

A LONGITUDINAL ANALYSIS OF FACTORS ASSOCIATED WITH ADHERENCE TO  
PREVENTIVE PAP TEST RECOMMENDATIONS AMONG MIDDLE-AGE  
CHINESE-AMERICAN WOMEN

by

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## ABSTRACT

### **Background**

Pap tests can prevent cervical cancers by allowing for the early detection and removal of precancerous lesions. In the US, Chinese American women (66%) have a lower rate of obtaining Pap tests within the past three years than non-Hispanic white women (83%), Filipino women (83%), and Asian Indians (70%). Predictors of adherence to repeated Pap tests among Chinese American women are not well understood in the current literature.

### **Purpose**

The purpose of this longitudinal study is to analyze factors associated with adherence to preventive Pap tests among middle-aged Chinese American women. This longitudinal study will: (a) estimate annual uptake of Pap testing and examine changes over a seven-year period among middle-aged Chinese American women and (b) determine which factors are associated with middle-aged Chinese American women's adherence to Pap testing for cervical cancer prevention in the U.S. health care system.

### **Method**

The Study of Women's Health across the Nation (SWAN) Series provides the data from Chinese females for this secondary analysis. In total, the present study analyzed data from 498 individuals (1,326 person-time-waves). By using the Systems Model of Clinical Preventive Care, Generalized Estimating Equation (GEE) was applied to explore associations between the likelihood of having a pap test and explanatory factors.

## **Result**

Of the 1,326 person-time-waves, 61% (n= 824) had a Pap test in seven waves. The likelihood of adhering to Pap test among Chinese American women was significantly and positively associated with having a physician for female health care (PFH), time spent by the PFH, having cancer(s), and having fibroids. However, patients who were too busy to visit healthcare providers and patients who did not have a primary health care provider were less likely to adhere to a Pap test.

## **Discussion and Implications**

The findings highlighted the importance of the availability of healthcare resources and education about Pap testing for Chinese American women to encourage them to have preventive Pap tests. It is important for health care providers and social workers to emphasize the benefits of using preventive Pap tests for Chinese American women. Implications for practice are discussed.

## LIST OF ABBREVIATION AND SYMBOLS

%	Percent
n	Number
$\chi^2$	Computed value of chi-square test
Sig.	Significant/significance
SD	Standard deviation
p	The probability that the null hypothesis (that of no relationship) is correct
<	Less than
=	Equal to

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## **1. INTRODUCTION**

### **Natural History of Cervical Cancer**

Cervical cancers arise within cells in the transformation zone, the junction of the endocervix, which is covered with glandular cells, and the exocervix, which is covered in squamous cells (Castellsagué, 2008). There are two common types of cervical cancers: squamous cell carcinoma and adenocarcinoma. Over 90% of cervical cancers are squamous cell carcinomas and most of the other cervical cancers are adenocarcinomas (Castellsagué, 2008). Rarely, some cases are adenosquamous carcinomas or mixed carcinomas, which have features of both squamous cell carcinomas and adenocarcinomas (Moore, 2006).

Persistent human papillomavirus (HPV) infection has been firmly established as the main cause of cervical cancers (Bosch, Lorinez, Muñoz, Meijer, & Shah, 2002; de Sanjosé et al., 2010; Schiffman et al., 2007). Persistent infection by certain types of HPV is the cause of cervical cancer (Castellsagué, 2008). All cases of cervical cancers are caused by persistent infection with HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68 (Schiffman & Solomon, 2013). Papilloma viruses have co-evolved with animal hosts over millions of years. More than one hundred HPV genotypes have been identified, and more than 15 of those HPV genotypes can cause cervical cancers (Castellsagué, 2008).

HPV is considered the most common sexually transmitted infection among the general population. If the individuals infected with HPV do not become negative within two years, they move to the next step in the process of developing cervical cancer, viral persistence. The longer HPV is persistent, the lower the probability of clearance of HPV over time (Plummer, Schiffman, Castle, Maucort-Boulch, & Wheeler, 2007).

Based on the current medical evidence, the type of HPV is the strongest predictor of viral persistence and progression to precancer (Plummer et al., 2007). HPV 16 is more commonly associated with cancerous lesions than other types (Schiffman et al., 2007). Consequently, the risk of precancer diagnosis increases with the presence of HPV 16 (Plummer et al., 2007). In the precancer stage, undifferentiated cells with genetic abnormalities have replaced almost the full thickness of the cervical epithelium, and it is less possible that precancer regresses back to normality (Schiffman et al., 2007). Twenty-five to thirty-five are the average age of precancer (Kiviat, Critchlow, & Kurman, 1992). It is estimated that 40% of patients with 3–5 years of persistent infection may develop invasive cervical cancer. There is a 20–30% risk of invasion over a 5–10-year time frame for patients with precancer (Kinlen & Spriggs, 1978). The peak risk of cervical cancer is age from 35 to 55 (Kinlen & Spriggs, 1978).

### **Prevalence of Cervical Cancer**

Cervical cancer is one of the leading types of cancer in women worldwide (Jemal et al., 2011; Schiffman et al., 2007). Worldwide, the burden of cancer has shifted to developing countries. About 57% of cases and 65% of cancer deaths happen in less developed countries (Torre et al., 2015). Cervical cancer is the third leading cause of cancer death among females (Torre et al., 2015). Worldwide, approximately 527,600 new cases of cervical cancer are identified, and 265,700 deaths are caused by cervical cancer annually (Torre et al., 2015). In

2016, there were 12,990 new cases of cervical cancer and 4,120 deaths caused by cervical cancer in the United States (Siegel, Miller, & Jemal, 2016). In 2010, the incidence for cervical cancer was 8.1 cases per 100,000 women, and the mortality rate was 2.4 deaths per 100,000 women per year (National Institutes of Health, 2010).

In the United States, the burden of cervical cancer is disproportionately high among Asian women. Chinese Americans are the largest Asian sub-group (23% of 19.4 million Asian Americans) in the U.S., and their incidence rate of cervical cancer is 4.5, as compared to 8.0 in non-Hispanic White women (American Cancer Society, 2018). In the U.S., although Asian women have lower cervical cancer incidence than non-Hispanic White women, Asian women have lower screening rates than non-Hispanic White women (71% vs. 83%). In addition, Asian women have a lower five-year cause-specific survival rate than non-Hispanic White women (72% v.s. 70%) (Torre et al., 2016).

### **Cervical Cancer Preventive Screenings**

According to the pathology of cervical cancer, Many forms of cervical cancer can be prevented with early detection (Schiffman et al., 2007). The U.S. Preventive Services Task Force (USPSTF) and American Cancer recommend having interval Pap tests for cervical cancer to all females. In the past decades, the recommendations changed with the development of biomedical science. From 1987 to 2002, women who were aged 18 and over or sexually active were suggested to have yearly Pap testing; from 2003 to 2012, women were suggested to start to have yearly Pap testing 3 years after first vaginal intercourse but no later than 21, and women aged 30 years to 70 years should have a Pap test every 2 to 3 years after 3 normal results in a row (American Cancer Society, 2018). Since 2012 to present, Women aged 21 to 29 should have a

Pap test every 3 years. HPV testing will only be provided if there is an abnormal Pap test.

Women who are aged 30 to 65 are recommended to have a Pap test combined with an HPV test every 5 years; Or women aged 30 to 65 should continue to have a Pap test every 3 years, see table 1 (American Cancer Society, 2018). The established guidelines for cervical cancer screening are cost-effective strategies, because the risk of developing cervical cancer is very low among women within 5–10 years of first sexual intercourse, women after total hysterectomy for reasons unrelated to cancers, and older women with repeated negative cytology HPV tests (Solomon, Breen, & McNeel, 2007; Wright & Schiffman, 2003).

Table 1: History of Pap Testing Recommendations for Cervical Cancer Prevention

Date	Age	Frequency
1987-2002	18 years old or older	Yearly
	21 years old or sexually active	Yearly with conventional Pap test or every 2 years with liquid-based Pap test.
2003 - 2012	30 years old or older	Every 2 to 3 years. Or a Pap test combined with an HPV DNA testing every 3 years.
	70 years old or older	May stop if there is no abnormal test result
2012 - present	21 - 29	Every 3 years
	30 - 65	Every 3 years or every 5 years combined with HPV DNA test.
	Over 65	May stop if there is no abnormal test result

### Pap Test and HPV Test

There are dramatic decreases in the incidence and mortality of cervical cancer due to the wide use of cervical cancer screening (IARC Working Group on the Evaluation of Cancer, 2005). There are two other effective preventive strategies: HPV vaccination and preventive cervical cancer screenings (ex. HPV testing and Pap testing) (Schiffman et al., 2011). The Pap test is a screening used to detect potentially pre-cancerous (cervical intraepithelial neoplasia [CIN]) in the cervix (Schiffman & Solomon, 2013). In 1996, the Pap test was approved by the U.S. Food and Drug Administration to prevent cervical cancer (Carpenter & Davey, 1999).

The automated screening of liquid-based cytology (Pap test) is more advanced than the conventional cervical screening because it, as an automated-assisted method, can identify

abnormal areas of the slides for the pathologists to view to diagnose abnormalities (Carpenter & Davey, 1999). However, there is no convincing evidence that liquid-based cytology is more accurate than conventional screening (Schiffman et al., 2007). Nonetheless, liquid-based cytology may reduce the proportion of inadequate smears, which potentially improve the sensitivity of identifying abnormal cells (Schiffman et al., 2007b). The clinical evidence suggested that having interval Pap tests can reduce cervical cancer deaths by up to 80% (Arbyn et al., 2011). In addition, adjunctive HPV testing is used to clarify whether women have equivocal lesions (atypical squamous cells of undetermined significance). USPSTF and ACS suggest women to have a Pap test or a pap test combining with a HPV test every five years, starting at age 30 (Moyer, 2012).

In the U.S., Pap test programs usually target women aged 30–70 years, which are the peak ages of cervical cancer risk (Gustafsson, Pontén, Bergström, & Adami, 1997). Strategies of Pap testing require routine screenings at short intervals and a low cytological threshold for additional follow-up. The cytology-based cervical cancer screenings need repeated screening cycles (Schiffman & Solomon, 2013). The frequent use of cytology screening for cervical cancer creates the problem of high financial cost.

### **Cervical Cancer Screenings among Chinese American Women**

Preventive screening is indispensable to the process of cervical cancer treatment. Cervical cancer screening uptake varies among different settings and involves a wide range of social factors, such as age, race, affordability, demand for protection against cancer risk, and desire to prevent cervical cancer.

In the U.S., Chinese women tend to have lower utilization rates of Pap testing than Whites (American Cancer Society, 2016). The delay in getting Pap testing is particularly striking for Chinese women in the U.S. Late diagnosis is associated with accelerated progression to advanced cancer stages and a poorer prognosis for survival. In the US, Chinese women (66%) have a lower utilization rate of the Pap testing within the past three years than non-Hispanic White women (83%), Filipino women (83%), and Asian Indians (70%) (American Cancer Society, 2016). Among Chinese American women, high cervical cancer incidence and mortality is likely related to low prevalence of Pap test use, which leads to delaying treatment and detection of cancers at advanced stages (McCracken et al., 2008). Increasing adherence to periodic Pap tests among Chinese American women is of public health importance in the U.S.

Understanding Chinese American women's Pap test use behaviors under the U.S. health care system is important, and little has been done in this area. There is a lack of current literature about Chinese American women's long-term cancer-related health behaviors from the current literature, and even less is known about factors that may facilitate Chinese American women's routine participation in Pap testing. The National Association of Social Workers (NASW) code of ethics mandates that social workers in public health and primary care work to reduce race, ethnicity, and gender-based health care disparities and ensure the health right for all ("Ethical Standards in Social Work: Preface," n.d.). To tackle disparities in cancer prevention, social workers should strive to address both structural and cultural barriers through advocating preventive health care use including interval Pap tests among minority women. As both the USPSTF and the ACS recommend individuals receive periodic Pap test regularly, longitudinal studies must be done to address this knowledge gap.

The purpose of this study is to analyze factors associated with middle-age Chinese American women's adherence to Pap testing for cervical cancer prevention in the U.S. health care system. A longitudinal study will provide a robust understanding of factors associated with Chinese American women's cervical cancer screening behaviors over time. Identifying facilitators and barriers of having a Pap test may promote adherence to periodic preventive care for cervical cancer and improve the cervical cancer survival rate among Chinese American women.

### **Proposed Study Aims**

A. Estimate annual uptake of a Pap test and examine changes over a seven-year period among middle-aged Chinese American women.

B. Determine which factors are associated with middle-age Chinese American women's adherence to a Pap test for cervical cancer prevention in the U.S. health care system.

## **2. LITERATURE REVIEW**

### **Health Care Utilization Disparities**

Disparities in health care utilization have been observed among racial minorities in the United States. Understanding health care use disparities is one of the main goals of public health research. Asian Americans, including Chinese Americans, have been found to be significantly disadvantaged in using various types of health care services (Dey & Lucas, 2006; Lasser, Himmelstein, & Woolhandler, 2006). Multiple social, psychological, and biological factors and cultural experiences relating to health care use disparities among bi- or multi-cultural immigrants will be discussed in detail later in this proposal.

Clearly, there are some socioeconomic reasons for Chinese American women's health care use disparities. In the United States, the majority of Chinese Americans are foreign-born (Ku & Matani, 2001). Therefore, they could be unfamiliar with the U.S. health care delivery systems and lack knowledge about the availability of health care services compared to others born and raised in the U.S. (Chun, Chesla, & Kwan, 2011). In addition, given the U.S. immigration policy barring immigrants from public medical benefits, including Medicaid, many U.S. immigrants face challenges in accessing public health care services (Wong, Campsmith, Nakamura, Crepaz, & Begley, 2004).

Cultural differences in health care use have been a concern in prior studies. For instance, Chinese immigrants' distrust of western medicine is also a contributing factor to health care use

disparities (Maleku & Aguirre, 2014). More information about this distrust of western medicine and cervical cancer-related stigma will be discussed in the following sections.

### **Pap Test Uptake**

Several predictors of Pap test uptake have been discussed in current literature. Previous studies suggest that inadequacy of Pap test use among Chinese American women is related to multiple factors, such as limited English proficiency, lack of insurance coverage, cultural conflicts, lack of knowledge about cervical cancer prevention, length of stay in the U.S., and social support (Hislop et al., 2004; Lee-Lin et al., 2007; Wang, Fang, Tan, Liu, & Ma, 2010). Each of these factors is discussed below.

Prior studies consistently suggest that knowledge of cervical cancer screening and Pap test use are positively correlated (Chawla, Breen, Liu, Lee, & Kagawa-Singer, 2015; Gupta, Kumar, & Stewart, 2002; Hislop et al., 2004; Wong, Wong, Low, Khoo, & Shuib, 2009). In addition, Chinese American women with lower levels of education are more likely to fail to adhere to preventive Pap tests (Wong et al., 2009). Generally, women who have higher levels of education have more preventive Pap tests. As higher levels of education positively associate with increasing income, insurance coverage, and quality health care, those factors contribute to adherence to Pap test (White et al., 2017).

Prior studies have found that Chinese American women, who are foreign-born or recently arrived (<5 years), have minimal participation in preventive health care (Hiatt et al., 2001; Lai & Kalyniak, 2005). Among Chinese American women, the key barriers to obtaining screening are limited English proficiency and lack of health care knowledge (Wang et al., 2010). About 40% of Chinese Americans report speaking English less than “very well,” which may compromise Chinese women’s use of Pap tests (Torre et al., 2016). Immigrants who experience a language

barrier generally have more challenges to access to health care and to use of overall health care including Pap testing (Wang et al., 2010). Chinese American women with good English ability can communicate with their health care providers more effectively and are more likely to use cancer preventive care (Chen & Wang, 2013)

Insurance coverage is another significant predictor of adherence to preventive Pap tests. Lack of health insurance has been widely recognized as a persistent barrier for Asian American populations to access preventive screenings for cervical cancer in the U.S. (Ashing-Giwa et al., 2004; Chawla, Breen, Liu, Lee, & Kagawa-Singer, 2015; Cook, Tseng, Chin, John, & Chung, 2014; Shi, Lebrun, Zhu, & Tsai, 2011). Prior studies consistently found that racial minorities have lower health insurance coverage rate than Whites in the U.S. (Reyes & Hardy, 2015; Singh, Rodriguez-Lainz, & Kogan, 2013). The low rate of health insurance coverage has been identified as one of the key barriers of accessing a Pap test for many Asian Americans including Chinese American women (Chawla et al., 2015a). In the United States, immigrant populations are less likely to be covered by public health insurance because of the 1996 Personal Responsibility Work Opportunity Reconciliation Act (Ku & Matani, 2001).

Uninsured individuals have significantly lower utilization rate of all types of preventive care than the insured (Hardcastle, Record, Jacobson, & Gostin, 2011; Mainous, Hueston, Love, & Griffith, 1999; Sonfield & Pollack, 2013). Uninsured Chinese American women, when in need of medical care, usually first seek help from their family members and unlicensed health care providers, and seek safety net providers as the last resort (Hiatt et al., 2001). Although a Pap smear is inexpensive and is widely covered by insurance plans, the cost of a Pap smear without insurance coverage is disconcerting (Chen & Wang, 2013). Therefore, Chinese American women

may not receive a Pap test until some serious symptoms appear and their health problems worsen greatly (Lee-Lin et al., 2007).

Age is another significant predictor of having Pap tests. Women who are 30 to 49 years of age are more likely to have Pap tests than those 21 to 29 years of age (Chawla et al., 2015). However, middle-aged women (around 40 to 70 years of age) are at the peak risk of invasive cervical cancer (Gustafsson et al., 1997). In the U.S., 35% of Chinese Americans are middle aged. About 40% of invasive cervical cancer cases in Asian American women develop in middle age (40 to 70 years of age) (American Cancer Society, 2018). Furthermore, one longitudinal study suggested that Chinese women were more likely to perceive age-based and gender-based discriminations in the U.S. healthcare system than African American, Japanese, and Hispanic women, which significantly reduces the use of the Pap test (Jacobs et al., 2014). Therefore, educational programs promoting a regular Pap test for middle-aged, Chinese American women (40 to 70 years of age) can effectively prevent the development of advanced stages of cervical cancer and increase survival rate.

Availability of health care providers is another important factor in promoting the use of preventive Pap test. Prior studies suggest that women who have a certain place for routine health care are more likely to have had a Pap test (Maxwell, Bastani, & Warda, 2000; McCracken et al., 2008; Seeff & McKenna, 2003; Singh & Hiatt, 2006). These findings resonate with others that found Chinese women, who are born in the U.S., reside longer in the U.S., and have a certain place for routine health care, are more likely to have had a Pap test (Lee, Chen, Jung, Baezconde-Garbanati, & Juon, 2014; Sentell, Tsoh, Davis, Davis, & Braun, 2015; Tung, Granner, Lu, & Qiu, 2017; Wang et al., 2010). Low cancer care literacy is associated with poorer

access to health care (Sentell et al., 2015). Having a certain place for routine health care can ensure the receipt of needed preventive care, such as Pap testing (Sentell et al., 2015).

Social relationships play a significant role in using Pap tests. A positive correlation between marriage and Pap test use has been well documented. Screenings for cervical cancer are more prevalent among married women (Kagawa-Singer et al., 2007; Nelson, 2014; Pourat, Kagawa-Singer, Breen, & Sripatana, 2010) than single women. A prior study demonstrated the importance of family support in the health of racial or ethnic minority groups in the U.S. (Lin, Simeone, Ensel, & Kuo, 1979). For example, unmarried women may lack awareness of indications of cervical cancer and benefits of having Pap testing (Wong et al., 2009). Therefore, first-generation Chinese immigrants have less resources or information on preventing cervical cancer compared with U.S.-born individuals, which reduces their likelihood of using preventive screening for cervical cancer (Hislop et al., 2004). In addition, a systematic review suggested that homeless women, women who have sex with women, and obese women are less likely to participate in Pap testing (Brankovic, Verdonk, & Klinge, 2013). However, the roles of these risk factors on Chinese-American women's adherence to Pap tests are not clear in the current literature.

### **Asian Cultural Influence on Pap Test Uptake**

Misunderstanding about prevention behaviors for cancer care exists commonly in Asian communities (Parsa, Kandiah, Abdul Rahman, & Mohd Zulkefli, 2006). They may doubt that cervical cancers are caused by a virus (HPV), therefore hesitating to have preventive screenings for cervical cancer (Parsa et al., 2006). Chinese American women may assume it is not necessary to have a cancer screening unless they have any cancer-related symptoms (Chua, Mok, Kwan,

Yeo, & Zee, 2005). Furthermore, they may think a repeat screening is unnecessary after having a test (Chua et al., 2005).

In addition, in Chinese culture, participation in a Pap test can be interpreted by their partners as distrust and promiscuity, which hinders them from pursuing periodic screenings (Kwan, Lo, Tam, Chan, & Ngan, 2012). Attending a screening or testing positive for HPV implies promiscuity or premarital sexual activity to women's social networks, including family, friends, and communities, discouraging Chinese American women from discussing preventive female health issues, such as the Pap test with their relatives and friends. Therefore, Chinese American women may be likely to deny the necessity of repeated Pap tests if they do not perform risky sexual behaviors or only have one sexual partner (Kwan et al., 2012).

A common psycho-socio-cultural barrier to having a Pap test among Chinese American women is fear of learning that one has cancer or another disease (Nelson, 2014). A fatalistic attitude toward cancer is a barrier that hinders Chinese women from using preventive Pap tests (Seow, Huang, & Straughan, 2000). Due to fatalistic belief, Chinese women may negate the value of testing because they believe having cancer is fate (Lee-Lin et al., 2007).

Finally, Chinese American women commonly report embarrassment from clinical vaginal examination (Seow et al., 2000). A main reason for not doing the screening among Chinese American women is embarrassment and loss of privacy (Hulme et al., 2016). A possible explanation may be that Chinese culture considers the personal body a very private matter, causing women to be unwilling to have their breast and vaginal areas examined by health care providers (Woo, Brotto, & Gorzalka, 2009). Furthermore, experiences of discrimination during health care utilization can cause lack of trust and anxiety among Chinese American women in

accessing health care services in the US. Chinese patients may doubt western doctors' professionalism (Lee, Kearns, & Friesen, 2010). Different from the distrust held by African Americans, Asian patients' distrust toward western doctors is caused by concerns about doctors' limited knowledge, not by the mismatch of patient-doctor race or ethnicity (Lee et al., 2010). Any uncertainty from medical professionals about their medical knowledge may cause patients anxiety and damage the trust between patients and doctors, because such uncertainty of diagnosis may be interpreted by the patients as lack of medical knowledge (Holroyd, Twinn, & Shia, 2001; Kolar et al., 2015).

### **Health Care Systems and Pap Testing Utilization**

As discussed above, insurance coverage is an important predictors of adherence to preventive Pap testing (Ashing-Giwa et al., 2004; Chawla et al., 2015; Cook et al., 2014; Shi et al., 2011). In this section, the relationships between the U.S. health care system and Pap testing are discussed. The U.S. health care system is highly sophisticated and complex.

In the United States, the two major public financing systems for health care services are Medicaid and private insurance (Chen & Vargas-Bustamante, 2011). Medicaid is the major publically funded welfare program for low-income individuals. In the U.S., Medicaid provides health benefits to a large number of women of the appropriate ages for Pap tests (Boss & Guckes, 1992). Under the Affordable Care Act (ACA), although coverage of preventive services varies in different states, Medicaid in all 50 states covers screening for cervical cancer (The Henry J. Kaiser Family Foundation, n.d.). A comparative study found that women in states that are not expanding Medicaid have significantly lower odds of receiving Pap tests (Sabik, Tarazi, & Bradley, 2015). Researchers suggested that Chinese women on are more likely than insured

counterparts to utilize only oriental medicine and less likely to use preventive health care (Jang, Lee, & Woo, 1998).

Medicare is another major federal health insurance program. Different from Medicaid, Medicare focuses its service on people who are 65 or older. However, as women who are older than 65 years are not recommended to have preventive screenings for cervical cancer, Medicare has a minor effect on women's Pap test use. In addition to federal health care programs, there are a few community-based health care programs for minorities. Unfortunately, the community-based health care programs, including Federally-funded Community, Refugee Medical Assistance and Migrant Health Centers, usually do not provide enough preventive health care services, including screenings for cervical cancer.

### **Theoretical Models**

The Behavioral Model of Health Services Use (BMHSU) (Aday & Andersen, 1974) is a model often used to explain health care use behaviors. The model posits that health care services utilization is associated with certain factors. Perceived medical needs, social-demographic characteristics (e.g., gender, age), social-structural factors (e.g., ethnicity, education), financial resources (e.g., income, insurance), community resources dictated by place of residence (e.g., geographic proximity to health services), and relevant government policies (e.g., Medicaid, Medicare) are correlated with individuals' health care use.

The Behavioral Model for Vulnerable Populations (BMVP) is a revised model of the BMHSU (Gelberg, Andersen, & Leake, 2000). The original behavioral model failed to consider cultural factors on ill individuals' health-seeking behaviors as well as other factors that are more relevant to vulnerable populations, such as the homeless and people of color. The BMVP model consists of three domains related to health care utilization behaviors: predisposing, enabling, and

needs. The Predisposing domain includes demographic aspects (e.g., gender, age), social structure (e.g., ethnicity, education) and cultural-based health beliefs. The Enabling domain contains financial resources, social resources, and personal ability. The health care Needs domain includes perceived and evaluated health conditions (Gelberg et al., 2000).

Based on the BMHSU and the BMVP, the Systems Model of Clinical Preventive Care (SMCPC) (Walsh & McPhee, 1992) was developed to conceptualize factors that affect clinical preventive-care services including preventive cancer screenings. The preventive behaviors are activities or procedures that have potential to result in one or more of the desired outcomes (Walsh & McPhee, 1992). The SMCPC model conceptualizes both patient and physician factors that affect preventive health care use behaviors from a joint perspective of psychosocial, behavioral, communication, and health education theories (Kwong & Mak, 2009). For the purposes of this dissertation, I will focus on studying patient-related factors.

The health belief model emphasizes patient attitudes and beliefs. Enabling factors and situational factors of the preventive activity are not considered (Walsh & McPhee, 1992). Therefore, the health belief model does not match with the purpose of this study. The BMSHU and the BMVP focus on behavior as a goal that involves individuals' self-efficacy (Aday & Andersen, 1974). These health behavior models are helpful in analyzing factors that influence given behaviors. The BMSHU and the BMVP assume that patients must first know what healthcare services they need to receive, and then judge their desire to seek healthcare services. This assumption may not be applicable to preventive activities, such as screenings for cancers, where the outcome is early detection of established disease (Walsh & McPhee, 1992). The BMSHU and the BMVP are appropriate to apply to the planning and evaluation of health interventions (Walsh & McPhee, 1992). The SMCPC model is unique in its focus on preventive

healthcare use (e.g., preventive Pap test) (Walsh & McPhee, 1992). The SMCP model includes health internal factors ( e.g., health care belief), external organizational factors (e.g., cost), and preventive activity factors ( e.g., previous negative results of screening for cancer) which are determined in the process of using preventive health care (Walsh & McPhee, 1992). Therefore, the SMCP involves comprehensive factors related to preventive activities, and it will be applied for this analysis.

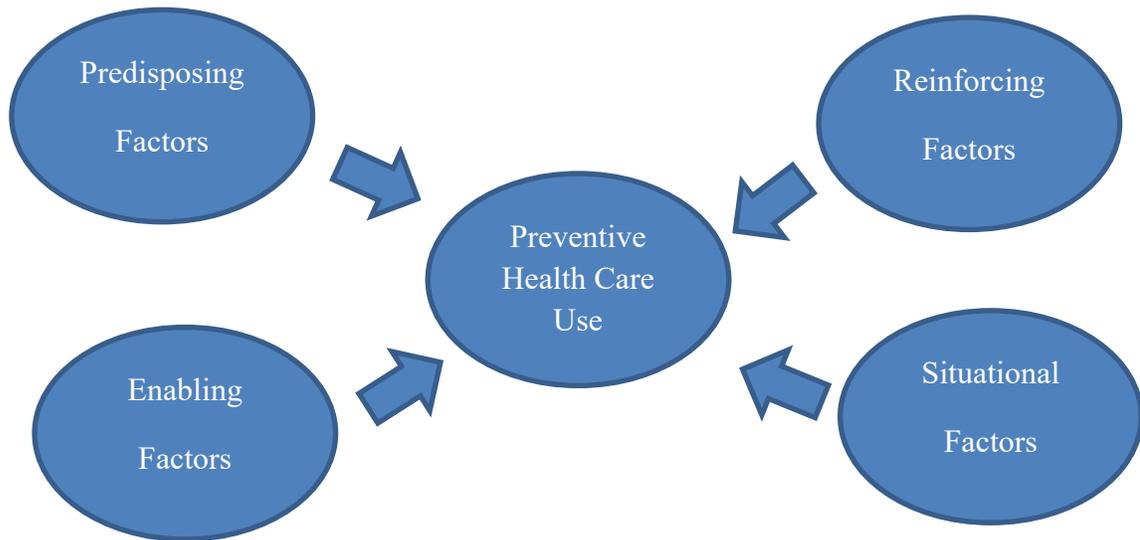
The SMCP details categories of factors that can promote preventive health care: predisposing factors, such as patients' health beliefs and attitudes, and age; enabling factors, such as income, insurance status, and education level; reinforcing factors, such as social support; and situational factors, such as risky health behaviors (Walsh & McPhee, 1992). The SMCP defines outcomes as decreased disease incidence, decreased morbidity, and decreased mortality, which are directly linked to preventive behaviors.

Predisposing factors are those factors related to motivation for engaging in preventive care (Walsh & McPhee, 1992) (figure 1). Predisposing factors refer to factors that may predispose patients to use certain types of preventive health care, including demographics, social structure, and health beliefs (Walsh & McPhee, 1992). Enabling factors are the skills and resources that necessary to use preventive health care. Knowledge of and education about the need for preventive care are two main domains of enabling factors (Walsh & McPhee, 1992). Furthermore, physiologic factors, skills, finance, and logistics are also necessary before the patients will consider the recommended of using preventive health care (Walsh & McPhee, 1992). Reinforcing factors refer to initiation of a behavior and keeping long-term preventive behaviors, such as adherence to Pap tests. Due to the benefits of using preventive care to request long-term participation, the reinforcing factors are extremely important to individuals'

participation in preventive behaviors (Walsh & McPhee, 1992). Situational factors are related to “cues to action,” which can be internal or external factors. For example, an internal cue may be patients’ symptoms (eg., pelvic pain) and an external cue may be reminders from physicians to patients (Walsh & McPhee, 1992).

Figure 1

*Theoretical Model*



Applying the SMCPC to this study concerning the outcome of interest in Pap testing, the predisposing factors relate to the motivation to receive pap tests, which include demographics, health beliefs, attitudes, and health values. Enabling factors refer to the skills and resources necessary to take pap tests, which include education, income, insurance status, and skills. Reinforcing factors are factors that can support uptake of pap tests, such as social support, and situational factors are related to health behaviors of patients, such as disease symptoms and risky behaviors (Walsh & McPhee, 1992). The SMCPC has been widely used in preventive screening and testing research for cancers (Hiatt et al., 2001; Kwong & Mak, 2009). The dependent and independent variables of this study are developed based on the SMCPC model. The included variables are discussed in the methods section.

## **Gaps in the Existing Literature**

Increasing adherence to periodic Pap testing among Chinese American women is of public health importance in the US. The review of literature helped to identify major gaps in current knowledge of Pap test uptake among Chinese women in the U.S. These include a limited understanding of Chinese American women's long-term cervical cancer-related preventive health behaviors and limited knowledge of factors that may facilitate Chinese American women's routine participation in Pap tests.

Previous studies of Chinese American women's cervical cancer screening behaviors are mainly qualitative studies that focus narrowly on discussing cultural barriers to participation in Pap test use. Many studies suggest that cultural factors play significant roles in Chinese American women's Pap test use and education about cervical cancer knowledge, which can promote adherence to screening guidelines (Chawla et al., 2015; Kwong & Mak, 2009). Cultural factors are widely discussed in the current literature, but economic, social, and psychological factors are understudied by using national data.

In addition, the cross-sectional analysis provides some knowledge of factors contributing to the one-time Pap test use among Chinese American women in current literature (e.g., de Sanjose et al., 2010; Gupta et al., 2002; Sargent et al., 2008; Sentell et al., 2015). However, predictors of adherence to repeated Pap test use among Chinese American women are complex and not well understood. One-time cross-sectional studies are not enough to understand factors leading Chinese American women to adhere to repeated Pap testing. The cross-sectional studies cannot investigate women's frequent Pap testing use and prolonged follow-up. Longitudinal studies can allow repeated observations of having Pap tests over a long period of time and relevant factors associated with it. Cervical cancer can only be prevented effectively by repeated

Pap tests, which request cross-sectional studies to be progressed to longitudinal studies (Brown et al., 2005). As the ACS recommends individuals to receive periodic screening tests for cervical cancer regularly, longitudinal studies must be conducted to address this knowledge gap.

This study's importance relies on providing a complete understanding of factors associated with Chinese American women's cervical cancer screening behaviors from a prior of time. This study is the only and first longitudinal study focusing analyzing Chinese American women's preventive Pap testing adherence. This study uses rigorous statistic models to identify facilitators and barriers of having a Pap test that may promote adherence to cervical cancer prevention guidelines and improve cervical cancer care among Chinese American women.

### 3. METHODS

#### Research Question and Hypotheses

With the identification of major gaps in current knowledge of Pap test utilization among Chinese American women in the United States, factors associated with adherence to the Pap test among Chinese American women will be analyzed. In this study, Chinese American women are defined as women who are Chinese origin and live in the U.S., not U.S.-born Chinese women. A secondary data analysis using longitudinal data will: (a) estimate the annual uptake of Pap tests and examine changes over a seven-year period among middle-aged Chinese American women; (b) determine which factors associated with middle-age Chinese American women's adherence to a Pap test for cervical cancer prevention in the U.S. health care system.

To address these aims, the following research questions will be studied:

1. What are the annual frequencies of Pap test uptake among middle-aged Chinese American women and how do they change over time in a seven-year period (2000-2008)?

Hypothesis: not applicable

2. How do predisposing factors, enabling factors, reinforcing factors, and situational factors relate to middle-age Chinese American women's Pap test uptake for cervical cancer prevention? 1a.) How do predisposing factors (age, quality of life, employment status, marital status, general health condition, and education) relate to Pap test uptake?

Hypothesis 1: Among Chinese American women, age is negatively associated with Pap test uptake.

Hypothesis 2: Among Chinese American women, quality of life, having employment, being married, general health condition, and education level are positively associated with Pap test uptake.

1b.) How do enabling factors (availability of female healthcare providers, availability of healthcare providers, time spent with healthcare providers, family income, health insurance, healthcare cost, distance to hospital, time of doctor visiting, trust in the physician, and willingness to know the clinical results) relate to pap test uptake?

Hypothesis 3: Among Chinese American women, healthcare cost and distance to a hospital are negatively associated with Pap test uptake.

Hypothesis 4: Among Chinese American women, availability of female healthcare providers, availability of healthcare providers, time spent with healthcare providers, family income, health insurance, time of doctor visits, trust in the physician, and willingness to know the clinical results are positively associated with Pap test uptake.

1c.) How do situational factors (number of sexual partners, having cancer, smoking and female health problems) relate to Pap test uptake?

Hypothesis 5: Among Chinese American women, number of sexual partners, having cancer, smoking and female health problems are positively associated with Pap test uptake.

1d.) How do reinforcing factors (availability of friends who can be trusted and availability of helpers with daily chores) relate to Pap test uptake?

Hypothesis 6: Among Chinese American women, availability of friends who can be trusted and availability of helpers with daily chores are positively associated with Pap test uptake.

### **Sample**

The Study of Women's Health across the Nation (SWAN) Series (1996-2008) provides the data on Chinese American women for this analysis. The SWAN is a multi-site longitudinal epidemiologic study that provides comprehensive information on women's health. During 1996–2008 (11 waves), SWAN researchers collected data describing a nationally representative sample of 3302 females from seven designated research sites (Boston, Chicago, the Detroit area, Los Angeles, Newark, Pittsburgh, and Oakland) for research on health care during females' mid-life. The SWAN selected and contacted women randomly to recruit participants. The participants were aged 42 to 52 years at the time of the first screening survey. Numerous health studies have demonstrated the SWAN's validity and high internal consistency (Bromberger, Harlow, Avis, Kravitz, & Cordal, 2004; Ganz, Rowland, Desmond, Meyerowitz, & Wyatt, 1998; Ganz, Greendale, Petersen, Kahn, & Bower, 2003; Sternfeld et al., 2004).

As a landmark study suggested that middle-aged women (around 30 to 70 years old) are at the peak risk of cervical cancer (Gustafsson et al., 1997), this study focused on analyzing predictors of adherence to preventive Pap test use among middle-aged Chinese women in the U.S. All Chinese participants who responded to using Pap tests (yes=1, no=0) in the survey years were included in this study. Participants who were eligible for inclusion in the proposed study include those who (1) self-identify as Chinese and (2) are not pregnant or breastfeeding. In

addition, participants who did not respond to the question of whether they had a Pap test during the survey years were excluded from this analysis.

The present study involves 498 Chinese American women. Each Chinese woman's longitudinal record comprised her information recorded from seven waves (the 4th, 5th, 6th, 7th, 8th, 9th, and 10<sup>th</sup>) of data collection, from 2000 to 2008). The person-time-waves are the unit of analysis in the study. Person-time-waves are repeated observations of an individual in a year over a period of time, which is the units of longitudinal analysis (Hardin & Hilbe, 2003). In total, the present study analyzed 1,326 person-time-waves. The average age of units of analysis is 53 (46-62, St.D= 3.28). Because many critical factors suggested by the SMCPD and the previous literature (e.g., insurance coverage, transportation, and patients' trust in physicians) were not covered by the SWAN in the first four waves' interviews, data from the first four waves interviews (baseline interview, 1st wave interview, 2nd wave interview, 3rd wave interview) were excluded from this study. The strategies of dealing with missing data for independent variables are provided below.

## **Measures**

**Dependent variable.** The dependent variable for this multivariate analysis was defined as *having had a Pap test* (yes=1, no=0). Participants' self-reported screening experience was coded as a dichotomous variable (0=did not have a Pap test; 1=had a recent Pap test).

**Independent variable.** The independent variables (i.e. predisposing factors, enabling factors, reinforcing factors, and situational factors) were selected based on the SMCPD model. Based on the SMCPD, the present study measured independent variables in four major groups: predisposing factors, enabling factors, reinforcing factors, and situational factors. For this

specific study, predisposing variables included *age*, *general health condition*, *quality of life*, *marital status*, *language* and *education*. *Age* represented the participants' ages in the year of interviews. *General health condition* described the participants' overall health condition: 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent. *Quality of life* described the participants' life quality on a 0-10 rating scale, in which 0 represents the worst possible life quality, and 10 represents the best possible life quality. The higher scores indicate better life quality. *Marital status* described whether the participants were living with a partner including spouses or cohabiting with a partner (Yes=1, No=0). The participants' education was described by five levels: 1 = less than high school, 2 = high school graduate, 3 = some college, 4 = college graduated, and 5 = post graduate education.

Enabling factor variables included: *female healthcare provider (FHP)*, *family income* (1= less than \$19,999, 2= \$20,000 to \$49,999, 3= \$50,000 to \$99,999, and 4= \$100,000 or more), and a subscale of accessibility to healthcare. The participants' healthcare resources were measured by *FHP*. *FHP* is a dichotomous variable that measures whether or not the participants had a healthcare provider specializing in female health. In addition, a subscale of accessibility to healthcare provided by the SWAN was employed to measure participants' access to Pap tests. The subscale has eight variables describing reasons why the participants were unable to use health care services when they needed the health care. Those eight dichotomous variables were *no health care insurance* (yes/no), *unaffordable healthcare cost* (yes/no), *no healthcare provider* (yes/no), *distance is too far* (yes/no), *no time to visit healthcare providers* (yes/no), and *do not trust the physician* (yes/no).

The reinforcing factors referred to social support and time spent by FHP (1= 0-5 minutes, 2= 6-10 minutes, 3= 11-15 minutes, 4= 16-20 minutes, 5= 21-30 minutes, 6= more than 30

minutes). In this study, participants' social support was measured by two variables with five levels: 1= none of the time, 2= a little of the time, 3= some of the time, 4= most of the time, and 5= all of the time. The three Social support variables are *friends can be trusted*, *helper with daily chores*, and *friends can take patients to the hospital*. *Friends can be trusted* described how often someone was available to the participants to confide in or talk to about health problems. *Friends can take patients to the hospital* described how often someone was available to the participants to take him/her to the hospital. *Helper with daily chores* described how often someone was available to the participants to help with daily chores if participants were sick. The SWAN did not collect data on participants' social support in the 7<sup>th</sup> wave interview and 9<sup>th</sup> wave interview. Therefore, we measured social support of the 7<sup>th</sup> wave interview by applying the data of social support in the 6<sup>th</sup> wave interview, and we measured social support of the 9<sup>th</sup> wave interview by applying the data of social support in the 8<sup>th</sup> wave interview. This is a common strategy dealing with missing data used for time series data analysis.

Situational factor variables included: *number of sexual partners*, *having cancer(s)*, *smoking*, *having several female health problems*, and *alternative health care utilization*. *Number of sexual partners* was measured as a continuous variable which described the number of men that the participants had intercourse with in the past six months. The SWAN did not provide the information on number of sexual partners in the 7<sup>th</sup> wave interview and 9<sup>th</sup> wave interview. Therefore, the numbers of sexual partners reported in the 6<sup>th</sup> wave interview were applied as the numbers of sexual partners in 7<sup>th</sup> wave interview, and the numbers of sexual partners in 8<sup>th</sup> wave interview were applied as the numbers of sexual partners in 9<sup>th</sup> wave interview. *Smoking* (yes/no) measured whether the participants smoke regularly. *Having Cancer(s)* (yes/no) measured whether the participants had any type of cancers since last interview. *Female health problems*

include three dichotomous variables: *abnormal vaginal bleeding* (yes/no), *fibroids* (yes/no), and *endometriosis* (yes/no). Participants' alternative health care utilization was measured by whether the participants used any folk medicine or traditional Chinese medicine in the past year. The SWAN did not provide information on alternative health care use in the 7<sup>th</sup> wave interview, the 8<sup>th</sup> wave interview, and the 9<sup>th</sup> wave interview. Therefore, the answers of whether the participants used alternative health care in 6<sup>th</sup> wave interview were applied to the 7<sup>th</sup> wave interview, the 8<sup>th</sup> wave interviewer, and the 9<sup>th</sup> wave interview. All included variables are presented.

## **Data Analysis**

**Descriptive analysis.** Descriptive analysis was conducted for all variables. Standard deviation, mean, median, range, minimum, and maximum were calculated for continuous variables. Frequencies were calculated for categorical variables. Since Pap testing uptake is the focus of this study, the sample was divided in two subsamples: those who had a Pap test and those who did not have a Pap test. To compare the different profiles of these two subgroups, Chi-square tests were applied to each categorical variable, and T-test analyses were applied to each continuous variable.

**Multivariate Analysis.** Autocorrelations between outcome variables and explanatory variables were estimated by generalized estimating equations (GEE) within SPSS, due to the use of repeated measures in this dataset. GEE is an appropriate statistic model for repeated measure studies because it can estimate the within-subject correlations by using an empirical covariance matrix (Hardin & Hilbe, 2003). Also, GEE is a robust and optimal model with missing at random or missing not at random in longitudinal data set (Hardin & Hilbe, 2003). The inclusion of time-

variant variables in my study allows for the possibility of specifying autoregressive correlation. GEE's Binomial Family and Logit Link option was applied because of the dichotomous nature of the outcome variables. The independent variable, having had a Pap test, is a dichotomous variable. Therefore, binary logistic model of the GEE is the appropriate model to analyze the relationship between having Pap tests and the independent variables (Hardin & Hilbe, 2003).

The range of correlations between variables included in the study ranges from  $r = -.11$  to  $r = .39$ , and tolerance statistics ( $\geq .44$ ) were checked during preliminary analysis. The correlation can provide some useful information of the associations between the outcome variable and each explanatory variable. However, regression advances correlation because regression has prediction capabilities (Schoenfeld, 1982). No multicollinearity problems exist among explanatory variables because all the tolerance statistics were greater than 0.40 (Schoenfeld, 1982).

The IBM SPSS Statistics 20 was used for data analysis. An alpha level of .05 was used to determine statistical significance for relationships examined in the proposed study.

### **Institutional Review Board Information**

These study methods were presented to the University of Alabama's Institutional Review Board (IRB) for approval. The IRB approval date for this study was May 23, 2018.

## 4. RESULTS

### Descriptive Results

**Predisposing factors.** Across the 1,326 person-time-waves, the average education level was college ( $M=3.3$ ,  $SD=1.2$ ). Across the person-time-waves the average measure for age was 52 years old ( $SD=3.2$ ); the average general health condition was fair ( $M=2.6$ ,  $SD=0.09$ ); and quality of life was 7.4 (of 10). In 76.3% of the final 1,326 person-time-waves, the surveyed Chinese American women were married (see Table 1).

**Enabling factors.** In 31.6% of the person-time-waves, a Chinese woman reported having a healthcare specialist for female health. A Chinese woman reported that she could not receive health care service when she needed health care because she had no health care insurance coverage in 1.4% of final person-time-waves; unaffordable healthcare cost in 1.0% of person-time-waves; no healthcare provider available in 0.9% of person-time-waves; transportation problems in 0.6% of person-time-waves; too busy to see a doctor in 3.5% of person-time-waves; do not trust the physician in 0.5% of person-time-waves. The average score for family income was \$50,000 to \$99,999 ( $M=3$ ,  $SD=0.8$ ) across the person-time-waves.

**Reinforcing factors.** On average across the person-waves, a Chinese woman had four friends who could be trusted ( $SD=0.8$ ), about four helpers with daily chores when she was sick ( $SD=1.1$ ), and about four friends who could take her to the hospital ( $SD= 0.9$ ). The average amount of time spent by FHP with a Chinese woman was 11-15 minutes ( $M=3.4$ ,  $SD =1.0$ )

**Situational factors.** The average number of sexual partners was 1.9 (SD= 0.2) across the person-time-waves. In 0.8% of the person-time-waves, a surveyed Chinese woman had cancer(s). In 1.3% of the person-time-waves, a surveyed Chinese American woman smoked; in 8.5% of the person-time-waves, a surveyed Chinese American woman had fibroids; in 0.6% of the person-time-waves, a surveyed Chinese American woman had endometriosis; in 3.6% of the person-time-waves, a surveyed Chinese American woman had abnormal vaginal discharge; and in 36.8% of the person-time-waves, a surveyed Chinese American woman used alternative medicine.

**Time indicators.** In 61.0% of the person-time-waves, a Chinese woman reported had a Pap test over the 7 waves. In 16.9% of the person-time-waves, a Chinese woman reported had a Pap test in the first wave of survey. In 16.0% of the person-time-waves, a Chinese woman reported had a Pap test in the second wave of survey. In 15.0% of the person-time-waves, a Chinese woman reported had a Pap test in the third wave of survey. In 14.9% of the person-time-waves, a Chinese woman reported had a Pap test in the fourth wave of survey. In 9.4% of the person-time-waves, a Chinese woman reported had a Pap test in the fifth wave of survey. In 13.3% of the person-time-waves, a Chinese woman reported had a Pap test in the sixth wave of survey. In 14.6% of the person-time-waves, a Chinese woman reported had a Pap test in the seventh wave of survey.

### **Comparison Based on History of Pap Testing**

To further describe the explanatory variables, detailed results of T-test and Chi-square test of time-varying variables are provided in table 1. Across the person-time-waves, there was a significant difference of education levels ( $p<0.05$ ); having a FHP ( $p<0.01$ ); availability of healthcare providers ( $p<0.05$ ); levels of busy ( $p<0.01$ ); time spent by the FHP ( $p<0.01$ ); having

cancer(s) ( $p < 0.05$ ); having fibroids ( $p < 0.01$ ); having abnormal vaginal discharges ( $p < 0.05$ ); and using alternative medicine ( $p < 0.05$ ) between Chinese American women who received Pap tests and who did not. For all other factors, there is no significant difference between Chinese American women who received Pap tests and women who did not. The results of comparison provided below include both significant independent variables and non-significant independent variables.

Table 2

*Descriptive Statistics of Time Varying Outcome and Explanatory Variables*

Variables	Total		Had a Pap test		Did not have a Pap test	
	frequency (n), percentage (%)	mean, St.D	frequency (n), percentage (%)	mean, St.D	frequency (n), percentage (%)	mean, St.D
Had a Pap test	821,61.0					
<b>Predisposing Factors</b>						
Age		52.8,3.2		52.7,3.2		52.9,3.3
General health condition		2.6,0.9		2.6,0.9		2.6,0.9
Quality of life		7.4,1.4		7.4,1.5		7.4,1.4
marital status (yes)	1027,76.3		634,77.2		393,74.9	
Education *		3.3,1.2		3.4,1.2		3.2,1.3
<b>Enabling Factors</b>						
female healthcare provider (FHP) (yes) **	426,31.6		650,79.2		270,51.4	
family income		3.1,0.8		3.1,0.8		3.1,0.9
no health care insurance (yes)	19,1.4		10,1.2		9,1.7	
unaffordable healthcare cost (yes)	13,1.0		5,0.6		8,1.5	
no healthcare provider (yes) *	12,0.9		3,0.4		9,1.7	
distance is too far (yes)	8,0.6		5,0.6		3,0.6	
too busy (yes)**	47,3.5		16,1.9		31,5.9	
do not trust the physician (yes)	7,0.5		5,0.6		2,0.4	
<b>Reinforcing Factors</b>						
friends can be trusted		4,0.8		4.0,0.8		3.9,0.9
friends can take patients to the hospital		4.2,0.9		4.2,0.8		4.2,0.9
helper with daily chores		3.7,1.1		3.7,1.1		3.7,1.1
time spent by FHP**		3.4,1.0		3.4,1.0		3.3,0.8
<b>Situational Factors</b>						
number of sexual partners		1.9,0.2		1.9,0.2		1.9,0.3
having cancer(s) (yes) *	11,0.8		10,1.2		1,0.2	
smoking (yes)	18,1.3		9,1.1		9,1.7	

fibroids (yes)**	115,8.5	89,10.8	26,8.5
endometriosis (yes)	8,0.6	7,0.9	1,0.2
abnormal vaginal discharge (yes)*	49,3.6	39,4.8	10,1.9
alternative medicine use (yes)*	495,36.8	322,39.2	173,36.8
<b>Time Indicators</b>			
Visit 1	227,16.9	136,16.6	91,17.3
Visit2	215,16.0	129,15.7	86,16.4
Visit3*	202,15.0	136,16.6	66,12.6
Visit4	201,14.9	134,6.3	67,12.8
Visit5	126,9.4	80,9.7	46,8.8
Visit6	179,13.3	106,12.9	73,13.9
visit7 *	196,14.6	100,12.2	96,18.3

\* p<0.05, \*\* p<0.01.

**Predisposing factors.** Chinese American women who adhered to Pap testing (M=3.4, SD=1.2) have significantly higher levels of education compared to those who did not (M=3.3, SD=1.3). Chinese American women who adhered to Pap testing (M=52.7, SD=3.2) have a similar average age compared with those who did not (M=52.9, SD=3.3). Chinese American women who adhered to Pap testing (M=2.6, SD=0.9) have the same average general health condition with those who did not (M=2.6, SD=0.9). Also, Chinese American women who adhered to Pap testing (M=7.4, SD=1.5) have similar average quality of life with those who did not (M=7.4, SD=1.4). Chinese American women who adhered to Pap testing (M=2.6, SD=0.9) have the same average general health condition with those who did not (M=2.6, SD=0.9). In 77.2% of the person-time-waves, a Chinese woman who had Pap tests reported that she was married; comparatively, in 74.9% of the person-time-waves, a Chinese woman who did not had Pap tests reported that she was married.

**Enabling factors.** In 79.2% of the person-time-waves, a Chinese woman who had Pap tests reported that she had a FHP; comparatively, in 51.4% of the person-time-waves, a Chinese woman who did not have Pap tests reported that she had a FHP. Across the person-time-waves, the average family income was significantly higher among Chinese American women who had Pap tests ( $M=3.2$ ,  $SD=0.8$ ) than Chinese American women who did not ( $M=3.1$ ,  $SD=0.9$ ). In 1.2% of the person-time-waves, a Chinese woman who had Pap tests reported that she did not have health care insurance; comparatively, in 1.7% of the person-time-waves, a Chinese woman who did not have Pap tests reported that she did not have insurance. In 0.6% of the person-time-waves, a Chinese woman who had Pap tests reported that she could not afford health care cost; comparatively, in 1.5% of the person-time-waves, a Chinese woman who did not have Pap tests reported that she could not afford the cost. In 0.6% of the person-time-waves, a Chinese woman who had Pap tests and who did not have Pap tests reported that she could not use health care because of the distance to clinics is too far. In 0.4% of the person-time-waves, a Chinese woman who had Pap tests reported that she could not have health care when she needed because of no healthcare provider available; comparatively, in 1.7% of the person-time-waves, a Chinese woman who did not have Pap tests reported that problem. In 1.9% of the person-time-waves, a Chinese woman who had Pap tests reported that she could not have health care when she needed because she was too busy; comparatively, in 5.9% of the person-time-waves, a Chinese woman who did not have Pap tests reported she was too busy to go to see a doctor. In 0.6% of the person-time-waves, a Chinese woman who had Pap tests reported that she did not trust her physicians; comparatively, in 0.4% of the person-time-waves, a Chinese woman who did not have Pap tests reported that she did not trust the physicians.

**Reinforcing factors.** Across the person-time-waves, the average time spent by the FHP was significantly longer among Chinese American women who had Pap tests ( $M=3.4$ ,  $SD=1.0$ ) than Chinese American women who did not ( $M=3.3$ ,  $SD=0.8$ ). Across the person-time-waves the average numbers of friends that the participants can trust were similar between Chinese American women who had Pap tests ( $M=4.0$ ,  $SD=0.8$ ) and Chinese American women who did not ( $M=3.9$ ,  $SD=0.9$ ). Across the person-time-waves the average numbers of friends that can take patients to the hospital were same between Chinese American women who had Pap tests ( $M=4.2$ ,  $SD=0.8$ ) and Chinese American women who did not ( $M=4.2$ ,  $SD=0.9$ ). Across the person-time-waves the average numbers of friends who can help participants with daily chores were same among Chinese American women who had Pap tests ( $M=3.7$ ,  $SD=1.1$ ) and Chinese American women who did not ( $M=3.7$ ,  $SD=1.1$ ).

**Situational factors.** Significantly, more Chinese American women who had Pap tests (in 1.2% of the person-time-waves) had cancer(s) than Chinese American women who did not have Pap tests (in 0.2% of the person-time-waves). Significantly, more Chinese American women who had Pap tests (in 10.8% of the person-time-waves) had fibroids than Chinese American women who did not have Pap tests (in 5.0% of the person-time-waves); more Chinese American women who had Pap tests (in 4.8% of the person-time-waves) had abnormal vaginal discharge than Chinese American women who did not have Pap tests (in 1.9% of the person-time-waves); and more Chinese American women who had Pap tests (in 39.2% of the person-time-waves) used alternative medicine than Chinese American women who did not have Pap tests (in 33.0% of the person-time-waves). Chinese American women who had Pap tests ( $M=1.9$ ,  $SD=0.2$ ) had the same average numbers of sexual partners as the Chinese American women who did not have Pap tests ( $M=1.9$ ,  $SD=0.3$ ). In 1.1% of the person-time-waves, a Chinese woman who had Pap

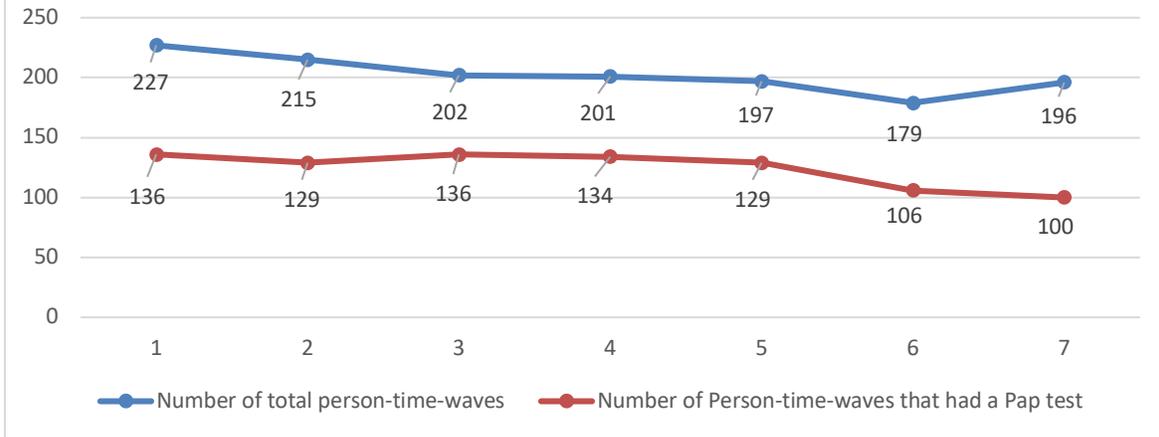
tests reported that she smoked; comparatively, in 1.7% of the person-time-waves, a Chinese woman who did not have Pap tests reported that she smoked. In 0.9% of the person-time-waves, a Chinese woman who had Pap tests reported that she had endometriosis; comparatively, in 0.2% of the person-time-waves, a Chinese woman who did not have Pap tests reported that she had endometriosis.

**Time indicators.** Significantly more Chinese American women who had Pap tests (in 16.6% of the person-time-waves) received a Pap test in the third wave of survey than Chinese American women who did not have Pap tests (in 12.6% of the person-time-waves), and fewer Chinese American women who had Pap tests (in 12.2% of the person-time-waves) received a Pap test in the seventh wave of surveys than Chinese American women who did not have Pap tests (in 18.3% of the person-time-waves). All other time indicators do not have significant differences according to participants' history of having Pap tests.

### **Results of Research Question 1**

The results of annual uptake of Pap test among middle-aged Chinese American women were presented in Chart 1. Furthermore, the changes over a seven-year period were shown in a line-chart (chart 1). There were 227 units of analysis in the first wave, of which 59.9% had a Pap test (n=136). There were 215 units of analysis included in the second wave, of which 60.0% had a Pap test (n=129). There were 202 units of analysis in the third wave, of which 67.3% had a Pap test (n=136). There were 201 units of analysis in the fourth wave, of which 66.7% had a Pap test (n=134). There were 197 units of analysis in the fifth wave, of which 65.4% had a Pap test (n=129). There were 179 units of analysis in the sixth wave, of which 59.2% had a Pap test (n=106). In the seventh wave, 196 unites of analysis were included and 51% had a Pap test (n=100).

Figure 2:  
*Changes of Pap Test Use Over Seven Waves*



## Results of Research Question 2

The results of multivariate analysis (table 2) showed that for these middle-aged Chinese American women, some predisposing factors, enabling factors, reinforcing factors, and situational factors demonstrated significant association with adherence to Pap test use.

Table 3

*Factors Associated with Adherence to Pap Tests*

	<b>B</b>	<b>Exp (B)</b>
<b>Predisposing Factors</b>		
Age	-0.02	0.97
General health condition	-0.07	0.92
Quality of life	0.02	1.02
marital status (single)	0.08	1.09
Education	-0.05	0.94
<b>Enabling Factors</b>		
Have a PFH (no)	1.21	3.36**
family income	-0.11	0.89
No health care insurance (no)	0.32	1.38
Unaffordable healthcare cost (no)	-0.72	0.48
No healthcare provider (no)	-1.27	0.27*
distance is too far (no)	1.75	5.75
too busy (no)	-1.16	0.31*
do not trust the physician (no)	1.11	3.05
<b>Reinforcing Factors</b>		
friends can be trusted	-0.45	0.95
friends can take patients to the hospital	0.33	1.03
helper with daily chores	0.05	1.05
time spent by FHP	1.21	3.35**
<b>Situational Factors</b>		
number of sexual partners	-0.00	0.99
having cancer(s) (no)	1.8	6.05**
smoking (no)	-0.47	0.62
fibroids (no)	0.51	1.66*
endometriosis (no)	1.00	2.74
abnormal vaginal discharge (no)	0.67	1.95
alternative medicine use (no)	1.14	1.15
<b>Time Indicators</b>		
Visit 1 (Visit7)	0.77	2.16*
Visit2 (Visit7)	0.68	1.99*
Visit3 (Visit7)	1.01	2.75**
Visit4 (Visit7)	0.83	2.29**
Visit5 (Visit7)	0.60	1.83*
Visit6 (Visit7)	0.37	1.45*

\* p&lt;0.05, \*\* p&lt;0.01.

Among enabling factors, Chinese American women who had an FHP ( $e^b = 3.36$ ,  $p < 0.01$ ) were more likely to have a Pap test. Participants who had an FHP were 2.36 times more likely to have Pap tests than the participant who did not. However, patients who do not have time to visit healthcare providers ( $e^b = 0.31$ ,  $p < 0.05$ ) and patients who do not have a primary health care provider ( $e^b = 0.27$ ,  $p < 0.05$ ) were less likely to adhere to a Pap test. Family income, insurance coverage, healthcare cost, travel distance to the healthcare, trust in the physician, and willing to know the clinical test results showed no significant association with likelihood of having Pap tests.

For reinforcing factors, only time spent by the FHP ( $e^b = 3.35$ ,  $p < 0.01$ ) was positively associated with Chinese American women's Pap test use, while having friends who can be trusted and having a helper with daily chores do not have significant association with Chinese American women's adherence to Pap test. A one-unit increase in time spent with physicians can increase the odds of having a Pap test by 3.35 times.

For situational factors, both participants who had cancer(s) ( $e^b = 6.05$ ,  $p < 0.01$ ) and participants who have fibroids ( $e^b = 1.66$ ,  $p < 0.05$ ) were more likely to adhere to Pap testing among these Chinese American women. Participants who had cancer were 5.05 times more likely to have Pap tests than the participants who did not. The likelihood of having Pap tests among participants who had fibroids was 1.66 times the likelihood of the participants who did not have fibroids. However, no other female health problems demonstrated such significant association. In this longitudinal analysis, no other predisposing factors, enabling factors, reinforcing factors, or situational factors demonstrated a significant association with having Pap tests.

Visit 1 ( $e^b = 2.16$ ,  $p < 0.05$ ), Visit 2 ( $e^b = 1.99$ ,  $p < 0.05$ ), Visit 3 ( $e^b = 2.75$ ,  $p < 0.01$ ), Visit 4 ( $e^b = 2.29$ ,  $p < 0.01$ ), Visit 5 ( $e^b = 1.83$ ,  $p < 0.05$ ), and Visit 6 ( $e^b = 1.45$ ,  $p < 0.05$ ) were positively associated with adherence to Pap testing among Chinese American women, compared to the last visit (Visit 7).

## 5. DISCUSSION

The results of this study suggest over half of Chinese American woman have Pap tests (61% of person-time-waves). This result is similar to the Centers for Disease Control and Prevention's cancer statistics for Chinese Americans showing that 64.9% of Chinese American women had a Pap test in 2015 ([CDC], 2017). During the concurrent period, in 39% of person-waves, Chinese American women did not adhere to the recommendations for cervical cancer screenings. The ratios of having Pap testing among Chinese American women are comparatively consistent. The utilization rates of Pap testing among Chinese American women do not have significant changes in recent years. Facilitators and barriers of adherence to recommendations of Pap-test use among Chinese American women are discussed below.

The findings partially supported the above hypotheses. Results in terms of predisposing factors suggest that there is no significant association between predisposing factors and adherence to Pap testing among Chinese American women. One prior cross-sectional study reported that education level is positively associated with having a Pap test among Chinese American women (Damiani et al., 2015). However, the findings of this study suggest that education level is not a significant predictor of adherence to interval Pap test use. The education levels may significantly associate with one-time Pap test use, but there is no evidence of multivariate analysis that can support a significant association between repeated Pap test use and education levels.

Among enabling factors, we found that having health care providers is a significant facilitator that may promote Chinese American women's adherence to the recommendations of Pap testing. Availability of health care resources is important to Chinese American women's adherence, particularly for having a health care specialist for female health care. Consistent with this result, no health care provider available is a significant barrier in this study. The potential explanation is that health care providers usually help with educating, reminding, and managing patients' interval clinical exams including Pap testing, which is supported by the findings in prior studies that lacking knowledge about cervical cancer and Pap testing are associated with Asian women's non-adherence to preventive cervical cancer screenings (Lee, 2000; Wong et al., 2009). However, this study also found a significant barrier related to enabling factors for Chinese American women to adhere to the recommended preventive Pap testing. Being too busy to visit a health care provider as an influential factor is consistent with previous literature. One qualitative study on Chinese American women's breast cancer care suggested that Chinese American women have poor social support for their health care (Ashing-Giwa et al., 2004). One participant of Ashing-Giwa's study reported that she relies on herself even during the time of sickness. She is busy with cooking for her children. Therefore, she has difficulties in visiting doctors. Another possible explanation may relate to Chinese culture on preventive cancer care. Chinese American women may assume it is not necessary to have a cancer screening unless they have any cancer-related symptoms (Chua et al., 2005). Furthermore, they may think a repeat screening is unnecessary after having a test (Chua et al., 2005). Chinese American women may hesitate to spend time on preventive cancer care because having preventive Pap testing is not their priority.

In terms of situational factors, consistent with the third hypothesis, Chinese American women who have cancer(s) and Chinese American women who have fibroids are more likely to

have Pap testing. Cancerous cells metastasis as the leading reason for the resultant mortality of patients with cancer has been well documented in the past few decades of research (Cancer, 2006). Women with cancer(s) have increased risk for developing other types of cancers including cervical cancer. It is critical for women with cancer(s) to adhere to routine cervical cancer screenings. A uterine fibroid is a common benign tumor among females. However, symptoms of fibroids are similar to the symptoms of uterine cancer, including pain or bleeding of the abdomen (Pron et al., 2003). Therefore, having fibroids is positively associated with having Pap testing.

Regarding the reinforcing factors, Chinese American women whose doctors spend more time with them are more likely to adhere to preventive Pap testing, which partially supports the last hypothesis. Previous studies have confirmed that time spent with the doctor is important to Chinese American women (Hagiwara et al., 2013; Tam Ashing, Padilla, Tejero, & Kagawa-Singer, 2003). Chinese American women consistently report that they are not provided enough time from the physicians (Chung & Kagawa-Singer, 1993; Tam Ashing et al., 2003). The plausible explanation is that Chinese traditional doctors usually spend more time with patients and investigate all of their behaviors related to their health, and immigrants may be used to this health care style (Xu & Yang, 2009). Another possible explanation is that Chinese American women may need a longer time to understand the doctors' diagnosis and treatment plan due to a language barrier (Mui, Kang, Kang, & Domanski, 2007). Studies have linked immigrant populations' increasing English proficiency and lengthening duration of U.S. residency to their increasing likelihood of using preventive health care (Derose et al., 2013). This study added the evidence that the physicians who spend a longer time with Chinese female patients can increase their use of preventive Pap testing. Potential health education through medical interactions

between physicians and patients contributes to Chinese American women's positive cervical cancer care behaviors.

In addition, findings of this longitudinal study reveal a cycle of Pap testing use among this cohort of Chinese American women. Even though participants were significantly more likely to have a Pap test in the first six waves comparing to the last wave, the odds ratios of having a Pap test in the wave 1, the wave 3, and the waves 4 are higher than other waves, which reflect the recommendations that women aged 31 to 65 years old should have a Pap test every five years (women aged from 31 to 65) (Moyer, 2012).

### **Limitations**

The primary limitations of this study are related to the research methodology (a secondary analysis) and the use of an existing dataset (that the researcher did not collect). The SWAN Series was designed to collect data from a cohort of middle-aged women from 1996 to 2008. The SWAN aims to examine the health of women during their middle-age years, and the cohort reached the period of middle-age in 2008. Therefore, the SWAN stopped collecting data in 2008. Because the last wave of data collection was about 10 years ago, some concerns were raised that the data set is too old to explain current barriers to use of cervical cancer screenings. However, to my knowledge, the SWAN is the most appropriate longitudinal dataset (with 11 waves) available to explain middle-aged women's adherence to regular Pap testing. The SWAN has been widely used to produce many recent published health care studies (e.g., Jacobs et al., 2014). For example, in 2017, Jacobs et al. published a longitudinal study that analyzed relationships between perceived discrimination and breast and cervical cancer screening by using the SWAN dataset.

Second, this study is limited by its inability to generate conclusions related to the causes of Chinese American women's Pap testing uptake. The current study does not allow for testing causal relationships or the direction of the relationships between independent variables and adherence to preventive Pap testing. Future studies are needed to analyze causal relationships. Also, this study is limited in its ability to control for some other variables that may explain Pap testing because they are not included in the SWAN dataset. Some variables included in the SMCPC were not provided by the SWAN, such as health beliefs, language and immigrant status. Furthermore, distrust of western medicine could not be measured completely by using the SWAN. The SWAN only provides two variables related to distrust of western medicine, such as the woman does not trust the physician and reliance on folk medicine use.

Third, the present study is limited by only measuring patient-level related to Pap test uptake. This study is developed using the SMCPC framework. The original SMCPC framework includes three parts' factors: the physician, the patients, and the practice environment. As this study aims to capture a good understanding of Chinese American women's Pap testing utilization from the patients' perspective, this study will only focus on patients' factors. Future studies that examine factors relate to the physician and the practice environment would enhance our understanding of Chinese American women's Pap test uptake in the U.S.

The last limitation for this study is that it does not explore Chinese American women's cultural beliefs and attitudes toward preventive cervical cancer care use. Future studies will consider exploring Chinese American women's cultural beliefs and attitudes toward cervical cancer care by using qualitative method, such as phenomenological studies and case studies. Qualitative studies may be developed to continue to explore this phenomenon more in depth. Detailed examinations of the experiences of Pap test uptake among Chinese will be explored in

the future studies. These experiences should include the influence of culture on the use of Pap tests.

## 6. IMPLICATIONS

The present study is a preliminary exploration of Chinese American women's adherence to preventive Pap tests in the United States. This study assessed and determined which economic, behavioral, and psychosocial factors are associated with routine Pap testing for cervical cancer prevention among Chinese American women. Identifying facilitators and barriers of having repeated Pap tests may promote Chinese American women's cervical cancer care in the U.S. Disadvantaged women of Chinese origin and cervical cancer prevention were discussed in this study, which can inform practitioners to develop evidence-based interventions of promoting Chinese American women's adherence to Pap testing.

First, the findings of this study highlight the need for enhancing education of cervical cancer prevention and the importance of having routine Pap testing among Chinese American women. Improving Chinese American women's knowledge of cervical cancer prevention has been documented as an effective strategy for their positive cancer care behavior changes. For example, Lee and her research team (2014) developed a mobile intervention to deliver cervical cancer prevention knowledge to racial minority women. Research evaluating this intervention revealed a significant increase of Pap test use among participants (Lee, Koopmeiners, Rhee, Raveis, & Ahluwalia, 2014).

Findings from the proposed study hold certain implications for social workers, especially health care workers who serve Chinese populations. Social workers should take the role of helping patients link to health care resources and assisting them to navigate the complex health

care system. Unavailability of health care providers and time consumption are two major reasons that Chinese American women fail to adhere to preventive Pap tests. It is important for social workers working in health care settings to help their Chinese American clients to understand U.S. health care system and provide education on Pap test and cervical cancer prevention.

Policy makers should consider the factors predicting preventive Pap test use in a cohort of Chinese women and make policies to help racial minority women to access cervical cancer preventive care effectively from a longitudinal perspective. For example, making agency-level policies to allow physicians to spend longer time to racial minority female patients than their counterparts, so that physicians may develop trustful relationships with their Chinese patients and answer their questions of treatment plan. In addition, arranging female health care providers to provide Pap tests to Chinese American women may be a culture-friendly policy.

Moreover, in order to help Chinese American women's adherence to Pap testing, nurses may need to spend more time on educating the medical knowledge of Pap testing and addressing their concerns. In the US, nurses take the primary role of health education. In medical settings, telehealth interventions have been widely used to provide information of diseases prevention and health care to patients (Koch, 2006; Rocque et al., 2017). Nurses may use telehealth technologies to deliver knowledges of Pap testing and cervical cancer prevention to Chinese American women, which may reduce the cost of time of physical doctor visiting. Future studies may consider exploring and developing web-based and mobile-based interventions on cancer prevention.

In summary, this study provided knowledge relevant to helping Chinese American women to stay healthy and to reduce the cervical cancer burden on the public health system in the U.S. Adhering to preventive Pap testing is critical for public health management. The

findings of this study can facilitate Chinese American women's cervical cancer prevention, which may potentially reduce morbidity and mortality of cervical cancer among Chinese in the U.S.

### **Future Directions**

The findings of this study made progress in understanding Chinese American women's interval Pap test use behaviors. However there is still a paucity of knowledge concentrate on understanding factors that hinder Chinese American women from adherence to preventive Pap testing, such as busyness and health care use experience. Specific areas of research still needs research effort to add knowledge of Chinese American women's cervical cancer prevention. The next steps of research are discussed below.

### **Exploring Chinese American Women's Cervical Cancer Care Experience**

Qualitative studies around Chinese American Women's Pap test use have been widely developed. However, there are few studies that explored Chinese American patients' Obgyn visiting experience. In-depth interviews that aim to exploring Chinese American women's perceptions of using female health care in the U.S. health care system need to be done. Furthermore, "busyness" as a barrier of adhering to preventive Pap testing among Chinese American women is only beginning to be investigated. Therefore, exploratory studies of Chinese American women's busy schedules that hinder them from accessing self-care, particularly for preventive care, need to be a priority of future studies.

### **Recruitment of Chinese American Patients to Clinical Trials**

Recruiting minority women for inclusion in clinical trial studies in purpose of developing practical interventions should be a research priority. Clinical trial studies are needed in order to

develop interventions on promoting adherence to preventive cervical cancer care and to examine the feasibility and effectiveness of these interventions. For example, using a two-by-two factorial design to randomly assign Chinese American women into intervention group or control group to receive a mhealth intervention. Pre-test and post-test scores will be compared to determine the feasibility and effectiveness of the mhealth intervention. However, a number of characteristics of the Chinese American women may present barriers to conducting clinical trials, such as language barriers and acculturation. When conducting clinical studies, subgroups of Chinese American women should be stratified based on their immigrant status and levels of English proficiency. In addition, support such as transportation may need to be provided to Chinese American participants of clinical trials.

### **Databases Available for Research**

This is a urgent need for collecting national representative databases to research the disparities in preventive cancer screening use among racial minority women including Chinese American women. The SWAN database is the best available data to study middle aged women's health; However, adhering to preventive Pap testing among young women is also a critical challenge to public health. Factors associated with youths' longitudinal cervical cancer prevention is also understudied. In addition, a number of factors suggested by the SMCPC were not measured by the SWAN dataset, including cultural beliefs, acculturation level, immigrant status. Concerning the public health management on cancer care among Chinese American women, a recent longitudinal database focusing on racial minority women's cancer care need to be collected for further understanding and addressing disparities in cancer screenings among Chinese American women.

## REFERENCES

- Aday, L. A., & Andersen, R. (1974). A framework for the study of access to medical care. *Health services research*, 9(3), 208.
- American Cancer Society. (2018). History of ACS Recommendations for the Early Detection of Cancer in People Without Symptoms. Retrieved February 22, 2019, from <https://www.cancer.org/health-care-professionals/american-cancer-society-prevention-early-detection-guidelines/overview/chronological-history-of-acr-recommendations.html>
- Arbyn, M., Anttila, A., Jordan, J., Ronco, G., Schenck, U., Segnan, N., ...von Karsa, L. (2011). European guidelines for quality assurance in cervical cancer screening. Second edition-summary document. *Annals of Oncology*. <https://doi.org/10.1093/annonc/mdp471>
- Ashing-Giwa, K. T., Padilla, G., Tejero, J., Kraemer, J., Wright, K., Coscarelli, A., ...Hills, D. (2004). Understanding the breast cancer experience of women: A qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. *Psycho-Oncology*, 13(6), 408–428. <https://doi.org/10.1002/pon.750>
- Bosch, F. X., Lorincz, A., Muñoz, N., Meijer, C. J. L. M., & Shah, K. V. (2002). The causal relation between human papillomavirus and cervical cancer. *Journal of Clinical Pathology*, 55(4), 244–265. <https://doi.org/10.1136/jcp.55.4.244>
- Boss, L. P., & Guckes, F. H. (1992). Medicaid coverage of screening tests for breast and cervical cancer. *American Journal of Public Health*, 82(2), 252–253. <https://doi.org/10.2105/AJPH.82.2.252>
- Brankovic, I., Verdonk, P., & Klinge, I. (2013). Applying a gender lens on human papillomavirus infection: cervical cancer screening, HPV DNA testing, and HPV vaccination. *International Journal for Equity in Health*, 12(1), 14. <https://doi.org/10.1186/1475-9276-12-14>
- Bromberger, J. T., Harlow, S., Avis, N., Kravitz, H. M., & Cordal, A. (2004). Racial/ethnic differences in the prevalence of depressive symptoms among middle-aged women: The Study of Women's Health Across the Nation (SWAN). *American Journal of Public Health*, 94(8), 1378–1385. <https://doi.org/10.2105/AJPH.94.8.1378>
- Brown, D. R., Shew, M. L., Qadadri, B., Neptune, N., Vargas, M., Tu, W., ...Fortenberry, J. D. (2005). A Longitudinal Study of Genital Human Papillomavirus Infection in a Cohort of Closely Followed Adolescent Women. *The Journal of Infectious Diseases*, 191(2), 182–192. <https://doi.org/10.1086/426867>
- Cancer, B. (2006). Breast Cancer Metastasis. *Cancer Genomics and Proteomics*, 9, 311–320. <https://doi.org/10.1037/e564602006-001>

- Carpenter, A. B., & Davey, D. D. (1999). ThinPrep(®) Pap test(TM): Performance and biopsy follow-up in a University Hospital. *Cancer*, *87*(3), 105–112. [https://doi.org/10.1002/\(SICI\)1097-0142\(19990625\)87:3<105::AID-CNCR2>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0142(19990625)87:3<105::AID-CNCR2>3.0.CO;2-Z)
- Castellsagué, X. (2008). Natural history and epidemiology of HPV infection and cervical cancer. *Gynecologic Oncology*, *110*(3 SUPPL.2). <https://doi.org/10.1016/j.ygyno.2008.07.045>
- Centers for Disease Control and Prevention (2017). *Use of Pap smears among women aged 18 and over, by selected characteristics: United States, selected years 1987–2015*.
- Chawla, N., Breen, N., Liu, B., Lee, R., & Kagawa-Singer, M. (2015). Asian American women in California: A pooled analysis of predictors for breast and cervical cancer screening. *American Journal of Public Health*, *105*(2), e98–e109. <https://doi.org/10.2105/AJPH.2014.302250>
- Chen, J., & Vargas-Bustamante, A. (2011). Estimating the effects of immigration status on mental health care utilizations in the United States. *Journal of Immigrant and Minority Health*, *13*, 671–680. <https://doi.org/10.1007/s10903-011-9445-x>
- Chen, W.-T., & Wang, J. (2013). Chinese female immigrants english-speaking ability and breast and cervical cancer early detection practices in the New York metropolitan area. *Asian Pacific Journal of Cancer Prevention : APJCP*, *14*(2), 733–738. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/23621228>
- Chua, M. S.-T., Mok, T. S. K., Kwan, W. H., Yeo, W., & Zee, B. (2005). Knowledge, Perceptions, and Attitudes of Hong Kong Chinese Women on Screening Mammography and Early Breast Cancer Management. *The Breast Journal*, *11*(1), 52–56. <https://doi.org/10.1111/j.1075-122X.2005.21480.x>
- Chun, K. M., Chesla, C. A., & Kwan, C. M. L. (2011). “So we adapt step by step”: Acculturation experiences affecting diabetes management and perceived health for Chinese American immigrants. *Social Science & Medicine* (1982), *72*(2), 256–264. <https://doi.org/10.1016/j.socscimed.2010.11.010>
- Chung, R. C.-Y., & Kagawa-Singer, M. (1993). Predictors of psychological distress among southeast Asian refugees. *Social Science & Medicine*, *36*(5), 631–639. [https://doi.org/10.1016/0277-9536\(93\)90060-H](https://doi.org/10.1016/0277-9536(93)90060-H)
- Cook, W. K., Tseng, W., Chin, K. K., John, I., & Chung, C. (2014). Identifying vulnerable Asian Americans under health care reform: Working in small businesses and health care Coverage. *Journal of Health Care for the Poor and Underserved*, *25*(4), 1898–1921. Retrieved from [https://apps.webofknowledge.com/full\\_record.do?product=UA&search\\_mode=GeneralSearch&qid=1&SID=2Exy7fUYYQfxFLBTggt&page=1&doc=1](https://apps.webofknowledge.com/full_record.do?product=UA&search_mode=GeneralSearch&qid=1&SID=2Exy7fUYYQfxFLBTggt&page=1&doc=1)
- Damiani, G., Basso, D., Acampora, A., Bianchi, C. B. N. A., Silvestrini, G., Frisicale, E. M., ... Ricciardi, W. (2015). The impact of level of education on adherence to breast and cervical cancer screening : Evidence from a systematic review and meta-analysis. *Preventive Medicine*, *81*, 281–289. <https://doi.org/10.1016/j.ypmed.2015.09.011>

- de Sanjosé, S., Quint, W. G. V, Alemany, L., Geraets, D. T., Klaustermeier, J. E., Lloveras, B., ...Bosch, F. X. (2010). Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study. *The Lancet Oncology*, *11*(11), 1048–1056. [https://doi.org/10.1016/S1470-2045\(10\)70230-8](https://doi.org/10.1016/S1470-2045(10)70230-8)
- Derose, K. P., Bahney, B. W., Lurie, N., & Escarce, J. J. (2009). Review: Immigrants and health care access, quality, and cost. *Medical Care Research and Review : MCRR*, *66*(4), 355–408. <https://doi.org/10.1177/1077558708330425>
- Derose, K. P., Escarce, J. J., & Lurie, N. (2013). Immigrants and healthcare: Sources of vulnerability. *Health Affairs*, *32*. <https://doi.org/10.1377/hlthaff.26.5.1258>
- Dey, A. N., & Lucas, J. W. (2006). Physical and mental health characteristics of U.S.- and foreign-born adults: United States, 1998-2003. *Advance Data*, (369), 1–19. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/16541709>
- Ethical Standards in Social Work: Preface. (n.d.). Retrieved January 12, 2016, from <http://naswpress.org/publications/ethics/inside/ethical-standards-preface.html>
- Ganz, P. A., Greendale, G. A., Petersen, L., Kahn, B., & Bower, J. E. (2003). Breast cancer in younger women: reproductive and late health effects of treatment. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology*, *21*(22), 4184–4193. <https://doi.org/10.1200/JCO.2003.04.196>
- Ganz, P. A., Rowland, J. H., Desmond, K., Meyerowitz, B. E., & Wyatt, G. E. (1998). Life after breast cancer: understanding women's health-related quality of life and sexual functioning. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology*, *16*(2), 501–514. <https://doi.org/10.1200/JCO.1998.16.2.501>
- Gelberg, L., Andersen, R. M., & Leake, B. D. (2000). The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. *Health services research*, *34*(6), 1273
- Goldstein, H. (1993). Hierarchical linear models: Applications and data analysis methods. *Journal of the American Statistical Association*, *88*(421), 386–388. Retrieved from <http://go.galegroup.com/ps/i.do?id=GALE%7CA257611760&sid=googleScholar&v=2.1&it=r&linkaccess=fulltext&issn=01621459&p=AONE&sw=w&authCount=1&u=tusc49521&selfRedirect=true>
- Gupta, A., Kumar, A., & Stewart, D. (2002). Cervical cancer screening among South Asian women in Canada: The role of education and acculturation. *Health Care for Women International*, *23*(2), 123–134. <https://doi.org/10.1080/073993302753429004>
- Gustafsson, L., Pontén, J., Bergström, R., & Adami, H. O. (1997). International incidence rates of invasive cervical cancer before cytological screening. *International Journal of Cancer*, *71*(2), 159–165. [https://doi.org/10.1002/\(SICI\)1097-0215\(19970410\)71:2<159::AID-IJC6>3.0.CO;2-#](https://doi.org/10.1002/(SICI)1097-0215(19970410)71:2<159::AID-IJC6>3.0.CO;2-#)
- Hagiwara, N., Penner, L. A., Gonzalez, R., Eggly, S., Dovidio, J. F., Gaertner, S. L., ...Albrecht,

- T. L. (2013). Racial attitudes, physician-patient talk time ratio, and adherence in racially discordant medical interactions. *Social Science & Medicine (1982)*, 87, 123–131. <https://doi.org/10.1016/j.socscimed.2013.03.016>
- Hardcastle, L. E., Record, K. L., Jacobson, P. D., & Gostin, L. O. (2011). Improving the population's health: the Affordable Care Act and the importance of integration. *The Journal of Law, Medicine & Ethics : A Journal of the American Society of Law, Medicine & Ethics*, 39(3), 317–327. <https://doi.org/10.1111/j.1748-720X.2011.00602.x>
- Hardin, J. W., & Hilbe, J. M. (2002). Generalized estimating equations. Chapman and Hall/CRC.
- Hiatt, R. A., Pasick, R. J., Stewart, S., Bloom, J., Davis, P., Gardiner, P., ... Stroud, F. (2001). Community-based cancer screening for underserved women: Design and baseline findings from the Breast and Cervical Cancer Intervention Study. *Preventive Medicine*, 33(3), 190–203. <https://doi.org/10.1006/pmed.2001.0871>
- Hislop, T. G., Teh, C., Lai, A., Ralston, J. D., Shu, J., & Taylor, V. M. (2004). Pap screening and knowledge of risk factors for cervical cancer in Chinese women in British Columbia, Canada. *Ethnicity & Health*, 9(3), 267–281. <https://doi.org/10.1080/1355785042000250102>
- Holroyd, E., Twinn, S. F., & Shia, A. T. (2001). Chinese women's experiences and images of the Pap smear examination. *Cancer Nursing*, 24(1), 68–75. <https://doi.org/10.1097/00002820-200102000-00011>
- Hulme, J., Moravac, C., Ahmad, F., Cleverly, S., Lofters, A., Ginsburg, O., & Dunn, S. (2016). "I want to save my life": Conceptions of cervical and breast cancer screening among urban immigrant women of South Asian and Chinese origin. *BMC Public Health*, 16(1), 1–12. <https://doi.org/10.1186/s12889-016-3709-2>
- IARC Working Group on the Evaluation of Cancer. (2005). Cervix Cancer Screening (IARC Handbooks of Cancer Prevention, 10). In *Cervix Cancer Screening*, IARC, Lyon (pp. 201–212).
- Islam, N., Kwon, S. C., Senie, R., & Kathuria, N. (2006). Breast and cervical cancer screening among South Asian women in New York City. *Journal of Immigrant and Minority Health*, 8(3), 211–221. <https://doi.org/10.1007/s10903-006-9325-y>
- Jacobs, E. A., Rathouz, P. J., Karavolos, K., Everson-Rose, S. A., Janssen, I., Kravitz, H. M., ... Powell, L. H. (2014). Perceived discrimination is associated with reduced breast and cervical cancer Screening: The Study of Women's Health Across the Nation (SWAN). *Journal of Women's Health*, 23(2), 138–145. <https://doi.org/10.1089/jwh.2013.4328>
- Jang, M., Lee, E., & Woo, K. (1998). Income, language, and citizenship status: Factors affecting the health care access and utilization of Chinese Americans. *Health & Social Work*, 23(2), 136–145. <https://doi.org/10.1093/hsw/23.2.136>
- Jemal, A., Bray, F., Center, M. M., Ferlay, J., Ward, E., & Forman, D. (2011). Global cancer statistics. *CA: A Cancer Journal for Clinicians*, 61(2), 69–90. <https://doi.org/10.3322/caac.20107>

- Kagawa-Singer, M., Pourat, N., Breen, N., Coughlin, S., Abend McLean, T., McNeel, T. S., & Ponce, N. A. (2007). Breast and Cervical Cancer Screening Rates of Subgroups of Asian American Women in California. *Medical Care Research and Review*, 64(6), 706–730. <https://doi.org/10.1177/1077558707304638>
- Kandula, N. R., Grogan, C. M., Rathouz, P. J., & Lauderdale, D. S. (2004). The unintended impact of welfare reform on the medicaid enrollment of eligible immigrants. *Health Services Research*, 39, 1509–1526. <https://doi.org/10.1111/j.1475-6773.2004.00301.x>
- Kandula, N. R., Wen, M., Jacobs, E. A., & Lauderdale, D. S. (2006). Low rates of colorectal, cervical, and breast cancer screening in Asian Americans compared with non-Hispanic whites. *Cancer*, 107(1), 184–192. <https://doi.org/10.1002/cncr.21968>
- Kinlen, L. J., & Spriggs, A. I. (1978). Women with positive cervical smears but without surgical intervention. *The Lancet*, 312(8087), 463–465. [https://doi.org/10.1016/S0140-6736\(78\)91457-5](https://doi.org/10.1016/S0140-6736(78)91457-5)
- Kiviat, N. B., Critchlow, C. W., & Kurman, R. J. (1992). Reassessment of the morphological continuum of cervical intraepithelial lesions: Does it reflect different stages in the progression to cervical carcinoma? *IARC Scientific Publications*, (119), 59–66. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/1428107>
- Koch, S. (2006). Home telehealth--current state and future trends. *International Journal of Medical Informatics*, 75(8), 565–576. <https://doi.org/10.1016/j.ijmedinf.2005.09.002>
- Kolar, S. K., Wheldon, C., Hernandez, N. D., Young, L., Romero-Daza, N., & Daley, E. M. (2015). Human papillomavirus vaccine knowledge and attitudes, preventative health behaviors, and medical mistrust among a racially and ethnically diverse sample of college women. *Journal of Racial and Ethnic Health Disparities*, 2(1), 77–85. <https://doi.org/10.1007/s40615-014-0050-2>
- Ku, L., & Matani, S. (2001). Left out: Immigrants' access to health care and insurance. *Health Affairs (Project Hope)*, 20, 247–256. <https://doi.org/10.1377/hlthaff.20.1.247>
- Kwan, T. T. C., Lo, S. S. T., Tam, K.-F., Chan, K. K. L., & Ngan, H. Y. S. (2012). Assessment of knowledge and stigmatizing attitudes related to human papillomavirus among Hong Kong Chinese healthcare providers. *International Journal of Gynecology & Obstetrics*, 116(1), 52–56. <https://doi.org/10.1016/j.ijgo.2011.07.035>
- Kwong, K., & Mak, A. (2009). Health care and cancer screening experience of chinese immigrants in New York City: A qualitative study. *Social Work in Health Care*, 48(3), 321–347. <https://doi.org/10.1080/00981380802599190>
- Lai, D. W. L., & Kalyniak, S. (2005). Use of annual physical examinations by aging Chinese Canadians. *Journal of Aging and Health*. <https://doi.org/10.1177/0898264305279778>
- Lasser, K. E., Himmelstein, D. U., & Woolhandler, S. (2006). Access to care, health status, and health disparities in the United States and Canada: Results of a cross-national population-based survey. *American Journal of Public Health*.

<https://doi.org/10.2105/AJPH.2004.059402>

- Lee-Lin, F., Pett, M. Beliefs and Pap test screening practices among Chinese American immigrants. *Oncology Nursing Forum*, 34(6), 1203–1209.  
<https://doi.org/10.1188/07.ONF.1203-1209>
- Lee, H. Y., Koopmeiners, J. S., Rhee, T. G., Raveis, V. H., & Ahluwalia, J. S. (2014). Mobile phone text messaging intervention for cervical cancer screening: Changes in knowledge and behavior pre-post intervention. *Journal of Medical Internet Research*.  
<https://doi.org/10.2196/jmir.3576>
- Lee, J. Y., Kearns, R. A., & Friesen, W. (2010). Seeking affective health care: Korean immigrants' use of homeland medical services. *Health & Place*, 16(1), 108–115.  
<https://doi.org/10.1016/j.healthplace.2009.09.003>
- Lee, M. C. (2000). Knowledge, barriers, and motivators related to cervical cancer screening among Korean-American women: A focus group approach. *Cancer Nursing*, 23(3), 168–175. <https://doi.org/10.1097/00002820-200006000-00003>
- Lee, S., Chen, L., Jung, M. Y., Baezconde-Garbanati, L., & Juon, H.-S. (2014). Acculturation and cancer screening among Asian Americans: Role of health insurance and having a regular physician. *Journal of Community Health*, 39(2), 201–212.  
<https://doi.org/10.1007/s10900-013-9763-0>
- Leong, F. T. L., & Lau, A. S. L. (2001). Barriers to providing effective mental health services to Asian Americans. *Mental Health Services Research*, 3(4), 201–214.  
<https://doi.org/10.1023/A:1013177014788>
- Lin, N., events, and illness : A model and an empirical test. American Sociological Association Stable URL : <http://www.jstor.org/stable/2136433>. *Journal of Health and Social Behavior*, 20(2), 108–119.
- Mainous, A. G., Hueston, W. J., Love, M. M., & Griffith, C. H. (2013). Access to care for the uninsured: Is access to a physician enough? *American Journal of Public Health*, 89(6), 910–912. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1508656&tool=pmcentrez&rendertype=abstract>
- Maleku, A., & Aguirre, R. T. P. (2014). Culturally competent health care from the immigrant lens: A qualitative interpretive meta-synthesis (QIMS). *Social Work in Public Health*, 29(6), 561–580. <https://doi.org/10.1080/19371918.2014.893417>
- Maxwell, A. E., Bastani, R., & Warda, U. S. (2000). Demographic predictors of cancer screening among Filipino and Korean immigrants in the United States. *American Journal of Preventive Medicine*, 18(1), 62–68. [https://doi.org/10.1016/S0749-3797\(99\)00110-5](https://doi.org/10.1016/S0749-3797(99)00110-5)
- McCracken, M., Olsen, M., Chen, M. S., Jemal, A., Thun, M., Cokkinides, V., ... Ward, E. (2008). Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. *CA: A Cancer Journal for*

- Clinicians*, 57(November 1950), 190–205. <https://doi.org/10.3322/canjclin.57.4.190>
- Moore, D. H. (2006). Cervical cancer. *Obstetrics and Gynecology*, 107(5), 1152–1161. <https://doi.org/10.1097/01.AOG.0000215986.48590.79>
- Moyer, V. A. (2012). Screening for cervical cancer: U.S. preventive services task force recommendation statement. *Annals of Internal Medicine*. <https://doi.org/10.1059/0003-4819-156-12-201206190-00424>
- Mui, A. C., Kang, S.-Y., Kang, D., & Domanski, M. D. (2007). English language proficiency and health-related quality of life among Chinese and Korean immigrant elders. *Health & Social Work*, 32(2), 119–127.
- National Institutes of Health. (2010). *Cervical Cancer*.
- Nelson, R. (2014). Breast and cervical cancer screening among Asian American women and Latinas: Does race-ethnicity matter? *Medscape Medical News*, 19(10), 10–11. Retrieved from <http://www.medscape.com/viewarticle/821537>
- Parsa, P., Kandiah, M., Abdul Rahman, H., & Mohd Zulkefli, N. A. (2006). Barriers for breast cancer screening among Asian women: A mini literature review. *Asian Pacific Journal of Cancer Prevention*, 7(4), 509–514.
- Plummer, M., Schiffman, M., Castle, P. E., MaucortBoulch, D., & Wheeler, C. M. (2007). A 2-year prospective study of human papillomavirus persistence among women with a cytological diagnosis of atypical squamous cells of undetermined significance or lowgrade squamous intraepithelial lesion. *The Journal of Infectious Diseases*, 195(11), 1582–1589. <https://doi.org/10.1086/516784>
- Pourat, N., Kagawa-Singer, M., Breen, N., & Sripipatana, A. (2010). Access versus acculturation: Identifying modifiable factors to promote cancer screening among Asian American women. *Medical Care*. Lippincott Williams & Wilkins. <https://doi.org/10.2307/25767017>
- Pron, G., Bennett, J., Common, A., Wall, J., Asch, M., & Sniderman, K. (2003). The Ontario Uterine Fibroid Embolization Trial. Part 2. Uterine fibroid reduction and symptom relief after uterine artery embolization for fibroids. *Fertility and Sterility*, 79(1), 120–127. [https://doi.org/10.1016/S0015-0282\(02\)04538-7](https://doi.org/10.1016/S0015-0282(02)04538-7)
- Reyes, A. M., & Hardy, M. (2015). Health insurance instability among older immigrants: Region of origin disparities in coverage. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 70(2), 303–313. <https://doi.org/10.1093/geronb/gbu218>
- Rocque, G. B., Halilova, K. I., Varley, A. L., Williams, C. P., Taylor, R. A., Masom, D. G., ... Kvale, E. A. (2017). Feasibility of a telehealth educational program on self-management of pain and fatigue in adult cancer patients. *Journal of Pain and Symptom Management*. <https://doi.org/10.1016/j.jpainsymman.2016.12.345>
- Sabik, L. M., Tarazi, W. W., & Bradley, C. J. (2015). State medicaid expansion decisions and disparities in women's cancer screening. *American Journal of Preventive Medicine*, 48(1),

98–103. <https://doi.org/10.1016/j.amepre.2014.08.015>

- Sargent, A., Bailey, A., Almonte, M., Turner, A., Thomson, C., Peto, J., ...ARTISTIC Study Group. (2008). Prevalence of type-specific HPV infection by age and grade of cervical cytology: Data from the ARTISTIC trial. *British Journal of Cancer*, *98*(10), 1704–1709. <https://doi.org/10.1038/sj.bjc.6604324>
- Schiffman, M., Castle, P. E., Jeronimo, J., Rodriguez, A. C., & Wacholder, S. (2007). Human papillomavirus and cervical cancer. *The Lancet*, *370*(9590), 890–907. [https://doi.org/10.1016/S0140-6736\(07\)61416-0](https://doi.org/10.1016/S0140-6736(07)61416-0)
- Schiffman, M., Herrero, R., DeSalle, R., Hildesheim, A., Wacholder, S., Cecilia Rodriguez, A., ...Burk, R. D. (2005). The carcinogenicity of human papillomavirus types reflects viral evolution. *Virology*, *337*(1), 76–84. <https://doi.org/10.1016/j.virol.2005.04.002>
- Schiffman, M., & Solomon, D. (2013). Cervical-cancer screening with human papillomavirus and cytologic cotesting. *New England Journal of Medicine*, *369*(24), 2324–2331. <https://doi.org/10.1056/NEJMcp1210379>
- Schiffman, M., Wentzensen, N., Wacholder, S., Kinney, W., Gage, J. C., & Castle, P. E. (2011). Human papillomavirus testing in the prevention of cervical cancer. *Journal of the National Cancer Institute*. <https://doi.org/10.1093/jnci/djq562>
- Schoenfeld, D. (1982). Partial residuals for the proportional hazards regression model. *Biometrika*. <https://doi.org/10.1093/biomet/69.1.239>
- Seeff, L. C., & McKenna, M. T. (2003). Cervical cancer mortality among foreign-born women living in the United States, 1985 to 1996. *Cancer Detection and Prevention*, *27*(3), 203–208. [https://doi.org/10.1016/S0361-090X\(03\)00062-X](https://doi.org/10.1016/S0361-090X(03)00062-X)
- Sentell, T. L., Tsoh, J. Y., Davis, T., Davis, J., & Braun, K. L. (2015). Low health literacy and cancer screening among Chinese Americans in California: A cross-sectional analysis. *BMJ Open*, *5*(1), e006104. <https://doi.org/10.1136/bmjopen-2014-006104>
- Seow, A., Huang, J., & Straughan, P. T. (2000). Effects of social support, regular physician and health-related attitudes on cervical cancer screening in an Asian population. *Cancer Causes and Control*, *11*(3), 223–230. <https://doi.org/10.1023/A:1008954606992>
- Shi, L., Lebrun, L. A., Zhu, J., & Tsai, J. (2011). Cancer screening among racial/ethnic and insurance groups in the United States: A comparison of disparities in 2000 and 2008. *Journal of Health Care for the Poor and Underserved*, *22*(3), 945–961. <https://doi.org/10.1353/hpu.2011.0079>
- Siegel, R. L., Miller, K. D., & Jemal, A. (2016). Cancer statistics, 2016. *CA: A Cancer Journal for Clinicians*, *66*(1), 7–30. <https://doi.org/10.3322/caac.21332>
- Singh, G. K., & Hiatt, R. A. (2006). Trends and disparities in socioeconomic and behavioural characteristics, life expectancy, and cause-specific mortality of native-born and foreign-born populations in the United States, 1979–2003. *International Journal of Epidemiology*, *35*(4), 903–919. <https://doi.org/10.1093/ije/dyl089>

- Singh, G. K., Rodriguez-Lainz, A., & Kogan, M. D. (2013). Immigrant health inequalities in the United States: Use of eight major national data systems. *The Scientific World Journal*, 2013. <https://doi.org/10.1155/2013/512313>
- Solomon, D., Breen, N., & McNeel, T. (2007). Cervical cancer screening rates in the United States and the potential impact of implementation of screening guidelines. *CA: A Cancer Journal for Clinicians*, 57(2), 105–111. <https://doi.org/10.3322/canjclin.57.2.105>
- Sonfield, A., & Pollack, H. A. (2013). The Affordable Care Act and reproductive health: Potential gains and serious challenges. *Journal of Health Politics, Policy and Law*, 38(2), 373–391. <https://doi.org/10.1215/03616878-1966342>
- Sternfeld, B., Wang, H., Quesenberry, C. P., Abrams, B., Everson-Rose, S. A., Greendale, G. A., ... Sowers, M. (2004). Physical activity and changes in weight and waist circumference in midlife women: Findings from the study of women's health across the nation. *American Journal of Epidemiology*, 160(9), 912–922. <https://doi.org/10.1093/aje/kwh299>
- Tam Ashing, K., Padilla, G., Tejero, J., & Kagawa-Singer, M. (2003). Understanding the breast cancer experience of Asian American women. *Psycho-Oncology*, 12(1), 38–58. <https://doi.org/10.1002/pon.632>
- The Henry J. Kaiser Family Foundation. (n.d.). *Medicaid Benefits: Diagnostic, Screening and Preventive Services*. Retrieved April 17, 2017, from <http://kff.org/medicaid/state-indicator/diagnostic-screening-and-preventive-services/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D>
- Torre, L. A., Bray, F., Siegel, R. L., Ferlay, J., Lortet-tieulent, J., & Jemal, A. (2015). Global Cancer Statistics, 2012. *CA: A Cancer Journal of Clinicians*, 65(2), 87–108. <https://doi.org/10.3322/caac.21262>.
- Torre, L. A., Sauer, A. G., Chen, M. S., Kagawa-Singer, M., Jemal, A., & Siegel, R. L. (2016). Cancer Statistics for Asian Americans, Native Hawaiians, and Pacific Islanders, 2015: Convergence of incidence between males and females. *CA: A Cancer Journal for Clinicians*, 66(3), 182–202. <https://doi.org/10.3322/caac.21335>.
- Tung, W.-C., Granner, M., Lu, M., & Qiu, X. (2017). Predictors of cervical cancer screening for Chinese American women. *European Journal of Cancer Care*, 26(4), e12552. <https://doi.org/10.1111/ecc.12552>
- Walsh, J. M., & McPhee, S. J. (1992). A systems model of clinical preventive care: an analysis of factors influencing patient and physician. *Health education quarterly*, 19(2), 157-175.
- Wang, X., Fang, C., Tan, Y., Liu, A., & Ma, G. X. (2010). Evidence-based intervention to reduce access barriers to cervical cancer screening among underserved Chinese American women. *Journal of Women's Health*, 19(3), 463–469. <https://doi.org/10.1089/jwh.2009.1422>
- White, A., Thompson, T. D., White, M. C., Sabatino, S. A., de Moor, J., Doria-Rose, P. V., ... Richardson, L. C. (2017). Cancer screening test use - United States, 2015. *MMWR*.

*Morbidity and Mortality Weekly Report*, 66(8), 201–206.  
<https://doi.org/10.15585/mmwr.mm6608a1>

- Wong, F. Y., Campsmith, M. L., Nakamura, G. V., Crepaz, N., & Begley, E. (2004). HIV testing and awareness of care-related services among a group of HIV-positive Asian Americans and Pacific Islanders in the United States: Findings from a supplemental HIV/AIDS surveillance project. *AIDS Education and Prevention*, 16(5), 440–447.  
<https://doi.org/10.1521/aeap.16.5.440.48736>
- Wong, L. P., Wong, Y. L., Low, W. Y., Khoo, E. M., & Shuib, R. (2009). Knowledge and awareness of cervical cancer and screening among Malaysian women who have never had a Pap smear: A qualitative study. *Singapore Medical Journal*, 50(1), 49–53.  
<https://doi.org/10.1080/10705500802365490>
- Woo, J. S. T., Brotto, L. A., & Gorzalka, B. B. (2009). The Role of Sexuality in Cervical Cancer Screening Among Chinese Women. *Health Psychology*, 28(5), 598–604.  
<https://doi.org/10.1037/a0015986>
- Wright, T. C., & Schiffman, M. (2003). Adding a test for human papillomavirus DNA to cervical-cancer screening. *The New England Journal of Medicine*, 348(6), 489–490.  
<https://doi.org/10.1056/NEJMp020178>
- Xu, J., & Yang, Y. (2009). Traditional Chinese medicine in the Chinese health care system. *Health Policy*. <https://doi.org/10.1016/j.healthpol.2008.09.003>

## APPENDIX

THE UNIVERSITY OF  
**ALABAMA®**  
*Office of the Vice President for*  
Research & Economic Development  
**Office for Research Compliance**

October 12, 2018

Yuqi Guo  
School of Social Work  
The University of  
Alabama Box 870314

Re: IRB # EX-1 8-CM-055-A: "A Longitudinal Analysis of Factors Associated with Adherence to Preventive Pap Test Recommendations among Middle-Aged Chinese American Women"

Dear Ms. Guo,

The University of Alabama Institutional Review Board has reviewed the revision to your previously approved exempt protocol. The Board has determined that the change does not affect the exempt status of your protocol.

*Please remember that your approval period expires one year from the date of your original approval (May 23, 2018), not the date of this revision approval.*

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB approval number. Changes to this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants.

Good luck with your research. Sincerely,

cc: Dr. Laura Hopson