices, socioeconomic factors, physical environment, social conditions, and access to health care services are the main determinants of health (De Maio *et al*, 2013). Socioeconomic status (SES) is the most consistent social determinant found on health literature research to influence health disparities. The health differences can be observed across the different levels on the SES. The very poor have worse health in comparison to those classified as poor. This is seen throughout the SES ladder, the upper level has better health than the lower level. However, the literature also emphasizes the need for a multilevel perspective, acknowledging that while health is experienced individually, it is the

result of both individual and contextual factors (De Maio *et al*, 2013). In addition, the Socio Ecological Model, suggests that behavior is affected by multiple levels of influence that includes intra- and interpersonal, organizational, community and public policy (McLeroy,1988).

Ethnic and Other Social Determinants of Health

Social determinants of health are linked to three major domains of race, sex and class. These are involved in a complex pathway through which exposures, behaviors, physical constitution and other direct or indirect factors cause disease (Kaufman *et al*, 1999). Disparities among the different ethnic and racial groups include multiple chronic and infectious disease.

Socioeconomic status plays an important role in health disparities. Various studies have attempted to determine the role of SES factors in explaining racial/ethnic disparities across different conditions, however no direct relationship has established. It is believed that racial and ethnic disparities most likely result from complex relationships between SES and other factors (Adler *et al.*, 1993). However, SES alone shows strong and consistent associations with lack of access to preventive health screening and/or treatment resulting in chronic disease and poor health behaviors for decades (Adler *et al.*, 1993). In addition, researchers studying ethnic health disparities have identified racism and discrimination as co-factors that influence a person's decision for seeking health services (Williams *et al.*, 2003). A study by Finch and colleagues reported that chronic exposure to discrimination is associated with greater risk for hypertension, diabetes, stroke, disability, and other chronic conditions even, after controlling for SES factors, such as income, education, age, access to health care and availability of health insurance (Finch *et al.*, 2009). In addition, not only discrimination itself has been associated, perceived discrimination has reported to be consistent with poorer reports of health as well (Hausmann *et al.*, 2008). A biopsychosocial framework is usually used to explain the linkage between perceived racism and

health status (Todorova et al., 2010). In a study where perceived discrimination and SES were examined as predictors of negative emotions among Hispanic and African Americans, indicated that perceived discrimination was predictive with increased reports of daily anger and nervousness, even after controlling for SES (Brondolo *et al.*, 2008). Ethnic disparities are also observed in reproductive health. For example, research suggests that minority women in the USA fear government's encouragement for contraceptive use is solely to the purpose of limit the growth of ethnic or minority populations (Rocca *et al.*, 2012). Health systems and provider's attitudes have also been identified as important determinants of health for reproductive health (Ebrahim, 2009). Countries, in which universal health systems are implemented, report higher reproductive health care for ethnic minority women due to providers' encouragement for regular screening or constant education (Ebrahim, 2009).

Ethnic disparities can also be observed in contraceptive use. Concerns about safety of and side effects from effective methods contribute to the reluctance of women to contraceptive, primarily in minority communities probably due to poor access to health education and/or cultural norms discouraging reproductive health communication (Clark *et al.*, 2006).

Ethnic Health Disparities in Low- and Middle-Income Countries

Disparities in the health outcomes of ethnic minority groups are well documented in the U.S., Canada and other high-income countries. However, much less is known about those in low- and middle-income countries (LMICs). Although health disparities among population groups exist in all countries, the causes for these may be different between high and LMICs. Factors affecting health disparities range from socioeconomic, political, ethnic, and even cultural. In high-income countries, SES factors determine access to health services; however in urban populations, among LMICs, it has been found that access to health services are correlated to health care knowledge

and services (Leon *et al.*, 2001). Another example of SES impacting ethnic health disparities is preventive screening. In high income countries, SES factors delay the diagnosis of breast cancer; women with a low SES are more likely to be diagnosed at later stages than women with a higher SES (Cleg *et al.*, 2009).

Poor environmental conditions are associated with low SES. The environment can promote the incidence of infectious and/or non-communicable diseases. Factors such as food scarcity, unclean water, poor sanitation and housing conditions, polluted environments, and a lack of good and adequate health care are associated with a high incidence of disease (Boerma *et al.* 2008). These socioeconomic inequalities in place of living are associated with a wide range of diseases around the world, regardless of a country's level of health and wealth. However, low and middle-income countries' data report higher presence of these factors in ethnic minority communities (Boerma *et al.* 2008). Despite the environmental disparities observed, data has shown adequate prenatal and delivery care, access to health services and coverage of preventive and curative interventions are more accessible to minority groups in low and middle income countries than in high income countries (Boerma *et al.* 2008). However, even with higher health care accessibility, poor treatment options and/or old fashion screening services in LMICs mortality for preventable conditions is high.

Breast cancer incidence is an example of this difference between low and middle-income countries and high-income countries. Currently, LMICs report higher breast cancer incidence, this has been attributable to improved life expectancy, urbanization and adoption of Western lifestyles (WHO, 2010). International initiatives have attempted to improve cancer care in low and middle-income countries especially breast cancer (WHO, 2008). The underlying premise of the initiatives was to reduce the breast cancer care disparity by improving access to care, existing diagnostic and

therapeutic methods (WHO, 2008). Although these are universal needs, each LMIC faces different limitations and challenges. Initiatives need to be tailored to the needs of each country. For example, in high-income countries, treatment improvements are reported to have greater effect than mammography screening on breast cancer mortality (Autier *et al.*, 2011). However, LMICs heavily promote breast cancer screening for an early diagnosis that might have the woman's life, since treatment options might not be available. Some LMICs implement screening programs targeted to the most at risk women so they will benefit the most. Results from other interventions have shown that if not tailored to a target population, then are not cost-effective for the country, since the most affected group will not benefit from the intervention (Yip *et al.*, 2008). In Brazil, for example, the major breast cancer mortality disparities identified among ethnic groups are: delay in breast cancer diagnosis due to low cancer awareness and implementation of mammography screening, quality of cancer care, and restricted access to radiotherapy and modern systemic therapies (Lee *et al.*, 2012).

Ethnic disparities in maternal and childcare are more prevalent in low and middle income countries in comparison to high income countries. In Brazil, despite health coverage is universal, prenatal care varied accordingly to family income and maternal skin color (Victora *et al.*, 2010). Although 98% of the sample (ranging from 96% among the poorest to 99% for the richest), had at least one prenatal visit, those women who had private care, had the highest number of visits and procedures (Victora *et al.*, 2010). Women with a high SES were more likely to start prenatal care earlier and to have the highest number of visits in comparison to low SES women. Black women were more likely to start prenatal care later and to have fewer visits than white or brown-color women (Victora *et al.*, 2010).

Ethnic Health Disparities in the Latin America and Caribbean Region

The Latin American and the Caribbean (LAC) Region has substantial racial and ethnic diversity. Indigenous groups account for 45 million of the 500 million people in Latin America, and about 90 million that are Afro-descendants. Indigenous and Afro-descendants are at higher risk for experiencing health and health care disparities due to low SES and associated factors, segregation and discrimination (Mayer-Foulker & Larrea, 2007).

Most of the LAC region population descends from three major racial/ethnic groups: indigenous, which includes more than 400 distinct groups; Europeans, descendants mostly from Spain and Portugal; and Africans, who are descendants of slaves brought during the American colonization. Mestizos are people of mixed European and indigenous lineages (Ecuador, 2013). Indigenous groups in Latin American and the Caribbean represent around 8% of the total population (PAHO, 2009). Indigenous and Afro-descendent groups in the region continue to experience health disparities. Differences among Indigenous, Afro-descendent, and other populations in the region persist in several areas besides health, such as employment, income, education and housing which later threaten health (Bello and Rangel, 2000).

In a study in which indigenous and Afro-descendant health disparities were estimated for Bolivia, Guatemala, Peru and Brazil was found that ethnic minorities have poorer health outcomes than the corresponding ethnic majority for most Latin American regions (Mayer-Foulker & Larrea, 2007). Health differences favoring the ethnic majority include living in urban areas, high access to education, and access to healthcare. (Mayer-Foulker & Larrea, 2007). When comparing minority ethnic groups versus majority groups, it is found that ethnic groups have a lower income per-capita (including household goods, education, health care use, and basic household quality).

Chapter 2: Reproductive Health and Health Seeking Behaviors in LAC

The International Conference on Population and Development Programme of Action states that reproductive health is more than the capability to reproduce and the freedom to do so. It encompasses reproductive information and access to safe, effective, affordable and acceptable family planning methods of the population's choice. In addition, reproductive health includes access to appropriate health care services that provide safety and security to women during pregnancy and childbirth, sexual health, and STIs information. Reproductive health is an essential part of general health and human development (UNFPA, 1995).

Reproductive Health Services Knowledge, Attitudes and Practices (KAP) in LAC

Young people are at risk for most reproductive health issues (United Nations, 1999). Most studies in reproductive health focus on adolescents and young adults. They represent 1.2 billion of the total world population and 85% live in low and middle-income countries. Trends have shown a rising for age at marriage while sexual debut is decreasing for both genders (Van Look *et al.*, 2004). This increases their risk for infrequent and inconsistent contraceptive use, multiple and casual partners, contact with sex workers (WHO, 2002). These factors can lead to unintended pregnancies and an increase risk for contracting sexually transmitted infections. Pregnancy is not uncommon among sexually active unmarried young women. The data suggests that 12% to 25% of adolescents who give birth are unmarried (Blum *et.al.*, 2004). Data from Brazil, Colombia, and Peru suggests that 30 to 40% of the adolescent pregnancies are unwanted (Blum *et.al.*, 2004). A recurrent solution for unwanted pregnancies is abortion. Although this practice is illegal and highly restricted, it is clandestine in most countries of Latin America (Schutt-Ainer *et. al.*, 2003). Unmeasured abortion rates make accuracy in pregnancy rates challenging (Schutt-Ainer *et. al.*, 2003). However, based on hospital data reporting on abortion complications approximately 23-

30% of adolescent pregnancies ended in therapeutic abortion in Colombia and Peru. (Alan Guttmacher Institute, 1995). Unsafe abortion is a major contributor for maternal mortality among adolescents and young women in Latin America (Schutt-Ainer *et. al.*, 2003).

Knowledge about sexual and reproductive health is limited among adolescents and young women in Latin America. In Peru, it was found that adolescents tend to have superficial knowledge about STIs and HIV/AIDS. Despite acknowledging the need for contraceptive use, they fail to do so (Kostrzewa, 2008). Although in Latin America, an increase in contraceptive use has been observed during the last decade, this has not proven sufficient to decrease the risk of adolescent pregnancy, nor other risks associated with sexually transmitted infections (Kostrzewa, 2008). In Mexico, results from focus group discussions indicate low knowledge about emergency contraception and medical abortion among middle-class men and women of reproductive age (15-65). Even after being educated on both methods, participants remained concerned about the methods' efficacy, mechanism of action, and potential to encourage sexual risk-taking. Religious and cultural factors, as well as barriers in communication with providers and within families, were considered as significant challenges (Gould *et al.*, 2002).

The reproductive health and behavior of ethnic minority groups in Latin America has been given little attention. In Guatemala, research suggests that indigenous women appear to use reproductive health services less frequently compared to mestizo women (Seiber and Bertrand, 2002). Some studies on Guatemala women have suggested that woman's socioeconomic and residential disadvantages, such as urban versus rural, are strong predictors of the likelihood for women to have regular health services. Women living in rural communities are less likely to seek out or have regular health check-ups or screening services (Seiber and Bertrand, 2002). These factors have also been identified as the most important factors in their underutilization of modern

health care services, since low SES women have lower access to quality care (De Broe and Hinde, 2006). In addition, indigenous women are often reported to often distrust and avoid modern health care services (Rohloff *et al.*, 2011). For example, Rohloff and associates (2011) reported that indigenous Guatemalan women preferred traditional alternatives to prenatal care and delivery because of perceived discrimination at public health care facilities from mestizo professional staff. In addition, since childbearing is highly ritualized in many indigenous groups as midwives assume the role of physical, spiritual and social care providers, indigenous women often prefer the use of midwives rather than institutions for delivery (Ishida *et al.*, 2012). Another study reported that ethnic language barrier is the most important obstacle for indigenous women to seek reproductive services. Rural residency and education seemed to be less important for the use of institutional delivery services and modern contraceptives (Ishida *et al.*, 2012).

Cervical Cancer in the LAC Region

Cervical cancer is responsible for approximately 1% of female deaths worldwide, killing more than 273,000 women annually (Ferlay *et al.*, 2010). Of these deaths, 80% occur in LMICs (Villa, 2012). Cervical cancer is the second most common cause of cancer in the LAC region. In 2005, the incidence of cervical cancer was four times higher and mortality five times higher than in North America (International Agency for Research, 2008).

Despite concerted public health efforts, the incidence of cervical cancer has continued to rise in many countries in Latin America. Although some countries have experienced a decline in cervical cancer incidence since the last decade, it is projected that the number of new cases in the region will increase by more than 75% in the next two decades due to barriers affecting the screening access of vulnerable groups (Parkin *et al.*, 2008). For example in Mexico, although a national detection program has been in place for 23 years, cervical cancer remains the leading

cause of death among women aged 35 years and older (Lazcano, 1999). Several Latin American countries such as Brazil, Colombia, Cuba, Guatemala, Uruguay and Venezuela, have cervical cancer mortality rates similar to Canada during 1960s (Robles, 1996). A steady death rate, without any significant declines, over a 33 year-period, has been observed in most LAC countries, whereas Canada and USA display a steadily decreasing rate over the same period (Robles, 1996). This disparity between high-income countries and low and middle-countries, is not well understood. However, research suggests that poor screening behaviors among women in most LAC region countries could be responsible for the unchanging mentality (Robles, 1996).

Cervical Cancer Screening Knowledge, Attitudes and Practices

Regular screening is crucial to decrease the burden of cervical cancer. Through screening, cancer can be diagnosed at an early stage and increase the chance for survival. The most current CDC cervical cancer screening guidelines recommend that women aged 21 to 65 years old perform a Papanicolau test (pap smear) every three years (CDC, 2014).

CDC also recommends that better targeted programs and policy designed to increase cervical cancer screening need to be implemented in LIMC (Püschel *et. al.*, 2010). However, a solid understanding of the factors preventing women from seeking diagnosis and treatment is crucial for the success of any program. Education has been shown to be an important determinant in a woman's decision to get a Pap smear. Better educated women are more likely to undergo screening tests than women with a low education. In addition, health education has been also been consider an important factor for women seeking screening behaviors. A study conducted by Lamadrid (1996) in Chile indicated that low health literacy about the purpose of cervical cancer screening is an important barrier to screening. Of the total sample of 233 women aged 25-54 years of age attending three primary health care clinics in Santiago, only 28% knew the purpose of the

Pap smear, 58% knew it was related to reproductive health and 14% knew nothing about the test. Other reported barriers included fear of pain from the procedure (39%), fear of being reproached by the practitioner for failing to get screened earlier (60%) and being afraid they might lose part of the uterus (<1%) were the common misconceptions for not being screened (Lamadrid, 1996). These results suggest the need for more educational programs to increase the screening behaviors in Chile. Similar results were found in a study conducted in Bolivia, in which women were reluctant to seek screening for cervical cancer despite acknowledging the importance of it for diagnosis and treatment. Until health problems are evident family funds are spend on health services (Hunter, 2004).

Another study reported that poor access to health care centers and low service quality constituted major barriers for women to obtain cervical cancer screening in Mexico, Ecuador, Venezuela, El Salvador, and Peru (Agurto *et al.*, 2004). Screening-related costs were another important identified barrier; except for El Salvador, where the public health service of these countries provided free cervical cancer screening. Women who were dependent on their husband's income were less likely to get screened due to fear of wasting part of the family income. Cost of treatment if required, fear of husband's reaction to such costs, medical exam's discomfort level, experienced and/or perceived lack of privacy and disrespectful treatment from health care providers prevent women from seeking screening. In addition, physicians' negligence related to care provision and, anxiety about screening results were also reported as barriers. The authors concluded women did not perceive cervical cancer as a preventable disease and hence screening for cervical cancer was not considered important. Fatalism is considered as a major player in the decision for seeking reproductive health services. (Agurto *et al.*, 2004).

A different study conducted in Bolivia, Brazil, Dominican Republic, Ecuador, Guatemala, Nicaragua, Peru, and Trinidad and Tobago found a doctor's visit was a decisive factor for women to seek a Pap smear. Since, it is common for the doctors in low and middle income countries to spend more time with the patients, education, and awareness provided one on one emphasized the importance of prevention and screening. This was true even after family income was adjusted for all countries (Soneji & Fukui, 2013).

Breast Cancer in Latin American Populations

Latin America shows a lower breast cancer incidence than high-income countries; however mortality rates are higher. These differences have been attributed to screening strategies and access to treatment (Cazap *et al.*, 2008). For example, despite a high incidence of breast cancer in high income countries, 89% of women diagnosed with breast cancer have a 5-year survival rate, primarily due to early detection and treatment (Parkin, 2008). Low and middle income countries have higher incidence in comparison to high income countries.

Latin America and Caribbean countries have higher mortality rates for breast cancer than high-income countries. This increased risk for breast cancer has been attributable to socioeconomic development and consequent changes in lifestyle practices and reproductive behaviors (Lannin *et al.*, 1998). Socioeconomic development has an impact on health due to changes in alimentation. This results in a poor nutrient diet and lack of physical activity, which might lead to obesity and sedentary life increasing the risk for cancer. Other associations have been studied as well. For example, the effectiveness of early detection programs in LAC in comparison to the effectiveness of programs in the US. Developed countries, such as U.S., have better early detection programs; this has been attributed to a high level of health education and awareness. This leads to a late diagnosis in LAC hence a higher mortality rate. The high breast cancer mortality in Latin American

countries is mostly associated to late (stages II, III y IV) detection of breast cancer (Giuliano, 1996).

Several factors have been investigated in an attempt to explain the reproductive health screening disparity that exists in low and middle-income countries in comparison to high-income countries. This disparity has been explained as to better care systems implemented in high income countries, early detection, diagnosis, and proper treatment (Lozano-Ascencio *et al.*, 2009). Developed countries with better care systems promote periodic health check-ups that lead to an early diagnosis increasing the chance for cancer prognosis. In addition developed countries have access to the most advanced treatments and hence better treatment outcomes. In contrast, low- and middle-income countries face challenges in treatment and diagnosis despite government funded health care systems in some countries due to factors such as poor screening behaviors and/or poor prognosis on available treatments (Lozano-Ascencio *et al.*, 2009).

A telephone survey of 100 breast cancer experts from 12 Latin American Countries found that 90% of the countries did not have a national law or guideline for mammography screening. The access rate to mammography was 66.3% at the country level and 47% at the center level. It was also found that 80% of the centers across countries have sophisticated diagnostic testing for hormone receptors and biomarkers. Overall nearly 80% of patients started treatment within three months of breast cancer diagnosis (Cazap E *et al.*, 2008). Although this study depicts higher uptake of screening and treatment for breast cancer, it is true only for the population having most access to cancer treatment among the twelve countries studied.

Mammography Screening Knowledge, Attitudes and Practices

Mammography use is an integral part of breast cancer prevention and control programs (Urban *et al.*, 1994). Although mammograms provide initial detection of abnormalities in the

breast tissue, a biopsy or a more profound assessment (MRI, CT-scan, blood marker tests, etc.) needs to be conducted to confirm the diagnosis. The National Cancer Institute recommends women aged 40 or older to get a mammography every 1 to 2 years. Early screening allows for an early detection of lumps more likely to be smaller and still confined to the breast. Detection at an early stage allows for a better prognosis of a woman with this disease. Women with an increased risk for breast cancer (Mutation on BRCA1 or BRCA 2 genes) should consult a physician to devise a customized plan for screening and early detection. Therefore, understanding the factors that encourage or prevent women from seeking a mammography is important to eliminate cancer disparities among ethnic minorities (Flynn *et al.*, 2011). For example, Latino women living in the U.S., have reported a lower screening rate in comparison to White women (Ries *et al.*, 2008). In fact, the difference in screening behaviors has consistently increased during the last decade for White women and Latino women although the disparity still exists (Ries *et al.*, 2008). In addition, U.S. born Latino women are more likely to be diagnosed at cancer stages III and IV with those women with a lower income are more likely to be diagnosed at later stages as compared to women with higher income (Howe *et al.*, 2006). However, low SES is not the only factor discouraging women to get screened. Education and accessibility also seem to shape screening uptake (Howe *et al.*, 2006).

Other factors that shape breast cancer screening include health beliefs, access to health insurance and age of the woman. A study conducted in Chile, in which more than half of the participants were self- identified as Mestizo and 8.6% as indigenous, 90% of the participants reported that breast cancer could be caused by blows to the breast and that they will only need a breast exam in case they feel pain. In addition, almost 70% of the women agreed that cost of the mammogram prevented them from going, but only 46% reported knowing where they can go to

get screened (Püsche *et al.*, 2010). Likewise, a study conducted on the U.S.-Mexico border found that age, education and insurance status were significantly associated with a positive history of preventive screening behaviors. In addition, low SES and low self-efficacy were the main barriers preventing women from getting screened for breast cancer (Banegas *et al.*, 2012).

Another study found that Latin America and Caribbean older women have a low prevalence of mammography use, probably due to the high cost of mammograms. Higher education was associated with an increased mammography use and a lack of health insurance or public insurance, limited access to health care and screening behaviors (Reyes-Ortiz *et al.*, 2007). Some studies have also found that having fatalistic beliefs predicted lower use of self-breast exams and clinical breast exams among Latino women (Dettenborn *et al.*, 2004). Research has found that some ethnic minorities, such as Latinos, experience higher negative feelings (e.g., fatalism, perceived discrimination, etc.) relating to cancer screening influencing their decision for seeking screening (Friedman *et al.*, 1995). Interventions designed to promote breast cancer screening must be tailored to address the various factors that prevent screening access and uptake in the priority population.

Breast Self-Examination Knowledge, Attitudes and Practices

Breast self-examination is an important tool to identify any abnormal lumps on the breast that could indicate breast cancer. Breast self-examination (BSE), which is recommended in most countries of Latin America, is based on the notion that up to 90% of all breast cancers can be detected by women regularly examining their breast. However, evidence suggests there is no significant mortality difference between women who practiced breast self-examination regularly and those who did not (Thomas *et al.*, 1997 & Semiglazvo *et al.*, 1999). There is no clear evidence of the BSE effectiveness. It has been argued that BSE alone is not enough and a more systematic approach to self-examination could lead to earlier detection. A study conducted in Monterrey,

Mexico was reported that only 1 in 200 women performed the BSE in a correct manner and at the optimal time (Anderson *et al*, 2009). This finding emphasized not only the importance of BSE knowledge but also the need for women to have a proper technique and perform regular BSE at an optimal time to consider BSE as a preventive measure. However, research does suggest that promoting BSE in low and middle income countries helps to raise breast cancer awareness at a low cost, thus promoting early diagnosis and treatment (Robles & Galanis, 2002).

Contraceptive Use Knowledge and Practices in Latin American Populations

Modern contraceptive methods have been instrumental in improving family planning with respect to pregnancy timing, birth spacing, and child number (WHO, 2013). Modern contraceptive methods include combined oral contraceptives, progesterone only-pills, implants, progesterone injectable, monthly injectable or combined injectable contraceptives, intrauterine device (e.g., copper containing device, levonorgestrel device), male and female condoms, male sterilization (e.g., vasectomy), female sterilization, emergency contraception

During the past decade, there has been an increase in the number of new contraceptives. Women's knowledge and decision about reproductive health, especially in low- and middle-income countries, has led to an increase in uptake of contraceptive use leading to a decrease in family size. Since the 1960 to 2009, contraceptive use among married women increased from 67% to 72%. In high income countries and from 9% to 61% in low and middle income countries among married women (Darroch, 2013). In 2012, an estimated 42% of all pregnancies in LMICs were unintended, resulting in 40 million induced abortions and 10 million miscarriages (London Summit on Family Planning, 2012). About 222 million women have unmet need for modern contraceptives in low and middle income countries (London Summit on Family Planning, 2012). The use of modern contraceptive methods have helped to decrease the number of maternal deaths in Latin

America by 20% over the last 20 years by reducing the number of unplanned pregnancies; This includes high risk pregnancies, such as those in women with high parity (Cleland *et al.*, 2012). Despite the increase in modern contraceptive use, the number of unintended pregnancies and their outcomes (e.g., abortion, child/maternal mortality, etc) continue at high levels. This has been explained due to the use of an ineffective contraceptive method or inconsistent use of contraception (Cleland *et al.*, 2012).

Over the last decade, in the U.S., there has been an increase in female sterilization (almost 40%) as the predominant contraceptive method followed by male sterilization (~30%), pills (~10%) and IUDs (~10%) (Darroch, 2013). In the U.S., several factors affecting a women's decision to use a contraceptive method have been identified. The wide variety of contraceptive methods allow users to constantly change the contraceptive method used lowering the effectiveness of the method selected. For this reason, some studies have suggested that the key for consistent use of a contraceptive method is better when it is less user dependent, meaning the less the women needs to do (e.g., IUD) the most adherent to the method the women will be (National Research Council, 2009). Although long-acting intrauterine contraceptives have been proven to be efficient and cost effective and user independent few nulliparous women have adopted this method (National Research Council, 2009).

It is estimated that only 7% of Latina America and Caribbean women use IUCs (United Nations, 2011). Study findings have suggested that misconceptions by nulliparous and their health care practitioners on IUC benefits and health risks are a main reason for non-use (Black *et al.*, 2013). In a study conducted in 14 countries, it was found that in Latin America the main barriers preventing the recommendation of IUC by health care providers are concern about pelvic inflammatory disease, infertility and insertion pain. Fear of infertility was reported to be the main

concern in Latin America (Black *et al.*, 2013). Age is also a determining factor for contraceptive use. Younger women (15- 25 years old) are more likely to use a contraceptive in comparison to older women (26 – 35 years old). It is believed that this disparity may be due to the fact that the younger women (15-25 years of age) have been receiving some kind of sexual health education at school and through community programs in comparison to older women (Mohamed *et al.*, 2005).

Sexually Transmitted Infections in Latin American Populations

Sexually transmitted infections (STIs) are passed from one person to another through intimate sexual contact (vaginal, anal or oral) unprotected sex or genital contact (Sexually Transmitted Infections, 2012). The most common STIs diagnosed are chlamydia, bacterial vaginosis (BV), genital herpes, gonorrhea, hepatitis B, HIV/AIDS, Human Papilloma Virus (HPV), pubic lice, syphilis, and trichomoniasis (Sexually Transmitted Infections, 2012). STIs, if untreated, can cause cancer, pelvic inflammatory disease, infertility, urinary tract infection, pregnancy problems, widespread infection to other parts of the body and even death (Sexually Transmitted Infections, 2012). Having an STI increases the risk for contracting other STI such as HIV.

Reporting of STIs in Latin America is a challenge. Although all countries, except Brazil and Uruguay, have mandatory reporting of AIDS and HIV infection, reporting of other STIs varies considerably across countries (Garcia *et al.*, 2011). In addition, it is not easy to have an accurate incidence for STIs in LAC since surveillance and data reporting systems differ considerable from one country to another (Garcia *et al.*, 2011). In 2006, there were a total of 539,063 cases in 19 countries of LAC. WHO estimates were expecting 38 million of new cases of STIs in LAC for the same timeframe. This underlines the vital importance of screening, detection and diagnosis for STI control and prevention (Garcia *et al.*, 2011).

The high incidence and prevalence of sexually transmitted infections (STIs) in Latin America remains an important public health challenge. A study conducted in Brazil in 1990 showed that 30% of the sexually active adolescent males had an STI at least once in their lifetime (Childhope, 1997). It also was reported that 28% of Peruvian men aged between 18-29 years old had urethral discharge, genital ulcers, or genital warts prior the 12 months before the survey (Garcia *et al.*, 2007).

Human immunodeficiency virus (HIV) related illnesses are the second leading cause of death in the world (Geneva: WHO, 2009). In 2012, approximately 35.3 million people were living with HIV worldwide (HIV/AIDS, 2013). In 2011, an estimated 1.4 million people were living with HIV in Latin America (UNAIDS, 2012). It is the first leading cause of death among the Caribbean population of 15-49 years old (Camera *et al.*, 2003). Controlling Human Immunodeficiency Virus (HIV) infection is a major challenge for many LAC populations. Risk for infection is considered higher in low- and middle-income countries in comparison to higher income countries. The factors that have been associated with this disparity are an uneven distribution of health services, concentration of poverty among ethnic groups and certain geographical areas, gender inequalities and harmful lifestyle practices (Calculating Women's Sexual and Reproductive Risk, 2007). In addition, social and cultural factors also fuel the HIV epidemic. For instance, fear of stigma, rejection and discrimination prevents Jamaican infected people to disclose their HIV status and testing for those who are at higher risk (Jamaica Ministry of Health, 2007).

Research in the Caribbean countries has shown that more than 25% of the sexually active people are not aware of the status of their sexual partner and that 40% do not use condoms (CARICOM-PANCAP, 2008). Significant relationships between age, relationship status and condom use have been observed among these low- and middle-income countries (CARICOM-

PANCAP, 2008). Despite the fact that LAC has lower rates for HIV than other high income countries, the global HIV infection decline between 2000-2008 was not observed in LAC (UNAIDS & World Health Organization [WHO], 2009). In previous decades HIV infection incidence was predominantly in the population of men who have sex with men, now is widely spread and women are considered a vulnerable population. This is true in the Chilean population. By 1990, the ratio of HIV infected males was 7 per every woman in comparison to 4 infected males per every woman in 2009 (Chilean Ministry of Health, 2009). It is important to have a great understanding of all the potential factors affecting women's vulnerability to HIV, such as gender inequality, poverty, and lack of perceived risk for HIV, to develop adequate prevention programs (Cianelli *et.al.*, 2010).

Chapter 3: Health Disparities and Health Equity in Ecuador

Ecuador

Ecuador is a middle income Andean country located on the northwestern coast of South America. It borders with Colombia on the north and Peru on the east and south. In July 2012, the population totaled 15,223,680 inhabitants (Index Mundi, 2012). The single largest age group is 25-54 years old (38.4%). According to the 2010 Ecuadorian Census, the largest ethnic group is Mestizo (79.3%), followed by Indigenous groups (6.1%), Afro-Ecuadorian (7.2%), and other (7%). There has been a great improvement in health since the 1960s. Average life expectancy has increased by 37% and infant mortality decreased by 75% (Index Mundi, 2013). Despite a general improvement on SES and health care, Ecuador still has significant disparities in health. The gap between the rich and poor has widened despite the 6-year increase in life expectancy (Drexler, 2005). Almost 40% of the population lives under the poverty line (people living below 50% of the countries' average income) (UNDP, 2006). Ecuador has a relatively low development index ranking 83 out of the 117 countries in the UN Development Index (United Nations Development Programme, 2012). *Per capita* income averaged \$8,800 US dollars per year (Ecuador GDP, 2012). Indigenous groups, who more often reside in rural areas, are reported to be at greater risk for health and health care disparities (Larrea and Montenegro, 2006). The use of health care services varies greatly by age, gender, SES and urban/rural residency. More than two-thirds of the population lack health insurance and resources to pay for health services (PAHO, 2007). The main public health institutions are the Ministry of Public Health (MPH) and the Ecuadorian Social Security Institute (IESS). Private medical care is more often used by wealthier individuals and other individuals for specific services not covered by public health institutions.

Health and Health-Seeking among Ecuadorian Ethnic Minority Groups

Little is known about health disparities among Ecuadorian ethnic minorities. However, results from the National Survey ENSANUT found that there has been a 3% increase in cervical cancer screening from 2006 to 2012. However, the existing evidence indicates that Afro-Ecuadorian and indigenous women are at higher risk for delivering infants with adverse growth outcomes than mestizo women. Afro-Ecuadorian women were more than twice as likely to deliver children classified with microcephaly compared to those delivered by the mestizo women (Weigel *et al.*, 2013). Additionally, the article suggests the need to study the reasons for health seeking behaviors and education since it was found that the indigenous group had fewer pregnancy control visits compared to the other two ethnic groups and Afro-Ecuadorian women were more likely to report the use of alcohol and tobacco during pregnancy (Weigel *et al.*, 2013). Alcohol and tobacco use have been associated with a greater risk for breast and cervical cancer (Conroy *et al.*, 2012). The fact that Afro-Ecuadorian women are more likely to use them increases their risk for these types of cancer. Afro-Ecuadorian women are not the only Ecuadorian minority group at disadvantage. It has been reported that indigenous people have higher mortality probability (30%) in comparison to mestizo. Morbidity is also higher among indigenous in comparison to mestizo. Rates for chronic infections, gastrointestinal illness, and unknown origin diseases are 2 to 4 times higher for indigenous than mestizo (Kuang-Yao *et al.*, 2010).

Factors influencing health-seeking behaviors are not well identified among Ecuadorian ethnic groups. Less is known about factors affecting reproductive health among the ethnic groups. SES and education have been associated with a reduced health-care seeking for children with acute respiratory problems in rural Ecuador (Luque *et al.*, 2007). A low SES and education increase the risk for respiratory infections and delays health care-seeking behaviors (Luque *et al.*, 2007).

Reproductive Health and Health Screening in Ecuador

The ENDEMAIN studies were a series of reproductive health surveys conducted in Ecuador by the Centro de Estudios de Población y Desarrollo Social (CEPAR). Data reported by the 1995 ENDEMAIN survey indicated that rural women had a high prevalence of unprotected sex, with little use of female or male protection in comparison to urban women (ENDEMAIN, 1995). The data indicated that Afro-Ecuadorians, which are a neglected group and are the largest and fastest, growing group in Ecuador, and have the poorest reproductive health behaviors. For example, a 15 year old study conducted in Esmeraldas Province, where the Afro-Ecuadorians population constitutes 90% of the total population, it was found that sexual intercourse with multiple partners is a frequent practice. Close to three quarters than half (~75%) of the women reported having more than one sexual partner and Afro-Ecuadorians were more likely to have multiple partners in comparison with the other ethnic groups. Contraceptive use practices were low among Indigenous and Afro-Ecuadorian women. Lack of health education has been associated as a risk factor for unprotected sex. Women with lower education are more likely to engage in unprotected sex and use a non-effective contraceptive method (Weigel *et al.*, 2000). In addition, adolescent's reproductive health is also been affected primarily by a lack of reproductive health education. In Ecuador, several factors have been associated with a low contraceptive use. One of which has been found is a lack sources of information for reproductive and sexual health; in addition to reluctance of the parents to respond questions about sexuality (Beckwith, 2006).

Although there has been a decrease in the fecundity in Ecuador by half in a 5-year period, findings have shown that the average age for Ecuadorian women to engage in sexual activity is 18.5 years old, which is one year younger that it was in 1994 (ENSANUT 2012). In the 1994 ENDEMAIN survey it was found that the total fertility rate was 2.95 in urban areas while 4.59 in

rural areas. The higher the education the lower the fertility rate: 6.24 for illiterate women, 5.42 for those with incomplete primary, 3.96 for those with complete primary, and 2.14 for those with higher education. Of the total sample of 13, 582, 56.8% of the women used a contraceptive method. The most common was sterilization with 19.8%, 11.8% using IUDs, 10.2% pills, 7.4% rhythm, 3.5% withdrawal, and 2.6% condom. It was found that urban women were more likely to use a contraceptive method in comparison to rural 66.0% vs. 44.4%. Of the total participants 37.8% of contraceptive users obtained their supplies in the public sector. It was estimated that 12.1% of the rural women have unsatisfied needs for family planning (Ecuador ENDEMAIN, 1999). It was also found that about 75% of the women received at least one prenatal care visit, 72% of which initiated care in the first trimester and 74% received a sufficient number of visits. High education and high SES were positively associated with having prenatal care. Women with a secondary level of education or higher were more likely than women without formal education to receive prenatal care (Eggleston, 2000). In addition, the use of family planning services also was positively associated with prenatal care.

Chapter 4: Study Aims and Hypothesis

Study Rationale

The clinical and public health importance of reproductive and sexual health screening is well documented. However, little is known about any existing disparities in reproductive health screening among women belonging to ethnic minority groups in Ecuador. The investigation of these is important for a number of reasons. The findings from this study are expected to enhance the understanding of factors affecting the decisions for health seeking behaviors among ethnic minorities and majority groups in Ecuador. This information can help to inform needs in Ecuador for policies, programs, and strategies that address women's reproductive health needs in Ecuador.

Study Goal

The overall goal of the proposed study is to identify the main ethnic differences for (1) contraceptive use knowledge and screening practices, (2) breast cancer knowledge and screening practices, (3) cervical cancer knowledge and screening practices and (4) HIV and STIs knowledge and screening practices among Ecuadorian women aged 15-49 years who participated in the ENDEMAIN 2004.

Major Objectives

The major objectives of secondary data analysis are to:

1. Describe the prevalence of reproductive and sexual health screening behaviors among reproductive-aged Ecuadorian women with respect to cervical cancer, breast cancer, contraception use and sexually transmitted infections,.
2. Identify ethnic (Mestizo, Indigenous, Afro-Ecuadorian) differences in knowledge and screening practices prevalence of contraceptive use, breast cancer, cervical cancer, HIV and STIs among the three major Ecuadorian ethnic groups.

Study Hypotheses

1. Based on the published evidence from prior studies of ethnic minority groups, it is hypothesized ethnic minority women (i.e., Afro-Ecuadorian and indigenous) will be less likely than mestizo majority women to have a higher contraceptive knowledge and use due ethnic minorities' reduced access to health care, a low education and SES level (place of living, income, etc.).

2. Based on the published evidence from prior studies of ethnic minority groups, it is hypothesized ethnic minority women (i.e., Afro-Ecuadorian and indigenous) will be less likely than mestizo majority women to have higher breast cancer knowledge and screening practices due ethnic minorities' reduced access to health care, a low education and SES level (place o living, income, etc.).

3. Based on the published evidence from prior studies of ethnic minority groups, it is hypothesized ethnic minority women (i.e., Afro-Ecuadorian and indigenous) will be less likely than mestizo majority women to have higher cervical cancer knowledge and screening practices due ethnic minorities' reduced access to health care, a low education and SES level (place o living, income, etc.).

4. Based on the published evidence from prior studies of ethnic minority groups, it is hypothesized ethnic minority women (i.e., Afro-Ecuadorian and indigenous) will be less likely than mestizo majority women to have higher STIs knowledge and HIV knowledge and screening practices due ethnic minorities' reduced access to health care, a low education and SES level (place o living, income, etc.).

Chapter 5: Methods

Data Source

This study conducted a secondary data analysis from the *Encuesta Demografica y de Salud Maternal e Infantil* (ENDEMAIN 2004) national survey carried out by the Center of Community Studies and Social Development (Centro de Estudios de Poblacion y Desarrollo Social (CEPAR) with technical assistance from the Centers for Disease Control and Prevention (CDC). ENDEMAIN is a series of reproductive health surveys conducted in Ecuador aided by international institutions such as United States Agency for International Development (USAID), and University of North Carolina (UNC), ENDEMAIN attempts to obtain accurate demographics and reproductive health of the women and children (5years old and less) among 15 provinces of Ecuador.

The ENDEMAIN-2004 survey was a national coverage cross-sectional study with urban and rural representation, developed to collect information on the built housing and household members. The ENDEMAIN survey consists of 2 major questionnaires provided to two different samples and two additional forms: Household Questionnaire (designed to obtain information on demographic and socioeconomic characteristics of household members; access to health insurance; use of health services and expenses; international migration, housing characteristics and household; and household consumption expenditure), MEF Individual Questionnaire (designed to be applied to women in childbearing age identified at home: history of the interviewee; reproductive history; child health services related to maternal health, family planning, reproductive preferences; young adult; marriage; violence against women, sexually transmitted infections (STIs), HIV, AIDS, maternal mortality, school attendance, housing characteristics and household consumption expenditures of households, and anthropometry), Questionnaire for Household

Consumption Expenditure (prepared for information food security, costs in food and non-food products in households selected through a sub-sample), prices (form prepared for information on economic establishments, selected segment level, the selling prices of food and non-food products).

The results from the survey have as ultimate goal to provide the bases for public policy and tailored programs that could improve the reproductive health of the women in the country.

Dataset

The main dataset analyzed in this study was the ENDEMAIN 2004 MEF Questionnaire Data (Demographic and Maternal & Child Health Survey). Using a multistage clustering design, ENDEMAIN 2004 provided a nationally representative sample of 28,908 households (MEF questionnaire was completed in 10,813 households; and Household Questionnaire was completed in 10,985 households) in Ecuador. The 2001 National Census was utilized as the sampling frame for selecting individual non-institutionalized households within census sectors. Dataset is publically available at: <http://ghdx.healthdata.org/record/ecuador-reproductive-health-survey-2004>.

Data Collection

The ENDEMAIN 2004 survey instrument was paper-based and administered by a trained interviewer from July 2004 to October 2004. Two different questionnaires were applied to two different samples. In this study the data collected for the Mujer de Edad Fertil (MEF) questionnaire was used - a female member of reproductive age completed an interview on sexual and reproductive health in a total of 10,813 households; b) an adult member completed an interview on health utilization and expenditures in 10,895 households.

Sample Population

The survey participants were randomly selected from the 17 different strata, which include the Insular and Amazonia regions, 10 Sierra and 5 Coast provinces. Out these strata, 692 segments were selected, then 42 households from each segment were randomly selected. From these, 42 households, alternately 24 households were survey the MEF questionnaire (which is the one used for these study) and the rest 18 houses were given a Housing questionnaire. After the 24 houses were selected, randomly one woman aged between 15 to 49 years old was selected for survey per household. The survey was validated in rural and urban communities, and evaluated during trainings. The data collection lasted three months (July 5th to October 8th 2005). A total of 16,530 qualifying households were selected to participate in the MEF questionnaire. Out of the total-qualifying households, 67.4% contained an eligible woman. Of these 97% of the households were surveyed which results in 10,814 full interviews for the MEF questionnaire.

Sample Size

The inclusion criteria for participation in the ENDEMAIN 2004 MEF survey were being a female in reproductive age (15-49 years), living in one of the randomly chosen households in a randomly selected segment. Sample included pregnant women or women with other health condition. Males or women age <15 or >49 years old were excluded from the study.

Study Design

This is a cross sectional study conducted in 2004. Dataset was obtained from the Global Health Data Exchange website.

Measures

Socio-demographic measures

Socio-demographic status was established by taking into account eight measures: self-identified ethnicity (indigenous, mestiza, Afro-Ecuadorian, white, other), age (self-reported and verified by month and year of birth), highest education level attained (none, elementary school, middle school, high school, college), income (currently working), residence site (rural, urban, do not know), marital status (living with a partner, married, widow, separated, divorced, single), parity (number of live births), and health insurance (IESS, SSC, private, public and private, ISPOL/ISSFA, none, other, do not know).

Contraceptive use measures

Contraceptive knowledge and practices were determined using six measures: ever using a contraceptive method (yes, no, refuse to answer), ever using a modern contraceptive method (yes, no, refuse to answer), currently using a contraceptive method (yes, no, refuse to answer), currently using a modern contraceptive method (yes, no, refuse to answer), ever heard of: vasectomy, female sterilization, norplant, contraceptive injections, birth control pills, IUD devices, male condom, male withdrawal method, rhythm method, vaginal methods, lactational amenorrhea, emergency contraceptives (yes, no, refuse to answer), ever use: vasectomy, female sterilization, norplant, contraceptive injections, birth control pills, IUD devices, male condom, male withdrawal method, rhythm method, vaginal methods, lactational amenorrhea, emergency contraceptives (yes, no, do not know), currently using: vasectomy, female sterilization, norplant, contraceptive injections, birth control pills, IUD devices, male condom, male withdrawal method, rhythm method, vaginal methods, lactational amenorrhea, emergency contraceptives (yes, no, do not know).

Breast cancer measures

Breast cancer knowledge and screening practices were determine using four measures: ever heard of breast cancer (yes, no, do not know), ever done a self-breast examination (yes, no, do not know), ever taught how to do a self-breast examination (yes, no, do not know), ever gotten a mammogram (yes, no, do not know).

Cervical cancer measures

Cervical cancer knowledge and screening practices were determine using two measures: ever received information about cervical cancer (yes, no, do not know), ever gotten a pap-smear (yes, no).

HIV and STIs measures

STIs knowledge and HIV knowledge and screening practices were determine using eight measures: ever heard of (yes, no, refuse to answer): syphilis, gonorrhoea, genital herpes, genital warts, leukorrhoea, chlamydia, human papilloma virus, trichomoniasis, candidiasis, hepatitis B virus; ever heard of HIV/AIDS (yes, no, refuse to answer). Participants were also asked if they believe a person can be HIV infected and no display symptoms (yes, no, refuse to answer), believe HIV cannot be cured (yes, no, refuse to answer), knows about HIV testing (yes, no, refuse to answer), knows where to get HIV test (yes, no, refuse to answer), ever been tested for HIV (yes, no, refuse to answer), and knowing two or more HIV prevention methods (yes, no, refuse to answer).

Statistical Analysis

Data analysis was performed using the IBM-SPSS Version 21 database management and analysis software. Univariate analysis for continuous variables included mean and standard

deviation. Univariate analysis for categorical variables included frequencies and percentages. Bivariate analysis was conducted for binary variables using unadjusted chi-square for contingency tables and ANOVA for continuous variables for majority Mestizo versus minority Indigenous and Afro-Ecuadorian women.

Logistic regression was used to compare the prevalence ratio among the three groups (Mestizo versus Indigenous, and Afro-Ecuadorian) while adjustment for other covariates. Based on literature reviews and statistical variable selection, income quintile, marital status, current health insurance, education and maternal parity were included in the multiple logistic regression model as potential confounders. P-values below 0.05 for both adjusted and unadjusted analysis is considered significant.

Several variables were recoded for the assessment of ethnic differences. Ethnicity was recoded into 4 levels (indigenous, mestizo, Afro-Ecuadorian, other), although for analysis purposes only 3 levels (indigenous, mestizo & Afro-Ecuadorian) were use. Health insurance was recoded into two levels (public or private, none); marital status into three levels (married/living with partner, divorced/separated/widow, single); highest education level attained into 4 (none, primary, secondary, superior); income (first, second, third, fourth, fifth) into 5 levels.

IRB Approval

Data used in these analyses are secondary data and do not include any identifying information. The data are publically available. The study did not involve interaction with human research participants and was thus not subject to review by an Institutional Review Board (IRB).

Sample Size & Power

This is a cross-sectional study using secondary data. Accordingly, it was necessary to determine if the existing sample size would provide adequate power for the proposed analyses. Using G* Power software, overall alpha at .05, power of .80, and a “small” effect size for between group differences it was determined that a total of 967 participants would provide adequate power to detect group differences in the specified outcomes. The existing sample size thus provided adequate power across all of the analyses.

Chapter 6: Results

The goal of this study was to assess ethnic differences in knowledge and practices of reproductive health among Ecuadorian women. This cross sectional study using secondary data allowed us to gain valuable insight regarding the health disparities between Mestizo, Indigenous and Afro-Ecuadorian women. The study results have implications for design of interventions geared towards tailoring educational programs to enhance reproductive health knowledge and practices in Ecuador.

Socio-demographic Characteristics

The characteristics of the participants of the study (n=10,814) are displayed in Table 1. Overall, Mestizo (30.1) reported a higher mean age in comparison to Indigenous and Afro-Ecuadorian women had a mean age of 30.1 years and a mean parity of 2.3. Almost half of the participants reported having completed their secondary education (44%). More than 80%, reported not having health insurance (88.8%) and more than half reported being unemployed at the time (53.25%), and being married or living with a partner (66.4%).

The majority of the women identified themselves as Mestizo women (86%) and had a slightly higher mean age of 30.22 years and a mean parity of 2.19 when compared to Indigenous and Afro-Ecuadorian women. More than half (60%) reported completing at least their secondary education, almost half (45.1%) were currently employed, 88.3% lack health insurance and 66.5% were married or living with a partner.

The second largest group was the Indigenous women (9.9%). Indigenous women had the lowest mean age of 28.81 years and a mean parity of 2.86 when compared to Mestizo and Afro-Ecuadorian women. Less than a fourth (22.5%) of Indigenous women reported completing their

secondary education or above, becoming the least educated group in comparison to the other two ethnic groups. Furthermore, almost all (93.%) indigenous women reported lack of health insurance, more than half were married (66.2%) and were the highest employed ethnic group (63.2%) in comparison to Mestizo and Afro-Ecuadorian women. Please refer to Table 1 for more information.

The last group was the Afro-Ecuadorian women (3.6%). Women had mean age of 29.43 and a mean parity of 2.78. Less than half (43.5%) of Afro-Ecuadorian women have completed their secondary education or above and almost all (90%) were uninsured. More than half of the women were married or were living with a partner (62.5%) and less than half (42.7%) were employed.

Contraceptive use

More than half of the participants (69%) reported ever using a contraceptive method. The highest percentage of contraceptive use was reported by Afro-Ecuadorian women (72.4%), followed by Mestizo women (72.3%) and Indigenous women (44.9%). The statistical analysis findings for contraceptive knowledge and use partially supported the hypothesis that ethnic minority women (i.e., Afro-Ecuadorian and indigenous) were less likely than mestizo majority women to have a higher contraceptive knowledge even after controlling for confounders. Without adjusting for other covariates, the prevalence ratio for having any lifetime use of a contraceptive method between the Indigenous women and the Mestizo women is 0.62 (95% CI: 0.58 -0.66). This indicates that Indigenous women have a much lower proportion for lifetime use of a contraceptive method than Mestizo women, and this finding is statistically significant. With covariate adjustment, the prevalence ratio for having any lifetime use of a contraceptive method between the Indigenous women and Mestizo women becomes 0.68 (95% CI: 0.64-0.72). This indicates that by

holding other covariates fixed, Indigenous women have a much lower proportion for lifetime use of a contraceptive method than the Mestizo group, and this finding is statistically significant (p-value <0.05).

However, this is not true for Afro-Ecuadorian women. The prevalence ratio for having any lifetime use of a contraceptive method between Afro-Ecuadorian women and Mestizo women, with covariate adjustment, is 1.05 (95% CI: 1.00 and 1.11). This indicates that the Afro-Ecuadorian women has a similar proportion for lifetime use of contraceptive method compared to Mestizo women, holding other covariates fixed, and this finding is statistically significant (p-value<0.05). Overall, Indigenous women were less likely to have any lifetime use of a contraceptive method than the Mestizo women, however there is not a statistical difference in any lifetime use of a contraceptive method between Afro-Ecuadorian and Mestizo women. Results from additional analyses related to contraceptive use can be found in Table 2.

This difference is not only shown in any lifetime use but also in the type of contraceptive used. Based on literature review, it was expected for Mestizo women to be more likely to have any lifetime use of a modern contraceptive method in comparison to Indigenous and Afro-Ecuadorian women. Hypothesis stating that Mestizo women will have higher contraceptive use practices than minority ethnic women was supported for Indigenous women in which, adjusting for other covariates, were statistically less likely to have any lifetime use of a contraceptive method than Mestizo women (PR: 0.51; 95% CI:0.46-0.56). However, no difference was found for any lifetime use of a modern contraceptive method between Afro-Ecuadorian and Mestizo women. This phenomenon was also found in current use of a contraceptive method and current use of a modern contraceptive method. Although all groups reported a lower modern contraceptive use percentage in comparison to any contraceptive method, Indigenous women were less likely than Mestizo

women to currently be using a contraceptive method (PR: 0.65; 95% CI: 0.60-0.71) and/or currently be using a modern contraceptive method (PR: 0.47; 95% CI: 0.41-0.53). Modern contraceptive methods refer to combined oral contraceptives, progesterone pills, implants, IUD, male and female condoms, male and female sterilization, lactation amenorrhea while traditional contraceptives only refer to rhythm method and male withdrawal.

The most common contraceptive method used reported was birth control pills. In contrast with the hypothesis, Afro-Ecuadorian (92.2%) women reported a highest percentage for be familiar with method in comparison to Mestizo women (91.8%). After adjusting for confounders, it was not found a statistical difference in birth control pills knowledge between the Afro-Ecuadorian and Mestizo women (PR: 1.04; 95% CI: 1.01-1.07). However, Afro-Ecuadorian women were less likely than Mestizo women to ever and/or current use of birth control pills (PR: 0.96; 0.94; 95% CI: 0.92-0.99; 0.91-0.98). This was different for Indigenous women, when comparing the prevalence ratio, it was found that Indigenous women were less likely than Mestizo women to be familiar with birth control pills (PR: 0.58; CI: 0.54-0.61). However, there was no statistical difference for any lifetime or current use of birth control pills between Indigenous women and Mestizo women (PR: 1.16; 1.01 95% CI: 1.13-1.18; 0.96-1.06).

Another common reported contraceptive method used reported was contraceptive injections. Although, Afro-Ecuadorian women reported the highest percentage knowledge for contraceptive injections in comparison to Indigenous and Mestizo women, unlike hypothesized, there was not found a statistical difference between Indigenous (PR: 1.04; 95% CI: 1.02-1.06) and Mestizo women and Afro-Ecuadorian (PR: 1.04; 95% CI: 1.02-1.07) and Mestizo women for contraceptive injections knowledge. This was true even after controlling for confounders for any lifetime use of contraceptive injections, although highest percentage use was reported by Mestizo

women, there was no statistical difference between Indigenous (PR: 1.03; 95% CI: 1.01-1.05) and Mestizo women and Afro-Ecuadorian (PR:1.02; 95% CI:1.02-1.06) and Mestizo women for contraceptive injections use.

Minority ethnic differences can be observable in modern contraceptive knowledge. For example, Norplant, a contraceptive implanted under the skin that gradually release the hormone levonorgestrel over a number of years, was the least acknowledged method. Indigenous women (PR: 0.40, 95% CI: 0.32-0.49) and Afro-Ecuadorian (PR: 0.78, 95% CI: 0.65-0.94) women were less likely to know Norplant in comparison to Mestizo women.

Among participants who reported not using a contraceptive, the main reason for not doing so was not being sexually active (52.8%). Other reasons for not using contraceptives included wanting to get pregnant (7.8%), not liking contraceptives (6.8%), fear of side effects (6%), breastfeeding or post-partum (4.7%), refusal of use by sex partner (2.8%), lack of knowledge about contraceptives (2.6%), side effects from prior use (2%), being elderly (1.7%), carelessness/negligence (1.3%), lack of money (1.3%), being sterile (1.3%), health or hormonal problems (0.9%), religious reasons (0.5%).

Almost half (49%) of the 518 study respondents who reported that they would like to use a contraceptive, indicated that they would like to use a contraceptive method to prevent pregnancy rather than preventing STIs. More than half (59%) reported they would like to use a contraceptive method in the future. There were differences between ethnic groups on the reported prevalence rate for the willingness to use a contraceptive method in the future. Indigenous reported the lowest percent (38.8%), followed by mestizos (61.7%) and Afro-Ecuadorians (69.8%).

Breast and Cervical Cancer Knowledge and Screening Practices

Breast Cancer

More than two thirds (68.2%) of the 10, 725 study respondents reported having heard of breast cancer. However, less than one third (31.3%) reported having a breast exam at least once in their lifetime emphasizing the lack of routine breast cancer screening. Mestizo women (72.6%) reported the highest percentage in breast cancer knowledge followed by Afro-Ecuadorian women (69.5%) and Indigenous women (29%). Indigenous women (PR: 0.53, 95% CI: 0.48-0.58) were statistically significant less likely to ever hear of breast cancer in comparison to Mestizo women ($p < 0.05$). Indigenous (PR: 0.59; 95% CI: 0.37-0.52) and Afro-Ecuadorian (PR: 0.94; 95% CI: 0.62-1.43) women were less likely to ever had a mammogram in comparison to Mestizo women. These findings supports the hypothesis that ethnic minority women will be less likely to be have knowledge and screening practices regarding breast cancer in comparison to the majority ethnic women.

Nearly one-third (35.1%) reported been taught how to perform a self-breast exam. Mestizo (38.4%) and Afro-Ecuadorian (31%) women reported the highest percentages. Indigenous women were statistically significant less likely than Mestizo women to been taught how to do breast self-examination (PR: 0.37; 95% CI: 0.30-0.46) and ever done breast self-examination (PR: 0.50; 95% CI: 0.42-0.61) after controlling for confounders ($p < 0.05$). However, Afro-Ecuadorian women were similar to Mestizo women in being taught how to do a breast self-examination (PR: 1.00; 95% CI: 0.87-1.16) and had ever conducted a breast self-examination (PR: 0.98; 95% CI: 0.93-1.14). Results from additional analyses related to breast cancer screening can be found in Table 3. Nearly one-third (35.1%) reported been taught how to perform a self-breast exam. Significant differences can be observed across ethnicity and these findings were confirmed in the multivariate analyses.

Only 6.8% reported having at least one mammography in their lifetime. Significant differences between ethnicities suggest a lack of access to health care services, especially for Indigenous women, where only 1.8% reported having a mammography in their lifetime. On the other hand, higher numbers of mestizo women (7.4%) and Afro-Ecuadorians (5.7%) reported having a mammography in their lifetime.

The most frequent reason (57.7%) noted by women who reported that they had never had a mammogram was that they had not considered it to be necessary for them to do so. Other reported reasons were that they did not know that they should have one (14.5%), delaying going for the exam (13.1%), perceiving that the test is too expensive (5.5%), they are not the right age for the exam (4.7%), and fear regarding the exam itself (1.4%).

The differences in the reasons for not seeking a mammography can be observed by ethnicity. For example, Indigenous women reported the main reasons for not seeking breast cancer screening was not considering it necessary for them to do so (37.1%) and did not being aware that they should have one (36.1%). Mestizos (59.9%) and Afro-Ecuadorians (65.5%) reported they did not know it was necessary. This difference was also observed in breast cancer awareness, where Mestizo women were more likely to have ever heard of breast cancer when compared to Indigenous and Afro-Ecuadorian women.

Cervical Cancer

The reported lifetime prevalence of screening was highest among Mestizo women (55.8%) and lowest among indigenous women (24.1%). Different organizations were used for cervical cancer screening, however the Ministry of Public Health, a governmental funded organization, was

the highest reported place. The Ministry of Public Health clinic or hospital (35.4%) followed by private practice clinic or medical physician offices (25.1).

Out of the women who reported to be familiar with Pap smear screening exam for cervical cancer, slightly more than half (52.5%) reported that they had been screened at least once in the past. Mestizo women reported the highest percentage for cervical cancer knowledge. Without adjusting for other covariates, the prevalence ratio for having received information regarding cervical cancer between Indigenous women and Mestizo women is 0.73 (95% CI: 0.61-0.87). With covariate adjustment, the prevalence ratio for having any lifetime use of birth control pills between Indigenous women and Mestizo women reduces to 0.66 (95% CI:0.56-0.78). This indicates that Indigenous women are statistically much less likely to ever had received information regarding cervical cancer in comparison to Mestizo women ($p < 0.05$). Afro-Ecuadorian women (PR: 0.90; 95% CI: 0.76-1.07) were less likely to ever had received cervical cancer information in comparison to Mestizo women. These ethnic disparities can be observed in screening as well. Indigenous women (PR: 0.56; 95% CI: 0.50-0.62) and Afro-Ecuadorian women (PR: 0.98; 95% CI: 0.90-1.07) were less likely than Mestizo women to have a lifetime pap smear. These findings support the hypothesis that Mestizo women are more likely to have cervical cancer knowledge and screening in comparison to the ethnic minority women. Results from additional analyses related to cervical cancer screening can be found in Table 3.

There were no statistically significant differences ($P < 0.05$) in the time reported for the last screening among Mestizo, Afro-Ecuadorian and Indigenous women (364 ± 80 days vs. 360 ± 78 days vs. 360 ± 91 days). The two most frequent reasons noted by the participants ($n=5068$) who reported that they had never undergone a pap smear were that they (1) had not considered it to be

necessary for them to do so (36.7%) or (2) that they did not know that they should have one (23.7%).

HIV Knowledge and Screening Practices

All ethnic differences for HIV knowledge and screening are presented in Table 4. HIV infection was the most common STI to be known by the ethnic groups. Mestizo (92.8%) reported the highest percentage for knowing HIV in comparison to Indigenous (46.1%) and Afro-Ecuadorian (92.4%) women. Indigenous women (PR: 0.60; 95% CI: 0.56-0.64) were statistically significant less likely than Mestizo women to ever heard about HIV/AIDS ($p < 0.05$). Afro-Ecuadorian (PR: 1.04; 95% CI: 1.01-1.07) women were not statistically significant different from Mestizo women ($p < 0.05$) to ever heard about HIV/AIDS. Mestizo (12.9%) reported the highest screening percentage in comparison to Indigenous (2.0%) and Afro-Ecuadorian women (11.5%). Indigenous (PR: 0.37; 95% CI: 0.24-0.57) and Afro-Ecuadorian (PR: 1.24; 95% CI: 0.94-1.62) women were statistically significant less likely than Mestizo women to ever been tested for HIV ($p < 0.05$). These findings support the hypothesis that minority ethnic groups are more likely than Mestizo women, the majority ethnic group, to know about HIV and have higher screening practices.

STIs Knowledge

HIV, gonorrhea and syphilis were the most acknowledged STIs by the three ethnic groups. The highest percentages for HIV, gonorrhea, and syphilis were reported by Mestizo women (92.8%, 74.7%, 52.6%), followed by Afro-Ecuadorian (92.4%, 80.2%, 50%) and Indigenous women (46.1%, 20%, 11.7%). Indigenous women were statistically significant less likely than Mestizo women to ever hear about HIV (PR: 0.60; 95% CI: 0.56-0.64), gonorrhea (PR: 0.38; 95%

CI: 0.33-0.43) and syphilis (PR: 0.38; 95% CI: 0.32-0.45) after controlling for confounders ($p < 0.05$). Afro-Ecuadorian (PR: 1.19; 95% CI: 1.13-1.26) women statistically not significantly different than Mestizo women about ever heard of gonorrhea ($p < 0.05$). These findings support the hypothesis that minority ethnic groups are more likely than Mestizo women, the majority ethnic group, to know about STIs. Results from additional analyses related to STIs knowledge can be found in Table 5.

Chapter 7: Discussion

This study investigated the ethnic differences in knowledge and practices regarding contraceptive use, breast and cervical cancer and STIs. This study identified health education as an area for improvement for the communities in Ecuador. Health literacy is a critical component of women's health status and their family. Child mortality rates are higher in households where mothers did not complete elementary education (WHO, 2009). A direct relationship has been observable between low health literacy and low formal education resulting in low breast cancer screening, overall poorer health status and higher mortality rates (Berkam *et al.*, 2011). Poor health literacy partially explains racial disparities for some outcomes (Berkam *et al.*, 2011).

Contraceptive Use

One of the areas of focus of this study was to assess the knowledge and perceptions regarding contraceptive use among reproductive aged Mestizo, Indigenous and Afro-Ecuadorian women. Of the total number of ENDEMAIN respondents, more than half reported ever using contraceptive method. Out of the three ethnic groups, Mestizo women were the most educated, employed and health insured. These socio demographic factors placed the Mestizo women at advantage in terms of knowledge, access and practices in comparison to the Indigenous and Afro-Ecuadorians. Therefore, Mestizo women reported being more likely to ever hear of modern contraceptive in comparison to the other two ethnic groups. In addition, contraceptive use was higher among Mestizo women in comparison to the Indigenous and Afro-Ecuadorian women. This study assessed both modern and traditional methods of contraception; such methods include: oral contraceptives, implants, intrauterine device (IUD), male and female condoms, male and female sterilization, emergency contraceptive pill, withdrawal, calendars, and periodic abstinence. The use of aforementioned methods depends heavily on a woman's access to such resources, her

knowledge and perceptions of these methods, as well as social and cultural influence on her decision-making processes (Ross & Hardee, 2013). The existing health disparity between Mestizo women and Indigenous and Afro-Ecuadorians has been observable throughout Latin America, studies suggest that the main determining factor for this is the limited access to sources where to obtain the contraceptive (Ross & Hardee, 2013). However, education seems to be an essential factor in contraceptive use. An intervention conducted among Afro-Ecuadorian women that included education about contraceptive use and accessibility to condoms resulted in increased contraceptive use. Current interventions in Ecuador focusing on the most at risk group, Afro-Ecuadorians, have increased condom use among this group. Almost half of the respondents (43.8%) reported currently using a contraceptive method; this prevalence is comparable to Mestizo women prevalence who also almost half reported currently using a contraceptive method (44.6%). The success of current interventions in Afro-Ecuadorians suggests the need for tailored interventions for Indigenous women. The effectiveness of such interventions emphasize the need for policy reform which will make contraceptives and family planning education available at local health centers in the Indigenous and Afro-Ecuadorians communities; such formal health education for women will aid in reducing health disparities for the ethnic minority women in future (Pignone et al., 2005; Benjamin, 2010).

Health Screening knowledge, attitudes and practices (KAP)

Cervical and breast cancer rates are higher in low-income countries in comparison to middle and high-income countries. One of the aims of this study was to assess the differences in health knowledge, attitudes and practices (KAP) regarding cervical and breast cancer among the three major ethnic groups in Ecuador. As hypothesized, differences were as expected in which Mestizo women, in comparison to Indigenous and Afro-Ecuadorian women, reported a higher

level of KAP. Factors shaping KAP levels in general include health education, formal education, access to healthcare and

Cervical Cancer

Only half of the respondents (52.5%) reported ever having a Pap smear test in their lifetime. The low reported prevalence of cervical cancer screening is alarming taking into consideration that in the U.S., Hispanics and Afro-Ecuadorian women report more than 70% prevalence (CDC, 2010) of cervical cancer screening. Although screening disparities experienced in developing countries are attributable to poor access to healthcare, lack of education and poor risk awareness, further studies need to be conducted to analyze the extent that ethnicity might have in screening among low and high and middle income countries.

Among the three ethnic groups, Mestizo reported the higher screening prevalence in comparison to Indigenous and Afro-Ecuadorian women. Results from this study suggest that poor access to preventive healthcare is the main factor influencing screening practices. More than 80% of surveyed Mestizo women lack health insurance. However they reported the highest screening practices (55.8%). Even though this was true even after controlling for demographic factors, the fact that Mestizo women are more likely to reside in a urban setting instead of a rural might be one of the reasons for the screening disparities among Mestizo women and Indigenous and Afro-Ecuadorian women. Another factor could be higher cervical cancer risk awareness among Mestizo women and hence more proactive screening practices. Indigenous women reported the lowest screening practices with only 24.1% of the Indigenous women reported ever having a pap smear in their lifetime. This low cervical cancer screening rate emphasizes the need for tailoring health interventions for Indigenous and Afro-Ecuadorian women. Such interventions must incorporate

increasing access (proximity) to screening in addition to the promotion of screening. Policy development for preventive measures should be implemented as well. Policy needs to acknowledge the need for tailored programs and facilitate availability of culturally appropriate services for these ethnic groups. Funding for mobile screening units could help to address the lack of access issue among these vulnerable ethnic groups. Further studies need to be conducted to address the frequency in which these three major Ecuadorian ethnic groups access cervical cancer screening. This research would allow identifying other factors that might be influencing a women's decision to periodically conduct cervical cancer screening, since early diagnosis increases survival rate.

Mestizo women were more likely to receive information about cervical cancer and having a pap smear during their lifetime in comparison to Indigenous and Afro-Ecuadorian women. The existing health disparity between Mestizo and Indigenous women could be attributed to a low prevalence of cancer and the limited education access of the latter ethnic group (Moore et al., 2014). Although previous research has suggested that poor access to preventive healthcare is the underlying factor for low screening prevalence. Results from this study suggest that lack of information and risk awareness are the major factors influencing the screening prevalence among these Ecuadorian ethnic groups. An intervention focusing on increasing access to health/screening services in addition to promotion of screening among Afro-Ecuadorian women showed an increase in health knowledge and screening practices among this group in comparison to the baseline (Gottschalk, 2014). Indigenous women may benefit from such tailored interventions that address the lack of awareness about cervical cancer screening and lack of access to screening.

As expected Mestizo women showed the highest screening practices in comparison to the other two ethnic groups. Education seems to be a major factor determining a women's decision to

cervical cancer screening (Berkam *et al.*, 2011). Hence educational interventions need to emphasize the potential risk for cervical cancer considering that the main reasons reported by those women who have not had a pap smear were that they were not aware of the need to have a test or that they had not considered it necessary or that they did not know that they should have one.

Breast Cancer

Globally, breast cancer awareness has increased among women over the past decade (Jemal *et al.*, 2011). Ecuador has not been the exception; this was reflected in the breast cancer knowledge reported by the women of this study. More than 60% reported ever having heard of breast cancer. However, only 35.1% of the respondents reported ever having a breast exam. This may be due to a low perceived risk, lack of healthcare access, low SES, embarrassment and fatalism. (Pushel *et al.*, 2009).

As hypothesized, Mestizo women were more likely to ever hear of breast cancer in comparison to Indigenous and Afro-Ecuadorian women. Indigenous reported the less knowledge, this supports previous research suggesting that access to healthcare and health insurance are factors shaping preventive care seeking. Indigenous women were more likely to be insured and reported more than 90% of them being insured compared to Mestizo and Afro-Ecuadorian.

Self-breast examination has been used as breast cancer screening practice, however the proper examination technique needs to be taught for a preventing effect. Low- and middle-income countries promote self-breast examination as a preventive measure for breast cancer to avoid the high cost or lack of access to mammography services (Dey, 2014). However, only 35% of study participants reported been taught how to perform a self-breast exam. No detailed information was studied in regards to the technique used by those respondents who acknowledged been taught how

to perform a self-breast exam. Further studies need to be conducted to assess the efficacy and practice behavior of those women who were taught self-breast examination among these ethnic groups.

Although the three ethnic groups reported a low prevalence of ever had a breast cancer screening. Indigenous women reported the lowest prevalence of mammography practices. Tailored interventions for this vulnerable ethnic group should be implemented to ensure proper preventive services are available and culturally accessible.

As stated before health education has been identified as one of the main factors for women to understand breast cancer risk and motivate proactive screening practices. Formal health education needs to be focus on policy development and proposed interventions. Respondents reported two of the main reasons for never had performed a mammography was that they did not considered to be necessary and that they did not know they should have one. Despite Indigenous women reported the lowest breast cancer screening prevalence, Afro-Ecuadorian women reported the highest percentage for not knowing that they should get one.

Sexual Transmitted Diseases Knowledge

This decade women are being sexually active at an early stages in comparison to previous decades. Ecuador is not the exception. As a female engage in early sexual behavior have a much higher risk of contracting sexually transmitted infections. However, low levels of knowledge about sexual transmitted infections have been reported on developing countries. This problem has been linked to poor STIs screening and high rates of infection.

Afro-Ecuadorian women were more knowledgeable about sexual transmitted diseases when compared to Indigenous and Afro-Ecuadorian women. Although Mestizo women were more

likely to be knowledgeable than Indigenous women, Afro-Ecuadorian reported higher knowledge for the most common sexual transmitted infections (STIs). This can be attributable to interventions conducted countrywide focusing on Afro-Ecuadorian women, since they have reported highest infection rates for common STIs. The success of this intervention among a high risk ethnic group demonstrate the need for effective tailored interventions for Indigenous women addressing specific seeking screening behaviors factors should be implemented.

Despite all STIs have health impacts, HIV is considered of the greatest concern. Although the mortality rate for HIV has decreased over the years, low and middle income countries still display high rates of mortality (Global Health Observatory Data Repository, 2013) probably due to the late diagnosis and low screening practices. Afro-Ecuadorian women were more likely to have HIV knowledge and screening practices in comparison to Mestizo and Indigenous women suggesting that interventions tailored to Afro-Ecuadorian women may enhance STI/HIV testing. Indigenous women reported the lowest knowledge, underlying the need for STI and HIV awareness among this ethnic group. Most of ENDEMAIN respondents reported knowing HIV in comparison to the rest of the surveyed STIs. This was true for all three ethnic groups. However, specific knowledge on transmission, treatment and cure was not as accurate as the solely existence of HIV. For example, only 77.3% of Mestizo women reported that HIV cannot be cured/it is a mortal disease in comparison to 33.2% of Indigenous women and 68.5% of Afro-Ecuadorian women. In addition, limited knowledge was reported for places where HIV testing services are provided as well as HIV preventive methods. Indigenous women were the least likely to have accurate knowledge in comparison to the Indigenous and Afro-Ecuadorians probably causing the low testing percentage (2%) in comparison to the Mestizo women (12.9%) and Afro-Ecuadorian women (11.5%). Access to care and information has been a decisive factor for accurate

knowledge, higher testing rates and taking preventive measures (Park *et al.*, 2002). Women living in urban communities are more likely to have higher KAP regarding HIV (Park *et al.*, 2002), this can explain the low prevalence in knowledge and testing reported by Indigenous women. Policy development advocating for HIV former education and HIV testing in urban and rural community centers is being proposed for the promotion of safer sexual behavior among Ecuadorian women. Since, indigenous women reported the lowest KAP, it is necessary for a tailor intervention in which determining factors for KAP are addressed.

Study Strengths and Limitations

The ENDEMAIN survey has several of strengths. It is nationally representative of households with reproductive age women in Ecuador. Hence, a comparison through time can be done and inferences for the future health of the country can be made. In addition, it is a large sample size (10,813), and randomly selected households which allowed for a representative sample and thus allowing for inferences about the reproductive health status of the women 15-49 years old across the country. In addition, it is one of the few studies that analyze the interrelation between ethnic minorities in reproductive behaviors; and a few addressing minority disparities among the ethnic groups in Ecuador.

This study also has several potential limitations. For example, it is not possible to established causality since the data were collected in a cross-sectional study. All answers were self-reported; therefore, some bias might be found due to agreeability and recall-bias.

Chapter 8: Conclusions

The study findings have implications for program planning and policy development for reducing health disparities in minority populations. Ecuadorian minority groups often experience undesirable health outcomes. The study results shed light on the factors shaping health disparities related to sexual and reproductive health among ethnic groups and consequently inform public health programs design for these population groups. Public health programs focusing on increasing uptake and adherence of regular screening health behaviors for breast and cervical cancer and STIs must also strive to advance policy.

Based on the results of this study, policy development for preventive measures (biometric exam, mammography & pap smear) provided free of cost to all women should be implemented. This policy in addition to providing preventive services, needs to include: educational sessions for contraceptive use, cervical and breast cancer screening and sexual transmitted infections screening. Policy for mandatory health educational related to contraceptive use, cervical and breast cancer and sexual transmitted infections could be enforced for women in reproductive years.

Since minority ethnic groups are at risk of having the poorest reproductive health outcomes, tailored interventions for indigenous and Afro-Ecuadorian women must address major reproductive health issues such as contraceptive use and breast and cervical cancer screening. This may help to decrease the number of unplanned pregnancies and reduce the maternal/child mortality in these minorities and in the nation as a whole. In addition to informing public health program design, the study results have implications for policy development related to advancing the health of ethnic minority groups. Public health policy must address the lack of access to health care services among minority women residing in rural areas.

Table 1: Descriptive statistics of sociodemographic characteristics for Mujer en Edad Fertil (MEF) respondents aged 15-49 years old

	All women	Mestizo	Indigenous	Afro-Ecuadorian
Mean Age	30.1 (±9.4)	30.2(±9.4)	28.9 (±9.4)	29.4(±10.0)
Mean Parity	2.3(±2.1)	2.2 (±2.0)	2.9 (2.7)	2.8(±2.7)
Education				
None	404 (3.7%)	220 (2.4%)	165 (15.8%)	12 (3.1%)
Primary	4366 (40.4%)	3477(37.4%)	643 (61.6%)	205 (53.4%)
Secondary	4368 (40.4%)	4006 (43.1%)	208 (19.9%)	129 (33.6%)
Superior	1676 (15.5%)	1600 (17.2%)	27 (2.6%)	38 (9.9%)
Health insurance				
Public or Private	1165 (10.8%)	1053 (11.3%)	66 (6.3%)	39 (10.2%)
None	9608 (88.8%)	8215 (88.3%)	973 (93.3%)	343 (89.3%)
Marital Status				
Married/ Living with partner	7181(66.4%)	6186 (66.5%)	690 (66.2%)	240 (62.5%)
Divorced/Separated/Widow	1046 (9.7%)	909 (9.8%)	72 (6.9%)	53 (13.8%)
Single	2587 (23.9%)	2208 (23.7%)	281 (26.9%)	91 (23.7%)
Employment				
Yes	5056 (46.7%)	4195 (45.1)	659 (63.2%)	164 (42.7%)
No	5758 (53.25%)	5108 (54.9%)	384 (36.8%)	220 (57.3%)
Income quintile				
First	2607 (24.1%)	1925 (20.7%)	538 (51.6%)	112 (29.2%)
Second	2321 (21.5%)	1945 (30.9%)	261 (25.0%)	101(26.3%)
Third	2118 (19.6%)	1889 (20.3%)	130 (12.5%)	78(20.3%)
Fourth	2020 (18.7%)	1885 (20.3%)	75 (7.2%)	53(13.8%)
Fifth	1748 (16.2%)	1659 (17.8%)	39 (3.7%)	40(10.4%)

Table 1: Ethnic differences in contraceptive knowledge and use among Mujer en Edad Fertil (MEF) respondents aged 15-49 years old

	Mestizo n=9308	Indigenous n=1042	Afro- Ecuadorian n=384	Indigenous		Afro-Ecuadorian	
				Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)	Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)
Contraceptives							
Any lifetime use of a contraceptive method	6730 (72.3%)	468 (44.9%)	278(72.4%)	0.62 (.58-.66)†	0.68(.64-.72)‡	1.00(.94-1.07)	1.05(1.00-1.11)‡
Any lifetime use of a modern contraceptive method	6131 (65.9%)	300 (28.8 %)	252 (65.6%)	0.44(.46-.48)†	0.51(.46-.56)‡	1.00(.93-1.08)	1.06(1.00-1.13)
Current use of a contraceptive method	5136 (55.2%)	346(33.2%)	202 (53.9%)	0.60(.55-.66)†	0.65(.60-.71)‡	0.98(.89-1.07)	1.00(.93-1.06)
Current use of a modern contraceptive method	4151 (44.6%)	189(18.1%)	168 (43.8%)	0.41(.36-.46)†	0.47(.41-.53)‡	0.98(.87-1.01)	1.01(.91-1.23)
Vasectomy							
Familiar with method	3694 (39.7%)	91(87%)	111(28.9%)	0.22(.18-.27)†	0.43(.35-.52)‡	.73(.62-.85)†	.94(.82-1.09)
Any lifetime use	17 (0.5%)	0 (0.0%)	0 (0.0%)	--	--	--	--
Current use	17 (0.5%)	0 (0.0%)	0 (0.0%)	--	--	--	--
Female Sterilization							
Familiar with method	8325 (89.6%)	578 (55.4%)	330 (85.9%)	0.62(.59-.65)†	0.70(.67-.75)‡	.96(.92-1.00)	1.00(.96-1.04)
Any lifetime use	1656 (19.9%)	6.6 (11.4%)	60 (18.2%)	1.03(1.01-1.05)	1.05(1.03-1.07)‡	.98(.94-1.02)	1.02(1.00-1.05)
Current use	1656 (19.9%)	6.6 (11.4%)	60 (18.2%)	1.02(1.01-1.05)	0.98(0.96-1.04)‡	.96(.92-1.04)	0.99(0.98-1.05)
Norplant							
Familiar with method	3121 (33.5%)	82(7.9%)	83 (21.6%)	0.23(.19-.29)†	0.40(.32-.49)‡	0.64(.53-.78)†	0.78(.65-.94)‡
Any lifetime use	75 (2.4%)	0 (0%)	0 (0%)	--	--	--	--
Current use	35	0	0	--	--	--	--
Contraceptive Injections							
Familiar with method	7908 (85%)	466 (44.7%)	319 (83.1%)	0.53 (.49-.56)	1.04(1.02-1.06)‡	0.98(.93-1.02)	1.04(1.02-1.07)‡
Any lifetime use	1904(24.1%)	79 (17.0%)	53 (16.6%)	1.04 (1.02-1.06)†	1.03(1.01-1.05)‡	1.04 (1.02-1.07)†	1.04(1.02-1.06)‡
Current use	447 (23.5%)	26 (32.9%)	12(22.6%)	0.95(.89-1.01)	0.95(.89-1.01)	1.05 (.94-1.07)	1.01(.95-1.08)
Birth Control Pills							
Familiar with method	8540 (91.8%)	552(52.9%)	354(92.2%)	0.58(.54-.61)†	0.66(.63-.70)‡	1.00(.98-1.04)	1.04(1.01-1.07)‡
Any lifetime use	4759(55.7%)	439(79.5%)	175 (49.4%)	1.15(1.13-1.18)†	1.16(1.13-1.18)‡	0.96(.93-.99)†	0.96(.92-.99)‡
Current use			61(34.1%)	0.99(.94-1.04)	1.01(.96-1.06)	0.95(.91-.099)†	0.94(.91-.98)‡
IUD Devices							

Familiar with method	8233 (88.5%)	511 (49.0%)	324 (84.4%)	0.55 (.52-.59)†	0.65(.62-.70)‡	0.95(.91-1.00)	1.01 (.96-1.04)
Any lifetime use	2321 (28.2%)	114 (22.3%)	84 (25.9%)	1.03 (1.01-1.06)†	1.03(1.01-1.05)‡	1.01 (.99-1.04)	1.01 (.98-1.04)
Current use	704 (30.3%)	56 (49.1%)	28 (33.3%)	0.89 (.84-.95)†	0.92(.86-.98)‡	0.98 (.92-1.05)	0.98(.92-1.05)
Male Condom							
Familiar with method	8326 (89.5%)	416(39.9%)	343(89.3%)	0.45 (.41-.48)†	0.55 (.51-.59)‡	1.00(.96-1.03)	1.05(1.01-1.09)‡
Any lifetime use	2557 (30.7%)	71 (17.1%)	83 (24.2%)	1.04 (1.03-1.06)†	1.05(1.03-1.07)‡	1.01(.99-1.03)	1.02(.99-1.05)
Current use	427(16.7%)	15 (21.1%)	16 (19.3%)	0.98(.93-1.03)	0.97(.94-1.03)	0.99(.94-1.03)	0.98(.94-1.03)
Male Withdrawal Method							
Familiar with method	4051 (43.5%)	269(25.8%)	178(46.4%)	0.59(.53-.66)†	.75(.67-.84)‡	1.07(.95-1.19)	1.18(1.06-1.31)‡
Any lifetime use	2065 (51.0%)	178 (66.2%)	94 (52.8%)	0.90(.86-.94)†	0.94(.90-.99)‡	0.99(.94-1.04)	1.00(.95-1.05)
Current use	680 (32.9%)	111(62.4%)	37 (39.4%)	0.83(.78-.87)†	0.90(.85-.95)‡	0.96(.90-1.02)	0.98(.92-1.04)
Rhythm method							
Familiar with method	5921(63.6%)	293(28.1%)	215(56.6%)	0.59(.53-.66)†	0.61(.56-.68)‡	1.06(.95-1.19)	1.00(.92-1.09)
Any lifetime use	2113 (35.7%)	136(46.4%)	52 (26.0%)	0.94(.90-.97)†	0.93(.90-0.97)‡	1.06(1.02-1.10)†	1.05(1.02-1.09)‡
Current use	618(29.2%)	75(55.1%)	21 (37.5%)	0.85(.80-.90)†	0.89(.83-.95)‡	0.95(.88-1.03)	0.96(.89-1.04)
Vaginal methods							
Familiar with method	3470(37.3%)	69(6.6%)	138 (35.9%)	0.18(.14-.22)†	0.31(.24-.39)‡	0.96(.84-1.10)	1.16(1.02-1.33)‡
Any lifetime use	504(14.5%)	7(10.1%)	29 (21.0%)	1.02(.99-1.06)	1.03(.99-1.06)	0.97(.93-1.00)	0.97(.93-1.01)
Current use	28(5.6%)	0 (0.0%)	2 (6.9%)	1.03(1.02-1.04)†	1.03(1.01-1.05)‡	0.99(.95-1.04)	0.99(.95-1.04)
Lactational Amenorrhea							
Familiar with method	2665 (28.6%)	90 (8.6%)	100 (26.0%)	.30(.25-.37)†	0.46(.38-.58)‡	.91(.77-1.08)	1.04 (.88-1.24)
Any lifetime use	464 (17.4%)	24 (26.7%)	19(19.0%)	.95(.90-1.00)	0.96(.91-1.01)	.99(.95-1.04)	1.00 (.96-1.04)
Current use	64(13.8%)	8 (33.3%)	4(21.1%)	.90(.80-1.00)	0.92(.82-1.04)	0.96(.87-1.07)	0.98 (.88-1.09)
Emergency Contraceptives							
Familiar with method	1677 (18%)	40(3.8%)	64(16.7%)	0.21(.16-.29)†	0.45(.33-.61)‡	0.93(.74-1.16)	1.24(.99-1.56)
Any lifetime use	81(4.8%)	0	5(7.8%)	1.025(1.02-1.03)†	1.02(1.01-1.03)‡	0.99(.95-1.02)	0.99(.95-1.02)
† p<0.05 =statistically significant unadjusted association in reference with Mestizo women. ‡ p<0.05 = statistically significant adjusted association in reference with Mestizo women. -- No statistical analysis was performed.							

Table 2: Ethnic differences in breast and cervical cancer knowledge and screening practices among Mujer en Edad Fertil (MEF) respondents aged 15-49 years old

	Mestizo n=9308	Indigenous n=1042	Afro- Ecuadorian n=384	Indigenous		Afro-Ecuadorian	
				Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)	Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)
Tetanus vaccination							
Ever been vaccinated against tetanus	7213(80.8%)	651(66.6%)	320(85.8%)	0.82(.79, .86) †	0.86(.82-.90)‡	1.06(1.02, 1.11)†	1.08(1.04, 1.12)‡
Cervical Cancer Screening							
Ever received information about cervical cancer	3142(33.9%)	131(12.9%)	94(24.6%)	0.73(.61-.87) †	0.66(.56-.78)‡	0.38(.33-.45)†	0.90(.76-1.07)
Lifetime-ever had a pap smear	5178(55.8%)	244(24.1%)	190(49.6%)	0.43(.39-.44) †	0.56(.50-.62)‡	0.89(.80-0.99)†	0.98(.90-1.07)
Timing of most recent pap smear (1-way ANOVA)	363.1+-80	360+-90.5	360.5+-78	--	--	--	--
Breast Cancer Screening							
Ever heard of breast cancer	6748(72.6%)	302(29.0%)	267(69.5%)	0.40(.36-.44) †	0.53(.48-.58)‡	0.96(.90-1.103)	1.05(.98-1.19)
Have you done a breast self-examination	3143(33.8%)	103(9.9%)	107(27.9%)	0.29(.24-.35) †	0.50(.42-.61)‡	0.82(.70-.97)†	0.98(.083-1.14)
Has anyone taught you to do a breast self-exam	3571(38.4%)	78(7.8%)	119(31.0%)	0.20(.16-.24) †	0.37(.30-.46)‡	0.81(.69-.94)†	1.00(.87-1.16)
Lifetime-Have you ever had a mammogram	686(7.4%)	19(1.8%)	2.2(5.7%)	0.25(.16-.35) †	0.59(.37-.52)‡	0.73(.51-1.17)	0.94(.62-1.43)
Had no symptoms thus no need for it	5158(60.4%)	380(39.0%)	237(66.0%)	0.42(0.38-0.44)	0.44(.23-.64)	0.77(.62-.98)	0.92(.61-1.27)
Lack of information about mammograms	1033(12.1%)	370(37.9%)	43(12.0%)	0.27(0.23-0.36)	0.32(.21-.58)	0.74(.58-.92)	0.88(.55-1.14)
† p<0.05 =statistically significant unadjusted association in reference with Mestizo women. ‡ p<0.05 = statistically significant adjusted association in reference with Mestizo women. -- No statistical analysis was performed							

Table 3: Ethnic differences in HIV knowledge and screening practices among Mujer en Edad Fertil (MEF) respondents aged 15-49 years old

	Mestizo n=9308	Indigenous n=1042	Afro- Ecuadorian n=384	Indigenous		Afro-Ecuadorian	
				Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)	Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)
Ever heard of HIV/AIDS	8636(92.8%)	481(46.1%)	355(92.4%)	0.50(.47-.53)†	0.60(.56-.64)‡	1.00(.97-1.03)	1.04(1.01-1.07)‡
Belief person can be infected but not show symptoms	6456(69.4%)	270(25.9%)	237(61.7%)	0.37(.34-.41)†	0.51(.46-.57)‡	0.89(.82-.96)†	0.98(.91-1.06)
Belief HIV cannot be cured. Mortal illness	7195(77.3%)	356(33.2%)	263(68.5%)	0.43(.39-.47)†	0.56(.51-.61)‡	0.89(.83-.95)†	0.95(.88-1.01)
Ever heard of HIV testing	5568(59.9%)	149(14.3%)	214(36.2%)	0.24(.21-.28)†	0.37(.32-.43)‡	0.93(.85-1.02)	1.09(1.00-1.19)‡
Knows where to get HIV test	3748(40.3%)	74(7.1%)	139(36.2%)	0.18(.14-.22)†	0.34(.27-.42)‡	0.90(.79-1.03)	1.14(1.00-1.29)‡
Ever been tested for HIV	1200(12.9%)	21(2.0%)	44(11.5%)	0.16(.10-.24)†	0.37(.24-.57)‡	0.89(.67-1.18)	1.24(.94-1.62)
Reports knowing 2 or more HIV prevention methods	3432(36.9%)	78(7.5%)	133(34.6%)	0.20(.16-.25)†	0.32(.26-.40)‡	0.94(.82-1.08)	1.10(.96-1.26)
Total # of HIV prevention methods named	1.3+-1.2	0.3+-0.7	1.3+-1.2	--	--	--	--
† p<0.05 =statistically significant unadjusted association in reference with Mestizo women. ‡ p<0.05 = statistically significant adjusted association in reference with Mestizo women. -- No statistical analysis was performed							

Table 5: Ethnic differences in STIs knowledge among MEF respondents aged 15-49 years old

	Mestizo n=9308	Indigenous n=1042	Afro- Ecuadorian n=384	Indigenous		Afro-Ecuadorian	
				Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)	Unadjusted PR (95% C.I.)	Adjusted PR (95% C.I.)
Ever heard of:							
Syphilis	4891(52.6%)	122(11.7%)	192(50.0%)	0.22(.19-.26)	0.38(.32-.45)‡	0.95(.86-1.05)	1.15(1.04-1.26)
Gonorrhea	6948(74.7%)	209(20.0%)	308(80.2%)	0.27(.24-.30)†	0.38(.33-.43)‡	1.07(1.02-1.30)†	1.19(1.13-1.26)‡
HIV	8636(92.8%)	481(46.1%)	355(92.4%)	0.50(.47-.53)†	0.60(.56-.64)‡	1.00(.97-1.03)	1.04(1.01-1.07)
Genital Herpes	4261(45.8%)	80(7.7%)	125(32.6%)	0.17(.14-.21)†	0.31(.25-.38)‡	0.71(.61-.82)†	0.88(.76-1.01)
Genital Caudiloma	2480(26.7%)	43(4.1%)	100(26%)	0.16(.11-.22)†	0.27(.20-.37)‡	1.02(.86-1.22)	1.20(1.01-1.42)
Leuconhea	1888(20.3%)	35(3.4%)	65(16.9%)	0.17(.12-.23)†	.28(.20-.40)‡	0.83(.67-1.05)	1.02(.92-1.28)
Chlamydia	1002(10.8%)	15(1.4%)	45(11.7%)	0.13(.08-.22)†	.29(.17-.48)	1.09(.82-1.44)	1.42(1.07-1.89)
Hepatitis B	3559(38.3%)	85(8.1%)	148(38.5%)	0.21(.17-.26)†	0.38(.31-.46)‡	1.01(.89-1.15)	1.26(1.12-1.43)‡
HPV virus	1155(12.4%)	27(2.6%)	45(11.7%)	0.21(.14-.30)†	0.47(.32-.70)‡	0.94(.71-1.25)	1.25(.94-1.67)
Trichomoniasis	1137(12.2%)	15(1.4%)	44(11.5%)	0.12(.07-.20)†	0.29(.17-.49)‡	0.94(.71-1.25)	1.31(.98-1.75)
Candidiasis	1056(11.4%)	10(1.0%)	34(8.9%)	0.08(.05-.16)†	0.22(.11-.41)‡	0.78(.56-1.08)	1.11(.80-1.54)
† p<0.05 =statistically significant unadjusted association in reference with Mestizo women.							
‡ p<0.05 = statistically significant adjusted association in reference with Mestizo women.							

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Curriculum Vitae

Ruth Castillo was born and raised in Cd. Juarez, Mexico. After she completed her high school education, applied to El Paso Community College for an Associates of Science and then she transferred to The University of Texas at El Paso (UTEP) to pursue a Bachelor's degree in Biological Sciences. As an undergraduate she was actively involved in research and completed three summer internships (Princeton University, Universidad de Cadiz in partnership with Bucknell University and Universidad de Costa Rica in partnership with UTEP). In addition, she volunteered with Texas Tech Health Science Center doing breast cancer research and her findings allowed her to become a co-author in a publication. Once she graduated with her Bachelor's, she decided to pursue the degree of Master's in Public Health. As part of the program she completed a practicum at the City of El Paso Department of Public Health, where she has been employed since the completion of the practicum. During her graduate studies she was involved in elderly falls research, which allowed her to become a co-author in a publication, and HIV research with out of care patients.