

TOBACCO USE AMONG PREGNANT WOMEN IN NEPAL

Prevalence and Socio-demographic Determinants

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Master's Thesis

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School of Health Sciences

(Public Health)

December, 2013

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School of Health Sciences
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Prevalence and Socio-demographic Determinants
Master's thesis, 55 Pages
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Health Sciences (Public Health)
December, 2013

ABSTRACT

Background: Continuation of tobacco use during pregnancy affects maternal health and has negative impact on fetal health as well. The number of smokers during pregnancy in a developing country like Nepal is soaring high. Different socio-demographic factors might have association with tobacco use during pregnancy.

Objective: To examine the prevalence of tobacco use and its association with socio-demographic variables among pregnant women in Nepal

Methods: The present study was based on the nationally representative sample collected through Nepal Demographic Health Survey (NDHS), 2011. A total of 798 pregnant women (15-49 years old) were included in the study. The information about socio-demographic variables and use of different forms of tobacco was collected through questionnaire survey and household interviews. Descriptive statistics with chi-square test was used to calculate the prevalence of tobacco use (overall tobacco use, cigarette smoking, number of cigarette in 24 hour, chewing tobacco, pipe and bidi smoking) and socio-demographic variables (age, ethnicity, religion, region, type of place of residence, education, occupation, wealth index, number of living children, duration of current pregnancy). Binary logistic regression analysis was then used to calculate the crude and adjusted odd ratios (OR) with 95% confidence intervals (CI) for the association between tobacco use (overall tobacco use, cigarette smoking) and socio-demographic variables.

Results: The prevalence of tobacco use among pregnant women was 22%. Cigarette smoking was the most common form of tobacco use. Adjusted logistic regression model showed that socio-demographic variables such as age, ethnicity, religion, region, education, occupation, wealth index and duration of current pregnancy were significantly associated with tobacco use (overall) and cigarette smoking. Women of higher age group had higher odds of tobacco use

[Odd Ratios 6.17, 95% Confidence Interval (2.67-14.24)] and cigarette smoking [OR 6.47, 95% CI (2.44-17.16)]. “Low caste” Dalits had higher odds of tobacco use [OR 2.90, 95% CI (1.61-5.22)] and cigarette smoking [OR 3.96, 95% CI (2.11-7.44)]. Women from Terai region were less likely to use tobacco and smoke cigarette. Educated women and also women who lived with educated partners were less likely to smoke cigarettes. Those engaged in agricultural work had higher odds of cigarette smoking [OR 2.65, 95% CI (1.08-6.54)]. Those categorized as poor were more likely to smoke cigarette and women during late pregnancy period had higher odds of cigarette smoking [OR 1.96, 95% CI (1.06-3.61)].

Conclusion: Tobacco use among pregnant women in Nepal was found high. Different socio-demographic characteristics such as higher age, low ethnicity, other religious group, residents of Terai region, higher education, agriculture and other occupation, higher wealth index and late pregnancy period were strongly associated with tobacco use. Immediate attention of policy makers to formulate action oriented strategies among target group in order to prevent and control tobacco use during pregnancy is required.

Key Words: Tobacco use, Pregnant women, Nepal, Prevalence, Socio-demographic factors

ACRONYMS

BCC	Behaviour Change Communication
DHS	Demographic Health Survey
EA	Enumeration Area
FCTC	Framework Convention on Tobacco Control
IEC	Information Education Communication
MDG	Millennium Development Goal
NDHS	Nepal Demographic Health Survey
NSS	National Sample Survey
SIDS	Sudden Infant Death Syndrome
VDC	Village Development Committee
WHO	World Health Organization

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1. INTRODUCTION

Tobacco products are made entirely or partly of tobacco as a raw material, containing highly addictive psychoactive ingredient, nicotine. These products can be smoked, sucked, chewed or snuffed (Eriksen et al. 2012). Smoke from these products is a complex mixture of chemicals produced by the burning of tobacco and its additives containing thousands of chemicals and over sixty known carcinogens (American Cancer Society, 2012). Nicotine products has been considered as one of the most heavily used addictive drugs and are designed to regulate the speed and amount of nicotine delivery, which contributes to the risk of developing and sustaining addiction (WHO, 2006)

It is estimated that men smoke nearly five times as much as women worldwide, with prevalence varying across countries (Guindon & Boisclair, 2003) However, in the beginning of the 21st century, prevalence of smoking among women was 22.8%, signifying gradual increase of female smokers (Borio, 2010).With the recent decline in smoking in industrialized countries, the multinational tobacco companies have moved aggressively into the developing nations. Consequently, there is a risk of an epidemic of tobacco-related diseases in the developing world, where tobacco use is increasingly becoming a major health issue for women as well as men (Mackay & Croftont, 1996).

In the South-East Asia Region, one in ten adult female use tobacco in different forms. The findings of the Global Adult Tobacco Surveys point toward an increasing prevalence of tobacco use among women and girls in the region (WHO, 2010). The World Health Organization surveillance in 2007 revealed 15% of women smoked tobacco products and 4.6% used smokeless tobacco in Nepal. The prevalence of smoking among adult females in Nepal is one of the highest in the WHO South-East Asia Region (MOHP, 2012).

Tobacco use continues to be the leading global cause of preventable death and disability. It increases risk for a number of chronic diseases like cancer, lung diseases, and cardiovascular diseases (WHO, 2013). Tobacco use kills millions of people and causes billions of dollars of economic damage worldwide each year. Most of these deaths occur in low- and middle-income countries, and this disparity is expected to widen further over the next several decades. If current

trends continue, by 2030 tobacco will kill more than 8 million people worldwide each year, with 80% of these premature deaths among people living in low and middle-income countries (WHO, 2011).

Tobacco use and smoking among pregnant women is a major cause of spontaneous abortions, premature births, stillbirths, and many other complications such as placenta previa, placental abruption, and a shorter gestation period. It also increases the risk of sudden infant death syndrome (SIDS) (CDC, 2004). According to meta-analysis of published reports, tobacco use during pregnancy is responsible for 19,000 to 141,000 spontaneous abortions each year; 1,900 to 4,800 infant deaths caused by prenatal or pre-birth disorders; and 1200 to 2200 deaths from SIDS (DiFranza & Lew, 1995). Nicotine, carbon monoxide, and other harmful chemicals that enter the bloodstream of pregnant mother go directly into baby's body, which prevents from getting enough vital nutrients and oxygen for growth. Smoker mother who breastfeeds can expose her baby to nicotine and other substances through breast milk. This can relate certain unwanted symptoms in the baby, such as restlessness, rapid heartbeat, diarrhea, vomit and shorter sleep times. Also, child whose mother smoked while pregnancy or those exposed to secondhand smoke may be shorter, smaller and even slow learners in school (American Cancer Society, 2013).

Tobacco use is less likely to decline during pregnancy compared with alcohol and other drug use and women who smoke cigarette during pregnancy are more likely to continue this habit after delivery (Cornelius & Day, 2000). Maternal smoking during pregnancy is a major public health challenge worldwide leading massive consequences to both mother and child. Very few studies have been conducted with respect to female smoking in Nepal, especially among the pregnant women.

Numerous research studies suggest that socio cultural factors influence the initiation and continuation of tobacco use among adults (Bobo & Husten, 2000). Also, socio-demographic factors have direct or indirect influence in tobacco using behavior. Factors like age, residence, education, wealth quintile etc may have association with tobacco use (MOHP, New Era, 2012). This study focuses on determining the prevalence of tobacco use and socio-demographic factors associated with tobacco use among pregnant women in Nepal.

2. LITERATURE REVIEW

The review focused mainly on tobacco use among pregnant women relating different other aspects like history of tobacco use, roots of tobacco intake, types of tobacco, epidemic, prevalence and determinant factors etc. A methodological search was done by using different databases and journals like Ovid Medline, BMJ, Pub med and Google scholar. Also, online search facilities from University of Tampere were used for viewing online electronic journals. Some reports, webpage and newspaper articles are also reviewed. The main key words used were “tobacco use”, “pregnant women”, “Nepal”, “prevalence” and “socio-demographic factors”.

2.1 History of Tobacco use

Tobacco plants first came into light some 18,000 years ago when migrant Asiatic people first crossed the Bering Strait and spread across the continents known today as the Americas, where tobacco is native. Since then a wide dissemination both of the plant’s cultivation and of the practice of smoking existed. However, the history of smoking practice in one form or other existed since ancient period. During 5000 BC, tobacco and various hallucinogenic drugs were smoked in various shamanistic ritual and ceremonies all over America (Gately, 2001).

Tobacco was likely to be chewed or snuffed in the beginning. Consequently, indigenous people learned to smoke tobacco in various forms such as pipes or as predecessors to modern cigars or cigarettes. Later, tobacco became popular as a daily narcotic among both men and women (Gately, 2001). During 1492, Christopher Columbus introduced dried tobacco leaves as a gift from American Indians he encountered. Soon after, tobacco became popular among sailors. They brought tobacco back to Europe, and its cultivation flourished (Randall, 1999). Tobacco was grown as first cash crop for money in North America during 1612 (Jacobs, 1997). By 1910, first cigarette manufacturing machine was invented and cigarette smoking became more commercial. However during 1900s, tobacco use was mainly available on chewing, snuffing and pipe forms. Consequent marketing and advertising of tobacco products increased tobacco consumption in western countries (Goodman, 1993).

Tobacco was often exaggerated containing medicinal qualities but the Surgeon General of the U.S reported about the dangers of cigarette smoking in 1964. He suggested that the nicotine and tar in cigarettes cause lung cancer. However tobacco production flourished and by 1980's, more tobacco companies were established (Jacobs, 1997). By 1990's, tobacco industry marketing shifted heavily outside US, especially targeting developing countries in Asia. Today, we have enough evidence about harmful effects of tobacco use but still tobacco companies are on rise and people are hooked up into this dangerous habit (Randall, 1999).

2.2 Roots for tobacco intake among women

After the Second World War, tobacco manufacturers changed their campaign and begin targeting the other side of market. Males being dominant tobacco consumers, advertisement and glamorous Hollywood films were used to encourage ladies to smoke (Randall, 1999). Currently, selling tobacco products to women has become the largest profitable market opportunity in the world (WHO, 2010).

Petraitis and colleagues (1995) proposed influencing factors of tobacco use among women: social, cultural, and personal. Social influences included characteristics, beliefs, attitudes, and behaviors of the persons. Cultural influences were different practices and norms followed within the society. Personal influences included individual biological characteristics, personality traits behavioral skills etc.

Although, tobacco intake among women may be influenced by several cultural, psychosocial, and socioeconomic factors, including body image and peer pressure, it can be even misunderstood as a sign of freedom among young women. Regardless of the reason for tobacco incitation, addiction sets in quickly and its dependence increases (WHO, 2010). Certain socio cultural factors like family and peer influences, advertising and tobacco availability may also increase the risk factor (Bobo & Husten, 2000). Apart from different reasons of tobacco initiation, continuation of tobacco use results from nicotine addiction, lack of awareness of risk, and difficulty in quitting. Further, the dependence-producing properties of nicotine are responsible for producing withdrawal symptoms such as drowsiness, fatigue, insomnia, irritability, anxiety etc which increases craving for tobacco (WHO, 2010).

In Nepal, smoking cigarette is often considered a symbol of independence and freedom among women. It has also become a fashion statement among people, especially urban women. Among rural women, tobacco chewing is more socially acceptable than smoking, and among smokers bidi smoking is more popular than cigarette smoking (MOHP, 2012).

2.3 Types of Tobacco use

Different types of tobacco products can be found in the market. They generally include cigarettes with different flavors, cigars, and other forms of tobacco targeted primarily among young and minority users. Different forms of tobacco as per WHO listings are as follows (Mackay & Eriksen, 2002):

Cigarettes: Manufactured cigarettes are most popular form of tobacco used worldwide. They consist of processed tobacco with hundreds of chemicals. It has paper wrapped cylinder which can be lit at one end and inhaled through other (Figure 1).



Source: (Wikipedia, 2013)

Figure 1. Cigarettes

Bidi: It is prepared locally by small amount of tobacco, wrapped inside temburni or tendu leaves and tied with string. They are supposed to deliver more tar and carbon monoxide than manufactured cigarettes (Figure 2).



Source: (Wikipedia, 2013)

Figure 2. Bidi

Chewing tobacco: It is smokeless form of tobacco consumed directly by placing a portion between the cheek and gum or upper lip teeth. It is also prepared by adding tobacco, areca nuts and staked lime wrapped in a betel leaf. It is also known as plug, loose-leaf, and twist (Figure 3).



Source: (Smokers choice guide, 2013)

Figure 3. Chewing Tobacco

Pipe: It is made of briar, slate, clay or other substance where tobacco is placed in the bowl and inhaled through stem. Tobaccos for smoking in pipes are often carefully processed to achieve the degree of flavor (Figure 4).



Source: (Smokers choice guide, 2013)

Figure 4. Pipe

Cigar: It consists of air cured and fermented tobaccos tightly rolled inside a tobacco wrapper. It is supposed to produce more carcinogenic compounds compared to cigarettes. It is found in different size and shapes (Figure 5).



Source: (Wikipedia, 2013)

Figure 5. Cigar

Kreteks: They are clove flavored cigarette forms. Different forms of tobacco and exotic flavorings are used within Kreteks (Figure 6).



Source: (Wikipedia, 2013)

Figure 6. Kreteks

Sticks: It is prepared from sun cured tobacco wrapped in a cigarette paper (Figure 7).



Source: (Novac, 2011)

Figure 7. Sticks

Hookahs: It is a water pipe consisting bowl and hose or tube. Tobacco inhalation using a hookah is deeper and has longer smoking sessions compared to cigarettes (Figure 8).



Source: (Wikipedia, 2011)

Figure 8. Hookahs

Snuff: It is smokeless form of tobacco either in moist or dry form. Moist snuff is used by placing a pinch of tobacco between the lower lip or cheek and gum. It is also available in small, teabag like sachets. Dry snuff is powdery and is used by sniffing or inhaling the powder from the nose (Figure 9).



Source: (Wikipedia, 2011)

Figure 9. Snuff

In Nepal, both smoking and smokeless forms of tobacco are quite popular. Smoking forms includes cigarette, bidi, hookah, sulfa and chillum or kankad. The smokeless tobacco products include surti leaves, khaini, gutkha and paan with tobacco ingredients. The most popular form of chewing tobacco is paan with tobacco and is practiced more in the Terai region (MOHP, 2012).

2.4 Tobacco epidemic

2.4.1 Consequences on pregnant women

Tobacco use including both smoking and non smoking forms has adverse effect on maternal and child health. The risk for prenatal mortality, stillbirths, neonatal deaths and SIDS are higher among babies of women who smoke during pregnancy (CDC, 2004). Adverse effects in growth, cognitive development, and behavior of the child has been linked with tobacco exposure during pregnancy (Cornelius & Day, 2000).

Cigarette smoking contains harmful chemicals such as nicotine and carbon monoxide, causing adverse pregnancy outcomes. It is known that chemicals including nicotine, cyanide, and carbon monoxide can pass through the placenta into the fetal blood supply and constrict the oxygen flow to the growing infant's body. The risk of respiratory infections and allergic immune responses in infants also increases with maternal smoking during pregnancy (Mathews & MacDorman, 2008). In 2005, Mathews and Mac Dorman also found that infant mortality was higher among babies born to mothers who smoked than babies born to mothers who do not smoke.

Tobacco use in West African countries indicates suffering of general health consequences such as increased risk of tuberculosis infection and mortality, low birth weight for babies of smoking mothers, and tobacco consumption associated malnutrition among women (da Costa, 2005).

In a study conducted on rural southeastern plains of Nepal, pregnant women who smoke were more likely to report symptoms of vaginal bleeding, edema, severe headache and convulsions during pregnancy and the cases of infant mortality up to 6 months was approximately 30% higher among smokers compared to nonsmokers (Christian, et al., 2004). Also, complication during pregnancy such as hemorrhage was higher among women consuming tobacco during pregnancy. Smokers had higher incidence of multiple complications such as retained placenta, premature delivery, post-partum morbidity and post partum depression (Mitra & Bhadra, 2012). Cigarette smoking was one of the factors associated with early and late pregnancy related mortality in Nepal (Christian, et al., 2008).

2.4.2 Prevalence among all women and pregnant women

Smoking prevalence is declining in industrialized countries such as Northern and Western Europe, North America and the Western Pacific region and increasing in countries of Asia, South America and Africa (Shafey, Eriksen, Ross, & Mackay, 2009). As per The Tobacco Atlas (2009), nearly 1.25 billion adults worldwide are smokers. Smoking among women was highest in WHO European Region (22%). In Nepal, a National Sample Survey (NSS, 2000) carried out in 10 out of 75 districts reported prevalence of 'ever smoker' among females as 31.6% (World Bank, 2011). Nepal Demographic Health Survey (NDHS) in 2006 estimated prevalence of tobacco use among women 20% whereas; NDHS 2012 estimated 13% prevalence of female smokers. The World Bank Report (2010) revealed prevalence of smoking among females (% of adults) in Nepal 29% during 2009.

The prevalence of smoking among pregnant women has been shown to vary across different countries. For example, prevalence rates range from 9.9% in Japan (Kaneita, et al., 2007), to 17% in Australia (Mohsin & Bauman, 2005) and 30-35% in Spain (Jiménez, 2006). In a cross sectional study conducted in United States, 48% of total participants smoked cigarettes during their pregnancy period (Katirai, 2011), and in other cohort study, 23% of them consumed tobacco (Perreira & Cortes, 2006). Baron et.al, (2013) found 9.2 % of total pregnant women smoked during prenatal period in Netherland and 10% in Bangladesh (Mitra & Bhadra, 2012). A cross sectional study in Nepal revealed 19.2% of total pregnant women used tobacco during pregnancy (Table 1).

Table 1. Prevalence and determinant factors of tobacco use during pregnancy

Reference, Country	Study design	Subjects (Pregnant women)	Prevalence of Smoking	Factors influencing tobacco use during pregnancy
Katirai, 2011 US	Cross Sectional study	71	48% of women smoked during pregnancy	<ul style="list-style-type: none"> • Marital status: single • Financial source (using Medicaid system for health service) • Less knowledge on health effects of smoking
Perreira & Cortes, 2006 US	Cohort study	4185	23% women consumed alcohol, tobacco, or illicit drugs during pregnancy	<ul style="list-style-type: none"> ▪ Indigenous white mother ▪ Paternal health behaviors (smoking and domestic violence) ▪ Low socioeconomic background
Mohsin & Bauman, 2005 Australia	Cross sectional study	426,344	17% smoked during pregnancy	<ul style="list-style-type: none"> ▪ Younger age (teenage) ▪ Indigenous background ▪ Lack of antenatal care during first trimester
Baron et al. 2013 Netherland	Prospective cohort study	6107	9.2% smoked during pregnancy	<ul style="list-style-type: none"> ▪ Low education ▪ Turkish ethnicity ▪ Having no partner ▪ Non religious
Kaneita et al. 2002 Japan	Cross sectional study	260	9.9% smoked during pregnancy	<ul style="list-style-type: none"> ▪ Young age ▪ Less schooling ▪ More than one child
Mitra & Bhadra, 2012 Bangladesh	Cross sectional study	549	10% used tobacco during pregnancy	<ul style="list-style-type: none"> ▪ Higher age ▪ Low Socio economic status ▪ Illiterate ▪ Higher order of parity
Gupta & Sreevidya, 2004 India	Prospective cohort study	1217	Not calculated	<ul style="list-style-type: none"> ▪ Low socioeconomic status ▪ Less education ▪ Less antenatal care ▪ Low body weight
Christian et al. 2004 Nepal	Cross sectional study	17767	Not calculated	<ul style="list-style-type: none"> ▪ Higher Age group ▪ Low socio economic status ▪ No education
Shrestha et al. 2012 Nepal	Cross sectional study	234	19.2% used tobacco during pregnancy	<ul style="list-style-type: none"> ▪ Lower age group ▪ Low socio economic status

2.5 Determinants influencing tobacco use during pregnancy

Table 1 describes different factors associated with tobacco use during pregnancy. In a study done by Perreira and Cortes (2006), paternal health behaviors such as smoking and domestic violence were strongly associated with maternal substance use. Foreign-born women were less likely to smoke during pregnancy than US-born women and low socioeconomic background was associated with prenatal substance use. 23 % of women consumed alcohol, tobacco, or illicit drugs during the 9 months of pregnancy. Another study in US, showed marital status, financial source for the pregnancy and participant's knowledge on health effects of smoking as factors associated with smoking during pregnancy (Katirai, 2011).

Study by Mohsin and Bauman (2005) in New South Wales of Australia showed that cigarette smoking was higher among teenage mothers and those with an Aboriginal (indigenous) background than older women and non aboriginal women. Lack of antenatal care during first trimester was strongly associated with higher smoking risk during pregnancy. Baron and Colleagues (2013) found characteristics such as low education, being of Turkish ethnicity, having no partner and being non-religious as factors associated with smoking during pregnancy.

Study in Japan showed that odds ratios for smoking during pregnancy was higher among women of younger age than older women, women having less schooling compared to educated women and those having more than one child compared to women in their first pregnancy (Kaneita, et al., 2007). In a study by Mitra and Bhadra (2012) in Bangladesh, use of tobacco was higher among women living in slum households, older women, those with higher order of parity and illiterate women compared to richer, younger, those with low order of parity and literate women. Study by Gupta and Sreevidya (2004) in India showed that women using smokeless tobacco were from lower socioeconomic status, low educational background, had less body weight and were less likely to have had optimal antenatal care.

Study by Christian and Colleagues (2004), in rural southeast plains of Nepal concluded that cigarette or bidi smokers were more likely from older age group, illiterate and poor wealth index compared to nonsmokers. Similarly, study conducted among 234 pregnant women in eastern part of Nepal revealed that prevalence of tobacco use was high among younger age group (20-29 year) and those below the poverty line.

2.6 Tobacco control efforts

The World Health Organization Framework Convention on Tobacco Control (FCTC) adopted by the World Health Assembly on May 2003 demonstrates global political will to strengthen tobacco control and save lives. WHO FCTC is a legally binding global treaty for countries to implement and manage tobacco control programs and address the growing epidemic of tobacco use (WHO, 2011). It was developed in response to the globalization of the tobacco epidemic and reaffirm right of people to the highest standard of health. By 2013, it has embedded 177 member countries (WHO, 2013).

Nepal ratified WHO Framework Convention on Tobacco Control on November, 2006. The Tobacco Product (Control and Regulation) Act, 2010 is the primary law governing tobacco control in Nepal and enforces regulations regarding smoking in public places, workplaces, and public transport; tobacco advertising and sponsorship; and tobacco packaging and labeling (MOHP, 2012). With the support of Tobacco Control and Regulatory Act formulation in 2010, ban on smoking in public places was enforced later on August 2011. Smoking in public places was fined up to Rs 100 and civil servants would be liable to departmental action. Act of selling tobacco products to persons under the age of 18 years and pregnant women could be fined up to Rs 10,000. Advertising and sponsoring programs in the name of tobacco-related products through media was prohibited. It also became mandatory for producers to cover 75 per cent of the packet of tobacco products with statutory warning from November, 2011. On May, 2012 actions on smoking in public places and tobacco packaging and labeling was further implemented (Campaign for Tobacco Free Kids, 2012).

2.7 Antenatal care in Nepal

The National Safe Motherhood Program has been regarded as priority for the government of Nepal's Health Sector Strategy, which works toward meeting the Tenth Five-year Poverty Reduction Strategy and health sector targets set out in fulfilling Millennium Development Goals (MDGs). It includes various aspects of antenatal care such as availability of skilled health workers, quality of health facilities, health sector reform, legalization of abortion, recognition of the significant levels of mother to child transmission of HIV/AIDS etc. It also focuses on

Behaviour Change Communication (BCC) through mass media, local media and inter-personal communication for promoting positive behavior among mother. It also includes Safe Motherhood Information Education Communication (IEC) strategy where interpersonal communication between providers and clients is focused. Health promotive behavior such as prevention and control of tobacco use during pregnancy is focused by both BCC and IEC activities (MOHP, 2006).

In Nepal, about 6 in 10 mothers receive antenatal care from a skilled provider and 50% make four or more antenatal care visits during their pregnancy. The percentage of pregnant women who were informed of complications during pregnancy was 32% (MOHP, New Era, 2012).

2.8 Conceptual framework

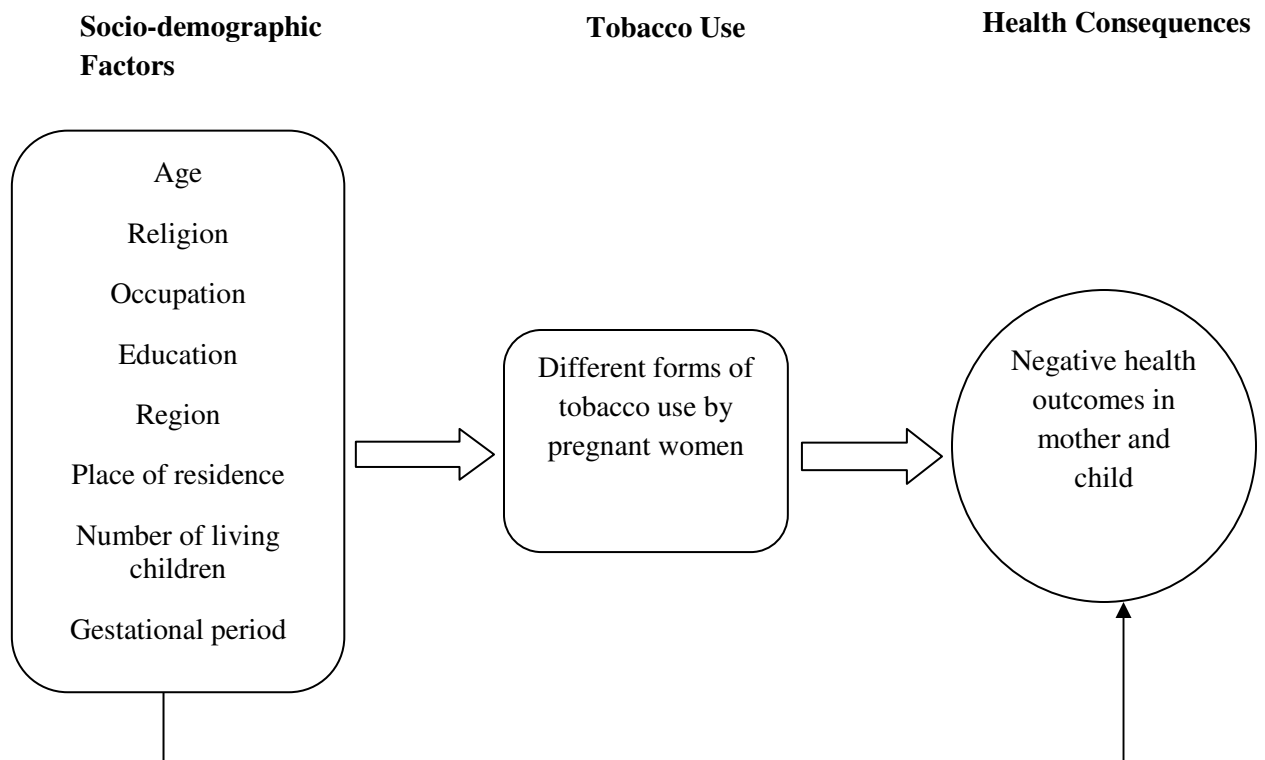


Figure 10. Theoretical framework of the study

This study is based on above theoretical model prepared by author herself (Figure 10). The possible association between socio-demographic factors and tobacco use is shown in the figure, which can consequently result negative health outcomes among mother and child. Socio-demographic factors such as education, occupation, place of residence, age, religion, ethnicity etc might be associated with tobacco use among pregnant women. Tobacco products can be used in different forms, as per availability in the market.

3. AIM OF THE STUDY

The aim of this study was to illustrate tobacco use among pregnant women in Nepal.

3.1 Specific Objectives

- To examine the prevalence of tobacco use among pregnant women in Nepal
- To describe tobacco use patterns (smoking cigarette, bidi, pipe and chewing tobacco) among pregnant women in Nepal
- To examine association of socio-demographic factors (age, ethnicity, religion, region, place of residence, education, occupation, wealth index, number of living children and duration of pregnancy) with tobacco use among pregnant women in Nepal

4. STUDY METHODS

4.1 Study setting

The study area is based on Nepal. Nepal is a small, landlocked, mountainous country bounded to the north by China the east, south and west by India (Figure 11). The total area of Nepal is 140,800 sq km. It is divided in three different geographical parts; Himalayan Region, Hilly Region and Terai Region. Nepal is an agricultural country, with about 94% of the population engaged in farming. The population is about 30 million.



Source: (Foreign and Commonwealth Office, 2012)

Figure 11. Map showing location of Nepal within South East Asia

Table 2. Key Indicators of Nepal

Indicator	Nepal
Gross Domestic Product (GDP)	1160 US dollars
Human Development Index Value	0.458
Adult Literacy Rate (% among >15 year old)	59.1
Expenditure in Health, Public (% of GDP)	2
Expenditure in Education, Public (% of GDP)	4.6
Life Expectancy at Birth	68.8 years
Total Fertility Rate*(per women)	2.6
Under 5 Mortality Rate (per 1000 live births)	48
Maternal Mortality Rate (per 100,000 live births)	380
Urban Population	19.2 %
Female Population (Millions)	15.4
Male Population(Millions)	15.1

Source: Human Development Reports, 2011/ *Nepal Demographic Health Survey, 2011

4.2 Data Source

4.2.1 Nepal Demographic and Health Survey, 2011

The 2011 Nepal Demographic and Health Survey is the fourth nationally representative comprehensive, cross sectional survey conducted as part of the worldwide Demographic and Health Surveys (DHS) project in the country. NDHS collected demographic and health information from a nationally representative sample of 10,826 households, which yielded completed interviews with 12,674 women age 15-49 in all selected households and with 4,121 men age 15-49 in every second household.

4.2.2 NDHS sampling frame and sample selection

Nepal is divided into 75 districts, which are further divided into smaller Village Development Committee (VDCs) and municipalities. The VDCs and municipalities are further divided into wards. The larger wards in the urban areas are divided into sub wards. An enumeration area (EA) was specified as a ward in rural areas and a sub ward in urban areas.

Two-stage stratified cluster sampling was done for sample selection procedure. In the first stage, EAs were selected using a probability-proportional-to-size strategy. In order to achieve the target sample size in each domain, the ratio of urban EAs to rural EAs in each domain was roughly 1 to 2, resulting in 95 urban and 194 rural EAs (a total of 289 EAs). Complete household listing and mapping was carried out in all selected EAs (clusters). In the second stage, 35 households in each urban EA and 40 households in each rural EA were randomly selected.

4.2.3 Study population

The study population is based on pregnant women at the time of survey of reproductive age group 15- 49 years. Out of the total household interviewed, 12,918 women were identified eligible for the individual interview. Only 798 women were currently pregnant during data collection period.

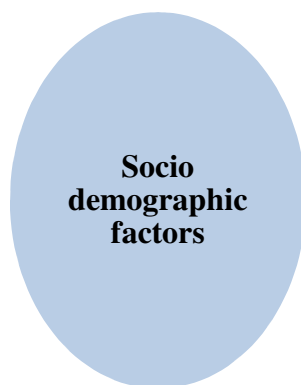
4.3 Ethical Approval

Ethical approval for conducting the survey was taken from National Health and Research Council, and permission to use the NDHS data was obtained from Macro International Inc. During the primary data collection of Nepal Demographic Health Survey, ethical approval was taken through written informed consent in both household and women's questionnaire. For participants who were illiterate, thumb impressions were obtained. The time duration of interview was clearly mentioned and participants had all freedom of choice to discontinue in case of disinterest. Privacy and confidentiality of the respondents were strictly maintained.

4.4 Exposure and outcome variables

The exposure variable includes different socio-demographic factors like age, ethnicity, religion, region, place of residence, education, occupation, wealth index, number of living children and duration of current pregnancy. Primary outcome includes tobacco use (overall) and different forms of tobacco use like cigarette, cigars, bidi, chewing tobacco and pipe are illustrated as secondary outcome variables (Figure 12).

Exposure variable



Outcome variable

Primary: Tobacco use (overall)
Secondary: Forms of tobacco (cigarette, bidi, chewing tobacco, cigars, pipe)

Figure 12. Exposure and outcome variables

4.5 Measurement of variables

There were separate three different questionnaires administered in the 2011 NDHS: the Household Questionnaire, the Woman's Questionnaire, and the Man's Questionnaire. All the variables in the study are generated from women's questionnaire except the "wealth index" category which is generated from household questionnaire. The related questionnaires can be found in NDHS web report. In this study, majority of socio-demographic variables have their categories recoded during statistical analysis because of less number of participants in some category.

4.5.1 Measurement of tobacco use during pregnancy

Smoking or any form of tobacco use was assessed by the question "Do you currently smoke or use any other type of tobacco?" The response of "yes" and "no" was yielded. Further information on cigarette smoking was yielded by calculating percentage of frequent smokers (≥ 6 cigarettes per day). If other than cigarette form of tobacco was used, it was classified into five categories: Pipe, bidi, chewing tobacco, snuff and other (specified). In our study, only pipe, bidi, chewing tobacco and cigarette smoking was accessed due to very less number of snuff and other tobacco users. It was all coded by "yes" and "no" category.

4.5.2 Measurement of current pregnancy status

The women were asked if they were pregnant at the time of data fill up and was responded by "yes", "no" and "unsure". Our study focused only on women who were pregnant during the period of study (i.e. responded "yes").

4.5.3 Measurement of socio-demographic factors

Age

The Age of the respondent was left open ended at the time of data collection and recoded afterwards in 3 categories; 15-24, 25-34 and 35-49.

Education

School attending level was assessed by the question "Have you ever attended school?" and the response was categorized by "yes" and "no". Those who attended school were further asked about their highest grade completed. It was further categorized as primary, secondary, tertiary, no education and don't know in the dataset. The variable was further recoded into no education, primary and more than primary in our study.

Partner's education

Partner's education was assessed by question "Did your (last) (Husband/Partner) ever attend school?" and "What was the highest grade he completed?" Categorization was done by listing primary, secondary, tertiary, no education and don't know. The variable was further recoded into no education, primary and more than primary in our study.

Occupation

Respondent's occupation was accessed by asking "What is your occupation i.e. What kind of work do you mainly do?" and the response was listed as not working, professional/technical/managerial, clerical, sales and service, skilled manual, unskilled manual, other and don't know. Further recoding was done in our study as not working, agriculture and other.

Partner's occupation

Partners occupation was accessed by asking "What is your (husband's/partner's) occupation?" or "What was your (last) (husband's/ partner's) occupation?". The response was categorized into professional/technical/managerial, clerical, sales and service, skilled manual, unskilled manual, agriculture, other and don't know. Further recoding was done in our study as agriculture, manual and other.

Religion

Religion was classified into six categories: Hindu, Buddhist, Muslim, Kirat, Christian and other (specified). Further recoding into Hindu and other (all religion except Hindu) was done in the study.

Ethnicity

Caste or ethnicity was classified as hill Brahmin, hill Chhetri, Terai Brahmin/Chhetri, other Terai caste, hill Dalit, Terai Dalit, Newar, hill Janjati, Terai Janjati, Muslim and other in the dataset. It was further recoded into Brahmin and Chhetri, Dalit, Janjati and others.

Region and place of residence

Region was categorized into mountain, hill and Terai and place of residence was classified as rural and urban. No further recoding was done.

Wealth Index

The wealth index used in NDHS survey is a measure that has been used in many international level Demographic Health Surveys (Rutstein, 1999). It indicates the level of wealth that is consistent with expenditure and income measures. The index was constructed using household asset data via principal components analysis. Household score was assigned to every single household member, ranking each person in the population by his or her score, and then dividing the ranking into five equal categories (poorest, poorer, middle, richer and richest), each comprising 20 percent of the population. For present analysis the variables were re coded into three categories poor, middle and rich.

Number of living children

Number of living children was accessed by asking sons or daughters living with the respondent and their number. Number of living children was left open ended at the time of data collection and recoded afterwards in 2 categories: 0-3 children and 4 or more.

Duration of pregnancy

Duration of pregnancy was assessed by asking months of current pregnancy among the respondents who were pregnant during study period. Pregnancy duration was left open ended at the time of data collection and recoded afterwards in 3 categories: 0-3 months, 4-6 months and 7-9 months.

4.6 Statistical methods

Descriptive statistics was calculated for different socio-demographic variables and outcome variables as numbers and percentages. Secondly, socio-demographic variables such as age, ethnicity, religion, region, type of place of residence, respondent education, partner education, wealth index, number of living children and duration of current pregnancy was compared with outcome variables such as use tobacco (overall), smoke cigarette, number of cigarette in 24 hour, smoke pipe, use chewing tobacco and smoke bidi by using cross tabulation and chi square test using column percentage. After that, P-value was calculated to find significant statistical association between socio-demographic variables and outcome variables. P value with <0.05 was considered as significant.

In the 2011 NDHS the sample was selected with unequal probability to expand the number of cases available (and hence reduce sampling variability) for certain areas or subgroups for which statistics was needed. The data was weighted while calculating the descriptive statistics in order to make proper representation of target population.

In order to find the association, comparison between all the socio-demographic variables and outcome variables (overall tobacco use and cigarette smoking) was done. Crude odds ratio (OR) and 95 % confidence interval (CI) for all socio-demographic variable was calculated using binary logistic regression model using enter method. Some outcome variables were not possible to assess because of very small number of respondents using bidi, pipe and chewing tobacco. The second model of logistic regression analysis was adjusted simultaneously for all the socio-demographic variables used in the analysis. Statistical analysis was done using the Statistical Package for Social Sciences (SPSS), version 20.

5. RESULTS

5.1 Socio-demographic characteristics

Table 3 shows distribution of demographic variables among the pregnant women. The highest number of respondents was from the age group 25-34 years. One third of the women were Janjati and less than 20% Dalit. More than 80% of respondents were Hindu. Geographically, nearly half of the respondents were from Terai region followed by hilly region (40%). Majority of respondents (92%) were from the rural area.

Around two thirds of respondents did not have any education. One third of their partners did not have any education, whereas 36% attended more than primary level. Nearly 60% of respondents were involved in agriculture and about one third were not working. 41% of respondent's partners were engaged in manual work, 33% in agriculture and 27% did other work like services, clerical and professional jobs.

According to the wealth index, more than half of the respondents were poor and 22% within rich category. Most of the respondents (74%) had 0-3 children. Of all respondents, 38% were 4-6 months pregnant and 36% in their third trimester.

Table 3. Demographic characteristics of study population, n (%)

Variables	N (771)*	%
Age		
15-24 years	233	30.2
25-34 years	426	55.3
35+ years	112	14.5
Ethnicity		
Brahmin/ Chhetri	199	25.8
Dalit	136	17.6
Janjati	269	34.9
Other	167	21.7
Religion		
Hindu	625	81.1
Other	146	18.9
Region		
Mountain	83	10.8
Hill	308	39.9
Terai	380	49.3
Type of place of residence		
Urban	61	8.0
Rural	709	92.0
Respondent Education		
No education	512	66.5
Primary	119	15.4
More than Primary	139	18.1
Partner Education		
No education	244	31.7
Primary	249	32.4
More than Primary	277	36.0
Respondent Occupation		
Agriculture	456	59.1
No work	255	33.0
Other	60	7.8
Partner Occupation		
Agriculture	252	32.7
Manual	314	40.7
Other	205	26.5
Wealth Index		
Poor	458	59.4
Middle	145	18.8
Rich	168	21.7
No. of living children		
0-3	568	73.7
4 or more	203	26.3
Duration of current pregnancy		
1-3 months	205	26.2
4-6 months	290	37.6
7-9 months	276	35.8

5.2 Tobacco use

Table 4 describes distribution of outcome variables. Among all respondents, 22 % of pregnant women used any form of tobacco. Cigarette smoking (15%) was most common form of tobacco use whereas pipe (4%), chewing tobacco (5%) and bidi (5%) were least common. Within the cigarette smokers, 67% smoked 1-5 cigarettes per day and 33 % smoked 6 or more.

Table 4. Distribution of tobacco use, n (%)

Variables	N (771)	%
Use tobacco (any form)	166	21.5
Smokes cigarettes[†]	116	15.0
No. of cigarette in 24 hours*		
1-5	77	66.7
6 or more	38	33.3
Smokes pipe[†]	29	3.8
Use chewing tobacco[†]	37	4.7
Smokes bidi[†]	38	4.9

*Includes a missing value

[†]Total sum of variable smokes cigarettes, pipe, chewing tobacco and bidi may exceed 166, because the same respondent can belong to more than one category

5.3 Association of socio-demographic and outcome variables

The association of tobacco use, cigarette smoking and number of cigarette smoking with socio-demographic characteristics is shown in table 5. The prevalence of tobacco use was highest in age group 35-49 and lowest among the youngest age group 15-24 (P<0.001). Cigarette smoking also showed similar association with age.

The percentage of women who use tobacco (45%) and cigarette (38%) were more in “low caste” Dalits than “high caste” Brahmin and Chhetry (P<0.001). However, a higher percentage of smokers among the higher caste Brahmin and Chhetri (41%) and Janjati (55%) smoked at least 6 cigarettes per day.

A higher percentage of Hindus were cigarette smokers (17%), but among those who smoked cigarettes, other groups (77%) smoked cigarette more frequently (≥ 6 cigarettes per day) compared to Hindus (28%). Respondents from hilly region and mountain region were more often

tobacco users and cigarette smokers than respondents from Terai ($P < 0.001$). Respondents from rural area were more often tobacco users (23%) and cigarette smokers (16%) than from urban area.

Respondents having no education were more tobacco users (27%) and cigarette smokers (20%) than educated women ($P < 0.001$). Women living with partners attaining only primary level education used tobacco (34%) and cigarette (27%) most ($P < 0.001$), whereas those with partners attaining more than primary level education used tobacco (7%) and cigarettes (4%) least.

Majority of respondents involved in agriculture used tobacco (28%) and smoked cigarette (20%) ($P < 0.001$). Women with partners engaged in agriculture and manual work were more often tobacco users, cigarette smokers and were frequent smokers (≥ 6 cigarettes per day) than women whose partners were following other occupation ($P < 0.001$).

Respondents categorized as poor were more often tobacco users (33%) and cigarette smokers (24%) ($P < 0.001$). 35% of them consumed at least 6 or more cigarettes per day (although no significant difference between wealth index categories was shown). Women having 4 or more living children were more tobacco users (35%) and cigarette smokers (28%) than those having less or no children at all ($P < 0.001$). More of the respondents who were in their late pregnancy consumed tobacco (29%) and cigarettes (26%) than of women in their early pregnancy period ($P < 0.001$). However, women in their early pregnancy (44%) and late pregnancy (41%) were most often frequent smokers.

Table 5. Cross tabulation of demographic and outcome variables (tobacco use, cigarette smoking and number of cigarette smoked in 24 hours), n (%)

Demographic Characteristics	Use Tobacco (Any form)	P value	Smokes cigarettes	P value	No. of cigarette in 24 hours (6 or more)	P value
	N (%)		N (%)		N (%)	
Age						
15-24 years	12 (5.2)	<0.001	9 (3.9)	<0.001	3 (33.3)	0.085
25-34 years	120 (28.2)		82 (19.2)		23 (28.0)	
35-49 years	34 (30.4)		25 (22.3)		13 (52.0)	
Ethnicity						
Brahmin, Chhetri	57 (28.6)	<0.001	44 (22.1)	<0.001	18 (40.9)	0.017
Dalit	61 (44.9)		51 (37.5)		10 (19.6)	
Janjati	47 (17.5)		20 (7.4)		11 (55.0)	
Other	1 (0.6)		1 (0.6)		0	
Religion						
Hindu	134 (21.4)	0.489	103 (16.5)	0.012	29 (28.2)	0.001
Other	32 (21.9)		13 (8.9)		10 (76.9)	
Region						
Mountain	30 (36.1)	<0.001	23 (27.4)	<0.001	8 (36.4)	0.871
Hill	118 (38.3)		82 (26.6)		27 (32.9)	
Terai	18 (4.7)		11 (2.9)		3 (27.3)	
Type of place of residence						
Urban	4 (6.6)	0.001	4 (6.6)	0.032	2 (50.0)	0.413
Rural	162 (22.8)		112 (15.8)		37 (33.0)	
Respondent education						
No education	137 (26.8)	<0.001	104 (20.3)	<0.001	36 (34.6)	0.400
Primary	20 (16.8)		9 (7.6)		2 (25.0)	
More than primary	9 (6.5)		3 (2.2)		0	
Partner education						
No education	63 (25.8)	<0.001	36 (14.8)	<0.001	17 (47.2)	0.025
Primary	84 (33.7)		67 (26.8)		20 (29.9)	
More than primary	18 (6.5)		12 (4.3)		1 (7.7)	
Respondent Occupation						
Agriculture	128 (28.1)	<0.001	89 (19.5)	<0.001	31 (34.8)	0.880
Not working	23 (9.0)		20 (7.8)		6 (30.0)	
Other	14 (23.3)		7 (11.5)		2(28.6)	
Partner occupation						
Agriculture	64 (25.4)	<0.001	35 (13.9)	<0.001	28 (80)	<0.001
Manual	80 (25.5)		65 (20.7)		9 (13.8)	
Other	21 (10.3)		15 (7.4)		1 (6.7)	

Wealth Index	152 (33.2)	<0.001	110 (24.0)	<0.001	38 (34.9)	0.210
Poor	6 (4.1)		3 (2.1)		0	
Middle	8 (4.8)		3 (1.8)		0	
Rich						
Number of living children						
0-3	94 (16.5)	<0.001	58 (10.2)	<0.001	18 (31.0)	0.396
4 or more	71 (35.1)		57 (28.2)		20 (35.1)	
Duration of current Pregnancy						
1-3 months	27 (13.2)	<0.001	18 (8.7)	<0.001	8 (44.4)	0.002
4-6 months	58 (20.0)		25 (8.6)		1 (4.0)	
7-9 months	81 (29.3)		73 (26.4)		30 (41.1)	

The association of different forms of tobacco use (smoking pipe, bidi and chewing tobacco) with socio-demographic characteristics is shown in Table 6. Age group of 25-34 and 35 or more years had highest prevalence of smoking pipe, chewing tobacco and bidi smoking. Smoking pipe (13%) and bidi (13%) were more common among higher caste Brahmin and Chhetri than low caste Dalits, however tobacco chewing was more popular among low caste Dalits (10%) ($P<0.001$). Only respondents following Hindu religion smoked pipe (5%).

Majority of respondents smoking pipe, bidi and chewing tobacco were from hilly region or mountain region. Only respondents from rural area smoked bidi (5%) and chewed tobacco (5%). A higher percentage of women attaining no any formal education used pipe (6%) and bidi (7%) than the educated women, whereas women attaining primary level education used chewing tobacco (9%) more often than other women. Also, respondents living with partner attaining more than primary level education consumed tobacco products less often. Respondents engaged in agriculture were more often pipe (6%) and bidi (7%) users than those following other occupation. but chewing tobacco (13%) was more common among respondents following other occupation. Women living with partners engaged in manual works were more often pipe (6%) and bidi (9%) users than women whose partners followed other occupation.

As per the wealth index, a higher percentage of respondents categorized as poor smoked pipe (6%), bidi (8%) and chewing tobacco (6%) than middle and rich category women. More of the women having 4 or more living children smoked pipe (12%) and bidi (14%) than of women having 0-3 children ($P<0.001$). However, chewing tobacco (6%) was more common among

women having 0-3 children. The prevalence of smoking pipe (7%) was highest during 7-9 months pregnancy and chewing tobacco (8%) during 4-6 months of pregnancy.

Table 6. Cross tabulation of demographic and outcome variables (smoking pipe, chewing tobacco and smoking bidi), n (%)

Demographic Characteristics	Smokes pipe	P value	Use chewing tobacco	P value	Smokes bidi	P Value
	N (%)		N (%)		N (%)	
Age						
15-24 years	4 (1.7)	0.004	2 (0.9)	0.003	3 (1.3)	0.008
25-34 years	15 (3.5)		28 (6.6)		27 (6.3)	
35+ years	10 (9.0)		7 (6.2)		8 (7.1)	
Ethnicity						
Brahmin, Chhetri	26 (13.1)	<0.001	4 (2.0)	<0.001	25 (12.6)	<0.001
Dalit	3 (2.2)		13 (9.6)		3 (2.2)	
Janjati	0		20 (7.4)		10 (3.7)	
Other	0		0		0	
Religion						
Hindu	29 (4.6)	0.002	25(4.0)	0.060	28 (4.5)	0.164
Other	0		11(7.5)		10 (6.8)	
Region						
Mountain	9 (10.7)	<0.001	4 (4.8)	0.020	4 (4.8)	<0.001
Hill	21 (6.8)		22 (7.2)		34 (11.1)	
Terai	0		10 (2.6)		0	
Type of place of residence						
Urban	0	0.087	0	0.044	0	0.040
Rural	29 (4.1)		37 (5.2)		38 (5.4)	
Respondent education						
No education	29 (5.7)	0.001	20 (3.9)	0.047	34 (6.6)	0.008
Primary	0		11 (9.2)		2 (1.7)	
More than primary	0		6 (4.3)		2 (1.4)	
Partner education						
No education	15 (6.1)	0.001	12 (4.9)	0.004	20 (8.2)	<0.001
Primary	13 (5.2)		20 (8.0)		18 (7.2)	
More than primary	1 (0.4)		5 (1.8)		0	
Respondent Occupation						
Agriculture	26 (5.7)	0.003	29 (6.4)	<0.001	32 (7.0)	0.004
Not working	3 (1.2)		0		6 (2.4)	
Other	0		8 (13.3)		0	

Partner occupation						
Agriculture	9 (3.6)	0.021	16 (6.3)	0.143	10 (4.0)	<0.001
Manual	18 (5.7)		15 (4.8)		28 (8.9)	
Other	2 (1.0)		5 (2.4)		0	
Wealth Index						
Poor	29 (6.3)	<0.001	29 (6.3)	0.051	38 (8.3)	<0.001
Middle	0		3 (2.1)		0	
Rich	0		5 (3.0)		0	
Number of living children						
0-3	5 (0.9)	<0.001	32 (5.6)	0.021	10 (1.8)	<0.001
4 or more	24 (11.8)		4 (2.0)		28 (13.8)	
Duration of current Pregnancy						
1-3 months	0	0.001	7 (3.4)	0.006	6 (2.9)	0.299
4-6 months	11 (3.8)		23 (7.9)		16 (5.5)	
7-9 months	18 (6.5)		7 (2.5)		16 (5.8)	

Table 7 illustrates the relationship between socio-demographic variables and the use of tobacco (overall) and cigarette smoking. Women of older age group had higher odds of consuming tobacco compared to younger group (15-24) years, which remained consistent after simultaneously adjusted for all the socio-demographic variables used in the model. Older age groups of women also had higher odds of cigarette smoking than younger group when adjusted for other variables [OR 6.04, 95% CI (2.68-13.63)] and [OR 6.07, 95% CI (2.44-17.16)]. “Low caste” Dalits had higher likelihood of consuming tobacco) and cigarette smoking than “high caste” Brahmin and Chhetry in both crude and adjusted models. However, Janjati and other ethnic group were less likely to use tobacco than Brahmin and Chhetry. The significant association was lost in other ethnic group when adjusted. Other religious groups were more likely to use tobacco than Hindu when adjusted for other variables. Hindu were more likely to use cigarette than other religious groups in crude model but the significance was lost when adjusted for confounders.

In both crude and adjusted models, women from Terai region were less likely to use tobacco and cigarette than women living in mountain region [OR 0.22, 95% CI (0.09-0.50)] and [OR 0.18, 95% CI (0.07-0.48)]. Women from rural area were more likely to consume tobacco and smoke cigarette than women from urban area. However, the significant association was lost when adjusted for confounders.

Pregnant women who were educated for primary or more than primary level were less likely to use tobacco than not educated women, however when the model was simultaneously adjusted, it lost its significant association. Those who were educated were less likely to smoke cigarette than those who had no education in both crude and adjusted models. Similarly, those with partners attending more than primary level education had lower odds of tobacco use and cigarette smoking in both crude and adjusted models.

Women engaged in agriculture were more likely to use tobacco than women having no specific profession; however the significant association was lost when adjusted for all socio-demographic variables in the model. Those performing other jobs also showed significant association for tobacco use in both crude and adjusted models. Also, women who did agriculture had higher odds of cigarette smoking than those having no specific job in crude model and when adjusted with other variables [OR 2.65, 95% CI (1.08-6.54)]. Those whose partners worked in manual force or agriculture had higher odds of tobacco use than other category in crude analysis. The results were similar for cigarette smoking but were in opposite direction when being simultaneously adjusted with other variables.

Poorer women were more likely to use tobacco than those women categorized within middle and richer category of wealth index. Women belonging to richer category were less likely to smoke cigarettes. The association remained consistent even after the simultaneously adjustment done in the model [OR 0.13, 95% CI (0.02-0.59)].

Respondents having four or more children had higher likelihood of tobacco use and cigarette smoking than those having 0-3 children, however the significant association was lost when simultaneously adjusted with other variables. Women who were in late pregnancy were more likely to use tobacco than those in first trimester. They also had higher odds of cigarette smoking which remained consistent after being simultaneously adjusted [OR 1.96, 95 % CI (1.06-3.61)].

Table 7. Crude and Adjusted Odds ratio (OR) and 95% confidence Interval (CI) for tobacco use and cigarette smoking by socio-demographic variable

Dependent Variable	Use Tobacco (Any form)		Smokes cigarettes	
	Crude OR	Adjusted OR*	Crude OR	Adjusted OR*
Age				
15-24 years	1.0	1.0	1.0	1.0
25-34 years	5.46 (3.24-9.19)	6.06 (3.03-12.11)	4.60 (2.57-8.25)	6.04 (2.68-13.63)
35+ years	6.45 (3.52-11.82)	6.17 (2.67-14.24)	5.61 (2.87-10.96)	6.47 (2.44-17.16)
Ethnicity				
Brahmin/ Chhetri	1.0	1.0	1.0	1.0
Dalit	2.50 (1.65-3.78)	2.90 (1.61-5.22)	2.74 (1.78-4.22)	3.96 (2.11-7.44)
Janjati	0.70 (0.47-1.05)	0.44 (0.24-0.80)	0.48 (0.29-0.78)	0.37 (0.18-0.76)
Other	0.09(0.03-0.26)	0.39 (0.10-1.52)	0.13 (0.04-0.38)	0.63 (0.14-2.81)
Religion				
Hindu	1.0	1.0	1.0	1.0
Other	0.88 (0.56-1.40)	2.52 (1.19-5.35)	0.44 (0.23-0.82)	1.69 (0.66-4.33)
Region				
Mountain	1.0	1.0	1.0	1.0
Hill	1.19 (0.82-1.74)	1.62 (0.99-2.65)	1.05 (0.70-1.57)	1.13 (0.66-1.94)
Terai	0.12 (0.07-0.22)	0.22 (0.09-0.50)	0.14 (0.07-0.26)	0.18 (0.07-0.48)
Type of place of residence				
Urban	1.0	1.0	1.0	1.0
Rural	3.96 (2.18-7.19)	1.27 (0.45-3.54)	2.55 (1.40-4.66)	0.45 (0.14-1.44)
Respondent Education				
No education	1.0	1.0	1.0	1.0
Primary	0.37 (0.22-0.60)	0.58 (0.30-1.13)	0.25 (0.13-0.47)	0.41 (0.18-0.96)
More than Primary	0.14 (0.07-0.26)	0.47 (0.21-1.05)	0.09 (0.04-0.22)	0.27 (0.09-0.74)
Partner Education				
No education	1.0	1.0	1.0	1.0
Primary	0.78 (0.54-1.13)	0.86 (0.53-1.42)	0.87 (0.58-1.29)	1.23 (0.71-2.13)
More than Primary	0.13 (0.08-0.21)	0.23 (0.12-0.42)	0.15 (0.09-0.26)	0.47 (0.22-0.97)
Respondent Occupation				
No work	1.0	1.0	1.0	1.0
No work	3.68 (2.21-6.13)	2.05 (0.93-4.52)	3.21 (1.82-5.64)	2.65 (1.08-6.54)
Agriculture	3.25 (1.62-6.51)	3.50 (1.21-10.13)	2.27 (1.02-5.05)	2.82 (0.81-9.74)
Other				
Partner Occupation				
Other	1.0	1.0	1.0	1.0
Agriculture	2.40 (1.54-3.74)	0.70 (0.38-1.28)	1.78 (1.07-2.95)	0.35 (0.17-0.69)
Manual	3.20 (2.06-4.98)	1.55 (0.84-2.89)	3.30 (2.03-5.36)	1.49 (0.75-2.94)

Wealth Index				
Poor	1.0	1.0	1.0	1.0
Middle	0.11 (0.05-0.24)	0.41 (0.16-1.05)	0.09 (0.03-0.25)	0.36 (0.11-1.15)
Rich	0.08 (0.04-0.18)	0.43 (0.14-1.28)	0.04 (0.01-0.15)	0.13 (0.02-0.59)
No. of living children				
0-3	1.0	1.0	1.0	1.0
4 or more	2.54 (1.82-3.54)	0.96 (0.60-1.52)	3.38 (2.35-4.87)	1.55 (0.92-2.59)
Duration of current pregnancy				
1-3 months	1.0	1.0	1.0	1.0
4-6 months	1.25 (0.81-1.93)	1.13 (0.64-1.99)	0.68 (0.40-1.14)	0.44 (0.22-0.88)
7-9 months	2.07 (1.36-3.15)	1.66 (0.95-2.89)	2.27 (1.45-3.56)	1.96 (1.06-3.61)

*simultaneously adjusted for all socio-demographic variables (age, ethnicity, religion, region, type of place of residence, respondent education, respondent occupation, number of living children, wealth index, partner education, partner occupation and duration of current pregnancy).

6. DISCUSSION

In this study, the prevalence of any form of tobacco use among pregnant women in Nepal was found quite high (22%). Cigarette smoking was most common form of tobacco use, whereas other forms like smoking bidi, chewing tobacco and smoking pipe were also quite popular. Different socio-demographic characteristics like age, ethnicity, religion, region, education, occupation, wealth index and duration of current pregnancy showed significant association with either overall tobacco use or cigarette smoking among pregnant women except type of place of residence and number of living children when adjusted for other socio-demographic variables.

6.1 Comparison with earlier studies

In this study, prevalence of tobacco use among pregnant women was 22%. Similar study done among pregnant women in eastern part of Nepal showed 19.2% prevalence of tobacco use (Shrestha, Niraula, Ghimire, Pokharel, Pokharel, & Shah, 2013). The prevalence of tobacco use among pregnant women varied in different parts of the world: 17% in Australia (Mohsin & Bauman, 2005), 9.2% in Netherland (Baron, et al., 2013), 9.9% in Japan and 10% in Bangladesh (Mitra & Bhadra, 2012). Very high prevalence (48%) was found in a study conducted in Kentucky, US (Katirai, 2011).

In this study, age was significantly associated with tobacco use among pregnant women. Age group of 25-34 years and ≥ 35 years had more likelihood of tobacco use and cigarette smoking than younger age group 15-24 years. Similar results were found during a study conducted in southeast part of Nepal; pregnant women smoking cigarette were more likely to be older (Christian, et al., 2004) and more tobacco users were within the age group of 20-29 in eastern part of Nepal (Shrestha, et al., 2012). In contrast to this study finding, in New South Wales, Australia, cigarette smoking was higher among teenage mothers than older age group pregnant women (Mohsin & Bauman, 2005).

In this study, the pregnant women who were educated had fewer odds of cigarette smoking than those having no education. Those categorized poor were more likely to be cigarette smokers than rich, which is in line with results of previous study conducted in Nepal. In rural southwest part of

Nepal, cigarette smokers were more illiterate and poor compared to nonsmoking pregnant women (Christian, et al., 2004). More of the tobacco users were from slum households, older and illiterate pregnant women (Mitra & Bhadra, 2012). A previous study conducted in eastern Nepal also revealed that more than two third of pregnant women using tobacco were below the poverty line (Shrestha, et al., 2012). Similarly, a study in Netherland showed low education (OR 10.3; 95% CI 7.0-15.4) had strong association with any form of smoking (Baron, et al., 2013).

Partner's education also showed significant association with tobacco use among pregnant women in this study. Respondents with partners attaining more than primary level of education were less likely to use tobacco and smoke cigarette than having no formal education. Less percentage of respondents living with educated partners used chewing tobacco, pipe and bidi.

In this study, Dalits who were considered as low caste had higher likelihood of tobacco consumption and cigarette smoking than high caste Brahmin and Chhetry. Similar results was found from the study conducted in southeast part of Nepal where pregnant women who smoked were more likely from the lower Hindu-castes than higher casts (Christian, et al., 2004). Smoking among pregnant women was higher among women with indigenous background and lower among more affluent and overseas-born mothers (Mohsin & Bauman, 2005). Black mothers and Hispanic mothers were less likely to smoke cigarette during pregnancy compared to Whites (Perreira & Cortes, 2006) and being of Turkish ethnicity (OR 3.9; 95%CI 2.3-6.7) were more likely to use of any form of smoking than Dutch (Baron, et al., 2013). From these studies, it is clear that ethnicity and originality of an individual might play important role in association of tobacco use. Also, it was found in this study that respondents following different other religions like Christianity, Buddhist, Islam etc had higher likelihood of tobacco use compared to Hindus.

Geographical region was significantly associated with tobacco use and its different forms in the study. Pregnant women form Terai region was less likely to consume tobacco and smoke cigarette than pregnant women in mountain region. Also, respondent's occupation showed strong association with cigarette smoking. Respondent having agriculture as their major occupation was more likely to smoke cigarette than those having no specific job. Place of residence did not show any significant association but in contrast to the finding of this study, other study conducted within 9 developing countries showed that most of the pregnant women who

consumed tobacco were from rural areas (Pakistan and India) and majority did not work for pay (Bloch, Althabe, & Goldenberg, 2008).

In the study, women during late pregnancy period were more likely to smoke cigarettes than those during first trimester. This can be further supported by findings of Mohsin and Bauman (2005) that women who were smokers were less likely to quit smoking during pregnancy.

Pregnant women are a priority population for tobacco control efforts because tobacco uses during pregnancy pose serious threat to maternal and child health (CDC, 2004). Tobacco use has been a major cause of maternal and child mortality and morbidity throughout the world (DiFranza & Lew, 1995) and cigarette smoking was related to increased risk of pregnancy related maternal and infant mortality (Christian, et al., 2004). Different reasons such as low education, no work, low economic status etc might play direct or indirect influence in tobacco use during pregnancy. However, as tobacco use is based more upon behavioral aspects, quitting smoking and tobacco use during pregnancy is based more upon personal choice and motivation.

6.2 Strengths of the study:

Data from Nepal Demographic Health Survey covered national sample of pregnant women. Study populations were from diverse socio-demographic characteristics representing whole country. Thus, the results provide comprehensive information of socio-demographic cross sectional study and information generated could be generalized in national level.

The possibility of selection bias in the study is reduced due to two-stage stratified cluster sampling conducted during data collection procedure. During the study, regression analysis was adjusted for corresponding outcome variables reducing the risk of confounders. Weighting of data insures results derived from samples reflect that of target population.

6.3 Limitations of the study:

The study focused only on socio-demographic association with tobacco use among pregnant women. It does not provide good insight into other characteristics associated with women such

as reasons for tobacco use, family history, nicotine dependence level etc. Different other factors behind tobacco use can be equally important which was not focused within the study.

The study was limited among pregnant women aged 15 to 49 years, thus the findings cannot be generalized among non pregnant women in this age group. Also, due to cross sectional nature of this study, etiological conclusion could not be derived from cause and effect relationship.

During data collection process, participants were likely to over report or under report tobacco using behavior and socio-demographic characteristics leading possible bias in the study. There could be possibility of recall bias during data collection and information bias as the subjects might have denied use of tobacco in fear of being known to other family members. (Differential or non differential

Only the association between overall tobacco use and cigarette smoking with socio-demographic variables could be assessed due to less number of pregnant women smoking bidi, pipe and chewing tobacco. Even though regression analysis was adjusted for corresponding outcome variables there might be still possibility of residual confounding.

6.4 Implications and further research:

The information generated from the study can be useful for implementing strategies and guidelines among decision makers. This study may also help to clarify certain characteristics such as education level of pregnant women, age group, ethnicity etc as possible factors to consider when designing future intervention programs. Different interventions through mass media on harmful effects of tobacco use, such as use of poster, pamphlets, advertisements in newspaper, television, radio etc can be done. Counseling regarding control and limitation of tobacco using behavior during antenatal care could be very beneficial.

As studies related to tobacco use among pregnant women has been conducted less in Nepal, it opens a new door for implementing broader and focused research. More study on identifying direct causal relationships should be carried out in near future. The results from study can be beneficial for promoting changes in public health policy that would further discourage concurrent use of tobacco among pregnant women.

7. CONCLUSION

The study was focused on prevalence of tobacco use and socio-demographic factors influencing tobacco use among pregnant women. The prevalence of tobacco use (overall) among pregnant women was 22 %. Cigarette smoking was the most common form of tobacco use. Based on the results, it was evident that different socio-demographic variables showed strong association with tobacco use during pregnancy.

In the study, socio-demographic variables, such as higher age group and lower caste “Dalits”, were strongly associated with tobacco use. Education seemed to have an important role in tobacco use as respondent attending no any formal education had higher likelihood of cigarette smoking than educated respondents. Also, their partner’s education couldn’t be neglected because respondents who lived with partners attending more than primary level education used tobacco and smoked cigarette less likely compared to those living with uneducated partners.

Socio economic characteristics showed strong association with tobacco use. As per wealth quintile, those categorized as poor were more likely cigarette smokers than rich. Respondents following agriculture as their major profession had higher odds of cigarette smoking than other profession. The study also revealed that women during end term gestational period (7-9 months) had higher likelihood of cigarette smoking than those in first trimester.

These results show that there is still much potential for health gain with respect to tobacco use during pregnancy in Nepal. Awareness among pregnant women and consideration of possible influencing factors such as low educational status, low socio economic status, low ranking ethnic groups, higher age etc should be considered for designing effective anti-tobacco programs. Such studies should be strengthened in Nepal because only half of the population of pregnant women attains complete antenatal check up in Nepal (NDHS, 2012) and “history of tobacco use” has not been yet considered as a part of antenatal check up. Lack of antenatal care in the first trimester was strongly associated with increased risk of smoking during pregnancy (Mohsin & Bauman, 2005).

7.1 Recommendation

- With quite high prevalence of smokers during pregnancy, the study shows an urgent need to focus “tobacco using history” during antenatal check up and also necessity of counseling and guidance among pregnant women.
- More antismoking measures should be promoted based on the results of this study.

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my principal supervisor Dr. Tarja I. Kinnunen for her support and guidance throughout the study. She has patiently and inspiringly guided through my entire thesis process. Her detail observation and suggestions during the period has encouraged me to learn more and do better always. I will always appreciate her co-operation and readiness for instructing me even during the odd hours.

My heartfelt gratitude goes to my resource person, Dr. Subas Neupane, for supporting me throughout every part of thesis process; especially on statistical methods and procedure. I am grateful for providing his valuable time for my prompt inquiries and to solve dilemma in many issues. I am also thankful to Professor Anna-Maija Koivisto for helping me sort out appropriate statistical figures at the crucial moment.

I would like to express thanks to all the family members of University of Tampere, Public Health Department, especially to the head of department of Public Health Professor Clas-Håken Nygård, the head of department of International Health Professor Matti Salo, International co-ordinator Ms Catarina Ståhle-Nieminen, Dr. Tapio Kirsi and all my lecturers whose involvement and support has helped me complete my entire research process.

I am especially grateful to my friends Kalpana Bastola and Prakash K.C for sharing their valuable knowledge and experience during the thesis development. All my classmates in University of Tampere are also deeply acknowledged for their suggestions during thesis seminar period.

I would also like to acknowledge my Mom and Dad, whose encouragement and blessings has provided me moral support and strength to carry on. They have always motivated me to learn more and perform better in any situation.

Lastly, I would like to express my profound gratitude to the entire person who were involved directly or indirectly during my research process and helped to success my journey.

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