2018

Alcohol Consumption and Cervical Cancer Associations Among Women in Los Angeles, California

Tina A. Nmor
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Tina Ada Nmor

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Ji Shen, Committee Chairperson, Public Health Faculty
Dr. Nicoletta Alexander, Committee Member, Public Health Faculty
Dr. LaToya Johnson, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2018

Abstract

Alcohol Consumption and Cervical Cancer Associations Among Women in Los Angeles, California

by

Tina Ada Nmor

MPH, Walden University, 2011

MBA, American Intercontinental University, 2008

BBA, American Intercontinental University, 2006

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

February 2018

Abstract

Alcohol consumption and cervical cancer caught in the early stages are preventive epidemics, though the incidence of cervical cancer has continued to rise in Los Angeles, California. The purpose of this quantitative cross-sectional study was to better understand the association between alcohol consumption and cervical cancer incidence using the theory of relationism. California Health Interview Survey (CHIS) data collected in 2005 was used to investigate alcohol consumption and cervical cancer incidence among women in Los Angeles, California. The CHIS 2005 surveyed 43,020 adults; of those surveyed, 441 participants reported alcohol consumption and cervical cancer out of 25,548 adult women. Chi-square tests of independent and logistic regression were used to determine the strength of association between alcohol consumption and cervical cancer among women in the CHIS dataset. Chi-square results indicate consuming alcoholic drinks 30 days before diagnoses was not a significant predictor of cervical cancer. The logistic regression results suggest the number of alcoholic drinks consume per day was a significant predictor of cervical cancer incidence ($p = .000$). A major limitation of this study was the small sample sizes. A larger sample size is recommended. Implementing and enforcing awareness program and behaviors modification polices regarding alcohol consumption specifically among women diagnosed with cervical cancer could facilitate the reduction or elimination of alcohol consumption among women alcohol consumer diagnosed with cervical cancer in Los Angeles, California.

Alcohol Consumption and Cervical Cancer Associations Among Women in Los Angeles, California

by

Tina Ada Nmor

MPH, Walden University, 2011

MBA, American Intercontinental University, 2008

BBA, American Intercontinental University, 2006

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

February 2018

Dedication

This study is dedicated to my parents my father, Chief George Nmor, who slept in the Lord May 2009, and Mrs. Esther Nmor my mother, who taught me never to give up on my dreams, and to everybody who kept me going when I almost gave up. To my sunshine, my son Kolade Charles Fasesin, thank you for coping with my absence and understanding me when you so dearly wanted me around. Your soothing smile and words of encouragement kept me going when I was very exhausted and tired. You are the absolute reason I remained determined and focused on the finish line, I love you. Finally, to God, whom strengthened and empowered me to get to this point, all glory, honor, and adoration be unto your Holy name (amen).

Acknowledgments

My acknowledgment goes to my committee members for their steadfast support in assisting me in getting to this level. A special thanks to Dr. Ji Shen, my committee chair and my mentor throughout this dissertation process, for his effortless support and the countless hours spent in evaluating and proofreading my research work and most of all for your patience with me especially during my setbacks. Thank you, Dr. Nicoletta M. Alexander, for agreeing to come on board and serve as my content member and for all your support on such a short notice. My university research reviewer Dr. Latoya Johnson, thank you for your help in reviewing my work and helping me attain a scholastic voice. Finally, I will also like to acknowledge and thank my colleagues, specially Dr. Abosede Obikunle for your continuous advice and motivation and for spearheading me in the right direction and helping me stay focused throughout my writing process. I am very grateful to have crossed this path with all of you, my committee members. Without you all I would never have gotten to this point. God bless you all.

Table of Contents

List of Tables

Chapter 1: Introduction to the Study

Background

Alcohol consumption and cervical cancer are overlapping epidemics that contribute significantly to the burden of disease affecting women in Los Angeles, California (California Department of Public Health [CDPH], (2016)). Alcohol is a psychoactive ingredient with dependence-producing properties that has been commonly used for centuries in diverse cultures (World Health Organization [WHO], 2015). Alcohol consumption carries a risk of adverse health effect such as cancer, and social consequences that are connected to its toxic, intoxicating, and dependence-producing properties (WHO, 2015). Alcohol consumption is a serious health epidemic that has been attributable to over 3million deaths around world in 2012 (WHO, 2015).

According to the American Cancer Society (ACS, 2014a), most people have the knowledge that consuming more than one alcoholic drink per day could cause a serious health problem. However, only few people know that drinking alcohol could raise their risk of cancer (ACS, 2014a; Centers for Disease Control and Prevention [CDC], 2014a). In California, alcohol consumption resulted in 10,572 deaths and 304,472 years of potential life lost between 2006 and 2010 (CDC, 2016a; CDC, 2015). In 2010, excessive alcohol intake cost $35 billion (approximately $2.05 per drink) because of healthcare expenses and lost workplace productivity (CDC, 2016a; CDC, 2015). In 2001, approximately 3,596 deaths occurred from alcohol in California (Lund, 2004). Almost 950 (40%) deaths attributed to alcohol consumption was due to chronic causes (such as

cancer); 440(18%) death to other acute causes (CDC, 2014b). However, the association of alcohol consumption and cervical cancer is still uncertain.

Cancer is a major health problem in California. It is the second leading cause of death (California Department of Public Health [CDPH], 2016). In 2013, about 6,703 new cases of cervical cancer and 1,484 deaths, including 105,500 (13%) existing cases of cervical of cancer, were reported (CDPH, 2016). In 2008, 1,400 women were diagnosed with cervical cancer and 400 cervical cancer death-related were projected to occur yearly (Hofer et al., 2008). In 2009, the California Cancer Registry (CCR), estimated that more than 140,000 were diagnosed with some form of cancer that year, skin cancer not included. In the same year about 24% of deaths were attributed to cancer as compared to heart disease (25%), which was the leading cause of death among Californians (CCR, 2009). Hispanics have the highest death rate of 14.4%, followed by non-Hispanic Blacks (8.7%), Asian/ Pacific Islander (8.3%), and non-Hispanic Whites (7%) (Hofer et al., 2008; CCR, 2009). Even though, in California, a decline in cervical cancer was shown in the overall incidence and death, this decline has not been equally shared among women. Between 2000 and 2004, incidence rates of cervical cancer among Hispanic (14.4%) women were twice higher than non-Hispanic White women (7%), while the death rate was higher among non-Hispanic Black women compared among women of other races and ethnicities (Hofer et al., 2008).

Alcohol consumption is increasing in several countries, including the United States, and is a compelling cause of cancer worldwide (Boffetta & Hashibe, 2006). Approximately 88, 000 alcohol related-deaths and 2.5 million years of potential life lost

were attributed to excessive alcohol consumption each year in the US (CDC, 2014a). In 2006, the economic cost of alcohol consumption was estimated at $223.5 billion (CDC, 2014a). In California, the economic burden of cervical cancer was estimated at $1.3 billion per year, of which $10,436 per person was attributed to direct cost of care (County of San Diego, 2010).

Epidemiological data on alcohol consumption and its contribution to the development of cervical cancer are still limited. Not much is known about the safety and efficiency of quitting drinking alcoholic beverages, especially for people diagnosed with cervical cancer. Thus, there continues to be a gap in the literature about creating the awareness on the danger of consuming alcohol when diagnosed with cervical cancer. To date, no studies have explicitly analyzed alcohol consumption as a potential cause for cervical cancer. This gap in related literature could be due to human papillomavirus (HPV) associations to cervical cancer.

The main interest of this research is in alcohol consumption as a potential risk factor for developing cervical cancer. In the United States, cervical cancer is rated as the third common cause of cancer among women; this is preceded by breast cancer as the second common cause of cancer among women (ACS, 2016c). Even though cervical cancer can be caused by other risk factors, such as alcohol consumption, most efforts to prevent cervical cancer have emphasized on HPV screening program (ACS, 2016c). Chapter 2 contains an in-depth literature review regarding hypothesized risk factors for cervical cancer.

Problem Statement

Gaps exists in knowledge related to alcohol consumption and the incidence of cervical cancer among women in Los Angeles, California (Burd, 2003; CDC, 2014a). In 2016, 173,200 new cases of cancer and 59,060 cancer-related deaths were estimated to occur (CDPH, 2016). In 2013, there were 6,703 new cases of cervical cancer and 1,484 deaths, including 105,500 (13%) existing cases of cervical of cancer (CDPH, 2016). Similarly, in California, alcohol consumption resulted in 10,572 deaths and 304,472 years of potential life lost between 2006 and 2010 (CDC, 2016a; CDC, 2015). In 2010, excessive alcohol intake cost $35 billion, (approximately $2.05 per drink) because of healthcare expenses and lost workplace productivity (CDC, 2016a; CDC, 2015). Burd (2003) argued that the degree of the association between HPV and cervical cancer was higher compared to the association between smoking and lung cancer.

In the US, an estimated 11,771 new HPV-associated cervical cancer cases were diagnosed (CDC, 2016b). HPV alone does not explain the cause of cervical cancer. Most females diagnosed with HPV are not diagnosed with cervical cancer (ACS, 2016c). Therefore, other risk factors such as alcohol consumption, smoking, HIV infection, age, and sexual activity must be considered (ACS, 2016c). For example, women who consumed alcohol were more likely to have multiple sex partners and practice unprotected sex (CDC, 2016b). These activities increased the risks of unintended pregnancy and sexually transmitted diseases, such as HPV, leading to cervical cancer (CDC, 2016b). The research problem of this study is that the role in which alcohol consumption is associated with cervical cancer is unknown; although in recent years, few

studies have created an awareness program that showed the effect of alcohol consumption among women with cervical cancer.

Purpose of the Study and Nature of Study.

This cross-sectional study utilized secondary data to investigate the association of alcohol consumption as a potential risk factor for developing cervical cancer among women in Los Angeles, California. Pre-existing data was used to investigate the association. No empirical evidence has been found to support the consumption of alcohol as a potential risk factor for developing cervical cancer; however, researchers have identified several other potential risk factors as associates, such as HPV, smoking, chlamydia infection, being overweight, and HIV (ACS, 2016). The independent variable of the study was alcohol consumption and the dependent variable was cervical cancer. This study has two hypotheses put forth to answer the research questions below.

Research Questions.

This study was a retrospective cross-sectional study that is observational in nature and posed two main research questions with its associated hypotheses:

Research Question 1: Is there an association between consuming alcoholic drinks 30 days prior to diagnosis and the incidence of cervical cancer among women in Los Angeles, California?

Research Question 2: Is there an association between the number of alcoholic drinks consumed per day and cervical cancer incidence among women in Los Angeles, CA?

Hypotheses

The null hypothesis and alternative hypothesis associated with research question one and two are:

$H_0$1: There is no association between consuming alcoholic drinks 30 days prior and cervical cancer incidence among women in Los Angeles, California.

H_a1: There is an association between consuming alcoholic drinks 30 days prior and cervical cancer incidence among women in Los Angeles, California.

$H_0$2: There is no significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA.

H_a2: There is a significant association between the number of alcoholic drinks consumed per day and cervical cancer incidence among women in Los Angeles, CA.

Theoretical framework

Theory of relationalism by Kaipayil (2009) was the theoretical framework for this study. Theory of relationalism refers to the theory of realism, which construes the existence, significance, and temperament of things with regards to their relationality (Kaipayil, 2009). It is a philosophical theory of reality that suggests that there is an interrelation between consuming alcohol and the risk of cervical cancer (Kaipayil, 2009). This theory showed the association of cervical cancer incidence as the dependent variable and the alcohol consumption as the independent variable. This cross-sectional study design added to the existing body of knowledge surrounding cervical cancer by measuring the association between alcohol consumption and incidence of cervical cancer.

Definition of Terms

Comprehension of the terminology related with cervical cancer was essential for understanding the nature of this disease. Histological terms were defined to elucidate the makeup of cervical cancer. Medical terms are defined to help in understanding the language commonly used to describe the signs and symptoms related with cervical cancer. Definitions for the independent variables were retrieved from CDC (2014b). Listed below are fundamental terms used frequently includes:

Adenocarcinoma: Cervical cancer that originates in the mucus-producing cells of the inner or endocervix (ACS, 2016).

Carcinoma in situ: Cancer that is confined to the cells in which it originated and has not spread to other tissues (National Cancer Institute (NCI), n.d.).

Cervical intraepithelial neoplasia (CIN): Abnormal cell growth on the surface of the cervix (NCI), n.d.).

Cervix: Narrow, lower end of the uterus forming the opening to the vagina (NCI, n.d.).

Excessive alcohol consumption or binge drinking: men drinking five or more drinks, and women consuming three or more drinks, in about 2 hours (CDC, 2014c).

Heavy alcohol consumption: Eight or more drinks per week for women and 15 alcoholic drinks or more per week for men (CDC, 2017).

Human papillomavirus (HPV): Virus that causes abnormal cell growth; some types can cause cervical cancer (NCI, n.d.).

Pap smear test: Removal of cervical cells to screen for cancer (ACS, 2016).

Risky drinking: It is defined by consumption for men consuming more than 1 drinks per week, or more than four drinks on any occasion, and women consuming more than seven drinks per week or more than three drinks on any occasion (DeNoon,2014).

Squamous cells: Thin, flat cells on the surfaces of the skin, cervix, and linings of various organs (ACS, 2016).

Squamous intraepithelial lesion (SIL): Abnormal growth of squamous cells on the surface of the cervix (ACS, 2016).

Significance of the study

The intent of this study was to close the gap in the knowledge on the effects of alcohol consumption as a potential risk factor for incidences of cervical cancer among women in Los Angeles, California. The purpose of this study was to investigate the relationship between alcohol consumption and the risk of cervical cancer among women in Los Angeles, California. Thus, the significance of this research study was to reduce alcohol intake among women in Los Angeles, California. Because alcohol consumption is a modifiable behavior, the potential detrimental role of alcohol intake and its effect on the risk of cervical cancers is of a major concern for prevention (CDPH, 2016). Another significance was to understand the risk of cervical cancer in the population among those who never consumed alcohol. Providing answers to the questions above contributed further insight into the factors of alcohol-related health disparities among women in Los Angeles, California. Also, findings from this study could enable policy maker to reform the social policy that would potentially lead to a positive social change among women in Los Angeles, California (Gostin, 2008).

Implications for Social Change

Public health is a multilayered discipline, which consist of several fields to enhance the health and wellbeing of its community members. This study provided evidence for the association of alcohol consumption as a potential risk factor for the incidence of cervical cancer. The social change effect of this research study relates to creating awareness on the detrimental role of alcohol consumption as a potential risk factor for cervical cancer. Findings from this study may provide future researchers with information that could enable them to create effective awareness programs that will meet the needs of persons with similar characteristics such as individual's income level, racial and ethnic background, education level, age distribution, and occupation.

Summary and Transition

This chapter provided an introduction, which pertains to the overlapping epidemics of alcohol consumption and cervical cancer incidence; problem statement; nature and significance of the study; variables of interest; research questions and hypotheses; the theoretical framework; and important terms associated with the study. Chapter 2 focuses on literature reviews related to alcohol consumption and cervical cancer among women in Los Angeles, California and the United States and provides a review of the suggested risk factors. Chapter 3 provides details on the study design, proposed hypothesis, and the methodology content. Chapter 4 describes the data collection and analysis of demographic information of all the study participants. Chapter

5 provides the interpretation of the findings, study limitations, an implication for social change, and recommendations for future research.

Chapter 2: Literature Review

Introduction

Cervical cancer is a major cause of cancer death found among women both in the United States and around world (WHO, 2016). It is the second most common type of cancer among women in less developed countries (Faridi et al., 2011, WHO, 2016). In the United States, cervical cancer is rated as the third most common cause of cancer among women; this is preceded by breast cancer as the second most common cause of cancer among women (WHO, 2016). In developing countries, cervical cancer is normally the most common cause of cancer in women, which constituted approximately 25% of female cancers (Burd, 2003). In 2012, about 530 000 new cases of cervical cancer were estimated globally, and 270,000 deaths attributed to cervical cancer occurred each year (Beaulieu, Bloom, Bloom, & Stein, 2009; WHO, 2016).

With the implementation of cervical cancer screening program and Papanicolaou (pap) test in the United States, the incidences of cervical cancer have reduced significantly over the past 40 years (CDC, 2016). In 2010, ACS estimated 12,200 new cases of cervical cancer diagnosed and 4,210 deaths in the US. In 2011, about 12,710 women were diagnosed with cervical cancer and 4,290 cervical cancer deaths occurred (Glick Clarke, Blanchard, & Whitaker,2012). In 2013, there was slight decrease shown among women (n=11,955) diagnosed with cervical cancer and deaths (n=4,217) related to cervical cancer in the United States (CDC, 2016). This trend continued in 2016 with an estimated 12,990 new cases of cervical cancer diagnosed while the projected death decreased slightly to 4,120 (ACS, 2016). However, with HPV screening, cervical cancer

is preventable and treatable with early detection, though some women still are diagnosed with serious outcome (ACS, 2016).

The association between HPV and cervical has been well established. Burd (2003) argued that the degree of the association between HPV and cervical cancer is higher compared to the association between smoking and lung cancer. However, the overall evidence from epidemiologic research has not found sufficient evidence to consider alcohol consumption to be causally related to the risk of HPV associated to cervical cancer.

Literature Search Strategy

This chapter presents a discussion of findings from peer-reviewed research on the topic of alcohol consumption and incidence of cervical cancer. I reviewed peer-reviewed articles published between 2000–2016, with a few exceptions of studies published in the 1990s containing relevant information that is still useful when addressing the overlapping epidemics of alcohol consumption and cervical cancer incidence. This literature review focused on the association of alcohol consumption and risk of cervical cancer among women in Los Angeles, California. Primary sources of information were collected through Walden University library's databases. The specific databases included in this search were PubMed, Medscape, and Medline. The following search engines were also used: Google Scholar, PROQUEST, and EBSCO. Additional information was gathered thru the following authoritative sources: CDC, CDC Data & Statistics, ACS, National Cancer Institute, CDPH, CHIS, and the California Cancer Registry. Keywords used

included *alcohol consumption and cervical cancer, squamous-cell carcinoma, adenocarcinoma,* and *HPV*.

Histology Types of Cervical Cancer

Cervical cancer is the uncontrollable growth and the spread of abnormal cells in the cervix (NCI, n.d.). Squamous carcinoma (85%) and adenocarcinoma in situ (10% to 15%) are the most common type of cervical cancer (Lax, 2011, Mosby, 2009). When the cancer growth is limited to the surface of cervix it is referred to as adenocarcinoma in situ (AIS) (NCI, n.d.). At that stage, the cancer can be cured. However, when the cancer has grown outside of the cervix, the cancer is referred as invasive cancer (Lax, 2011, Mosby, 2009). Invasive cervical cancer is divided into three different stages of local stage, regional stage, and distant stage (Mosby, 2009, NCI, n.d.). These stages are divided into how far the cancer has spread. At the local stage, the cancer is confined to the cervix (Mosby, 2009, NCI, n.d.). At the regional stage, the cancer has spread beyond the cervix to nearby lymph nodes or into surrounding tissues (Mosby, 2009, NCI, n.d.). At the distant stage, the cancer has spread to other parts of the body. Cervical cancer is very difficult to treat once it has spread beyond the cervix (Mosby, 2009, NCI, n.d.).

Tumorigenesis of cervical cancer is HPV-related (Mosby, 2009). High-risk HPV (such as Type 16 and 18) is incorporated into the genome and advances to tumor progression (Mosby, 2009). About 50% of cervical cancer is caused by HPV-16 strain (Mosby, 2009). A 5-year survival rate for in situ cancer is usually about 73% to 92% (Mosby, 2009). Five-year relative survival rate for invasive cancer by stage are 91.3% at the local stage, 57.4% at the regional stage, and 16.8% at the distant stage respectively

(American Society of Clinical Oncology [ASCO], 2016; Surveillance Epidemiology and Result Program [SEER], 2012). There are different treatment options for cervical cancer depending on the stage of the cancer. Treatment for squamous carcinoma includes some of the following: laser surgery, cryosurgery, and cold knife conization, etc. (ACS, 2016b). Hysterectomy is recommended normally for adenocarcinoma in situ treatment; however, for women who are of childbearing age and wish to still have children, cone biopsy could be recommended and once they have finished having their children, hysterectomy would be recommended (ASC, 2016b).

Alcohol Consumption in the United States

Alcohol consumption is increasing in several countries, including the United States, and is a compelling cause of cancer worldwide (Boffetta & Hashibe, 2006). Approximately 88,000 alcohol related-deaths occur each year in the United States and 2.5 million years of potential life lost are attributed to excessive alcohol consumption (CDC, 2014a; CDC, 2014b). In 2006, the economic cost of alcohol consumption was estimated at $223.5 billion (Bloom et al, 2011; CDC, 2014).

Intake of alcohol has a substantial negative effect on mental, physical, and social health (Moore et al. 2005). Older adults, especially women who consume alcohol, have greater health risks related to the use of alcohol because of gender-related metabolic variances and age-related physiological differences, which increases sensitivity to alcohol (Moore et al. 2005). In a study that compared historical data from two national alcohol epidemiology surveys revealed that alcohol consumption (risky drinking) declined very slightly between 1991-1992 and 2001-2002 (Borders & Booth, 2007). Moore et al.

(2005) suggested that even though alcohol consumption declined among their study participants, the negative health effect of alcohol increased as they grow older. Consequently, as the quantity of alcohol consumed among men increased, the cancer mortality risk increased with risk ratio 1.53 (Breslow & Graubard 2008; CDC, 2017). Thus, average alcohol consumption has been shown to be associated with cancer mortality; this increase is seen on average of three to five alcoholic drinks per day for men, while women drinking two or more alcoholic beverages increases their risk of cancer mortality with risk ratio 1.23 (Breslow & Graubard 2008; CDC, 2017).

Binge drinking has been reported to increase the risk of cancer and cancer mortality (CDC, 2017). United States' adult binge drinking in 2012 accounted for over 38 million drinks, equivalent to four times per month; the largest number of alcoholic drink per binge averages about eight drinks each month (CDC, 2017). Adults between the ages 18 and 34 years were found to be the most likely to binge drink, with the prevalence and intensity of 28.2% and 9.3 drinks, respectively (CDC, 2017). Individuals above 65 years of age were also found to binge drink most often with an average of 5.5 episodes per month (CDC, 2017). Research showed that binge drinking was more common among individuals making over $75,000. However, individuals earning less than $25,000 were reported to have the highest binge drinking prevalence (5.0 episodes per month) and intensity (8.5 drinks on occasions) (CDC, 2017).

Alcohol Consumption in California

California is among the largest marketers of alcohol in the United States (Rosen, Miller, & Simon, 2008). About 14 billion alcoholic drinks were consumed alone in California in 2005, this contributed to several potential illnesses related to alcohol consumption (Rosen et al.,2008). In California, alcohol consumption resulted in 10,572 deaths and 304,472 years of potential life lost between 2006 and 2010(CDC, 2016a; CDC, 2015). In 2010, excessive alcohol intake cost $35 billion (approximately $2.05 per drink) because of healthcare expenses and lost workplace productivity (CDC, 2016a; CDC, 2015). Almost 950 (40%) deaths attributed to alcohol consumption were due to chronic causes (such as cancer); 440(18%) death to other acute causes (CDC, 2014b). Several research studies have estimated the extend and the cost of the problems associated to alcohol consumption at the national level, however, at state level no overall cost estimate exist for California that could determine the burden of the disparities (Rosen et al., 2008).

Binge drinking frequency was the highest among persons between the ages of 18 and 24 years (25.6%) (CDC, 2015). Among these groups, males (22.5%) and female (5.7%) engaged in binge drinking (CDC, 2015). Heavy alcohol consumption (one or more drinks per day for women and more than two drinks per day for men) has been shown to increase the risk of chronic diseases, including cervical cancer (CDC, 2015). Roughly 371 (6.2%) adults in California in 2005 were heavy alcohol consumers. Among these heavy alcohol users, 265 (6.9%) were White, 73(6.4%) Hispanic, 10 (4%) Blacks, 14 (3%) are other, non-Hispanic and 5.7% were multiracial, non-Hispanic groups (CDC,

2015). Adults whose income ranged from $35,000 to $49,000 (about 8%) were noted to be among the heavy drinkers (CDC, 2015).

Between 2005 and 2010 there was a huge increase in the prevalence among adults who claimed to have consumed at least one alcoholic beverage in the past 30 days: *n*=3,615 (56.2%) and *n*=9,280 (53.3%), respectively (CDC, 2015). In addition, 77% young males and 23% females die from alcohol-related diseases each year (CDC, 2013b). Reports showed that persons who start to consume alcohol before the age of 14 were five times more likely to become alcohol dependent compared to those who began after the age of 21years of age (CDC, 2013b). However, between 2011 and 2014, there was a significant decrease shown in the prevalence among adults who claimed to have consumed at least one alcoholic beverage in the past 30 days: *n*=9,162 (57.1%) and *n*=4,206 (53.6%), respectively (CDC, 2015). Among this decrease, the prevalence was higher among women from *n*=4,911 (50.5%) to *n*= 1,982 (46.6%) than men from *n*=4,251 (63.7%) to *n*= 2,224 (60.9%) (CDC, 2015).

Cervical Cancer in the United States

Cervical cancer is one of the most common cause cancer among women in the United States (Beaulieu et al., 2009; Bloom et al., 2011). It is the third common cause of cancer among women; this is preceded by the breast cancer as the second common cause of cancer among women (Beaulieu et al., 2009; Bloom et al., 2011). Although, in developing countries, cervical cancer is normally the most common cause of cancer in women, which constitute approximately 25% of female cancers (Burd, 2003). In 2010, American Cancer Society estimated 12,200 new cases of cervical cancer diagnoses and

4,210 deaths reported in the US (CDC, 2016). Approximately, 11,955 women were diagnosed with cervical cancer and 4,217 deaths related to cervical cancer occurred in the US alone in 2013 (CDC, 2016). This trend increased in 2016 with an estimated 12,990 new cases of cervical cancer diagnoses while the projected death decreased slightly to 4,120 (ACS, 2016; ASCO, 2016). However, with human papillomavirus (HPV) screening, cervical cancer is preventable and treatable with early detection, though some women still are diagnosed with serious outcome (ACS, 2016). The association between HPV and cervical has been well established as the primary cause of cervical cancer. Burd (2003), argued that the degree of the association between HPV and cervical cancer was higher compared to the association between smoking and lung cancer. Each year, in the US, an estimated 11,771 HPV-associated cervical cancer new cases are diagnosed (CDC, 2016b).

In 2013, about 12,340 new cases and 4,030 death-related to cervical cancer was estimated (ACS 2013). According Viens et al. (2012), in their study, the result of their analysis reported 33,369 HPV-related cancer between 2004 and 2008; however, an increase of about 38,793 HPV-related cancer diagnoses was shown between 2008 and 2012. They explained that this increase demonstrated an overall increase in HPV-related cancer incidence, from 10.8 per 100,000 persons from 2004 to 2008 to 11.7 per 100,000 persons from 2008 to 2012 (Viens et al., 2012). Even though, cervical cancer incidence and mortality rates have declined significantly due to pap smear screening and HPV vaccination (Byrd et al., 2013), yet cervical cancer disparities still exist among different race and ethnic group. Black and Hispanic women get HPV-related cervical cancer

compared to women of other races or ethnicities, this is likely due to decreased access to Pap testing or follow-up treatment (CDC, 2016b). Hispanic women have the highest cervical cancer incidence rate followed by black women; however, black women have the highest mortality rates (Coker et al. 2009).

HPV alone does not explain the cause of cervical cancer (ACS 2016c). Most female diagnosed with HPV are not diagnosed with cervical cancer, other risk factors include alcohol consumption, smoking, HIV infection, age and sexual activity (ACS, 2016c). Sexual activity and age increases the risk of HPV-related cancer (Burd, 2003; Byrd et al., 2013). HPV infection is the most common among sexually active women, ages 18 to 30 years (Burd, 2003). After the age of 30 a significant decrease in cervical cancer prevalence is seen among women (Burd, 2003). Though, cervical cancer incidence is more common among women above 35 years, which suggest that HPV infection diagnosed at a younger age could lead to slow progression to cancer (Burd, 2003). HPV in general is assumed to be responsible for about 91% of cervical cancer incidences (CDC, 2016c). Both the incidence and mortality rates of cervical cancer are twice higher among women; however, the cervical cancer incidence is steadily increasing among women (CDC, 2012).

Medical Care Cost of Cervical Cancer in California vs. the United States

Medical care cost of cancer in California was estimated at $1.3 billion per year, of this direct cost of cancer care per person was $10,436 in 2007 (County of San Diego, 2010). In 2002, the National Institutes of Health estimated medical costs of cancer, including cervical cancer at $171.6 billion, in which $95.2 billion was attributed to

indirect mortality costs, while $60.9 billion was attributed to direct medical costs and $15.5 billion attributed to indirect morbidity costs alone in the United States (Chang et al., 2004). In 2003, over 1.3 million people were diagnosed with cancer in the US; since then the incidence of cancer has continued to rise (Chang et al., 2004).

Between 2008 and 2011, annual medical cost for female cancer survivors was $8,400 and $4,000 attributed in loss productivity compared to women without cancer at $5,100 and $2,700 respectively (Ekwueme et al., 2014). Research conducted by Kutikova et al., (2005), found that diagnosed individuals (*n*=2040) with cancer were found to have more monthly total medical costs of $ 6,520 compared with controls subjects not diagnosed with cancers of $339, and the overall costs for the duration of the study period (from diagnosis to death or maximum of two years) were $45,897 for cases and $2907 for controls. Yabroff et al. (2008) revealed a Medicare claims data from January 1, 1999 through December 31, 2003 that estimated the medical cost of cancer for different stages of cancer. Cost per-patient net care was applied to a 5year survival of cancer patients by stages of care to estimate 5years costs of care and generalized to the cost of cancer (including cervical cancer) care varies depending on the stage at diagnosis, site of tumor, survival rate and phase-specific costs for cervical cancer (Yabroff et al., 2008).

In 2010, a study reported mean monthly net costs in the care of elderly cancer was about $1923 to $5,074 in the initial phase of care (Yabroff et al., 2011). In the subsequent phase of care, it was between $184 and $678 that was reported in the mean monthly net cost (Yabroff et al., 2011). Mean monthly net cost in the last year of life among patients who died from cancer was between $5, 238 and $7,710 (Yabroff et al., 2011). An

estimated cost of $124.5 billion was projected in the prevalence costs of cancer care in 2010 (Yabroff et al., 2011). Of which $6.6 billion (82.3%) was for cervical cancer screening routine and $1.0 billion (12.0%) was for cancer follow-up, of this $0.4 billion went for cervical cancer (Chesson *et al*., 2012). In another study, the prevalence of cancer cost was based on recent available data on cancer incidence, survival, and medical cost of care retrieved from 2003 and earlier (Mariotto et al., 2011). The prevalence of cancer was projected at the national cost of cancer care and estimated by phase of care (first year following diagnosis, and last year of life) tumor site between 13 cancers in men and 16 cancers in women through year 2020 (Mariotto et al., 2011).

Using the base case scenario, persistent cancer incidence, cost of care and survival was predicted at the national costs at $124.57 billion in 2010, and projected to increase to $157.77 billion in the year 2020, thus a 27% increase (Yabroff et al., 2011). This increase in cost over time reflects in the base case model the growth and aging in the US population (Mariotto et al. 2011). If the costs of care (recent incidence and survival trends) continue to increase annually assuming a 2% increase in the initial and last year of life phases of care, then the total cost by year 2020 could be projected to be $173 billion, which represents an increase of 39% of cost from 2010 (Mariotto et al. 2011; Yabroff et al., 2011). However, under the assumption of 5% increase, total cost of cancer care by 2020 would be estimated at $207 billion in the initial and last year phases of care, thus a 66% increase from 2010 (Mariotto et al. 2011; Yabroff et al., 2011). As the women population ages, the national medical cost of cervical cancer among other cancer types will continue to increase substantially (Mariotto et al. 2011; Yabroff et al., 2011)

Cervical Cancer in California

Cancer is a major health problem in California. In California, cancer is the second leading cause of death (California Department of Public Health (CDPH), 2016). In 2016, 173,200 new cases of cancer and 59,060 death cancer related were estimated (CDPH, 2016). Even though there has been decrease in death related to cervical cancer across all major race, rates are higher in non-Hispanic black women and Hispanic women when compared to Hispanic white and Asian Pacific Islander women (Hofer et al., 2008). In 2013, about 6,703 new cases of cervical and 1,484 deaths, including 105,500 (13%) existing cases of cervical of cancer was reported (CDPH, 2016).

Though there was a decline in cervical cancer overall incidence and death among women in California, this decline has not been equally shared among women (Hofer et al., 2008). Between 2000 and 2004. Incidence rates of cervical cancer among Hispanic (14.4%) women are twice higher than non-Hispanic white women (7%), while death rates are higher among non-Hispanic black women compared among women of other races and ethnicities (Hofer et al., 2008).

Alcohol Consumption and Cervical Cancer

Several studies have shown the association of human papillomavirus infection (HPV) and cervical cancer (CDC, 2016b). However, the association between alcohol consumption and cervical cancer has been found in limited research studies (CDC, 2016b). Women who consume alcohol are more likely to have multiple sex partners and practice unprotected sex. These activities increase the risks of unintended pregnancy and sexually transmitted diseases such as HPV leading to cervical cancer (CDC, 2016b). A

population-based cohort study was conducted in Sweden between 1965 and 1995 among 36,856 women discharged from hospital diagnosed with alcoholism, to analyze the risk of developing cancer (cervical cancer, cancer of the vagina and vulva) (Weiderpass et al., 2001). The result of the study revealed a significant trend of increased risk of invasive cervical cancer associated with alcohol consumption (Weiderpass et al., 2001). Several other studies have shown alcohol consumption as a contributing factor of cancers of esophagus, oral cavity, breast and liver cancer (Bagnardi et al., 2014).

Several studies have established cigarette smoking as the most common risk factor, nevertheless, alcohol intake was found to be associated with an increased risk of cervical cancer (WHO, 2016). Research have shown that HPV infection alone is not sufficient to cause cervical cancer, and other several possible cofactors have been proposed such as exposure to smoking-related carcinogens, dietary deficiencies and contraceptive hormones (Kjellberg, Hallmans, Ahren, *et al*., 2000). In addition, women who consume alcohol could be at a higher risk for progression from HPV infection to cervical cancer from lifestyle-related behaviors, such as early initiation of sexual intercourse and promiscuity (Ylitalo, Sørensen, Josefsson *et al*., 2000).

Hy et al. (2015) also conducted a study that tested 9,230 Korean women for HPV and asked those women about their consumption of alcohol. The result revealed that at the beginning of the study and during a two year follow up, women who consumed alcohol were almost three times likely compared to non-alcohol consumers to test HPV positive (Hy et al., 2015). Their study suggested that women who has been drinking for over five years were at higher risk of persistent HPV than women who drank less than

five years prior to their study (Hy et al., 2015). Their study suggested that reducing consumption of alcohol could be an important measure to avert cervical cancer development among women with risk of persistent high-risk (HR) human papillomavirus (HPV) infection (Hy et al., 2015).

Disentangling the effects of alcohol consumption and smoking has proven very difficult because these two exposures tend to be associated, but the possibility of an alcohol effect cannot be refuted because of this problem automatically (Hofer et al. 2001; Chao, 2007, and Neuenschwander, Pedersen, Krasnik, and Tonnesen, 2002). Specific tobacco carcinogens are found in the mucus of the female genital tract (Castle, 2008). In a study conducted in 2006, a causative association was found between alcohol consumption and liver cancer, larynx, cancers of the oral cavity, rectum and breast cancer in women however, no association was found with cervical cancer (Boffetta and Hashibe, 2006, CDC, 2016b). Evidence from their study suggested that the effect of alcohol was controlled by polymorphisms in genes, which encode enzymes for ethanol metabolism (such as; alcohol dehydrogenases, and cytochrome P450 2E1), folate metabolism, and DNA repair (Boffetta and Hashibe, 2006). However, the methods by which alcohol consumption applies its carcinogenic effect have not been fully defined, although plausible events include: a genotoxic effect of acetaldehyde, which is the main metabolite of ethanol; increased estrogen concentration is important for breast carcinogenesis; production of responsive oxygen species and nitrogen species; solvent role for tobacco carcinogens, and changes in folate metabolism (Boffetta and Hashibe, 2006). Alcohol

consumption is a modifiable behavior thus; its role in cancer prevention should be of utmost importance (Hofer et al. 2001).

Summary and Conclusion

This literature review concentrated on two epidemics that are affecting women in Los Angeles, California: alcohol consumption and cervical cancer. Initial epidemiologic evidences pointed out that HPV is the most important risk factors associated with cervical cancer (Burd 2003). Yearly, in the US, an estimated 11,771 HPV-associated cervical cancer new cases are diagnosed (CDC, 2016b). HPV in general is assumed to be responsible for about 91% of cervical cancer incidences (CDC, 2016c). Epidemiological data that relates to alcohol consumption and its contribution to the development of cervical cancer are still limited. Thus, there continue to be a gap in the literature about creating the awareness of the danger of consumption of alcohol while diagnosed with cervical cancer. This dissertation study added latest information and data to the body of literature, which is currently lacking recent data that would address effective awareness program for alcohol consumers with cervical cancer. This information could enable researchers, public health professional, and policy makers to create an awareness program that can reduce the current projected incidence rates of cervical cancer, and possibly tailor a program that could effectively meet the needs of different demographic characteristics during this twenty-first century among women in California.

In conclusion, different studies have called for more research on this topic, which involves the overlapping epidemic between alcohol consumption and cervical cancer incidence. Several unanswered questions remain, to be answered on creating the

awareness of the dangerous effect of consumption of alcohol and risk of developing cervical cancer. This dissertation study focused on investigating the association between alcohol consumption and its effect on developing cervical cancer. This research study added to the body of literature and could enhance public health efforts to collect, analyze, and share recent findings. Since nearly most of the data that are currently presented in prior literatures are outdated. In addition, the findings from dissertation study, could enable public health institutes, healthcare participations, and scholars to create effective awareness programs that can meet the needs of persons with similar characteristics such as, information's that are based on individual's income level, racial and ethnic background, education level, age distribution. In Chapter 3, details of the selected study design, its rationale, and the methodology content were presented.

Chapter 3: Research Method

Introduction

In this chapter, a detailed description of the methodology used to address the research question was outlined, with an emphasis on key elements such as research design and approach; instrumentation and materials; data collection technique; and data analysis for testing the stated hypotheses to answer the research questions. Overall, a description of the independent variable and dependent variables, and procedures for using secondary data were also discussed. This study investigated the association between alcohol consumption and cervical cancer incidence. This study addressed the hypotheses put forth to answer the research questions below:

Research Questions

This study was a retrospective cross-sectional study, observational in nature and posed two main research questions with its associated hypotheses:

Research Question 1: Is there an association between consuming alcoholic drink 30 days prior to diagnosis and cervical cancer incidence among women in Los Angeles, California?

Research Question 2: Is there an association between the number of alcoholic drinks consumed prior per day and cervical cancer incidence among women in Los Angeles, CA?

Hypotheses

The null hypothesis and alternative hypothesis associated with research question one is

$H_0$1: There is no association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California.

H_a1: There is an association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California.

$H_0$2: There is no significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA.

H_a2: There is a significant association between the number of alcoholic drinks consumed per day and cervical cancer incidence among women in Los Angeles, CA.

Research Design and Rationale

The main purpose of this study was to explore whether there is an association between alcohol consumption and incidence of cervical cancer among women in Los Angeles, California. Cervical cancer is a clinical disease; thus, recruitment of study subjects would be difficult. Therefore, this study employed a quantitative, retrospective cross-sectional design that utilized quantitative secondary data. Cross-sectional research, is observational in nature, which allows researchers to collect data on the exposure (in this case, alcohol consumption) and outcome (incidence of cervical cancer) of interest from a sample of subjects in a defined population simultaneously at a single point in time from the state of California (International Agency for Research on Cancer, n.d.).

California was chosen because information regarding cervical cancer incidence and self-behavior have been collected in CHIS. CHIS data collected in 2005 was used to investigate alcohol consumption and cervical cancer incidence among women in Los Angeles, California. CHIS is a population-based survey and data has been collected since 2001 (CHIS 2016). CHIS's survey is telephone based and cross-sectional in nature (CHIS, 2016). CHIS include data on the following races (Whites, Blacks, Latinos, Asians and Pacific Islanders, Alaska Natives and American Indians, Other single race, and Two or More Races) (CHIS 2016). Agencies that are in collaboration with the CHIS include the following: The California Endowment, the NCI, UCLA Center for Health Policy Research, Kaiser Permanente and the California Department of Public Health Care Services, and First 5 California (CHIS, 2016).

This study measured the association of alcohol consumption as a potential risk factor for developing cervical cancer among women in Los Angeles, California's population at a given point in time. Cross-sectional design enabled me to create the knowledge about the prevalence of alcohol consumption among the study participants in California. Thus, knowing the rate of alcohol consumption for the subgroups of this study population will help target interventions that are appropriate to the subgroup of interest. The incidence cases of cervical cancer and alcohol consumptions were calculated using CHIS SEER dataset.

This current design allowed for an analysis of variables such demographic factors (such as age, race, income, and educational background), and cervical cancer incidence rate. For this study, the independent variable (predictor or causal variable) was alcohol

consumption. The dependent variable (outcome variable) was the incidence of cervical cancer. Similar to other cross-sectional research, logistic regression analysis and Pearson' Chi-square test of independence for statistical data analysis were conducted to test the research questions and their hypotheses using secondary data. The intent of this study was to examine if there is an association between alcohol consumption and cervical cancer incidence among the study population in California; thus, cross-sectional study design was the best fit.

Population of study, and Sampling Procedures

For the purpose of this study, the sample population compared women in Los Angeles, California alcohol consumers and nonalcohol consumer ages 18 years and older. The Walden University Institutional Review Board (IRB) approval number for this study was 02-19-16-0156323. Upon IRB approval, secondary data on both cervical cancer incidence and alcohol consumption in 2005 among women in Los Angeles California 's residences were retrieved from the 2005 CHIS Database program.

In this dissertation study, all participants in the dataset were included. Statistical power was conducted by maximizing a likelihood function using SPSS version 21 (Simonoff, 2017). The power of a statistical test, by definition, is the likelihood that there is no effect and the null hypothesis will be rejected or the probability to detect an effect, (Faul, Erdfelder, Albert-Georg, and Buchner 2007), and for this dissertation study, the likelihood of (a) the rejection of the null hypothesis that there is no association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California, or (b) the rejection of the null hypothesis that there is no

significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA.

Eligibility Criteria

Eligibility criteria for the study sample included women in Los Angeles's residents in the CHIS 2005 dataset who were ages 18 and older and had data on cervical cancer and alcohol consumption.

Instrumentation and Materials

This dissertation study utilized a secondary dataset collected by CHIS database program in 2005. Both cervical cancer and alcohol consumption were measured from CHIS 2005 survey questionnaire. Using SPSS 21, the variable name SRSEX was used to determine the number of female in the sample population. The total sample include 25,548 females. The subset of the total 43,020 adults, 18 years and older, was used to perform crosstab analysis, a statistical test of the hypotheses, and a logistic regression analysis. For analysis, the following sections of the CHIS 2005 adult questionnaire were used, Section A: Demographic Information; Section C: Health Behaviors; and Section F: Cancer History and Prevention (CHIS 2016; CDC, 2014b). The subset for females was obtained using selected case and the boolean operator on the variable SRSEX as follows: SRSEX=2. This translated to select only females in the dataset. The described sections were used to analyze the association between alcohol consumption and cervical cancer. The 2005 CHIS surveyed 43,020 adult participants of which 25,548 were females.

For the purpose of this study, alcohol use will be classified as alcohol consumption and non-alcohol consumption. Upon IRB approval (02-19-16-0156323)

through Walden University, dataset from CHIS 2005 on cervical cancer incidences and alcohol consumption were accessed and transferred into and analyzed utilizing current version of SPSS Statistics 23 software**.**

Retrieving of Data and Analysis

Retrieving of data process commenced once Institutional Review Board (IRB) was approved through Walden University; then I gained an access to the secondary data from the proposed time-period from CHIS database by creating an account. This comprehensive dataset allowed for a large sample size and increased power. By employing CHIS 2005 survey as a secondary data source, I was able to conduct a retrospective cross-sectional study that examined the possible association between alcohol consumption and cervical cancer incidence among women in Los Angeles, California. For this study, the independent variable is alcohol consumption and dependent variable is cervical cancer incidence.

To address research question 1 and test hypothesis 1, crosstab analyses, using Pearson's chi-square test of independence were conducted. If there is significant association in the incidence of cervical cancer among independent variable, then the null hypotheses would be refuted, and the alternative hypotheses will be accepted. Result are presented in chapter 4. To address research question 2 and test hypothesis 2, a logistic regression analysis was conducted to predict if the amount of alcohol consumed on a daily base is associated with cervical cancer incidence; results are presented and discussed in chapter four.

All participants were divided into alcohol consumption and non-alcohol consumption group. Participants in alcohol consumption group are compared from non-alcohol consumption using logistic regression in terms of profiles of alcohol intake and socio-demographic characteristics. An advantage of using logistic regression is that it provides a quantified value to the strength of the association after adjusting for other variables (thus, removing confounding effects) (McDonald, 2014). The parameters of the model are estimated by maximizing a likelihood function using SPSS (Simonoff, 2017), which would determine the likelihood of (1) the rejection of the null hypothesis "that there is no significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA". In this dissertation study, most of the variables, including dependent and independent variables, are categorical variables, and logistic regression model was used to obtain adjusted odds ratios of alcohol consumption associated to cervical cancer so that the risk could be quantified.

Protection of Human Participants

All data used within the context of this study was obtained from the CHIS database public web site. This database is de-identified other than the indicators of gender, race and age. Variables in the database cannot be linked to specific individuals. Cases on the incidence of cervical cancer including population data for California were obtained for comparison. Researchers do not have any access to information (such as; social security numbers, names, dates of birth and address) that could be used to identify the study participants. This dissertation study is based solely on the examination of public

records that are completely anonymous. Thus, the risks of potential harm to human subjects are extremely minimal if at all possible.

Summary

This chapter discussed the Research Design and Rationale, Population of study, Sampling Procedures and Eligibility Criteria, Instrumentation and Materials, Data Collection and Analysis, that this study would follow. This study is a quantitative, cross-sectional study design. Data was accessed from the CHIS 2005 database program. Chapter 4 will reveal the results of the study; chapter 5 will discuss the limitations of the study and provide recommendations for future research, and its implications for social change.

Chapter 4: Results

Introduction

The methodology described in Chapter 3 was intended to facilitate this study to improve the epidemiological understanding of cervical cancer by quantitatively investigating the association between alcohol consumption and cervical cancer incidences among women in Los Angeles, California. SPSS 21 was used for the analysis of these results. This current study was cross-sectional in nature and conducted to test the association between the independent variable (alcohol consumption) and dependent variable (cervical cancer). The population is self-reported women in Los Angeles, California. The chi-square test and logistic regression analysis were used to test the hypotheses. P-value was set at $p < .05$, to be considered significant. For analysis, the independent variable is alcohol consumption and dependent variable is cervical cancer.

The data collected on alcohol consumption and cervical cancer incidences in the state of California enabled the testing of the hypotheses and answering the following research questions and hypotheses.

Research Question 1: Is there an association between consuming alcoholic drink 30 days prior to diagnosis and cervical cancer incidence among women in Los Angeles, California?

$H_0$1: There is no association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California.

H_a1: There is an association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California.

Research Question 2: Is there an association between the number of alcoholic drinks consumed prior per day and cervical cancer incidence among women in Los Angeles, CA?

$H_0$2: There is no significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA.

H_a2: There is a significant association between the number of alcoholic drinks consumed per day and cervical cancer incidence among women in Los Angeles, CA. This chapter is organized in the following three sections: data collection, data analysis, and summary.

Data Collection

Upon IRB approval, secondary data on CHIS 2005 adult questionnaire version 6.4 was accessed for adult participants, 18 years and above, from different race and ethnic groups from California. Data from CHIS 2005 survey consist 43,020 participants. For this analysis, the following sections of the CHIS 2005 survey was used. Section A: Demographic Information (Age [18 and older] and Gender [female]). Section C: Health Behaviors (consisting ofAE11: HAD AT LEAST ONE ALCOHOLIC DRINK IN PAST 30 DAYS and AE13: # OF ALCOHOLIC DRINKS PER DAY). Section F: Cancer history and prevention (CERVIX- ever told had cervical cancer) (CHIS, 2012). Variable used are nominal or categorical in nature.

The described sections were used to analyze the association between alcohol consumption and cervical cancer among women in Los Angeles, California. This study focused on adult women, 18 years and older, from different race and ethnic groups

(blacks, Hispanics, Asian and Pacific Islander). Total of *N*=25,548 female participants, were used to perform frequency table, crosstab analysis, Pearson chi-square, and logistic regression analysis.

Data Analyses

Sample Characteristics

A summary of the sample characteristics descriptive from the CHIS 2005 survey are outlined in the following tables: Table 1 shows the frequencies and percentages of drinking at least one alcoholic drink in past 30 days. Responds were as follows *n*=14,493 (56.7%) females responded yes as "had at least one alcoholic in past 30 days, while *n*=11,055 responded no when asked "number of alcoholic drinks per day". Frequencies and Percentages of # of Alcoholic Drinks Per Day was presented in table 2, most of the women *n* = 8,425 (33%) answered yes to consuming one alcoholic drink per day, *n* = 4288 responded as consuming at least two alcoholic drink per day, while *n*=1,050 (4.1%) responded as drinking at least three alcoholic drinks per day.

Table 3 showed the Frequencies and Percentages of "Ever Told Had Cervical Cancer". When asked "ever told they had cervical cancer", *n*=441 (1.7%) women responded yes while *n*=25,107 (98.3%) responded as not having cervical cancer.

Table 1

Frequencies and Percentages of Had At Least One Alcoholic Drink in Past 30 Days

	n	*%*
Yes	14493	56.7
No	*11055*	*43.3*
Total Sample Size	*25548*	*100*

Table 2*Frequencies and Percentages of # of Alcoholic Drinks Per Day*

	n	%
Inapplicable	11055	43.3
0	80	0.3
1	8425	33
2	4288	16.8
3	1050	4.1
4	349	1.4
5	126	0.5
6	95	0.4
7	22	0.1
8	21	0.1
9	1	0
10	18	0.1
12	15	0.1
15	2	0
16	1	0
Total Sample Size	25548	100

Table 3

Frequencies and Percentages of Ever Told Had Cervical Cancer

	n	%
Yes	441	1.7
No	25107	98.3
Total Sample Size	25548	100

Primary Analyses

Hypotheses for Research Question 1

$H_0$1: There is no association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California.

H_a1: There is an association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California.

To answer Research Question 1, the data was analyzed to determine whether or not prior alcohol consumption increases the chance of developing cervical cancer. In the CHIS 2005 survey, the question "ever told had cervical cancer" was asked to adults who were 18 years and older, the CHIS 2005 survey restricted the age limit of participants to 18 years and older. Using SPSS version 21, crosstab analyses, using Pearson's chi-square, was conducted to examine the associations between the independent variable (alcohol consumption) and dependent variable (cervical cancer). The cross-tabulation result was used to generate the numbers of women who drank alcohol and the number of

participants who responded, “ever told had cervical cancer.” For this analysis “ever told had cervical cancer” is the dependent variable and “AE11: HAD AT LEAST ONE ALCOHOLIC DRINK IN PAST 30 DAYS” is the independent variable. The hypothesis “there is no association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California” was analyzed.

Crosstabulation. There were total of $N = 25{,}548$ female respondents whose responses were used as a subset for this analysis. Of those who answered *yes* to “HAD AT LEAST ONE ALCOHOLIC DRINK IN PAST 30 DAYS” and the response to “ever Told Had Cervical Cancer” was as follow: $n=262$ for yes, and $n=14{,}231$ for no. Of those who answered *no* to “HAD AT LEAST ONE ALCOHOLIC DRINK IN PAST 30 DAYS” and responded to “ever Told Had Cervical Cancer” was as follows: $n=179$ for yes and $n=10{,}876$ for no. The data is presented in Table 4 below.

Table 4

Association of consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California

N=25,548 (100%)		HAD AT LEAST ONE ALCOHOLIC DRINK IN PAST 30 DAYS		Total
		YES	NO	
EVER TOLD HAD	YES	262	179	441
CERVICAL CANCER	NO	14231	10876	25107
Total		14493	11055	25548

Note: $p < 0.05$

Pearson's chi-square. The null hypothesis derived from question 1 was also analyzed using the Pearson's chi-square test for independence. A total of *n*=25,548 self-reported adult women 18 years and older were used as subset for this analysis. The participants were asked "*ever Told Had Cervical Cancer*." Response included *n*=441 women who answered yes and *n*=25,107 who answered no. A chi-square test was performed to analyze the association between alcohol consumption and cervical cancer. The result of the chi square analysis (see Table 5) did not demonstrate sufficient evidence to reject the null hypothesis ($H_0$1). The chi square test indicated that the calculated value of 1.315 is less than the chi square table or critical value of 3.84 at $p< 0.05$ level of significance with 1 degree of freedom (Gerstman, 2014). According, to the decision rule, the null hypothesis is accepted and thus, the alternate rejected. This means that there is no

significant association between consuming alcoholic drink 30 days prior and cervical cancer among women in Los Angeles, CA.

Table 5

Pearson Chi-Square showing no significance association of consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.315[a]	1	.252		
Continuity Correction[b]	1.206	1	.272		
Likelihood Ratio	1.322	1	.250		
Fisher's Exact Test				.265	.136
Linear-by-Linear Association	1.315	1	.252		
N of Valid Cases	25548				

Note: $p < 0.05$

Hypothesis for Research Question 2

$H_0$2: There is no significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA.

*H*a2: There is a significant association between the number of alcoholic drinks consumed per day and cervical cancer incidence among women in Los Angeles, CA.

Logistic regression. A logistic regression analysis was conducted to determine if the amount of alcohol consumed on a daily basis is associated with cervical cancer incidence (*Table 6*). For this analysis "Number of alcoholic drinks per day" is the independent variable and "ever told had cervical cancer" is dependent variable. Overall, a significant association was found, p <.000, Nagelkerke $R2$ =.001. The odds of cervical cancer diagnoses with the number of alcoholic drinks per day is lower -0.067 (=exp (B) 0.935) with 95% CI (0.883-0.991) among women who consumed alcohol. Number of alcoholic drinks per day was a significant predictor, p <.02, with the odds of cervical cancer diagnoses of 6.5% (= (0.935-1) *100) %, indicating that the number of alcoholic drinks consumed among women on daily basic were more likely to be diagnosed with cervical cancer.

Table 6

Logistic regression on the association of number of alcoholic drinks consumed per day and cervical cancer incidence among women in Los Angeles, CA

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
# of Alcoholic Drinks Per Day	-.067	.030	5.090	1	.024	.935	.883	.991
Constant	4.080	.052	6227.763	1	0.000	59.117		

Note. Block 1: $\chi 2$ (1) = 4.870, p <.027, Nagelkerke $R2$ =.001.

Summary

Chi-square test of independence and logistic regression were conducted to answer the research questions and their hypotheses. For the hypothesis 1 alternative, which states "there is an association between consuming alcoholic drink 30 days prior and cervical cancer incidence among women in Los Angeles, California", chi square test found that consuming alcoholic drinks 30 days before diagnoses was not a significant predictor of cervical cancer, therefore, the null hypothesis was not rejected.

For the hypothesis 2 alternative that states "There is a significant association between the number of alcoholic drinks consumed per day and cervical cancer incidence" logistic regression found that number of alcoholic drinks consume per day was a significant predictor of cervical cancer incidence. Thus, the null hypothesis was rejected and the alternative accepted. In the concluding chapter, the interpretation of the findings, study limitations, recommendations for future research, and implication of the research on social change will be presented.

Chapter 5: Discussion

Introduction

The objective of this dissertation research was to investigate the association between alcohol consumption and cervical cancer among women. This study focused on women diagnosed with cervical cancer in the state of California using CHIS 2005 survey data. Taken from the CHIS 2005 survey, the questions "has had at least one alcoholic drink in past 30 days and number of alcoholic drinks per day" served as the dependent variables, while the independent variable used was "ever told had cervical cancer." The chi-square test result revealed that consuming alcoholic drinks 30 days before diagnoses was not a significant predictor of cervical cancer, while the logistic regression found that the number of alcoholic drinks consume per day was a significant predictor of cervical cancer incidence. The null hypothesis was rejected and the alternative accepted. In this concluding chapter, the interpretation of the findings, study limitations, recommendations for future research, and implication of the research on social change are presented.

Interpretation of Findings

In California, little attention has been placed on the association of alcohol consumption and cervical cancer among women in Los Angeles. Most preventive effort on cervical cancer has emphasized on HPV screening because HPV-infection, in general, is assumed to be responsible for approximately 91% of cervical cancer incidences (CDC, 2016c). In the United States, cervical cancer is rated as the third common cause of cancer among women, and the leading cause of cancer related-death among women (CDC 2016c).

There has been limited evidence that links the association between alcohol consumption and cervical cancer risk. However, Hy et al., (2015) conducted a study who tested 9,230 Korean women for HPV and asked those women about their consumption of alcohol. The results of Hy et al., (2015) study found that, at the beginning of the study and during a 2-year follow up, women who consumed alcohol were almost three times likely compared to nonalcohol consumers to test positive for HPV. Their study suggested that women who has been drinking for over 5 years are at higher risk of persistent HPV than women who drank less than 5years prior to the study (Hy et al., 2015). Hy et al., (2015) suggested that limiting consumption of alcohol could be an important measure to avert cervical cancer development among women with risk of persistent high-risk HPV infection.

In Chapter 4, logistic regression analysis and Pearson chi-square analysis were conducted to answer the proposed research questions. First, cross-tabulation testing and Pearson chi-square test for independence was used to analyze Hypothesis 1. The cross-tabulation result (see Table 3) was used to generate the number of women who drank alcohol and the number of participants who responded, "ever told had cervical cancer." To predict the incidence of cervical cancer from alcohol consumption, a total of n = 25,548 respondent was used as a subset for the analysis of this hypothesis. There were 262 women who answered "yes*"* to "Had at least one alcoholic drink in past 30 days" and responded, "yes" to "Ever Told Had Cervical Cancer" while n=14,231 women who also consumed alcohol responded "no" to "Ever Told Had Cervical Cancer." In response to "Had at least one alcoholic drink in past 30 days," n=179 women responded "yes*"* and

10,876 responded "no*"* to "Ever told had cervical cancer." The result of the analysis (see Table 4) did not demonstrate sufficient evidence to reject the null hypothesis ($H_0$1). The chi-square test indicated that the calculated value of 1.315 was less than the chi-square table or critical value of 3.84 at $p< 0.05$ level of significance with 1 degree of freedom (Gerstman, 2014). According to the decision rule, the null hypothesis is accepted and thus, the alternate rejected. This means that there is no significant association between consuming alcoholic drink 30 days prior and cervical cancer among women in Los Angeles, CA. A handful of studies have addressed cervical cancer incidence from the alcohol consumption exposure. Nevertheless, in a case-control study by Rippe, (2013) found a mixed result with no overall clear association between alcohol and cervical; however, a positive trend was shown toward increased risk of cervical cancer with increased alcohol consumption.

For the second question, logistic regression analysis was used to analyze Hypothesis 2 to predict if the amount of alcohol consumed on a daily base is associated with cervical cancer incidence (Table 4). Consistent with the limited literature presented in Chapter 2 and the theory of relationalism, the result of the analysis demonstrated sufficient evidence to reject the null hypothesis ($H_0$2). A significant association was found, p <.000, Nagelkerke R2 =.001. The odds of cervical cancer diagnoses with the number of alcoholic drinks per day is lower -0.067 (= exp (B) 0.935) with 95% CI (0.883-0.991) among women who consumed alcohol. Number of alcoholic drinks per day was a significant predictor, p <.02, with the odds of cervix cancer diagnoses of 6.5% (=

(0.935-1) *100) %, indicating that the number of alcohol consumed among women on daily basic were more likely to be diagnosed with cervical cancer.

This result is supported by the literature where by Peirson, Fitzpatrick-Lewis, Ciliska, and Warren (2013) reported a significant trend of increased risk of cancer (such as cervical cancer) associated with alcohol consumption. Therefore, awareness programs that shows the effects of alcohol consumption among cervical cancer patients are needed in order to reduce alcohol intake among women in California because alcohol consumption is a modifiable behavior, the potential detrimental role of alcohol intake and its effect on the risk of cervical cancers is of a major concern for prevention (CDC, 2016b; Peirson et al., 2013). Findings from Hypothesis 2 suggests that a strong association between number of alcohol consumption and cervical cancer, thus, this could result in creating an awareness program that is easier to implement in the state of California since few studies have created an awareness program that shows the effects of alcohol consumption among cervical cancer patients.

In Chapter 1, the theory of relationalism was presented with the suggestion that an interrelation between things and events (Kaipayil, 2009), such as an association between cervical cancer incidence and alcohol consumption. Theoretically, implementing alcohol consumption awareness programs will result in a much significant decrease of cervical cancer incidence. The result of this dissertation study provided sufficient evidence to reject the null hypothesis that there is a significant association between the number of alcoholic drinks consumed and cervical cancer incidence among women in Los Angeles, CA. With the strong association between number of alcoholic drinks consumed per day

and cervical cancer incidence, there is an evidence that suggests rates of cervical cancer could be reduced with the implementation of an awareness program that shows the effects of alcohol consumption and behavior modification program that would encourage behavioral change among women with cervical cancer in Los Angeles, California since alcohol consumption is a modifiable behavior.

Limitations of the Study

This study was conducted using data from Los Angeles County California, therefore the results from this study cannot be generalized to a larger population such as the United States. To have a better understanding for alcohol consumption and cervical cancer incidence, it is imperative to look at all the states individually, as the social and political implications could be very different in relation to the trends in alcohol consumption.

Another major limitation of this study is that CHIS 2005 was a population-based survey that utilized telephone random digit dialing (RDD) of only homes with land line phones. Cell phone contact was not included since cell was best in reaching low SES individuals. Kohut *et al.*, 2012 explained that in 1997 a typical land line telephone survey response rate was 36% compared to 9% in 2012. In addition, generalizability of this study could be limited because of the systematic differences in the CHIS 2005 sample from residents living in California (CHIS, 2012). Data from the CHIS 2005 were weighted to reduce the source of telephone bias (CHIS, 2012). Even though, CHIS 2005 data cannot be generalizable to the real-world practice due to the observational design, however, entry into the database could not be strictly monitored compared to randomized trials.

This creates the potential for unqualified participants to enter information into the database and this could weaken the findings from the analysis of the database generalizability to general population (CHIS, 2012).

Another limitation is that like several other studies that utilized secondary data, the main source of information was self-reported to CHIS 2005. This self-reported data could be influenced by recall bias. Recall bias could lead to information being over or under estimated by study participants (Shokara, Vernonb, and Carlsonc, 2011). Further, participants can also underestimate their reporting due to social desirability bias (Beck, Guignard, and Legleye, 2014; Lofters, Moineddin, Hwang, and Glazier 2011). CHIS 2005 data are more often passive compare to data collected in a randomized trial. Another limitation is that the data on cervical cancer was smaller than desired sample size because of the specificity of the study. The sample size seemed large initially however, those that reported alcohol consumption and cervical cancer only totaled 441 participants out of 25,548 adult women (CHIS, 2016). Even though, the sample was small, the cervical cancer population was shown to have an association with alcohol consumption. A larger sample size could have increased the statistical significance of this study. Despite the sample size, statistical significant association was revealed between alcohol consumption and cervical cancer.

Recommendations

The findings of the study are significant for public health policy makers, public health professionals, state and community coalitions, and cervical cancer researchers. Alcohol consumers were the target for the research used to assess data for the variables of

this study. Findings from this study revealed that alcohol consumption was associated with the incidence of cervical cancer. Based on the findings of this study it is recommended that alcohol consumption awareness programs be implemented that show the effects of alcohol consumption with its association with cervical cancer diagnosis. Since cancers that are caused by alcohol consumption can be averted completely (ACS, 2014b), behavioral medication should also be included in these awareness programs.

Public health policy makers, public health professionals and CDC are urged to act upon the findings from this research. It is recommended that public health policy makers enforce and support policies that would implement these types of awareness programs. It is recommended that state and community coalitions educate policy makers, improve community participation, promote buy in and support, and assist in informing policy change. These actions could lead to social and behavior change among the targeted population. The involvement of the all these stakeholders is imperative because this would impact behaviors indirectly by creating legal and social climates in which consuming alcohol would become less desirable, and acceptable and in return the reducing cervical cancer incidences among women in Los Angeles, California. In addition, women diagnosed with cervical cancer should be educated for them to be informed about the detrimental effects of consuming alcohol. Public health policy makers, public health professionals, state and community coalitions are encouraged to act upon the findings from this research. Policy makers are recommended to enforce and support policies that will enhance patient health.

This research adds latest ideas to the body of existing literature when it comes to association of alcohol consumption and incidence of cervical cancer. Result from this dissertation study supports findings from Menezes, Bergmann, and Thuler, (2013) and Bagnardi (2012) who suggested that even though alcohol consumption declined among their study participant as they grew older but negative health effect of alcohol still increase as they grow older leading to cancer (such as cervical cancer). In addition, this research also offers valuable information on the association of alcohol consumption and cervical cancer incidences to agencies such as Center for Disease Control and Prevention (CDC), American Cancer Society (ACS), National Institutes of Health (NIH), and National Cancer Institute (NCI). These agencies are applauded for continuing to support and provide funding for different epidemiological research associated to cervical cancer prevention. Researchers are urged to expand on their epidemiological understanding of cervical cancer by carrying out the recommendations above for future studies.

Implications for Social Change

The findings from this dissertation study indicated a significant association between alcohol consumption and cervical cancer incidences. This study leads to new finding associated with cervical cancer incidence that would ultimately result in saving and enhancing lives of alcohol consumer diagnosed with cervical cancer. This study could influence public health professional to be more proactive in their efforts with regards to reducing the incidences of cervical cancer in Los Angeles, California. These results have the potential to influence public health professional, policymakers and other public health agencies mentioned above on the importance of enforcing the

implementation of the awareness program regarding the association of alcohol consumption and cervical cancer incidence among women in Los Angeles, California. In so doing, these agencies could encourage new research for better understanding that are associated with alcohol consumption and cervical cancer and validate this study on a larger scale. In addition, this study can also contribute to the knowledge that care providers need in order to implement and enforce the awareness program polices regarding alcohol consumption specifically among alcohol consumer with cervical cancer, thus facilitating in the reduction or elimination of alcohol consumption among alcohol consumer diagnosed with cervical cancer. In all, this would result in decrease in morbidity and mortality rate, and reduction in overall healthcare cost associated to cervical cancer incidences among women in Los Angeles, California.

Conclusion

The primary purpose of this study was to ascertain if there was an association between alcohol consumption and cervical cancer incidences among women in Los Angeles, California. The results of this study revealed that there was a significant association between number of alcohol consumed per day and cervical cancer incidences. This knowledge could contribute to positive social change by involving all the stakeholders mentioned above to help implement and promote alcohol related health programs on the detrimental role of alcohol consumption as a potential risk factor for cervical cancer or conduct future research among these populations. In conclusion, this study could provide future researchers with information that can enable them to create effective awareness programs that will meet the needs of persons with similar

characteristics such as income level, racial and ethnic background, education level, age distribution, and occupation.

References

American Cancer Society. (2007). Global cancer facts & figures 2007. Retrieved from http://www.cancer.org/acs/groups/content/@nho/documents/document/globalfactsandfigures2007rev2p.pdf

American Cancer Society. (2013). Cancer facts & figures 2013. Atlanta. Retrieved from, https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2013.html

American Cancer Society, (2014a). Alcohol use and cancer. Retrieved from http://www.cancer.org/cancer/cancercauses/dietandphysicalactivity/alcohol-use-and-cancer

American Cancer Society. (2014b). California Department of Public Health, California Cancer Registry. California cancer facts & figures. Retrieved from http://www.ccrcal.org/pdf/reports/acs_2014.pdf

American Cancer Society (2016a). What are the risk factors for cervical cancer? Retrieved from http://www.cancer.org/cancer/cervicalcancer/detailedguide/cervical-cancer-risk-factors

American Cancer Society (2016b). Cervical cancer: Treatment options for cervical cancer, by stage. Retrieved from http://www.cancer.org/cancer/cervicalcancer/detailedguide/cervical-cancer-treating-by-stage

American Cancer Society (2016c). Cervical cancer: Do we know what causes cervical cancer? Retrieved from http://www.cancer.org/cancer/cervicalcancer/detailedguide/cervical-cancer-what-causes.

American Society of Clinical Oncology. (2016). Cervical cancer: Statistics. 2005-2016 American Society of Clinical Oncology (ASCO). Retrieved from, http://www.cancer.net/cancer-types/cervical-cancer/statistics

Bandera, E.V., Freudenheim, J.L., & Vena, J.E. (2008). Alcohol consumption and lung cancer: A review of the epidemiologic evidence. *Cancer Epidemiol Biomarkers Prev*, *10*(8):813-21. Retrieved from http://cebp.aacrjournals.org/content/10/8/813.full

Bagnardi, V., Rota, M., Botteri, E., Tramacere, I., Islami, F…& La Vecchia, C. (2012). Light alcohol drinking and cancer: A meta-analysis. *Annals of Oncology, 24*, 1-8. Retrieved from, https://academic.oup.com/annonc/article/24/2/301/223860

Bagnardi V, Rota M, Botteri E, Tramacere, I., Islami, F … La Vecchia, C. (2014). Alcohol consumption and site-specific cancer risk: a comprehensive dose–response meta-analysis. British Journal of Cancer, 112, 580–593. Retrieved from https://www.nature.com/articles/bjc2014579

Beaulieu, N., Bloom, D. E., Bloom, L. R, & Stein, R. M. (2009). Breakaway: The global burden of cancer: challenges and opportunities. A report from the Economist Intelligence Unit. *Economist Intelligence Unit 14;30*(42):6016-9. doi: 10.1016/j.vaccine.2012.07.056. Epub 2012 Aug 4.

Beck, F., Guignard, R., Legleye, S. (2014). Does computer survey technology improve reports on alcohol and illicit drug use in the general population? A comparison between two surveys with different data collections modes in France. *PLoS One 9*: 1–e85810

Boffetta, P., & Hashibe, M. (2006). Alcohol and cancer. Lancet Oncology, 7(2), 149-156. DOI: 10.1016/S1470-2045(06)70577-0. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/16455479

Bloom, D.E., Cafiero, E.T., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L.R… Weinstein, C. (2011). *The global economic burden of noncommunicable diseases*. Paper presented at the World Economic Forum, Geneva, Switzerland. Retrieved from, https://www.world-heart-federation.org/wp-content/uploads/2017/05/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf

Borders, T. F., & Booth, B. M. (2007). Rural, suburban, and urban variations in alcohol consumption in the United States: Findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Rural Health. Autumn; 23*(4)*:314-21. DOI: 10.1111/j.1748-0361.2007.00109. x.* Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/17868238

Breslow, R. A., & Graubard, B. (2008). Prospective study of alcohol consumption in the United States: Quantity, frequency, and cause-specific mortality. *DOI: 10.1111/j.1530-0277.2007.00595. x.* Retrieved from, http://europepmc.org/abstract/med/18215212

Burd, E.M. (2003). Human papillomavirus and cervical cancer. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/12525422

Byrd, J.C., Furman, R.R., Coutre, S.E., Flinn, I.W., Burger, J. A… O'Brien S. (2013). Targeting BTK with ibrutinib in relapsed chronic lymphocytic leukemia. *New England Journal of Medicine. 369*(1):32-42. doi:10.1056/NEJMoa1215637.

California Department of Public Health (2009). California cancer registry. Retrieved from http://www.ccrcal.org/

California Department of Public Health. (2016). California cancer facts & figures. Retrieved from, http://www.ccrcal.org/pdf/Reports/ACS_2016_FF.pdf

California Health Interview Survey (2016). California Health Interview Survey (CHIS) 2011 – 2012 Selected Indicators. Retrieved from, https://www.cdph.ca.gov/programs/cpns/Pages/CaliforniaHealthInterviewSurvey(CHIS)2011-2012SelectedIndicators.aspx

Castle, P. E. (2008). How does tobacco smoke contribute to cervical carcinogenesis? *Journal of Virology. 82*(12): 6084–6086. doi:10.1128/JVI.00103-08. Retrieved from, http://jvi.asm.org/content/82/12/6084.full

Centers for Disease Control and Prevention. (2012). What is HPV? Retrieved from http://www.cdc.gov/hpv/WhatIsHPV.html

Centers for Disease Control and Prevention. (2013a). What are the risk factors? Retrieved from, http://www.cdc.gov/cancer/lung/basic_info/risk_factors.htm

Centers for Disease Control and Prevention. (2013b). Alcohol use – ALQ Target Group: SPs 18+ (CAPI). NHANES 2013. Retrieved from, http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/ALQ_CAPI_H.pdf

Centers for Disease Control and Prevention. (2014). Excessive drinking costs U.S. $223.5 Billion. Retrieved from http://www.cdc.gov/features/alcoholconsumption/

Centers for Disease Control and Prevention. (2015). Excessive alcohol use continues to be drain on American economy. Retrieved from http://www.cdc.gov/media/releases/2015/p1015-excessive-alcohol.html

Centers for Disease Control and Prevention. (2016a). Excessive Drinking is Draining the U.S. Economy. Retrieved from, https://www.cdc.gov/features/costsofdrinking/

Centers for Disease Control and Prevention. (2016b). What things increase a woman's risk of infertility? Retrieved from http://www.cdc.gov/reproductivehealth/infertility/

Centers for Disease Control and Prevention. (2016c). Cervical Cancer Statistics. HPV-Associated Cervical Cancer Rates by Race and Ethnicity. Retrieved from, http://www.cdc.gov/cancer/hpv/statistics/cervical.htm

Centers for Disease Control and Prevention (2017) What do you mean by heavy drinking? Retrieved from, https://www.cdc.gov/alcohol/faqs.htm

Centers for Disease Control and Prevention. (2017). Fact Sheets: Binge Drinking. Retrieved from https://www.cdc.gov/alcohol/fact-sheets/binge-drinking.htm

Chao. (2007). Associations between Beer, Wine, and Liquor Consumption and Lung Cancer Risk: A Meta-analysis**.** DOI: 10.1158/1055-9965.EPI-07-0386. Retrieved from, http://cebp.aacrjournals.org/content/16/11/2436.short

Chesson H.W., Ekwueme D.U., Saraiya M., Lowy D.R., Watson, M., & Markowitz L.E. (2009). Estimate of the annual direct medical costs of the prevention and treatment of disease associated with human papillomavirus in the United States. Retrieved from, http://www.sciencedirect.com/science/article/pii/S0264410X1201081X

County of San Diego. (2010). Health and Human Services Agency, Public Health Services, Community Health Statistics Unit. The Economic Burden of Chronic Disease in San Diego County. Retrieved from http://www.sandiegocounty.gov/hhsa/programs/phs/documents/CHS-EconomicBurdenofChronicDisease2010.pdf

Chang, S., Long, S. R., Kutikova, L., Bowman, L., Finley, D…& Bennett, C. L. (2004). Estimating the Cost of Cancer: Results on the basis of claims data analyses for cancer patients diagnosed with seven types of cancer during 1999 to 2000. doi: 10.1200/JCO.2004.10.170. *Journal of Clinical Oncology*. 22 (17) 3524-3530. Retrieved from http://jco.ascopubs.org/content/22/17/3524.short

Coker, A.L., Eggleston, K.S., Du, X.L., and Ramondetta, L. (2009). Ethnic Disparities in Cervical Cancer Survival Among Medicare Eligible Women in a Multiethnic Population. *Int J Gynecol Cancer*. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/19258935

DeNoon, D. J. (August 04, 2014) Substance Abuse and Addiction Health Center: Are You a Risky Drinker? Retrieved from, http://www.webmd.com/mental-health/addiction/news/20050721/are-you-risky-drinker

Ekwueme, D. U., K. Yabroff, K.R., Guy, GP., Banegas, M.P., de Moor J.S…&Virgo, K.S. (2014). Medical Costs and Productivity Losses of Cancer Survivors-United States, 2008-2011. *Centers for Disease Control and Prevention*. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6323a2.htm

Faridi, R., Zahra, A., Khan, K., & Idrees, M. (2011). Oncogenic potential of Human Papillomavirus (HPV) and its relation with cervical cancer. *Virology Journal* 20118:269. Retrieved from http://virologyj.biomedcentral.com/articles/10.1186/1743-422X-8-269

Faul, F., Erdfelder, E. Albert-Georg L., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods* 2007, 39 (2), 175-191. Retrieved from, https://pdfs.semanticscholar.org/b7db/37226525560b777192eb9497bb6a0ac0211c.pdf

Menezes, R.F. Bergmann, A., & Thuler, L. C. S. (2013). Alcohol Consumption and Risk of Cancer: A Systematic Literature Review. *Asian Pac J Cancer Prev*, 14 (9), 4965-4972. DOI: 10.7314/APJCP.2013.14.9.4965. retrieved from http://journal.waocp.org/article_28063_99f34b4a64ac443a124b39d3e581d682.pdf

Gerstman, B. B. (2014). Basic Biostatistics. Statistics for Public Health Practice (second edition)

Gostin, L.O. (2008). Public health law: Power, duty, restraint. Revised and expanded second Edition

Glick, S.B., Clarke, AR., Blanchard, A., and Whitaker ,A.K. (2012). Cervical cancer screening, diagnosis and treatment interventions for racial and ethnic minorities: A systematic review. *Journal of general internal medicine.* doi: 10.1007/s11606-012-2052-2. Retrieved from, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3403140/

Hofer B. M., Bates J. H., McCusker M. E., Nasseri, K., Cress, R. D., & Snipes. K. P. (2008). Cervical cancer in california. Retrieved from, http://ccr.ca.gov/pdf/Reports/Cervical-Min-08-4-8-08.pdf

International Agency for Research on Cancer. (n.d.). Chapter 5: overview of study designs. Retrieved from, http://www.iarc.fr/en/publications/pdfs-online/epi/cancerepi/CancerEpi-5.pdf

Kaipayil, J. (2009). Relationalism: A Theory of being. *Bangalore: JIP Publications.* Retrieved from, https://philpapers.org/rec/KAIRAT

Kjellberg L., Hallmans G., Ahren A.M., Johansson R., Bergman F…& Dillner J.(2000). Smoking, diet, pregnancy and oral contraceptive use as risk factors for cervical intra-epithelial neoplasia in relation to human papillomavirus infection. *Br J Cancer*. 82(7):1332-8. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/10755410

Kutikova L., Bowman, L., Chang, S., Long, S.R., Obasaju, C. &, Crown, W. H. (2005). The economic burden of lung cancer and the associated costs of treatment failure in the United States. DOI: dx.doi.org/10.1016/j.lungcan.2005.06.005. Retrieved from, http://europepmc.org/abstract/MED/16112249

Kohut, A., Keeter, S., Doherty, C., Dimock, M. & Christian, L. (May 15, 2012). Assessing the representativeness of public opinion surveys. Washington, DC: Pew Research Center for the People & the Press. Retrieved from, http://www.people-press.org/files/legacy-pdf/Assessing%20the%20Representativeness%20of%20Public%20Opinion%20Surveys.pdf

Lax (2011). Histopathology of cervical precursor lesions and cancer. *Acta Dermatovenerol Alp Pannonica Adriat.* 20(3):125-33. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/22131112

Lofters, A.K., Moineddin, R., Hwang, S.W. and Glazier, R.H. (2011). Predictors of low cervical cancer screening among immigrant women in Ontario, Canada. *BMC Womens Health*. 2011 27; 11:20. doi: 10.1186/1472-6874-11-20. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/21619609

Lund, L.E. (2004). Prevalence of binge drinking in California counties, 2001. *Center for Health Statistics*. Retrieved from, http://www.cdph.ca.gov/pubsforms/Pubs/OHIRbingeDrinkingCA2001.pdf

National Cancer Institute. (n.d). NCI dictionary of cancer terms. Retrieved from, https://www.cancer.gov/publications/dictionaries/cancer-terms?cdrid=46133

Neuenschwander, A. U., Pedersen, J. H., Krasnik, M. M., & Tonnesen, H. H. (2002). Impaired postoperative outcome in chronic alcohol abusers after curative resection for lung cancer. *European journal of cardio-thoracic surgery*, 22(2), 287. Retrieved from, http://ezp.waldenulibrary.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=7852472&site=ehost-live&scope=site

Mariotto, A.B., Yabroff, K.R., Shao, Y., Feuer, E.J., & Brown M.L. (2011). Projections of the cost of cancer care in the United States: 2010–2020. *Journal of the National Cancer Institute*103 (2): 117-128. doi: 10.1093/jnci/djq495. Retrieved from http://jnci.oxfordjournals.org/content/early/2011/01/12/jnci.djq495.short

Moore, A.A., Gould, R., Reuben. D.B., Greendale, G.A., Carter. M. K… Karlamangia, A. (2005). Longitudinal patterns and predictors of alcohol consumption in the United States. *America Journal of Public Health*. 95:458-465, doi:10.2105/AJPH.2003.019471

Mosby (2009). cervical cancer. *Mosby's Medical Dictionary, 8th edition*. Retrieved from http://medical-dictionary.thefreedictionary.com/cervical+cancer

Hy. O., Seo S.S, Kim, M.K., Lee, D.O., Chung Y.K…, Park S.Y.(2015). Synergistic effect of viral load and alcohol consumption on the risk of persistent high-risk human papillomavirus infection. *PLoS One.* 20;9(8): e104374. doi: 10.1371/journal.pone.0104374. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/25140695

Olesen, S.C., Butterworth, P., Jacomb, P., and Tait, R.J. (2012). Personal factors influence use of cervical cancer screening services: epidemiological survey and linked administrative data address the limitations of previous research. *BMC Health Services Research*201212:34. DOI: 10.1186/1472-6963-12-34

Peirson, L., Fitzpatrick-Lewis, D., Ciliska, D., & Warren, R. (2013). Screening for cervical cancer: a systematic review and meta-analysis. *Systematic reviews* 20132:35 DOI: 10.1186/2046-4053-2-35. Retrieved from https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/2046-4053-2-35

Rosen S.M., Miller T.R, Simon M. (2008). The cost of alcohol in California. Alcohol Clin Exp Res. 32(11):1925-36. doi: 10.1111/j.1530-0277.2008.00777. x. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/18717655

Rippe, J. M. (2013). *Lifestyle medicine*, Second Edition

Shokara, N.K., Vernonb, S.W., and Carlsonc, C.A. (2011). Validity of self-reported colorectal cancer test use in different racial/ethnic groups. *Family Practice*, 28 (6), 1, 683–688, https://doi.org/10.1093/fampra/cmr026. Retrieved from, http://fampra.oxfordjournals.org/content/28/6/683.full

Surveillance Epidemiology and Result Program. (2012). SEER Stat Fact Sheets: Cervix Uteri Cancer. *National cancer institute.* Retrieved from http://seer.cancer.gov/statfacts/html/cervix.html

Simonoff, J. S. (2017). Logistic regression: Modeling the probability of success http://people.stern.nyu.edu/jsimonof/classes/2301/pdf/logistic.pdf

UCLA Center for Health Policy Research (2012). California health interview survey. Retrieved from http://healthpolicy.ucla.edu/chis/Pages/default.aspx

Viens L.J, Henley S.J, Watson M., et al. (2012). Human Papillomavirus Associated Cancers United States, 2008–2012. MMWR Morb Mortal Wkly Rep 2016; 65:661–666. DOI. Retrieved from https://www.cdc.gov/mmwr/volumes/65/wr/mm6526a1.htm

Weiderpass, E., Ye, W., Tamimi, R., Trichopolous, D., Nyren, O…Adami, H. (2001). Alcoholism and Risk for Cancer of the Cervix Uteri, Vagina, and Vulva. Retrieved from, http://cebp.aacrjournals.org/content/10/8/899?ijkey=5b19a2ceceb140265870f998b823e46af3b4a20c&keytype2=tf_ipsecsha

World Health Organization. (2015). Alcohol: *Fact sheet*. Retrieved from, http://www.who.int/mediacentre/factsheets/fs349/en/

World Health Organization. (2016). Human papillomavirus and cervical cancer. Retrieved from, http://www.who.int/mediacentre/factsheets/fs380/en/

Yabroff, K.R., Lamont, E.B., Mariotto, A., Warren, J.L., Topor, M…& Brown M.L. (2008). Cost of care for elderly cancer patients in the United States. *Journal of the National Cancer Institute*, 100 (9), 7, 630–641. Retrieved from http://jnci.oxfordjournals.org/content/100/9/630.short

Yabroff, K.R., Lund, J., Kepka, D., & Mariotto, A. (2011). Economic Burden of Cancer in the United States: Estimates, Projections, and Future Research. doi:

10.1158/1055-9965.EPI-11-0650. *Cancer Epidemiol Biomarkers Prev.* Retrieved from, http://cebp.aacrjournals.org/content/20/10/2006.full

Ylitalo N., Sørensen P., Josefsson A.M., Magnusson P.K., Andersen P.K… Melbye M. (2000). Consistent high viral load of human papillomavirus 16 and risk of cervical carcinoma in situ: a nested case-control study. *Lancet.* 24;355(9222):2194-8. Retrieved from, https://www.ncbi.nlm.nih.gov/pubmed/10881892