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"Maternal smoking and Pregnancy wastage in Empowered Action Group States in India"

By

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This is to certify that the **Dr. Ruchita Singh** worked on **Dissertation** titled, **"Maternal Smoking and Pregnancy Wastage in Empowered Action Group States in India"** prepared and submitted to the International Institute of Health Management Research [IIHMR], Delhi, India is a genuine record of research carried out by Dr. Ruchita Singh **(Enrolment Number- PG/2/097)**, a student of PGDM equivalent to MBA in partial fulfilment of the degree of PGDM equivalent to MBA. The study was conducted between **February 15, 2024 to June 04, 2024**.

The dissertation has been examined and found to be satisfactory/dissatisfactory. We wish her a bright future ahead.

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The following dissertation titled "Maternal Smoking & Pregnancy Wastage in EAG States in India" at "IIHMR, Delhi" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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LIST OF ABBREVIATIONS

S. No.	Symbol	ABBREVIATIONS
1	NFHS	National Family and Health Survey
2	ICMR	Indian Council of Medical Research
3	PHFI	Public Health Foundation of India
4	LMIC	Low- and Middle-Income Countries
5	GATS	Global Adult Tobacco Survey
6	GBD	Global Burden of Disease
7	PSUs	Primary Sampling Units
8	NCD	Non-Communicable Disease
9	SLT	Smokeless Tobacco
10	EAG	Empowered Action Group
11	COPD	Chronic Obstructive Pulmonary Disease
12	MoHFW	Ministry of Health and Family Welfare

Abstract

Introduction: Despite global commitments to improve maternal and child survival, there exists paucity of regular scientific estimates related to pregnancy wastage, particularly in developing countries (Sharma & Chaudhary, 2000). Pregnancy Wastage is a common event, affecting up to a quarter of recognized pregnancies (Strumpf et al., 2022). Live birth accounts for 89% of all pregnancies in the five years prior to the NFHS-5 survey in India, with the remaining 11% ending in an abortion, miscarriage, or stillbirth. (IIPS, 2022). Among the various factors like higher mother age, delayed pregnancies, low maternal education, contributing to pregnancy wastage, smoking during pregnancy is the leading modifiable risk factor for poor birth outcomes (Plan et al., 2022). This study tries to analyse the pregnancy wastage and its relation with maternal smoking from EAG States in India.

Objective of the study: The study aims to estimate and understand the association between pregnancy wastage and maternal smoking along with economic & socio-demographic factors in the EAG states.

Data source and Methodology: This paper investigates the relationship between maternal smoking and pregnancy wastage in the Empowered Action Group States in India using the Indian version of Demographic Health Survey, National Family Health Survey (NFHS-5). The estimates are for Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Assam, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh known as Empowered Action Group States, and 324 districts of India. The univariate, bivariate and multivariate regression techniques were used to meet the objective of the study. The pregnancy wastage and its predictors including tobacco use (smoke and smokeless) was computed for the EAG states.

Result: Pregnancy wastage was higher among smokers compared to non-smokers in EAG States. The study shows that smoking behaviour along with other factors such as higher age of mother has significant positive association pregnancy wastage. The education as accessibility and wealth status as affordability proved to be statistically significant factors affecting pregnancy wastage in EAG states, India.

Conclusions: The study provides an estimate of the extent of pregnancy wastage among women in EAG States of India. Socio-economic factors are seen to influence the outcomes of pregnancy. This study advocates region-specific programs and policies to address the issue for protecting women particularly from pregnant and vulnerable population.

Chapter 1: Introduction

1.1: Background

Despite global commitments to improve maternal and child survival, there exists a significantly large loss related to pregnancy wastage, particularly in developing countries(1). Pregnancy wastage is a common event, affecting up to a one fourth of recognized pregnancies(2). Pregnancy wastage in a females' life has an impact not only on emotional and physical state of the individuals and their families, but also acts as an indicator of quality of healthcare facilities available in the society. Pregnancy Wastage has been recognized as a significant public health problem especially in the developing countries. Six million abortions occur annually in India, of which two million are spontaneous and four million are induced. (3). Pregnancy Wastage is not only unwanted but also has adverse impact on women's health. According to a report by The Lancet, the rate of abortions for the world is approximately 14 per 1000 women of childbearing age, totalling to 20 million deaths annually and resulting "somewhere in the world a woman dies every 8 minutes because of an abortion." Sub-Saharan Africa accounts for 38 000 of these deaths, whereas south-central Asia accounts for 24 000.

Live birth accounts for 89 percent of all pregnancies in the five years prior to the NFHS-5 survey in India, with the remaining 11 percent ending in an abortion, miscarriage, or stillbirth. A miscarriage occurred in 7 percent of pregnancies and an abortion occurred in 3 percent of them in the five years prior to the survey(4). Among the various factors like higher maternal age, educational attainment of the mother, wealth status contributing to pregnancy wastage, smoking during pregnancy is the leading modifiable risk factor for poor birth outcomes, including stillbirth, miscarriage, and pre-term birth(5).

It is evident from the findings of the 1st two Global Adult Tobacco Surveys that medical professionals counselled males more often than women to give up smoking(6).In addition to the health hazards due to tobacco consumption known to men, women are especially impacted by disturbed reproductive health. Furthermore, pregnant women who smoke tobacco have poorer pregnancy outcomes than the non-smokers (7). One of the biggest global public health concerns is tobacco use. The World Health Organisation (WHO) lists tobacco smoking as one of the main global avoidable causes of mortality. Approximately 6 million fatalities worldwide are attributed to tobacco use each year. According to WHO figures, there are up to 250 million smokers among women globally. In affluent nations, the percentage of women who smoke is believed to be 22%, whereas in underdeveloped nations, it is 9%(8). According to the Global

Adult Tobacco Survey (GATS) 2016-17, even though tobacco smoking has decreased from 27 percent to 20.2 percent in women between twenty four to forty five years of age, it is still significantly high (2)(9).

1.2: Maternal Smoking:

By 2030, the number of women aged 20 and over who die from tobacco use could increase from 1.5 million in 2004 to 2.5 million, with nearly three-quarters of these fatalities expected to occur in low- and middle-income nations.(10). The prevalence of smoking among men worldwide is gradually decreasing, but it is increasing rapidly among women. Women from developing nations are more vulnerable(11). Current rates of smoking were found to be 18.3 percent in Uruguay, 10.3 percent in Argentina, 6.1 percent in Brazil, 3 percent in Pakistan, and 0.8 percent in each of Ecuador and Guatemala, according to a multi-country survey(12). There were 23 percent of pregnant women who smoked, according to another Canadian study(13). The overall prevalence of tobacco use amongst pregnant women in LMICs was 2.6 percent; the prevalence was highest in South-East Asia (5.1%) and lowest in Africa (2.0%)(14).

Over a million adult deaths, or 9.5 percent of all deaths in India, are caused by tobacco smoking each year. 71 million women in India exclusively use smokeless tobacco (SLT)(15). According to official data from the NFHS-4 and the Global Adult Tobacco Survey-2 (GATS-2), between 4 percent and 7.4 percent of pregnant women and roughly 5 percent of breastfeeding mothers in India use tobacco in any way(16). Tobacco usage increases among Indian women who either have a spouse who smokes or have a female family member who smokes(17).

1.3 Pregnancy wastage:

It is particularly significant to highlight that smoking women in their reproductive years has a cumulative detrimental effect on reproduction, impacting everything from foetal and child development to pregnancy outcomes and fertility. Although the gestational period is a crucial and delicate time for a child's development, 52.9 percent of daily smokers throughout the world continue to smoke during pregnancy(18). The risk of sudden infant mortality increased twofold between not smoking during pregnancy and smoking one cigarette per day during the pregnancy, and it more than doubled with any mother smoking during pregnancy(19).

Pregnancy wastage is mainly of two types, stillbirths and early pregnancy losses, or abortions. The stillbirth rate in industrialized nations is considered to be substantially lower, ranging from 4.2 to 6.8 per 1000 live births, while in underdeveloped nations, the estimate is between 20 and 32 per 1000 live births (20). Worldwide abortion rates are estimated to be between 30 and 55 million per year, or 260 to 450 abortions for every 1000 live births. It has been estimated that

there are over 6 million abortions performed annually in India, of which 2 million are spontaneous and 4 million are induced (3,20).

Hereditary and environmental factors, such as those affecting early life stature, maternal age, current health and nutritional status, socioeconomic and educational standing, all have an impact on the result of pregnancy (20). Genetic, environmental, and bio-social factors, such as parity, the interval between pregnancies, socioeconomic status, education, access to healthcare, and previous obstetrics history, can all affect the outcome of a pregnancy (3). In addition, frequent obstetric problems such as infections, diabetes, hypertension, anaemia, antepartum haemorrhage, and others affect mothers and contribute to poor pregnancy outcomes (3).

Preterm deliveries, abortions, and low birth weights are among the adverse pregnancy outcomes (APOs) that carry a significant burden in both industrialized and developing nations (20).

A 2010 Royal College of Physicians study states that smoking during pregnant causes about 2,200 preterm births, 300 perinatal deaths, and up to 5,000 miscarriages every year in the UK (5).

Even though smoking amongst women has decreased over the past 20 years, pregnant women still continue to smoke often (21). Low socioeconomic status and maternal smoking during pregnancy have been well documented as important indicators of poor birth outcomes. It has been discovered that pregnant women who smoke are more often in households with lower socioeconomic status. In a study conducted to analyse the socio-economic status, smoking during pregnancy and birth outcomes, in the disadvantaged group of women, 37.6 percent had smoked at some point during their pregnancy, with nearly similar numbers of light and heavy smokers. In wealthy households, one in four expectant mothers smoked during their pregnancies; the majority of these women were light smokers (22).

It is commonly acknowledged that maternal smoking has an adverse impact on a variety of delivery outcomes (23). There is evidence connecting adolescent cigarette smoking during pregnancy to a higher risk of preterm birth, congenital defects, foetal growth restriction, low birthweight (LBW), and infant mortality (24,25). Most of the research to far has focused on the effects of maternal smoking on intrauterine growth restriction, small-size for gestational age (SGA), and low birth weight (LBW). Additional research has concentrated on the long-term consequences of maternal smoking on offspring, encompassing hypertension, obesity, attention deficit hyperactivity disorder, and habitual smoking (23). A significant portion of research

conducted in India focuses on stillbirth rates and early neonatal deaths; data about pregnancy losses that are categorized as abortions is mainly absent (26).

1.4 Trend of the burden:

The trend of burden due to pregnancy wastage related with maternal smoking has varied substantially in recent decades, reflecting changes in pregnant women's smoking behaviours as well as advances in public health initiatives. Pregnancy wastage, which includes miscarriages, stillbirths, and ectopic pregnancies, is a significant public health challenge, with maternal smoking identified as a preventable risk factor for negative pregnancy outcomes. Understanding these changing dynamics is critical for developing targeted interventions to reduce the burden of smoking-related pregnancy loss while improving maternal and foetal health outcomes. Smoking during pregnancy is still a major concern because it is associated with adverse health effects for both the mother and the newborn. Evidence shows a significant dose-response association between the no. of cigarettes smoked during pregnancy and the probability for negative outcomes.

Several studies have investigated the effect of mother smoking on the course of pregnancy. Smoking during pregnancy was linked to increased risks of low birth weight, preterm delivery, respiratory and gastrointestinal issues in the newborn, and a higher likelihood of admission to the neonatal intensive care unit even after controlling for confounders, according to a 2022 cross-sectional study published in BMC Public Health(27). Significant dose-response pattern was also found in the study, with heavier smokers (≥20 cigarettes/day) linked to a higher risk of intrauterine death and neonatal infection(27).

According to a review, published in the 2021 issue of BMC Pregnancy and Childbirth, smoking during pregnancy and the postpartum period has a considerable adverse impact on the health of both the mother and the unborn child. The review concluded that there is a definite dose-response gradient for many medical disorders and that smoking during pregnancy has substantial negative health effects even at low doses(28).

Research on the combined effects of maternal smoking and second-hand smoke exposure, as well as the consequences of second-hand smoke exposure during pregnancy, was also emphasised. One 2018 study found a link between smoking during pregnancy and decreased birth weight in full-term newborns, which may contribute to the burden of pregnancy waste brought on by maternal smoking and was published in the NCBI PMC. The study observed a dose-response impact between neonates whose mothers smoked 6–10 cigarettes per day and

435g lower mean birth weight in neonates whose mothers smoked 11–40 cigarettes per day, respectively, compared to children delivered to nonsmoking mothers(29).

Further, a 2013 study published in the Journal of the AMA indicated that in the United States, smoking during pregnancy is responsible with 13–19% of term low birth weight infants and 5-8% of preterm deliveries. The study also pointed out that while the percentage of pregnant women who smoke has decreased over the past few decades—from about 20% in the 1990s to around 10% in the 2000s—a significant number of pregnant women continue to smoke(30).

Probably because of growing awareness and initiatives to encourage pregnant women to quit up smoking, the burden of the negative effects seems to have reduced with time.

Nonetheless, a significant number of expectant mothers' smoke, underscoring the necessity of ongoing public health initiatives and assistance to assist pregnant mothers in quitting and make the mother and child's environment smoke-free.

As a result, addressing the burden of pregnancy wastage due to maternal smoking necessitates a multifaceted approach that addresses maternal smoking's root causes, such as poverty, inadequate education, and awareness.

Chapter 2: Data and Methods

2.1 Introduction

Pregnancy wastage is a complex and multi-dimensional problem that affects the females of various socioeconomic backgrounds. It refers to both still birth and miscarriage. Wasted pregnancy not only has an unfavourable effect on women's health but is also undesirable. Globally, men are becoming less likely to smoke, whereas women are becoming more likely to smoke than men. More at risk are women from underdeveloped countries(11). Among pregnant women in LMICs, tobacco use was prevalent overall (2.6%), with South-East Asia having the highest prevalence (5.1%) and Africa having the lowest prevalence (2.0%)(14). Between 4 and 7.4 percent of pregnant women and about 5 percent of nursing moms in India use tobacco in any way, according to official data from the NFHS-4 and the Global Adult Tobacco Survey-2 (GATS-2) (18). Smoking spouses or female family members are associated with higher tobacco consumption among Indian women(17).

It is particularly significant to highlight that smoking women in their reproductive years has a cumulative detrimental effect on reproduction, impacting everything from foetal and child development to pregnancy outcomes and fertility. Although the gestational period is a crucial and delicate time for a child's development, 52.9 percent of daily smokers throughout the world continue to smoke during pregnancy(18)

This study aims to investigate the factors that contribute to the burden of pregnancy wastage due to maternal smoking among women of the EAG States of India. Specifically, this paper will focus on the following factors affecting pregnancy wastage: age of the females, the place of residence, education status, wealth, region, religion, and ethnicity.

2.2 Need for the study

Maternal smoking during pregnancy is an important public health problem due to its detrimental effects on reproductive outcomes. It is one of the most important preventable risk behaviours for the long-term health and human capital of children is maternal smoking during pregnancy, which is linked with a number of health issues that affect the unborn child as well as persistent behavioural and neurodevelopmental abnormalities of the children(31). Preterm birth, still birth, Miscarriage, low birth weight, and infant death are only a few of the unfavourable birth outcomes that are increased by maternal smoking. Additional health effects on the unborn child from smoking during pregnancy could include infections and respiratory

issues. Number of studies have showed that smoking-related early physical health issues have a adverse impact on the accumulation of human capital throughout life in all the developed and developing nations. The adverse effects are dose-dependent, with higher levels of smoking leading to greater risks. Furthermore, paternal smoking has also been associated with an increased risk of pregnancy loss. Furthermore, paternal smoking has also been associated with an increased risk of pregnancy loss. Therefore, a continued and intensive research is needed to identify all the factors that contribute to smoking's detrimental impact on pregnancy outcomes to provide efficient initiatives and networks of support to assist expectant mothers in giving up smoking and raise awareness about the risks of both mother and father smoking before and during pregnancy. Lastly, formulate and implement public health policies and services to reduce smoking rates among individuals of reproductive age to reduce the burden of pregnancy wastage on the individual level as well as on the society.

2.3 Factors promoting smoking

The most possibly harmful tobacco use, smoking, is responsible for five million deaths globally and the other tobacco use causes disease and impairment. The World Health Organisation estimates that 50% of smokers will pass away too soon as a result of their continuous smoking behaviour(32). Numerous potentially fatal or non-fatal illnesses, such as lung, larynx, stomach, liver, leukaemia, COPD, cardiovascular disease, vascular dementia, asthma attacks, retinal degeneration, and peripheral vascular disease, are brought on by smoking(33).

Twenty percent of the world's population is estimated to smoke tobacco(34). Eighty percent of tobacco-related deaths globally occur in low- and middle-income nations. When it comes to tobacco use and smoking, India is not behind. It contributes to the greatest rate of tobacco-related death worldwide and is the second-largest user of tobacco products(35). Smoking is a common habit among Indian males, accounting for up to one-fourth of the total male population over the age of 15(36). Smokers make up 26% of Indian population. Smoking contributes to the burden of social, economic, and environmental factors in addition to both mental and physical load(34)(37). Tobacco usage caused India $1.7 billion in direct and indirect economic losses in 2004 as a result of smoking(38).

Parents' smoking and the smoking of their favourite movie stars serve as triggers for children to start and continue smoking along with other factors like peer pressure, cultural influences including environmental factors, hereditary factors, and hookah smoking. Parental supervision, family discussions about the risks of smoking, and smoking among friends, siblings, relatives, and parent-teen disputes are important indicators of smoking phases(39).

Potential techniques for helping smokers stop include the tobacco industry, frequent therapy, the media, minimising the effects of smoking family members, role models, and the smoking industry; however, empowerment, education, coercion, and the promotion of treatment in drug addiction facilities may also be effective.

To create effective, tailored interventions that reduce the burden of smoking, it is necessary to comprehend the various, inclusive roles that many factors play in the commencement of smoking as well as the role that barriers play in quitting(34).

2.4 Characteristics of people smoking

Smoking, a habit deeply embedded in the social fabric of numerous cultures, has long been scrutinised and discussed. Individuals that engage in such behaviours have a variety of characteristics that are affected by a complex interplay of personal, environmental, and psychological variables. According to research, personality qualities, particularly extroversion, can have a considerable impact on smoking behaviour. Extroverted people, with their proclivity for sociability and energetic behaviour, may be more likely to experiment with cigarettes, motivated by peer groups and a desire to project a specific image. Introverts, on the other hand, may use smoking to cope with feelings of boredom, emptiness, or worry, relying on nicotine's immediate gratification for relieving these internal issues(40).

Furthermore, an individual's smoking habits might be significantly influenced by his or her familial environment and parental influence. Adolescents who grow up in houses where smoking is common may be more likely to start the habit, either through direct exposure or a perceived social approval of the practice. The prevalence of smoking-related commercials and youth-targeted marketing initiatives may accelerate this trend, as young people may identify smoking with a particular amount of social status or desirability.

However, the decision to smoke is not simply influenced by external stimuli; the individual's psychological stresses and coping techniques also play an important role. Some people may smoke cigarettes to relieve boredom or worry, relying on the immediate satisfaction and physiological advantages associated with tobacco to help them cope with their emotions. This pattern of behaviour can become deeply ingrained, resulting in a cycle of reliance and difficulty in quitting, even when clear health risks exist. Despite widespread knowledge of the negative repercussions of smoking, a substantial percentage of the population continues to indulge in this habit, demonstrating the complex interaction of factors that impact this behaviour(41).

Furthermore, the traits of smokers reflect the multifaceted nature of human behaviour. Personality traits such as extroversion can incline people to experimentation and social acceptability of smoking, whereas introverted people may turn to cigarettes to cope with internal conflicts. Environmental influences, like as parental influence and the prevalence of smoking-related advertisements, shape and reinforce these inclinations, resulting in a complex web of interactions that drive and sustain the smoking habit. Peer influence, social norms, and easy access to tobacco products also play a role in smoking initiation and continuation. Understanding these characteristics can help develop targeted interventions and policies to address smoking among high-risk groups.

2.5 Ill effects of smoking on health

Cigarette smoking is the leading cause of preventable mortality worldwide. It kills around 480,000 people in the USA each year, accounting for approximately one out of every five deaths (42). Compared to HIV, illicit drug use, alcohol misuse, car crashes, and firearm-related incidents combined, smoking is the leading cause of death worldwide(43). Lung cancer kills more women annually than breast cancer, with smoking being the primary cause of death for over 90% of lung cancer cases(44). It also accounts for over 80% of all deaths from COPD(42).

Furthermore, cigarette smoking elevates the risk of death from all causes in both men and women, with the risk increasing over the last 5 decades in the United States.

Heart disease, stroke, and lung cancer are far more common among smokers than in nonsmokers. Smoking doubles the risk of stroke and coronary heart disease, respectively, by two to four times. Smokers are also 25 times more likely to develop lung cancer in men than in women (25.7 times)(42). Smoking has a detrimental effect on overall health, leading to increased absenteeism at work and higher healthcare costs. Smoking increases the risk of cardiovascular disorders, such as stroke and coronary heart disease, which are the leading causes of mortality in America

Early signs of cardiovascular disease can appear in smokers who use less than 5 cigarettes daily. Smoking constricts and hardens blood vessels, raising blood pressure and heart rate as well as raising the risk of blood clot development. A blood artery inside or close to the brain bursts, or a clot blocks blood supply to a part of the brain, resulting in a stroke. Blockages caused by smoking can limit the supply of blood to the skin and legs(45).

In addition to damaging the lungs, smoking causes chronic obstructive pulmonary disease (COPD), which is the cause of chronic bronchitis and emphysema. Smoking is the primary cause of lung cancer cases. Further contributing to or exacerbating asthma attacks is tobacco smoke. The risk of dying from COPD is 12–13 times higher for smokers than for non-smokers(42).

For cancer patients and survivors, smoking significantly elevates the risk of dying from cancer and other disorders. In the US, one out of every three cancer deaths could be prevented if no one smoked(42). Smoking is harmful for almost every organ in the body and has a negative impact on general health. It can make it more difficult for a woman to become pregnant and increase the risk of various health problems for her unborn child, including low birth weight, ectopic pregnancy, orofacial clefts, and preterm delivery(44).

Furthermore, smoking has a negative effect on men's sperm, which lowers fertility and raises the possibility of miscarriage and birth abnormalities. It also affects bone health; postmenopausal women who smoke have more chances to have fracture and have weaker bones overall. Smoking negatively impacts dental health, increasing the risk of gum disease and tooth loss. Smokers' eyes are also impacted as they have a higher chance of developing cataracts and AMD, which affects the central portion of the retina. Moreover, smoking is a known risk factor for type 2 diabetes mellitus, raising the disease's likelihood of occurrence by 30–40% and complicating its treatment. The general health implications include lowered immune function and increased inflammation, which can lead to a number of illnesses, including rheumatoid arthritis. Overall, smoking has a significant harmful impact on almost every facet of health(42).

2.6: Economic Burden

Approximately five million adult smokers pass away from smoking-related illnesses each year. By 2030, the yearly death rate is predicted to increase to almost 8 million, with low- and middle-income nations accounting for more than 80% of all deaths(46). Smoking has an enormous detrimental effect on the financial status of health systems and on society in general(47). When considering the costs connected with smoking, the literature usually mentions two categories of expenses: direct and indirect expenditures. Direct costs include charges for meals, transportation, other unofficial expenses. Direct non-health care costs include those related to hospital stays, prescription medications, overhead, and other related expenses. Indirect expenses include lost wages for family members who must pay for the patient's care as well as lost productivity from patients due to early death and absenteeism from work(47)(48).

1.5% to 6.8% of the total national health care expenses were attributable to the direct costs of smoking-related illnesses. According to studies conducted in Taiwan(49) and India(50), The percentage of each country's total national healthcare budget that was directly connected to smoking-associated ailments was 4.7% and 6.8%, respectively. A study found that smoking has a major financial impact on the health system and society at large, in addition to increasing disease and mortality. The analysis determined that the overall cost of smoking was 0.22–0.88% of the country's GDP and 1.5–6% of the nation's health system spending. Additionally, it has been found that early mortality costs and out-of-hospital care are the primary cost drivers of both direct and indirect spending(51). Smoking has an enormous detrimental effect on national healthcare expenditures and society in overall.

2.7: Hypothesis

H01: The prevalence of pregnancy wastage is equal in the female smokers and female non-smokers in the EAG states in India.

H02: The outcome variable – pregnancy wastage is independent from other demographic and socio-economic factors.

2.8 Data Source and Method

2.8.1 Source of data: National Family and Health Survey 5 [NFHS-5]

The data from National Family Health Survey i.e., NFHS-5 was used according to the availability of required information from different backgrounds. This information is used to document the factors affecting smoking trend and pregnancy outcomes including pregnancy wastage among females of the EAG States of India (Data on females and data related to pregnancy outcomes was used. Household-level variables are the place of residence, religion, caste, and wealth index. Maternal characteristics include education, region, information, etc was used for the calculation of the pregnancy outcomes among the smoker females in the EAG States).

The National Family Health Survey 5 (NFHS-5) conducted in India is used as a data source to analyse the burden of pregnancy wastage due to maternal smoking in the EAG States of India. The survey provides detailed information on various aspects of population and health, including socio-economic factors, demographic trends, smoking patterns, and health-related behaviours. NFHS-5 data can be used to examine the prevalence of pregnancy wastage due to maternal smoking in the EAG States of India, and to identify the factors linked with this problem.

This study finds the relationship between maternal smoking and pregnancy wastage in the Empowered Action Group States in India using the Indian version of Demographic Health Survey, National Family Health Survey (NFHS-5). The estimates are for Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Assam, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh known as Empowered Action Group States, and 324 districts of India.

The univariate, bivariate and multivariate regression techniques were used to meet the objective of the study. The information on birth order from mother was utilized to synchronise the information available for pregnancy terminated. Therefore, the duration and final outcome of pregnancy were used as dependent variable of pregnancy wastage. The pregnancy wastage and its predictors including tobacco use (smoke and smokeless) was computed for the EAG states. The survey employed intensive interviewer trainings and standardised measurement tools and techniques. The NFHS has two-stage sample design in most rural areas and a three-stage sample design in most urban areas. The rural sample was typically selected in two stages:

Primary Sampling Units (PSUs) were chosen in the first stage using a probability proportionate to population size. In the second phase, each PSU's households were systematically chosen.

2.9 Dependent variable

The pregnancy wastage status among female is assessed by ever smoking by the females in their life. To accomplish the objective of the current level of pregnancy wastage among the females of the EAG States in India, the study used data from the NFHS-5. The main advantage of using these projections is that the population figures are projected for the EAG states (Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Assam, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh) of India including the dimensions of the place of residence, age, ethnicity, religion, wealth, and categories of education to measure the burden of pregnancy wastage due to maternal smoking in the EAG states of India.

This involves data recording and modification according to the objectives. The data recording and all analysis were done in STATA 14.2 [Ref.]. The analysis may involve inferential statistics, such as chi-square tests and regression analysis.

Variables: Age of Respondent, Place of Residence, Religion, Ethnicity, and Wealth index, Education, and Region.

Table 2.1: Description and coding categories of variables used in the analysis

Description and coding categories of variables used in the analysis

Variables	Description and Coding categories
Age	The age of women recorded into category 15-49
Women's educational status	The women's educational attainment was recorded into4 categories such as 0= illiterate; 1= Primary; 2= Secondary; 3= Higher and above
Types of Residence	The woman's place of residence was recorded into 2 categories such as 1= Urban and 2= Rural
Wealth Index	The Women's wealth of Index was recorded into 5 categories such as 1= Poorest; 2= Poorer; 3= Middle; 4= Richer; 5= Richest
Religion	The Women's Religion was recorded into 4 categories such as 1= Hindu;2= Muslim; 3= Christian; and 4= Sikh and others
Ethnicity	The Caste was categorized as Scheduled Caste= 1; Scheduled Tribe= 2; Other Backward Class=3; and General= 4
Region	States were categorized into 2 regions namely; EAG states and Non EAG states where EAG States include Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Assam, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh and Non EAG States include the remaining states of India

The analysis's categorization of the variables made it possible to gain a deeper understanding of the prevalence pregnancy wastage due to maternal smoking and variables affecting pregnancy wastage among Indian women of the EAG States. Several factors are taken into consideration, including age of the females, educational level of the women, type of residence, wealth index, religion, ethnicity, and region.

The following factors are considered in the multivariate analysis of the burden of pregnancy wastage due to maternal smoking in the EAG states of India using data from NFHS-5:

Age [Respondents' current age]: Age of females in the age group of 15-49. The age of the female was taken at each age as a continuous variable.

Women's educational status: educational attainment of women is categorized as illiterate, primary, secondary, or higher and above.

Types of residence: The place of residence of women are categorized as urban or rural.

Wealth index: The wealth index of women is categorized as poorest, poorer, middle, richer, or richest.

Religion: Religion of women categorized as Hindu, Muslim, Christian, or Sikh and others.

Ethnicity: Ethnicity of women categorized as Scheduled Caste, Scheduled Tribe, Other Backward Class, or General.

Region: The region where the women live is categorized as EAG states (Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Assam, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh) and Non EAG states (remaining states of India).

The study aimed to explore the association between these factors and their impact on smoking trends among the females which is ultimately leading to adverse pregnancy outcomes in the women of the EAG States. To calculate the odds ratios and 95% confidence intervals, a logistic regression analysis was performed. The analysis was adjusted for confounding factors such as age, education, wealth, and place of residence. The multivariate analysis cleared that women's age, smoking status, educational status, wealth index, and place of residence, religion, caste were all significantly associated with the prevalence of the pregnancy wastage among the women of the EAG States. Smoker women who were below or above the normal reproductive age (20-30 years) were more likely to face the adverse pregnancy outcomes than the non-smoker females. Women with more education and wealth were less likely to bear the consequences of adverse pregnancy outcomes. Smoker women in the rural areas of the EAG States of India were more likely to face the burden of pregnancy wastage than those in the urban areas.

2.10: Statistical method

2.10.1 Univariate

Univariate analysis is a statistical approach used to evaluate a single variable separate, which focuses on the distribution, central tendency, dispersion, and shape of the variable. Before conducting more regression, it helped with the initial exploration and comprehension of the data by offering insights into the traits and behaviour of the variable.

2.10.2 Bivariate

A statistical method called bivariate analysis looks at the correlation between two variables. It investigates the interactions between two variables, offering information about causation, dependence, or correlation. It is frequently used to find patterns, predict the future, and comprehend the relationships between various factors in a dataset. Therefore, Chi-square distribution was used to understand the association between the variables [outcome and indicators].

2.10.3 Multivariate (Logit regression)

A statistical method called multivariate analysis, and more specifically logit regression, looks at the correlation between many independent variables and a binary dependent variable. It aids in determining the variables that affect the likelihood of an event or result occurring.

Smoking of different tobacco products was converted into a binary variable, measured from questions about whether the females have ever smoked any tobacco product in the EAG States of India (if yes=1; otherwise=0).

The model of pregnancy wastage [still birth and miscarriage among the smoker and non-smoker females of the EAG States] follows as,

$$\boldsymbol{P_i = Pr\ (Y = 1 |\ X = x_i)}$$

Where, Y is outcome of Pregnancy wastage and x is covariates

Therefore,

$$\boldsymbol{Y = \beta_0 + \beta_1 x_i}$$

The odds of the pregnancy wastage can be written as,

$$P_i / (1-P_i) = exp\ (\beta_0 + \beta_1 x_i)$$

Therefore, using these multivariate and interaction models the study try to seek the answer of below research questions:

2.11: Research questions

1. What is the level of smoking among female in EAG states?
2. What are the factors closely associated with the smoking pattern among female in EAG states in India?
3. What is the level of pregnancy wastage in the EAG states of India?
4. What is the level of pregnancy wastage among female smokers in EAG states in India?
5. What are the closely associated factors for pregnancy wastage among smoker females in the EAG states of India?

2.12: Objectives

Broadly the study is trying to find the factors associated with the mother's smoking and pregnancy wastage among female smokers in India. The specific objectives of the study are:

1. To study the current level of pregnancy wastage among smoker females in the EAG states of India.
2. To study the underlying common socio-economic factors of pregnancy wastage among smoker females in the EAG states of India.

Chapter 3: Smoking trend among Females in the EAG states, India

3.1: Introduction

Smoking can have long-term effects on the health and wellbeing of women and is frequently linked to several negative health effects. While the factors that influence smoking patterns are complex, the purpose of this study is to investigate the role of numerous socio-cultural, economic, and demographic factors, such as region, religion, ethnicity, wealth, education, and age on smoking trends among the females. India, with its wide diversity in terms of geography, culture, and socioeconomic conditions, presents an ideal setting for studying the impact of these factors on the smoking trend among women.

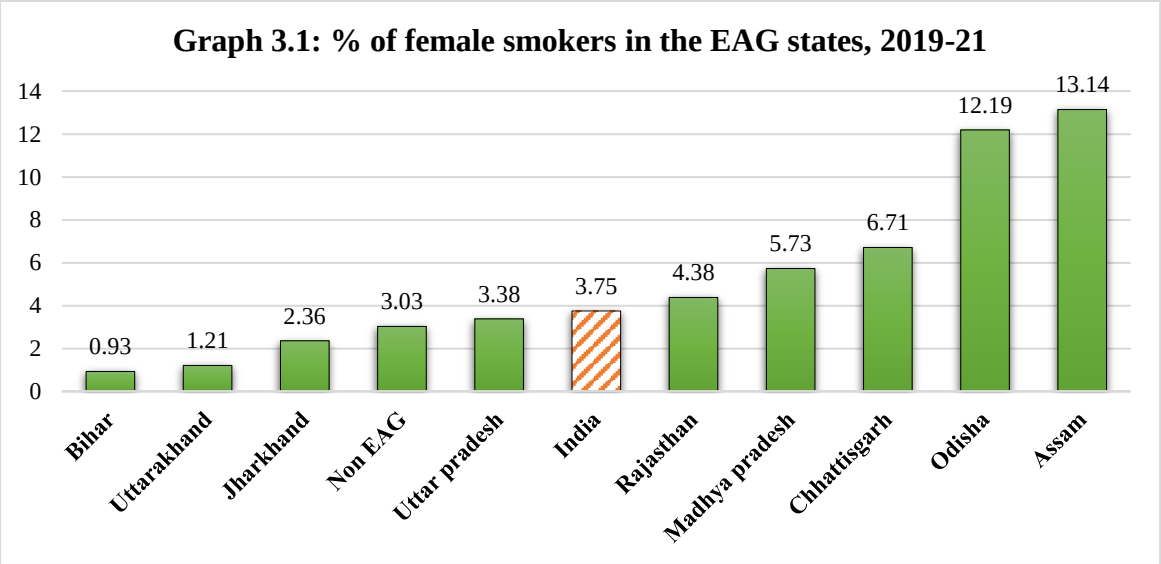
3.2: Regional and cultural differences and smoking patterns among females in EAG states

- Geographic Distribution of Smoking Trend: Studying regional differences in the prevalence of smoking among females in various EAG states (Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Assam, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh) of India.
- Religious Factors and Smoking among Women: Analysing the smoking prevalence among females from various religious groups like Hindu, Muslim, Christian, Sikhs, and others.
- Caste-based Differences: Investigating how castes i.e. SC- Scheduled caste, ST- Scheduled tribe, OBC- Other backward class, General influence smoking pattern among females from EAG states.

3.3: Socioeconomic factors and smoking among the females of EAG states

- Wealth Disparities: Investigating the relationship between household wealth and female smoking rates, with a focus on poverty and wealth inequality.
- Education and smoking: Analysing whether education influences young women's knowledge of the detrimental effects of smoking on health and their decision of smoking.

3.4 Results:



Graph 3.1: Percentage of female smokers in the EAG states, 2019-21

The graph 3.1 shows the graphical representation of female smokers by different EAG states in India. In India, on average at 3.75 per cent of women were reportedly smoking. The majority of the EAG states were found to have higher percent of female smokers than national average. These states were Assam (13.14), Odisha (12.19), Chhattisgarh (6.71), Madhya Pradesh (5.73) and Rajasthan (4.38). While on the other hand, some other states were found to have a lower percentage of female smokers than the national average. These states were Uttar Pradesh (3.38), Jharkhand (2.36), Uttarakhand (1.21) and Bihar (0.93).

Table 3.1: Percentage of female smokers in the EAG states in India, 2019-21

	Ever smoke (%)		
EAG States	**No**	**Yes**	**Total(N)**
Uttarakhand	98.79	1.21	6,612
Rajasthan	95.62	4.38	49,023
Uttar Pradesh	96.62	3.38	1,37,719
Bihar	99.07	0.93	74,261
Assam	86.86	13.14	20,271
Jharkhand	97.64	2.36	20,836
Odisha	87.81	12.19	25,972
Chhattisgarh	93.29	6.71	18,710
Madhya Pradesh	94.27	5.73	46,827
Non EAG States	96.97	3.03	3,96,937
India	96.25	3.75	7,97,167

Note: p< 0.001**,** p: Probability of chi-square

The table 3.1 shows the percentage of smoking in women, categorized by EAG states in India. The table includes the percentage of women who have never smoked as "No" and the percentage who have ever smoked in life as "Yes" for each EAG state, as well as the total number of women included in the study. The statistical analysis of the data is presented in the form of p-values for the chi-square test, which is a measure of the association between the variables. The results show that the overall prevalence of female smokers in India is 3.75%. The rows correspond to different EAG states in India, and the columns represent the smoking status of the females. The two categories of "Ever smoke" are "No" and "Yes". The numbers in the table represent the percentage of women in each EAG state who fall into each category. For example, in the state of Uttarakhand, 1.21% of women are the ones who have ever smoked in their life, similarly 4.38% of women from Rajasthan are smokers. The table also includes a row, which shows the overall percentages female smokers for all the Non EAG states combined i.e. 3.03%. According to this table, the prevalence of smoking among women in the EAG states is high. The highest percentages of female smokers are found in Assam (13.14%), Odisha (12.19%), and Chhattisgarh (6.71%). The lowest percentages of smoking among women are found in Bihar (0.93%) and Uttarakhand (1.21%)

Table 3.2: Percentage of female smokers in EAG states by background characteristics in India, 2019-21

Background characteristics	Smoker females (%)									
	Uttarakhand	Rajasthan	Uttar Pradesh	Bihar	Assam	Jharkhand	Odisha	Chhattisgarh	Madhya Pradesh	Total (N)
Respondent's current age										
15-20	0.34	24.63	22.69	2.22	14.56	2.16	9.88	5.54	17.98	879
20-25	0.11	17.58	27.55	2.82	14.09	1.79	12.25	4.77	19.02	2035
25-30	0.35	13.96	28.34	2.62	14.87	2.18	15.21	6.70	15.78	2909
30-35	0.33	10.96	27.29	2.93	15.27	2.96	17.54	6.76	15.95	2902
35+	0.60	9.30	25.06	4.94	15.08	3.16	20.62	7.89	13.35	9109
Highest level of education										
Illiterate	0.62	13.66	29.44	5.63	9.17	3.57	17.62	7.81	12.48	9,979
Primary	0.41	11.14	22.89	1.76	15.26	1.60	21.07	7.32	18.55	3,497
Secondary	0.08	8.91	20.57	1.51	28.00	1.77	15.60	5.20	18.37	4,184
Higher	0.28	11.85	34.90	0.79	25.14	3.35	10.42	1.71	11.57	174
Residence										
Urban	0.79	16.79	32.30	2.84	11.54	2.46	12.06	4.02	17.20	2,631
Rural	0.39	11.21	25.06	4.03	15.53	2.81	18.74	7.56	14.67	15,203
Wealth Index										
Poorest	0.22	5.74	23.84	5.41	14.25	4.07	21.50	8.35	16.63	8,918
Poorer	0.38	14.49	25.59	3.08	19.34	1.77	16.67	5.58	13.08	4,510
Middle	0.67	20.67	28.34	1.77	13.56	1.25	13.24	7.29	13.22	2,526
Richer	1.16	23.08	34.11	1.42	11.46	1.15	9.16	4.82	13.65	1,280
Richest	1.94	27.19	37.71	0.64	5.38	0.48	7.52	2.27	16.87	601
Religion										
Hindu	0.29	12.78	23.09	3.71	10.88	2.71	20.76	8.49	17.30	14,460
Muslim	1.27	9.83	43.68	5.00	33.47	0.47	2.46	0.14	3.68	3,016
Christian	<0.1	0.53	0.98	<0.1	40.04	7.76	39.73	10.31	0.66	178
Sikh& Others	<0.1	0.64	0.68	<0.1	6.22	40.41	10.96	2.68	38.40	181
Caste										

Background characteristics	Smoker females (%)									
	Uttarakhand	Rajasthan	Uttar Pradesh	Bihar	Assam	Jharkhand	Odisha	Chhattisgarh	Madhya Pradesh	Total (N)
SC	0.48	15.81	32.93	6.52	9.69	2.74	18.19	2.93	10.70	4,273
ST	<0.1	9.11	2.45	0.58	5.55	5.72	32.72	17.92	25.96	4,012
OBC	0.54	14.33	34.49	4.39	12.52	1.82	11.34	5.83	14.74	6,317
General	0.78	6.17	30.17	3.35	38.27	0.97	11.12	1.34	7.83	3,233
Total	**0.45**	**12.03**	**26.12**	**3.86**	**14.94**	**2.76**	**17.75**	**7.04**	**15.04**	**17834**

Note: p< 0.001**,** p: Probability of chi-square

The table 3.2 shows various demographic and socioeconomic factors that are potentially associated with smoking among women in EAG States of India. The data is organized into several categories, including age of respondent, highest educational level, place of residence, wealth index, religion, ethnicity, and region. For each category, the table presents the prevalence of smoking among women, by each EAG state: Rajasthan, Uttar Pradesh, Bihar, Odisha, Uttarakhand, Assam, Jharkhand, Chhattisgarh, and Madhya Pradesh for each demographic factor.

The table shows that the prevalence of smoking among women in the age groups from 15 years to 35+ years ranges from 0.11% to 28.34% among all the EAG States and Assam. With the highest prevalence seen in the age group 25-30 years (28.34%) while lowest prevalence of female smokers is found among 15-20 years age group (0.34%). Prevalence of smoking among all the age groups is highest in the state of Uttar Pradesh (28.34%) while lowest prevalence is seen in the state of Uttarakhand (0.11%). The statistically significant chi-square test results indicate that there is a significant association between the increasing age of the females and smoking among them ($p<0.001$).

The educational level, which is divided into four categories, the prevalence of smoking among women ranges from 0.28% to 34.9%, with the highest prevalence found among women of Uttar Pradesh with Higher level of education. Prevalence of smoking is seen to be increasing with increasing the level of education attained in the states of Assam (Higher 25.4% & illiterate 9.17%), Uttar Pradesh (Higher 34.9% & illiterate 29.44%) while an opposite trend is observed in the states of Bihar (Higher 0.79% & illiterate 5.63%) and Odisha (Higher 10.42% & illiterate 17.62%) where by increasing the level of education attained the prevalence of smoking is seen to decrease.

The place of residence, which is divided into two categories: urban and rural. The prevalence of smoking among women in these category ranges from 0.39% to 25.06%%, with the highest prevalence found among rural women of Uttar Pradesh (25.06%) and the lowest prevalence found among rural women of Uttarakhand (0.39%). Prevalence of smoking in urban areas is higher in the states of Uttarakhand (0.79%), Rajasthan (16.79%), Uttar Pradesh (32.3%), and Madhya Pradesh (17.2%), while higher rural smoking is found in the states of Bihar (4.03%), Assam (15.53%), Odisha (18.74%), Chhattisgarh (7.56%) and Jharkhand (2.81%).

The analysis also found that religion was associated with smoking status among women. Highest prevalence of smoking is found the among the Muslim women (43.68%) of Uttar Pradesh followed Christian women (40.04%) of Assam. Higher smoking prevalence is seen in

the Muslim women of the states Uttar Pradesh (43.68%), Assam (33.47%), Bihar (5%) while Hindu women were more likely to be smokers in the states of Rajasthan (12.78%), Odisha (20.76%), Madhya Pradesh (17.3%), and Chhattisgarh (8.49%). This may be related to cultural and dietary practices within the Hindu and Muslim communities and highlights the need for culturally sensitive interventions to address malnutrition in this population.

Table 3.3: Factor determining female smoking among EAG States by interaction model, 2019-21, India

Table 3.3A – Odds of smoking on Interaction between Place of residence and Highest level of education attained.

	Ever smoke (%)		
	Rural	**Urban**	**Total(N)**
Illiterate [Ref]	1	1	4,00,230
Primary	7.16	4.15	4,00,230
Secondary	2.41	5.57	4,00,230
Higher	0.39	4.77	4,00,230

The table 3.3A show the interaction effect between place of residence and highest level of education attained controlling age, religion, and ethnicity of smoker women in the EAG states of India, 2019-21. The place of residence and education status are considered to have the interaction effect because, the residence is the proxy of availability of smoking materials [availability] while, on the other hand, highest level of education attained triggers the accessibility of the smoking items. Rural women with primary level of education have highest odds of smoking [OR: 7.16, $p< 0.001$]. With increasing the level of education to secondary the odds decrease [OR: 2.41, $p<0.001$], while with higher education level it decreases the most [OR: 0.39, $p< 0.001$]

Table 3.3B – Odds of smoking on Interaction between Place of residence and Wealth Index.

	Ever smoke (%)		
	Rural	**Urban**	**Total(N)**
Poorest [Ref]	1	1	400230
Poorer	4.51	4.44	400230
Middle	3.23	4.67	400230
Richer	1.72	4.73	400230
Richest	0.99	4.62	400230

The table 3.3B show the interaction effect between wealth status and place of residence controlling age, highest level of education attained, religion and ethnicity of the smoker women

in EAG States of India, 2019-21. The place of residence and wealth status are considered to have the interaction effect because, the residence is the proxy of availability of smoking materials while, on the other hand, wealth status triggers the accessibility of the smoking materials. Rural women with poorer wealth status have higher odds of smoking [OR: 4.51, p< 0.001] whereas women of middle and richer households tend to have lower odds of smoking i.e. women of middle wealth status [OR: 3.23, p< 0.001] and richer wealth index [OR: 1.72, p< 0.001]. With increasing wealth status, tendency to smoke is seen to decrease among the females of the rural areas.

Table 3.3C –Odds of smoking on Interaction between Highest level of education attained and Wealth Index.

Ever smoke (%)

	Poorest [Ref]	Poorer	Middle	Rich	Richest	Total(N)
Illiterate [Ref]	1	1	1	1	1	400230
Primary	1	7.19	5.97	3.83	3.05	400230
Secondary	1	2.46	2.16	1.53	0.96	400230
Higher	1	0.61	0.43	0.36	0.24	400230

The table 3.3C show the interaction effect between wealth status of the women and highest level of education attained controlling age, place of residence, religion, and ethnicity of smoker women in the EAG states of India, 2019-21. The highest level of education attained and wealth status of the females are considered to have the interaction effect as, the highest level of education attained and the wealth status combinedly triggers the accessibility of the smoking materials. Women with primary level of education and poorer wealth status have the highest odds of smoking [OR: 7.19, p< 0.001] whereas women of middle and richer households with same education level tends to have lower odds of smoking i.e. women of middle wealth status [OR: 5.97, p< 0.001] and richer wealth index [OR:3.83, p< 0.001]. Similarly with the increase in level of education attained, the odds of smoking are seen to decrease in every category. Like odds of smoking among women of poorer category with secondary education are [OR: 2.46' p< 0.001] whereas women with higher education in poorer category have the odds of [OR: 0.61, p< 0.001]. Lowest odds of smoking amongst all categories are seen in the women of Richest income group with higher level of education [OR: 0.24, p< 0.001]. with increasing the level of education along with the wealth status, the tendency to smoke is seen to decrease among the females of the EAG States of India, indicating the positive impact that education has on controlling and limiting the smoking behaviour among the females.

Table 3.4: Odds of smoking among females in EAG states in India, 2019-21

Ever smoke	Odds Ratio	[95% Conf.	Interval]
		Lower	Upper
Respondent's current age			
15-20 [Ref]	1	1	1
20-25	2.37***	2.247	2.479
25-30	3.43***	3.274	3.596
30-35	4.49***	4.283	4.711
35+	5.97***	5.718	6.252
Highest level of education			
No education [Ref]	1	1	1
Primary	1.06***	1.033	1.092
Secondary	0.7***	0.686	0.722
Higher	0.37***	0.354	0.395
Residence			
Urban [Ref]	1	1	1
Rural	0.66***	0.646	0.684
Wealth Index			
Poorest [Ref]	1	1	1
Poorer	0.72***	0.708	0.744
Middle	0.52***	0.508	0.539
Richer	0.32***	0.309	0.333
Richest	0.14***	0.138	0.154
Religion			
Hindu [Ref]	1	1	1
Muslim	1.18***	1.145	1.225
Christian	2.67***	2.592	2.752
Sikh& Others	1.17***	1.117	1.226
Caste			
SC[Ref]	1	1	1
ST	1.93***	1.872	1.991
OBC	0.79***	0.773	0.822
None Of Above	1.14***	1.106	1.186
_Cons	0.038***	0.036	0.04

***** p<0.001; ** p<0.01; * p<0.05**

The table 3.4 show the odds ratio of females who smoke in the EAG states of India. The 95% confidence interval of the OR is presented in parenthesis. The table provides information on the association between various factors and smoking habits among the females of the EAG

States of India, allowing for comparisons between different groups or categories. The effect sizes and confidence intervals help assess the strength and precision of the associations.

The odds of smoking among the females are significantly lower at age of 20-25 years [OR: 2.36, p< 0.001] when compared with the females of higher age groups i.e. 25-35+ years. The Odds of smoking are seen to rise with the increasing age of the females like [OR: 3.43, p< 0.001] for 25-30 years and similarly, for 35+ years old females of the EAG States of India. The values in these rows indicate the estimated effect sizes or odds ratios for each category compared to the reference category (usually indicated as 1 or the first category).

The result of logistic regression among women are significantly estimating the odds of smoking among them when controlling only educational attainment. Highest odds of smoking are found among the females with primary level of education [OR:1.06, p<0.001]. By increasing the level of education, the odds of smoking are found to decrease i.e. with higher level of education, the odds of smoking become [OR:0.37, p<0.001] The odds of smoking among females are more likely in urban areas than their counterpart adolescent women residing in rural areas of the EAG States of India.

The household economic status and place of residence are found to estimate its effect on smoking by the females of the EAG States of India and similar settings. The wealth quintile is statistically significantly associated with smoking. The poorer women are more likely to smoke [OR:0.72, p<0.001] compared to those of middle and richer households. The odds of smoking are lowest among richest household females [OR: 0.14, p<0.001] of the EAG States of India, 2019-21.

The religious differences in smoking among females show that the Muslim [OR: 1.18, p<0.001] and Christian [OR: 2.67, p<0.001] women are statistically significantly more smoking compared to their counterpart women belonging to Hindu religion.

3.5: CONCLUSION

In conclusion, the findings of this dissertation highlight the significant variations in smoking trends and preferences among women in relation to different demographic factors. The percentages of females smoking were observed to vary based on factors such as age, educational level, wealth status, place of residence, religion, and caste. Smoking prevalence in the EAG States of India is affected by a variety of contextual factors. Socio-demographic interplay on maternal smoking is very complex. Education is seen to have a great impact on the smoking behaviour of the females as with the increasing level of education, a lower trend

in smoking is observed among the females. The prevalence of smoking among vulnerable segments in the society is cause for concern. Therefore, the tobacco control programmes of the country should consider regional differences and social gradients in tobacco consumption to create an area specific Tobacco hazard awareness campaign for tobacco cessation among the females and decrease the tobacco burden in India.

This study emphasises the importance of tracking tobacco use and smoking among the females and identifying target populations to form public health messaging and interventions to reduce the tobacco use among the females and prevent the females from its harmful effects on health of the females as well as the society.

Pregnancy Outcomes among Females in the EAG states, India

3.6: Introduction

Every society recognises the critical significance of maternal health. Improved maternal health care has been the focus of major initiatives during the last 15 years. Despite these efforts, in 2015, approximately 2.6 million women experienced stillbirths in the last trimester of pregnancy or during labour worldwide(52). The study estimates abortion to be 26% of all unfavourable pregnancy outcomes, with miscarriage accounting for up to 10% of clinically perceived pregnancies(53). In 2015, the stillbirth rate ranged from 1.3 to 8 per 1,000 births in high-income nations, and 18.4 per 1,000 births in middle-income countries. The research indicates that issues related to stillbirths are frequently disregarded in public health initiatives. In addition, the aims set forth in the Sustainable Development Goals and the Millennium Development Goals on the reduction of stillbirths have not gotten enough attention. To meet these global development goals and enhance the health of mothers and children, addressing stillbirths requires greater attention and funding(54).

Studies indicate that several factors influence adverse pregnancy outcomes, including age at first birth, wealth index, birth order, maternal contaminants, non-communicable diseases, and nutritional quality of life. Maternal age and delayed pregnancies also play significant roles. Additional factors like underweight status, tobacco use, alcohol consumption, lifting over 20 kg, and working overtime contribute to pregnancy complications. The interplay of these elements highlights the importance of comprehensive maternal health care and lifestyle management to mitigate risks during pregnancy(55)(56).

Improved mother health and pregnancy outcomes are major public health priority. Adverse pregnancy outcomes, such as miscarriage, stillbirth, and abortion, indicate poor maternal health. Low-middle income countries (LMICs) have a higher risk of maternal and neonatal fatalities caused by pregnancy and delivery difficulties(57). Natural pregnancy losses, such as miscarriage and stillbirth, can have a negative impact on both the mother's physical and mental health(58).

The contributing risk factors for an increased chance of pregnancy loss include maternal age, aberrant parental genetic makeup, infections, hormone imbalances, comorbidities, and lifestyle variables(59). India is one of six nations that bears half of the world's stillbirth burden.
(60).

Pregnancy-related complications and poor maternal health outcomes remain a significant public health concern in India, particularly in the Empowered Action Group (EAG) states.

These states, which include Rajasthan, Uttar Pradesh, Uttarakhand, Bihar, Jharkhand, Chhattisgarh, Madhya Pradesh, and Odisha, have consistently being lagging behind the national average in maternal and child health indicators.

Due to the overwhelming negative pregnancy outcomes, a more comprehensive action plan is required in order to identify the causes and implement preventive measures. As a result, this research is focused only on the EAG States of India. The study's goal is to determine the factors that influence unfavourable pregnancy outcomes, particularly miscarriage and stillbirth, in women in the Empowered Action Group States of India who are between the ages of 15 and 49.

Table 3.5: Percentage of pregnancy outcomes in the EAG states in India, 2019-21

	Pregnancy outcome (%)			Total(N)
EAG STATES	**Live Birth**	**Still birth**	**Miscarriage**	
Uttarakhand	86.6	1.31	12.09	2,094
Rajasthan	89.74	0.64	9.62	16,475
Uttar Pradesh	86.79	1.27	11.93	51,947
Bihar	90.32	1.29	8.39	33,424
Assam	88.56	1.01	10.42	6,559
Jharkhand	89.81	1.41	8.78	7,673
Odisha	84.74	1.34	13.92	8,402
Chhattisgarh	92.17	1.37	6.46	5,468
Madhya Pradesh	91.14	1.02	7.84	15,090
EAG & Assam	88.69	1.18	10.13	1,47,132
Non EAG	88.32	0.85	10.83	1,11,371
INDIA	88.53	1.04	10.43	2,58,502

Note: p< 0.001**,** p: Probability of chi-square

Table 3.5 shows the pregnancy outcomes in women, categorized by EAG states in India. The table includes the percentage of women who had "Live Birth", "Still Birth" and "Miscarriage" each EAG state, as well as the Non EAG States and total number of pregnant women included in the analysis. The statistical analysis of the data is presented in the form of p-values for the chi-square test, which is a measure of the association between the variables. The results show that the overall prevalence of pregnancy wastage in India is 10.83%. The rows correspond to different EAG states in India, and the columns represent the pregnancy outcomes of the females. The three categories of "Pregnancy Outcome" are "Live Birth", "Still Birth" and "Miscarriage". The numbers in the table represent the percentage of women in each EAG state who fall into each category. The highest percentages of pregnancy wastage are found in Odisha (15.26%), Uttarakhand (13.4%) and Uttar Pradesh (13.2%). The lowest percentages of

pregnancy wastage among women are found in Chhattisgarh (7.83%) and Madhya Pradesh (8.86%). According to this table, the prevalence of pregnancy wastage among women in the Non EAG states is slightly higher (11.68%) than the EAG States (11.31%).

Table 3.6: Factor determining Pregnancy Wastage among EAG States by interaction model, 2019-21, India

Table 3.6.A – Odd of pregnancy wastage on Interaction between Place of residence and Highest level of education attained.

	Pregnancy Wastage (%)				
	Rural		Urban		
	Still Birth	Miscarriage	Still Birth	Miscarriage	Total(N)
Illiterate [Ref]	1	1	1	1	1
Primary	1.13	9.62	1.19	10.20	147132
Secondary	1.15	10.44	1.20	9.96	147132
Higher	1.21	11.76	1.18	9.99	147132

The table 3.6A show the interaction effect between place of residence and highest level of education attained on pregnancy wastage controlling age, religion, and ethnicity of pregnant women in the EAG states of India, 2019-21. The place of residence and education status are considered to have the interaction effect because, the residence is the proxy of availability of medical facilities for the pregnant women while on the other hand, highest level of education attained leads to the awareness to timely access the medical facilities and lead a healthy life especially during pregnancy. Among the rural women odds of pregnancy wastage are seen to increase with increasing the level of education attained by the female. Rural women with primary education have lowest odds of pregnancy wastage [OR: 10.75, $p<0.001$]. Pregnancy wastage among Urban women is seen to decrease with increasing the level of education from primary to higher and above i.e. urban women with primary education [OR: 11.39, $p<0.001$] while urban women with higher education [OR: 11.17, $p<0.001$]. In urban areas education is seen to be associated with better pregnancy outcomes when compared with the rural areas.

Table 3.6.B – Odd of pregnancy wastage on Interaction between Place of residence and Wealth Index.

	Pregnancy Wastage (%)				
	Rural		Urban		
	Still Birth	Miscarriage	Still Birth	Miscarriage	Total(N)
Poorest [Ref]	1	1	1	1	1
Poorer	1.26	9.55	1.16	10.3	147132
Middle	1.02	11.72	1.21	9.88	147132
Richer	1.04	11.58	1.2	9.99	147132
Richest	0.85	13.24	1.2	9.99	147132

The table 3.6B show the interaction effect between wealth status and place of residence on pregnancy wastage controlling age, highest level of education attained, religion and ethnicity of the smoker women in EAG States of India, 2019-21. The place of residence and wealth status are considered to have the interaction effect because, the residence is the proxy of availability of medical facilities and services while, on the other hand, wealth status triggers the accessibility of these medical facilities and services. Despite higher wealth status the rural women are having higher odds of pregnancy wastage [OR: 14.09, $p<0.001$], whereas in the urban areas the odds are seen to decrease with the increasing wealth status [OR: 11.19, $p<0.001$], indicating easy accessibility to medical facilities and services with the increasing wealth. With increasing wealth status, tendency of pregnancy wastage is seen to decrease among the females of the urban areas.

Table 3.6.C – Odd of pregnancy wastage on Interaction between Highest level of education attained and Wealth Index

	Pregnancy Wastage (%)										
	Poorest [Ref]		Poorer		Middle		Rich		Richest		
	Still Birth	Miscarriage	Still Birth	Miscarriage	Still Birth	Miscarriage	Still Birth	Miscarriage	Still Birth	Miscarriage	Total(N)
Illiterate [Ref]	1	1	1	1	1	1	1	1	1	1	1
Primary	1	1	1.16	10.64	0.93	11.91	1.34	12.32	1.25	12.36	147132
Secondary	1	1	1.19	10.12	1.03	12.4	1.03	12.47	0.81	15.43	147132
Higher	1	1	1.54	9.98	1.34	11.24	0.87	13	0.76	13.62	147132

The table 3.6C show the interaction effect between wealth status of the women and highest level of education attained on pregnancy wastage controlling age, place of residence, religion, and ethnicity of smoker women in the EAG states of India, 2019-21. The highest level of education attained and wealth status of the females are considered to have the interaction effect as, the highest level of education attained and the wealth status combinedly triggers the accessibility to medical services available. Highest odds of pregnancy wastage are found in among the females of richest household with secondary level of education [OR: 16.24, $p<0.001$], followed by higher odds of pregnancy wastage among the females of richest household with higher level of education [OR: 14.38, $p<0.001$].

Table 3.7A: Percentage of Pregnancy Wastage in EAG states by background characteristics in India, 2019-21

Background Characteristics	Pregnancy wastage (%)									
	Uttarakhand		Rajasthan		Uttar Pradesh		Bihar		Assam	
Age	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage
15-20	0.6	0.68	5.04	5.54	7.68	15.07	27.54	14.39	2.57	3.05
20-25	0.88	0.86	4.36	7.48	26.09	21.68	16.76	12.49	2.29	1.93
25-30	1.09	1.09	3.41	5.78	26.98	24.95	13.45	8.72	3.21	2.49
30-35	1.29	0.85	3.96	4.61	26.07	23.77	15.77	8.87	1.11	2.97
35+	1.37	1.09	2.47	2.72	22.11	26	11.33	8.07	2.63	3.77
Highest level of education										
No education	1.26	0.89	5.11	7.64	30.07	35.65	30.52	21.73	1.57	1.95
Primary	1.06	1.16	4.52	8.27	25.97	27.37	15.23	13.04	3.24	2.97
Secondary	0.75	0.84	3.05	5.01	19.99	18.37	10.79	8.54	3.03	3.19
Higher	1.52	1.13	4.26	5.44	30.16	23.24	7.16	4.99	1.34	0.89
Residence										
Urban	0.6	1.06	2.5	4.87	22.18	18.17	10.62	5.17	1.28	1.19
Rural	1.15	0.88	4.35	6.38	25.35	25.4	17.7	13.03	2.84	3.21
Wealth Index										
Poorest	0.24	0.27	2.35	3.51	27.27	25.65	28.32	23.42	3.46	4.63
Poorer	0.73	0.76	4.89	5.66	25.81	27.06	17.5	14.93	3.59	4.64
Middle	1.22	0.95	4.27	6.72	23.15	21.08	8.96	8.81	2.23	2.33
Richer	1.53	0.95	4.36	6.34	19.57	19.27	9.84	5.49	1.09	1.18
Richest	2.57	1.64	4.62	6.67	25.95	22.8	2.63	2.14	0	0.43
Religion										
Hindu	0.88	0.89	4.35	6.44	24.85	23.93	16.68	10.66	1.88	2.06
Muslim	1.92	1.33	2.12	3.91	28.39	23.79	16.06	12.07	5.54	5.75
Christian	0	0.06	0	0.16	0	1.87	0	0.55	3.59	3.74

Background Characteristics	Pregnancy wastage (%)									
	Uttarakhand		Rajasthan		Uttar Pradesh		Bihar		Assam	
Age	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage
Sikh and others	0	1.01	4.42	1.66	0	2.31	0	0	0	0.45
Caste										
SC	0.91	0.82	3.54	5.99	30.1	26.06	17.4	10.5	1.06	1.15
ST	0.61	0.73	9.25	11.09	4.86	3.25	5.2	4.58	1.54	5.69
OBC	1.16	0.77	2.94	6.03	29.85	27.6	20.9	13.88	2.35	1.8
General	1.13	1.51	4.53	4.67	19.81	21.41	10.78	7.29	2.08	1.45
Not Clear	0.9	0.76	0.95	1.69	1.19	1.99	6.42	0.91	17.58	16.62

Note: p< 0.001**,** p: Probability of chi-square

Table 3.7B: Percentage of Pregnancy Wastage in EAG states by background characteristics in India, 2019-21

Background characteristics	Pregnancy Wastage (%)							
	Jharkhand		Odisha		Chhattisgarh		Madhya Pradesh	
Age	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage
15-20	7.68	2.94	4.07	3.15	1.13	1.08	7.25	4.33
20-25	3.81	3.00	3.89	3.78	2.97	1.22	5.86	4.89
25-30	3.44	2.20	5.31	4.58	2.98	1.68	6.48	4.71
30-35	4.13	1.88	2.77	5.19	2.44	1.06	4.55	2.92
35+	3.39	2.45	3.80	5.00	3.23	0.96	2.07	4.10
Highest level of education								
No education	6.02	3.41	2.70	3.26	1.06	0.94	4.09	2.95
Primary	2.83	1.97	4.46	4.96	3.13	1.60	5.87	4.74
Secondary	3.23	2.69	5.44	5.23	3.86	1.47	6.88	5.00
Higher	4.18	1.56	2.09	2.28	1.69	0.96	4.25	3.60

	Pregnancy Wastage (%)							
Background characteristics	**Jharkhand**		**Odisha**		**Chhattisgarh**		**Madhya Pradesh**	
Age	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage	Still birth	Miscarriage
Residence								
Urban	2.96	1.65	1.39	2.33	2.21	0.97	6.21	4.52
Rural	4.34	2.92	5.06	5.34	2.95	1.48	5.56	4.33
Wealth Index								
Poorest	7.38	5.50	5.79	7.02	3.36	2.04	6.34	5.56
Poorer	4.60	3.13	4.14	4.97	3.60	1.42	6.06	4.00
Middle	1.59	2.19	3.77	4.77	2.50	1.30	5.23	4.25
Richer	1.77	1.63	3.66	3.64	1.70	1.13	4.02	3.50
Richest	1.78	0.65	1.62	1.80	1.63	0.80	6.99	4.87
Religion								
Hindu	4.18	2.45	5.03	4.97	3.33	1.52	6.64	4.94
Muslim	2.61	2.24	0.20	0.96	<0.1	0.14	2.08	2.17
Christian	4.24	2.84	6.00	4.48	5.47	1.21	<0.1	<0.1
Sikh and others	9.68	5.36	<0.1	0.65	<0.1	0.56	1.15	0.97
Caste								
SC	2.92	2.08	2.08	4.12	1.21	0.89	4.18	3.34
ST	9.89	6.70	10.83	11.56	10.68	5.49	12.59	7.52
OBC	4.47	2.85	4.85	3.81	2.69	1.50	6.21	4.70
Gen	1.93	1.28	3.24	3.85	1.55	0.23	3.66	4.08
Not Clear	2.05	0.69	1.10	1.68	1.01	0.37	3.89	3.43

Note: p< 0.001**,** p: Probability of chi-square

Table 3.7 shows the percentage of Pregnancy Wastage (stillbirths and miscarriages) in EAG states by background characteristics like age of respondent, highest level of education attained, place of residence, wealth status, religion, and caste in India, 2019-21. It is seen that the age groups 15-20 years, 21-25 years, and 25-30 years generally shows lower percentages of stillbirths and miscarriages compared to older age groups (30-35 and 35+ years).

Younger women of the age groups 15-20 years, 21-25 years, and 25-30 years in states like Uttar Pradesh and Bihar show relatively high miscarriage rates compared to the females of the other EAG states of India.

Women with no education generally show higher percentages of stillbirths and miscarriages compared to those with secondary and higher education. The trend is consistent across almost all the EAG states of India, indicating education as a significant factor in reducing pregnancy wastage.

Urban areas tend to have lower percentages of stillbirths and miscarriages compared to rural areas in most of the Empowered Action Group states of India. The difference is noticeable in states like Uttar Pradesh and Bihar, where rural areas show significantly higher rates of pregnancy wastage i.e., stillbirths and miscarriages.

There is a clear trend where poorer wealth indices correlate with higher percentages of pregnancy wastage i.e., stillbirths and miscarriages. The females of the poorest household groups in states like Bihar and Uttar Pradesh exhibit high stillbirth and miscarriage rates. Efforts towards improving maternal health need to focus on educating women and improving healthcare access in rural areas and among the poorest populations.

Hindu women generally have slightly higher rates of pregnancy wastage compared to Muslim women across most of the EAG states. SC (Scheduled Castes) and ST (Scheduled Tribes) women generally have higher rates of stillbirths and miscarriages compared to OBC (Other Backward Classes) and 'Others.' This indicates that caste-based disparities impact pregnancy outcomes. Equitable healthcare requires addressing gaps based on caste and religion.

Pregnancy wastage rates in Uttar Pradesh and Bihar are among the highest in all categories, suggesting that these states require targeted healthcare interventions. States like Assam and Chhattisgarh also show higher rates in specific categories, but not as consistently high across all factors as Uttar Pradesh and Bihar. Higher levels of education and wealth are consistently

associated with lower rates of pregnancy wastage. This highlights the importance of socioeconomic improvements in reducing pregnancy wastage.

In Uttarakhand, the overall pregnancy wastage rate is 3.81% for stillbirths and 3.76% for miscarriages. Women aged 15-30 experienced less pregnancy wastage than those aged 30+. Those with no education have a higher percentage of stillbirths and miscarriages (4.03% and 3.38%, respectively). Urban areas do better than rural areas, with stillbirth rates of 2.61% and miscarriage rates of 2.05%, respectively, compared to higher rates in rural areas. The poorest households of the population have the highest wastage rates, with 4.48% for stillbirths and 3.55% for miscarriages. The Scheduled Caste (SC) females are especially vulnerable, with stillbirth rates of 5.59% and miscarriages of 4.79%. According to this study, higher education and urban residence considerably reduce pregnancy wastage, but the females belonging to poorest households and SC community are the most vulnerable groups with the increased risks of pregnancy wastage.

In Rajasthan, pregnancy wastage rates are 4.61% for stillbirths and 4.49% for miscarriages. Women aged 15-29 had lower risk than those aged 30+ years. Those with no education have higher percentages of stillbirths and miscarriages (5.62% and 5.57%, respectively). Urban areas have better outcomes (stillbirth: 2.60%, miscarriage: 2.22%) than rural areas. The poorest wealth index group had greater wastage rates, with stillbirths at 5.24% and miscarriages at 4.82%. Stillbirth and miscarriage rates are also higher among Scheduled Caste groups (5.49% and 5.11% respectively). This study highlights the critical role of education and wealth in reducing pregnancy wastage, highlighting significant socio-economic disparities.

In Uttar Pradesh, the overall pregnancy wastage rate is 4.91% for stillbirths and 5.83% for miscarriages. High wastage is observed even in younger age groups (15-29). Those with no education had extremely high rates of stillbirths (9.76%) and miscarriages (10.36%). Compared to rural areas, urban areas perform marginally better, with 3.60% stillbirths and 4.17% miscarriages. The poorest wealth index group females had especially high wastage rates, with stillbirths accounting for 7.30% and miscarriages for 7.98%. Stillbirths and miscarriages are also more common among Scheduled Caste groups, at 5.90% and 6.45%, respectively. This data indicates the urgent need for healthcare reforms, particularly among the uneducated and impoverished.

Bihar has a serious pregnancy wastage issue, with stillbirth and miscarriage rates of 4.97% and 5.37%, respectively. Women aged 15 to 29 had substantial wastage rates, similar to older

populations. Those without education have the highest rates of stillbirth (5.98%) and miscarriage (6.22%). Urban areas had lower pregnancy wastage than rural areas, with stillbirth and miscarriage rates of 3.69% and 4.10%, respectively. The lowest wealth index is associated with higher wastage rates, with 5.84% for stillbirth and 6.18% for miscarriage. The Scheduled Caste (SC) population also has a higher rate of pregnancy wastage, with 5.71% stillbirths and 6.13% miscarriages. Bihar, like Uttar Pradesh, requires extensive healthcare interventions, particularly for its less educated and poorer females.

In Assam, total pregnancy wastage rates are lower, with stillbirth at 3.28% and miscarriage at 3.45%. In younger women, aged 15 to 29, pregnancy wastage is less than older group females. Women with no education have moderate rates of stillbirth and miscarriage (3.67% and 4.37%, respectively). The difference between urban and rural areas is minor. The poorest wealth index group experiences more pregnancy wastage, with stillbirths at 3.91% and miscarriages at 4.03%. SC communities in Assam have moderate pregnancy wastage rates, with stillbirths at 3.61% and miscarriages at 4.24 %. Overall, Assam has moderate pregnancy wastage rates, with disparities based on education and wealth status, as well as highlighting the need for focused healthcare initiatives.

In Jharkhand, the overall pregnancy wastage rate is 4.02% for stillbirths and 4.42% for miscarriages. Women aged 15-29 had lower wastage rates than older groups. Illiterate women have significantly higher percentages of stillbirths and miscarriages (4.85% and 5.05%, respectively). Urban areas perform better than rural areas, with stillbirth rates of 2.84% and miscarriage rates of 3.34%. The poorest wealth index category females have greater rates of pregnancy wastage, with stillbirths accounting for 5.09% and miscarriages for 5.56%. Scheduled Caste (SC) populations also show more pregnancy wastage, with stillbirths at 5.15% and miscarriages at 5.64%.

In Odisha, overall pregnancy wastage rates are slightly higher, with 4.32% for stillbirths and 4.52% for miscarriages. Women aged 15-29 had lesser wastage rates than older groups. Women with no education have high incidence of stillbirths (4.34%) and miscarriages (5.67%). Urban areas exhibit a small improvement over rural location. The poorest wealth index categories have higher rates of wastage, with stillbirths at 5.10% and miscarriages at 5.52%. Like Jharkhand, the results highlight the significance of education and wealth in reducing pregnancy wastage in Odisha.

Uttar Pradesh and Bihar have the highest pregnancy wastage rates, calling for urgent healthcare changes. Across all the EAG states, better education and wealth indices are related to lower pregnancy wastage rates. Urban areas generally outperform, the rural areas with lower pregnancy wastage rates. Socioeconomic disparities are evident as the Scheduled Caste (SC) and Scheduled Tribe (ST) populations, as well as those with lower wealth indices, had more pregnancy wastage. These findings highlight the critical requirement for targeted efforts focusing on increasing education, socioeconomic conditions, and healthcare access in rural areas to effectively decrease pregnancy waste in the EAG states.

Table3.8: Odds of pregnancy wastage among females in EAG states in India, 2019-21

Pregnancy Wastage	**Odds Ratio**	**[95% Conf.**	**Interval]**
Respondent's current age		Lower	Upper
15-20 [Ref]	1	1	1
20-25	0.7***	0.673	0.748
25-30	0.69***	0.663	0.737
30-35	0.88***	0.835	0.938
35+	1.29***	1.215	1.381
Highest level of education			
No education [Ref]	1	1	1
Primary	1.26***	1.207	1.327
Secondary	1.3***	1.26	1.36
Higher	1.29***	1.233	1.363
Residence			
Urban [Ref]	1	1	1
Rural	0.88	0.861	0.92
Wealth Index			
Poorest [Ref]	1	1	1
Poorer	1.19	1.145	1.238
Middle	1.31***	1.259	1.368
Richer	1.31***	1.253	1.371
Richest	1.38***	1.318	1.462
Religion			
Hindu [Ref]	1	1	1
Muslim	0.73	0.701	0.76
Christian	0.74***	0.699	0.791
Sikh& Others	0.93*	0.881	1.001
Caste			
SC[Ref]	1	1	1
ST	0.75	0.718	0.788

Pregnancy Wastage	Odds Ratio	[95% Conf.	Interval]
Respondent's current age		Lower	Upper
OBC	0.98	0.954	1.022
None Of Above	1.07***	1.031	1.115
_cons	0.12***	0.116	0.133
***** p<0.001; ** p<0.01; * p<0.05**			

The table 3.8 show the odds ratio of Pregnancy wastage among the females in the EAG states of India. The 95% confidence interval of the OR is presented in parenthesis. The table provides information on the relationship between various factors and pregnancy wastage among the females of the EAG States of India, allowing for comparisons between different groups or categories. The effect sizes and confidence intervals help assess the strength and precision of the associations.

The odds of pregnancy wastage among the females are significantly lower at age of 20-25 years [OR: 0.699, p< 0.001] when compared with the females of higher age groups i.e.35+ years [OR: 1.295, p<0.001]. The Odds of pregnancy wastage are seen to be lower among the females of age groups 20-35 years. The values in these rows indicate the estimated effect sizes or odds ratios for each category compared to the reference category (usually indicated as 1 or the first category).

The result of logistic regression among women are significantly estimating the odds of pregnancy wastage among them. Highest odds of pregnancy wastage are found among the females with secondary level of education [OR:1.308, p<0.001]. By increasing the level of education, the odds of smoking are found to increase i.e. with higher level of education, the odds of smoking become [OR:1.296, p<0.001] The odds of pregnancy wastage among females are more likely in urban areas than their counterpart adolescent women residing in rural areas [OR: 0.889, p<0.001] of the EAG States of India.

The household economic status and place of residence are found to estimate its effect on pregnancy wastage by the females of the EAG States of India and similar settings. The wealth quintile is statistically significantly associated with pregnancy wastage. The richer women are more likely to have pregnancy wastage [OR:1.31, p<0.001] compared to those of middle and poorer households. The odds of smoking are increasing with the increasing wealth status i.e., poorer household females show lower pregnancy wastage odds [OR: 1.19, p<0.001], whereas

richest household females have highest odds of pregnancy wastage [OR: 1.387, p< 0.001] of the EAG States of India, 2019-21.

The religious differences in pregnancy wastage among females show that the Muslim [OR: 0.73, p<0.001] and Christian [OR: 0.74, p<0.001] women are statistically significantly having less pregnancy wastage compared to their counterpart women belonging to Hindu religion. Similarly, lowest odds of pregnancy wastage are seen among the females belonging to ST caste [OR: 0.75, p<0.001].

3.7: Conclusion:

According to World Health Organisation every 4 seconds, a woman dies due to pregnancy or childbirth, a young child loses their life, or a baby is lost to stillbirth. Most of these deaths are preventable with access to quality healthcare. A strong biological basis for long-term health is established during pregnancy. One of the main objectives is to incorporate prenatal health interventions into the continuum of care for mothers and newborns. However, specific stillbirth activities are needed for monitoring, research, policy creation, advocacy, and improvement The dearth of information regarding successful coverage of tried-and-true programmes for perinatal survival has improved. Organisations tasked with spearheading global initiatives for mothers and infants must take the initiative to encourage safe and healthy pregnancies in order to lower the number of stillbirths.

The Empowered Action Group (EAG) states of India have a notable prevalence of adverse pregnancy outcomes, according to our study. According to this study, the findings indicate a substantial correlation with a variety of socioeconomic and demographic factors. The primary contributing factor is that young women in these regions lack adequate access to basic health care services. The EAG states—Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Odisha, Rajasthan, Uttar Pradesh, and Uttarakhand reveal high levels of maternal and newborn death rates.

The study highlights the urgency these problems of pregnancy wastage pose and the need to be addressed through quick interventions. Family planning and spacing out pregnancies can greatly lower the likelihood of unfavourable outcomes; hence it is imperative to ensure that contraceptives are accessible and utilised. Comprehensive clinical surveillance during pregnancy is also essential. Pregnancy-related risks can be reduced by following the protocol, which includes routine checkups, timely identification, and management of problems.

Furthermore, it is essential to provide young women enough guidance along with knowledge regarding maternal health. This includes information regarding proper nutrition, the benefits of prenatal care, and the early identification of issues Providing women more information about their health will enhance their health-seeking behaviours and outcomes.

All these actions call for concerted efforts by local organisations, government agencies, and healthcare providers. It is possible to lower the incidence of unfavourable pregnancy outcomes in the EAG states of India through strengthening clinical monitoring and education, encouraging the use of contraceptives, and improving the accessibility and quality of healthcare services. These measures are essential for protecting the health of expectant mothers and newborns, which will eventually end up in healthier communities and improved public health outcomes overall.

Chapter 4: Pregnancy wastage and Maternal smoking

4.1: Introduction

Maternal smoking during pregnancy contributes to a number of infant health problems at birth, as well as long-term behavioural and neurodevelopmental deficiencies, and continues to be considered as one of the most important modifiable risk behaviours for child and long-term health and human capital(61). Maternal smoking increases the risk of a variety of undesirable birth outcomes, including infant still birth, preterm birth, low birth weight, and poor intrauterine growth(62). Smoking during pregnancy may also have adverse implications on children's health, such as respiratory issues and infections(63).

Pregnancy-related maternal smoking presents a serious risk to the foetus. The World Health Organisation recommends that pregnant women refrain from smoking cigarettes altogether because there is no safe lower limit on cigarette usage during pregnancy. Smoking will remain one of the most significant avoidable risk factors for unfavourable pregnancy outcomes, along with the growing concern over smoking's spread as a global epidemic in nations that are Third World in the future (64) (65). Multiple studies have found that smoking-related early physical health issues have a damaging effect on the accumulation of human capital throughout life in both developed and developing nations. For instance, low birth weight babies have lower scores on tests, fewer years completed in school, and higher rates of dropping out of school. They also have lower economic performance, as evidenced by lower income and later living in high-poverty areas(66).

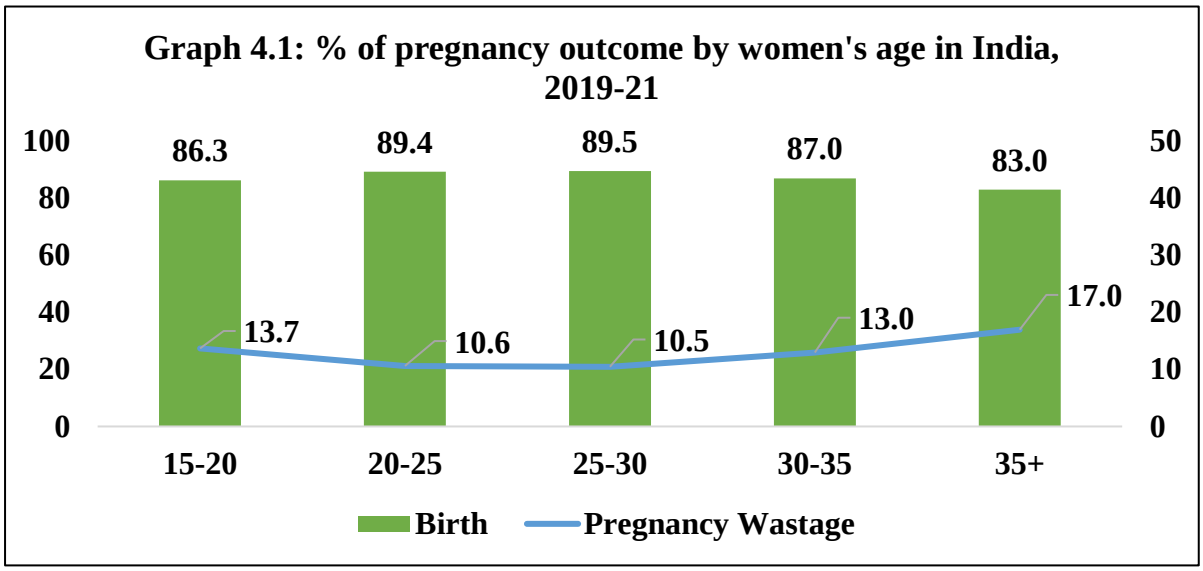
Studying the impact of maternal smoking on the prevalence of pregnancy wastage among the women in EAG states of India is crucial to understand the severity of the problem and to comprehend the associated covariates. Recent research shows an increase in the prevalence rates of pregnancy wastage, pointing it to be a growing public health concern. Age, socioeconomic status, location, and cultural influences are a few of the elements that contribute to the notable regional variations in pregnancy wastage rates that are seen across the various EAG states in the nation.

Table 4.1: Percentage of Pregnancy outcomes among smoker females in the EAG states, India, 2019-21

	Pregnancy outcomes (%)			
EAG STATES	**Live Birth**	**Still birth**	**Miscarriage**	**Total(N)**
Uttarakhand	92.83	0.00	7.17	19
Rajasthan	84.74	0.54	14.71	768
Uttar Pradesh	86.5	1.42	12.08	1809
Bihar	93.26	0.85	5.89	192
Assam	85.67	0.61	13.72	748
Jharkhand	92.12	1.57	6.32	132
Odisha	83.46	1.65	14.89	803
Chhattisgarh	90.85	0.87	8.28	299
Madhya Pradesh	92.03	1.34	6.63	783
India	86.11	1.32	12.58	8212

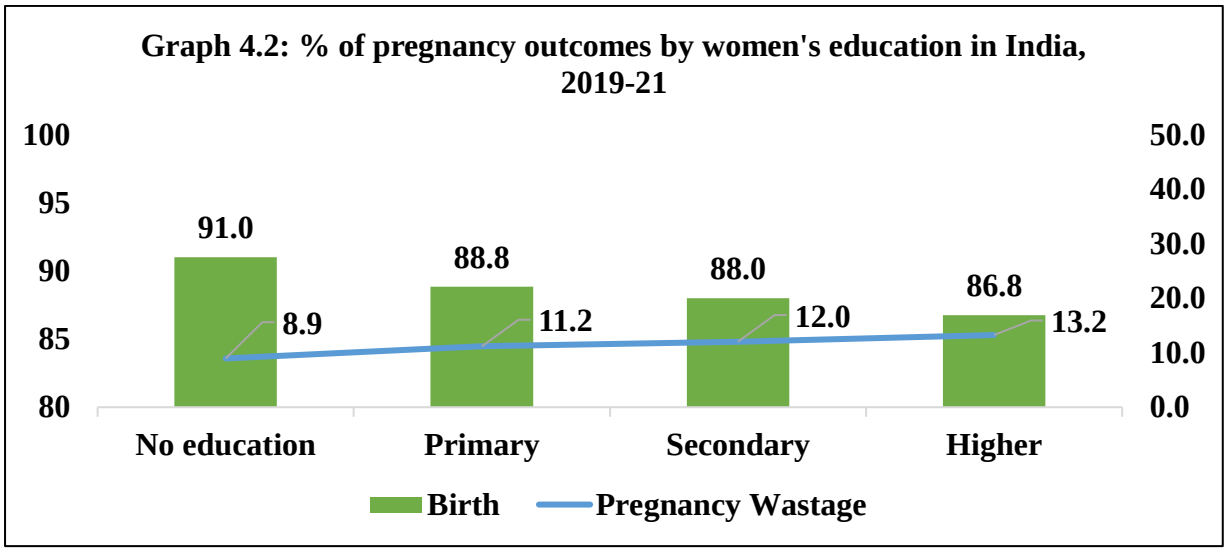
The table 4.1 shows the prevalence of different pregnancy outcomes among the smoker women by EAG states of India. The table includes the percentage of pregnancy outcomes classified as "Live Birth," "Still Birth" and "Miscarriage" among smoker women for each EAG state as well as total number of women included in the analysis. The statistical analysis of the data is presented in the form of p-values for the chi-square test, which is a measure of the association between the variables. The results show that the overall prevalence of Still birth is 1.32% and Miscarriage is 12.58% among smoker females of the EAG states in India. The state with the highest prevalence of still birth is Odisha with 1.65%, followed by Jharkhand with 1.57% and Uttar Pradesh with 1.42%. The state with the lowest prevalence of still birth is Uttarakhand with 0%, followed by Rajasthan with 0.54% and Assam with 0.61%. Whereas highest prevalence of miscarriage is seen in the state of Odisha (14.89%) followed by Rajasthan (14.71%) and Assam (13.72%). Bihar is the EAG state with lowest prevalence of miscarriage with 5.89% followed by Jharkhand with 6.32% miscarriage. The statistical analysis shows that there is a significant association between the variables, with a p-value of less than 0.001 for all categories. This indicates that the prevalence of pregnancy wastage among smoker females varies significantly across different EAG states of India.

Graph 4.1: Percentage of pregnancy outcomes by women's age in the EAG States, India, 2019-21



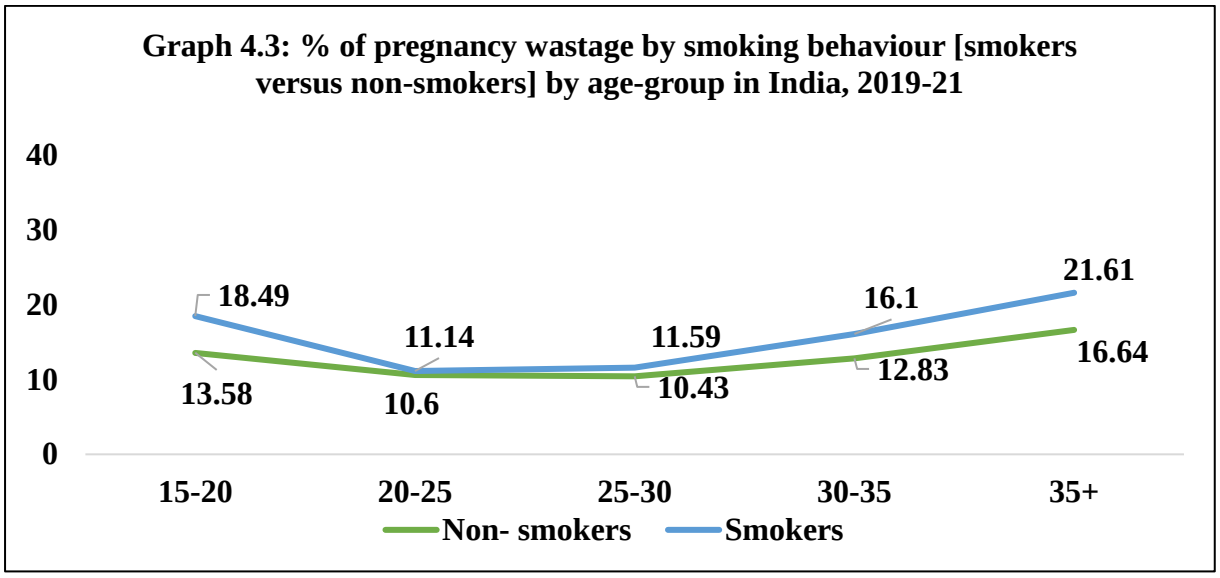
Graph 4.1 shows that among all the age categories (i.e. 15-20 years, 20-25 years, 25-30 years, 30-35 years, and 35+ years) women aged 35 years experienced the higher rate of pregnancy wastage i.e. miscarriage and stillbirth 16.97%, followed by women aged 30-35 (12.97%).

Graph 4.2: Percentage of pregnancy outcomes by women's education in India, 2019-21



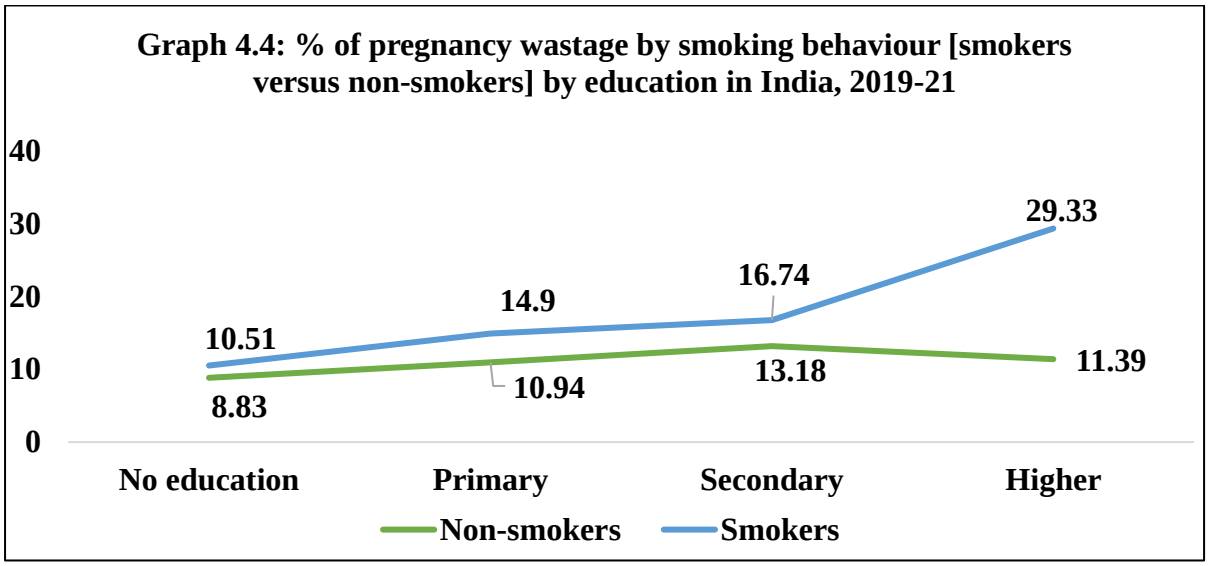
Graph 4.2 shows that the educational attainment has positive association with the pregnancy wastage outcome i.e. miscarriage and stillbirth .13.24% among pregnancy wastage are seen in women with higher education whereas it decreases to less than 10% in the females with no education.

Graph 4.3: Percentage of pregnancy wastage by smoking behaviour [smokers versus non-smokers] by age-group in India, 2019-21



Graph 4.3 shows that the age has mix association with pregnancy wastage. Increasing age first decreases the pregnancy wastage to 10.6% at 20-25years of age from 18.49% at 15-20 years of age and then again increases to 16.1% after age 30. The rate of change in pregnancy wastage with age of the females is found to be lower among non-smokers when compared with the smokers of the same age groups.

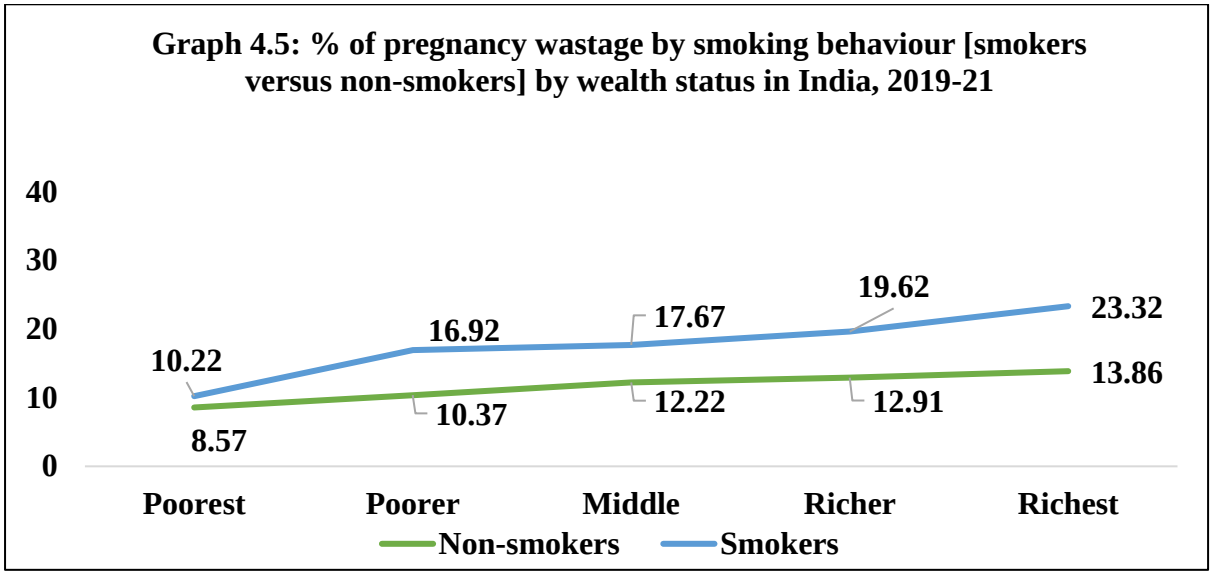
Graph 4.4: Percentage of pregnancy wastage by smoking behaviour [smokers versus non-smokers] by education in India, 2019-21



Graph 4.4 shows that the educational attainment indicates accessibility to buy the smoking material by the females and it is seen that with the increase in the educational attainment the

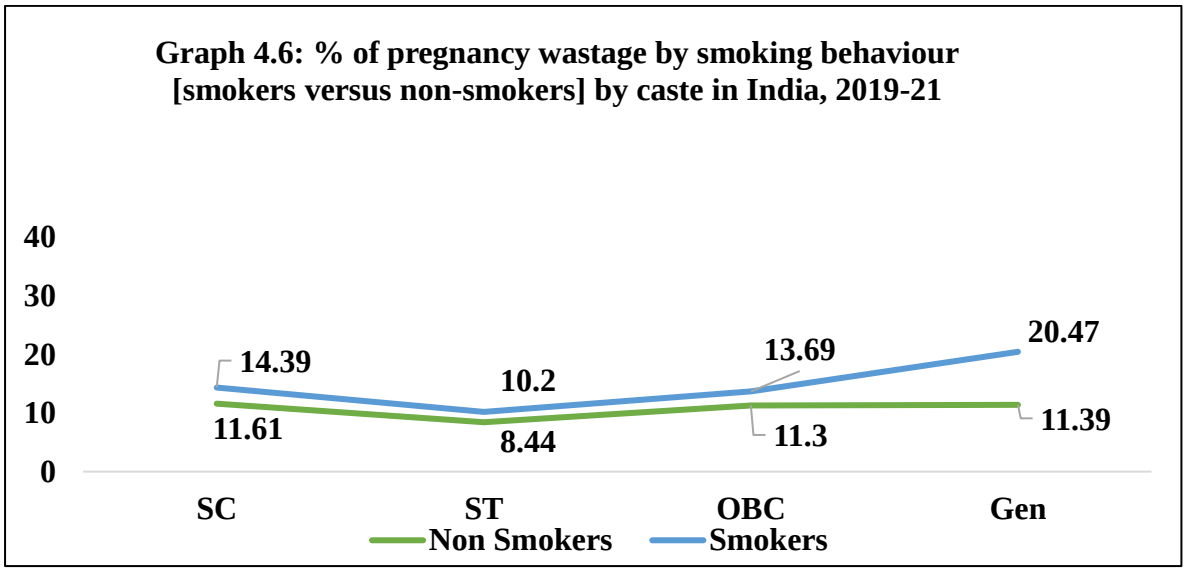
increase in pregnancy wastage also occurs. The smoker women with no education had a pregnancy wastage of 10.51% which increases to 14.9% in females with primary education, 16.74% in females with secondary education and highest in females with higher education i.e. 29.33%. This rate of increase was multifold among those females who smoke when compared with the non-smoker females.

Graph 4.5: Percentage of pregnancy wastage by smoking behaviour [smokers versus non-smokers] by wealth status in India, 2019-21



Graph 4.5 highlights that with the increase in the wealth status the affordability to buy the smoking material also increases. As the wealth status increases from poor to rich the pregnancy wastage increases. Women belonging to poorest wealth status show 10.22% of pregnancy wastage followed by 16.92% in poor wealth group, 17.7% in middle income group, 19.62% in richer and 23.32% in females belonging to richest income group. The rate of increase in pregnancy wastage is higher among smoker females compared to those who does not smoke belonging to same wealth status i.e. pregnancy wastage among smoker females of richest wealth group is 23.32% whereas in non-smokers of the richest income group it is found to be 13.86%.

Graph 4.6: Percentage of pregnancy wastage by smoking behaviour [smokers versus non-smokers] by caste in India, 2019-21



Graph 4.6 shows that the ethnicity shows the concentration of the pregnancy wastage by smoking behavior. Pregnancy wastage is seen to be higher among smoker females when compared with the non - smoker females. Highest prevalence of pregnancy wastage is seen among the smoker females of General category with 20.47% followed by smoker women of SC category with 14.39% and OBC category with 13.69% pregnancy wastage. Lowest prevalence of pregnancy wastage is seen among the non-smoker females of ST category with 8.44%.

Table 4.2: Percentage of Pregnancy wastage among female smokers in EAG states by background characteristics in India, 2019-21

Background characteristics	Pregnancy wastage among smokers (%)			
	Live Birth	Still Birth	Miscarriage	Total(N)
Respondent's current age				
15-20	81.52	2.52	15.97	357
20-25	88.86	1.03	10.11	2410
25-30	88.41	0.92	10.67	2782
30-35	83.9	1.9	14.2	1660
35+	78.39	1.71	19.9	1003
Highest level of education				
No education	89.49	1.18	9.33	3,557
Primary	85.1	1.2	13.7	1,722
Secondary	83.26	1.63	15.11	2,778
Higher	70.67	0.05	29.28	154
Residence				
Urban	79.95	1.06	18.99	1,393
Rural	87.36	1.37	11.27	6,819

Background characteristics	Pregnancy wastage among smokers (%)			
	Live Birth	Still Birth	Miscarriage	Total(N)
Wealth Index				
Poorest	89.78	1.16	9.06	4,278
Poorer	83.08	1.47	15.45	1,956
Middle	82.33	1.93	15.74	1,178
Richer	80.38	1.2	18.42	588
Richest	76.68	0	23.32	212
Religion				
Hindu	85.63	1.38	12.99	6,009
Muslim	87.33	1.42	11.25	1,553
Christian	90.87	0.63	8.5	468
Sikh and others	78.98	0.26	20.76	181
Caste				
SC	85.61	1.49	12.9	1,904
ST	89.79	1.37	8.83	2,258
OBC	86.31	1.39	12.3	2,436
Gen	79.53	1.18	19.29	973
Total	**86.11**	**1.32**	**12.58**	**8,212**

Note: p< 0.001**,** p: Probability of chi-square

The table 4.2 shows various demographic and socioeconomic factors that are potentially associated with pregnancy wastage among smoker women of the EAG states in India, with varied statistical significance level. The result is organized into several categories, including age of smoker females, highest education level, place of residence, wealth index, religion, ethnicity, and region. For each category, the table presents the prevalence of Live Birth, Still Birth, and Miscarriage among smoker women, for each demographic factor.

The prevalence of still birth and miscarriage significantly increases with age. As table 4.2 shows that at age 35+, prevalence of still birth is 1.71% and 19.9% of miscarriage is seen, followed by age group of 15-20 years where 2.52% of still birth and 15.97% of miscarriage is seen. Lowest prevalence of pregnancy wastage i.e. 1.03% still birth and 10.11% of miscarriage is seen in the age group of 20-25 years followed by 0.92% still birth and 10.67% miscarriage among the smoker females of age group 25-30 years of years indicating a trend of pregnancy wastage decreasing as age increases from 20 years to 30 years and then it seen to increase in the age group of 35+years.

The educational level is divided into four categories. Smoker women with higher educational levels tend to have a higher prevalence of still birth and miscarriage. For instance, those with a higher education or above have a prevalence of 29.28% miscarriage, compared to 9.33% for those with no education. This suggests a positive association between educational attainment

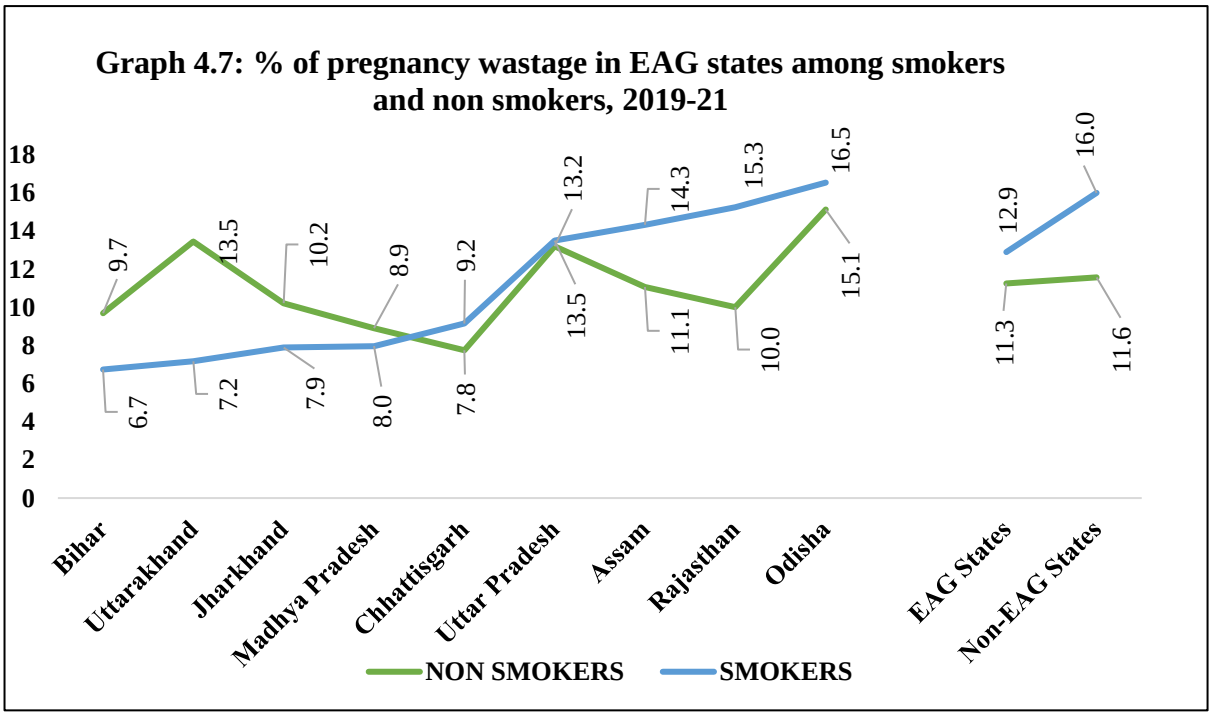
and pregnancy wastage, possibly due to lifestyle factors associated i.e. the accessibility to buy the smoking material by the females with higher education.

Women in urban areas have a significantly higher prevalence of still birth or miscarriage (1.06% and 18.99% respectively) compared to rural areas where 1.37% still birth and 11.27% miscarriage, $p < 0.001$). Urban settings may offer more access to smoking materials, leading to higher rates of still birth and miscarriage.

The wealth index is significantly associated with pregnancy wastage i.e. Still birth or miscarriage ($p < 0.001$). The prevalence of pregnancy wastage is seen to increase with wealth, ranging from 10.22% for the poorest to 23.32% for the richest, higher economic status may lead to greater accessibility and availability of smoking materials along with sedentary lifestyles, contributing to increased still birth and miscarriage prevalence.

Religion shows a significant association with pregnancy wastage ($p < 0.001$), with the highest prevalence among Sikh and others women (21.02%) and the lower among Hindu women (14.37%) and Muslim women (12.67%) whereas, Christian women are at lowest with (9.13%). Religious and cultural practices might influence the smoking habits, contributing to the differences in prevalence of pregnancy wastage among females of various religious groups.

Graph 4.7: Percentage of pregnancy wastage in EAG states among smokers and non-smokers, 2019-21



Graph 4.7 shows Pregnancy wastage is higher among female smokers compared to non-smoker females in EAG States of India. However, in some EAG states like Bihar, Uttarakhand, Jharkhand, and Madhya Pradesh pregnancy wastage was on the higher side when they were non-smokers compared to smokers.

Table 4.3: Odds of Pregnancy wastage among smoker females in EAG states, India, 2019-21

Ever smoke	**Pregnancy Wastage**		
	Odds Ratio	**[95% Conf.**	**Interval]**
Respondent's current age			
15-20 [Ref]	1	1	1
20-25	0.7***	0.67	0.744
25-30	0.69***	0.657	0.73
30-35	0.87***	0.822	0.922
35+	1.26***	1.184	1.347
Highest level of education			
No education [Ref]	1	1	1
Primary	1.26***	1.205	1.324
Secondary	1.32***	1.271	1.372
Higher	1.31***	1.253	1.385
Wealth Index			
Poorest [Ref]			
Poorer	1.2***	1.158	1.252
Middle	1.33	1.28	1.391
Richer	1.34***	1.283	1.404
Richest	1.43***	1.359	1.507
Residence			
Urban [Ref]			
Rural	0.89***	0.867	0.926
Religion			
Hindu [Ref]	1	1	1
Muslim	0.72***	0.699	0.758
Christian	0.69***	0.656	0.744
Sikh & Others	0.93**	0.872	0.991
Caste			
SC[Ref]	1	1	1
ST	0.73***	0.7	0.769
OBC	0.99	0.955	1.023
None Of Above	1.07***	1.025	1.109
_cons	0.12***	0.112	0.129

Table 4.3 provides information on the relationship between various socio-economic and demographic factors and pregnancy wastage, allowing for comparisons between different groups or categories. The effect sizes and confidence intervals help assess the strength and precision of the associations. The table show the odds ratio of Pregnancy wastage in women smoking in the EAG States of India. The 95%confidence interval of the OR is presented in parenthesis. The table show the odds ratio of Pregnancy wastage among women who smoke in the EAG States of India.

The regression analysis shows that the odds of pregnancy wastage is significantly higher among women aged 35 and above [OR: 1.26, $p<0.05$], but it was much higher when they smoke in EAG states, followed by age group 30-35 years [OR: 0.87, $p<0.05$].

The wealth quintile is statistically significantly associated with the pregnancy wastage among smoker females. As the odds of pregnancy wastage among women belonging to rich household and smoke, the odds are 1.43 times than the women who smoke in the poor households.

The urban women of EAG states were more likely to experience pregnancy wastage if they smoke than those of rural areas EAG states. Odds of pregnancy wastage among rural smoker women is 0.89 times of those living in the urban areas.

The result of logistic regression among smoker women are significantly estimating the odds of pregnancy wastage when controlling educational attainment. The odds of pregnancy wastage are higher among those smoker females who are having secondary or higher education [OR: 1.32 and 1.31 respectively, $p<0.01$]. Notably, illiterate smoker females' education is having lower odds of pregnancy wastage when compared to those with primary education [OR:1.26, $p<0.001$].

Odds of pregnancy wastage are found to be higher in the smoker females of the EAG States when compared with the counterpart non-smoker females.

4.2 Conclusion:

In conclusion, the findings of this dissertation highlight the significant variations in pregnancy wastage and smoking trends among women related to different demographic factors in the EAG States of India. The percentages of pregnancy wastage among smoker females are observed to vary based on factors such as age, educational level, place of residence, wealth index combined, caste, and religion.

The analysis shows the percentage of pregnancy wastage among women who smoked ranged from 11.14% to 21.61% across different age groups. The study shows that smoking behavior along with other factors such as higher age of mother has significant positive association pregnancy wastage.

Similarly, the pregnancy wastage ranged from 10.51% to 29.33% based on the educational level. Furthermore, variations in patterns of pregnancy outcomes are observed between urban and rural areas, with pregnancy wastage ranging from 12.64% to 20.05%. The wealth index combined had an impact on the consumption smoking materials leading to pregnancy wastage among the females, with percentages varying from 10.22% to 23.32% across different wealth categories. The education as accessibility and wealth status as affordability proved to be statistically significant factors affecting pregnancy wastage in EAG states, India.
Lastly, religion and caste influence the smoking choices among the women, leading to pregnancy wastage ranging from 9.13% to 21.02% across different religious groups and 10.2% to 20.47 across the different caste groups.

These findings highlight the importance of considering various demographic factors when examining pregnancy outcomes among smoker women. This study advocates region-specific programs and policies to address the issue for protecting women particularly from pregnant and vulnerable groups. Further research and longitudinal studies are warranted to explore the underlying factors contributing to these variations and to assess the effectiveness of interventions aimed at improving pregnancy outcomes especially among the females of the EAG States of India.

Chapter 5: Conclusion

5.1: Introduction

Tobacco is becoming one of the main risk factors for disease worldwide. The prevalence of tobacco uses among pregnant women in low- and middle-income countries (LMICs), where over 80% of smokers worldwide reside, is not well-documented based on population-based data. Pregnancy complications and poor foetal outcomes are among the known risks associated with tobacco use during pregnancy for both mother and child. Snuff and chewing tobacco are two examples of smokeless tobacco products that have been linked to stillbirth, premature birth, and low birthweight during pregnancy, albeit this use has received less research.(67)(68)(69).

Pregnancy wastage is a complex and multi-dimensional problem that affects the females of various socioeconomic backgrounds. Pregnancy Wastage refers to both still birth and miscarriage. These events are profoundly distressing and have substantial emotional, psychological, and physical repercussions for the affected women and their families.

The prevalence of the pregnancy wastage due maternal smoking has increased, particularly in low and middle-income countries undergoing socio-economic and demographic transitions. These transitions are characterized by shifts in dietary patterns, lifestyle changes, and urbanization. As societies become more affluent, there is an increase in the consumption tobacco and related products accompanied by reduced physical activity levels leading to more healthcare issues, especially among the females.

The lack of access to qualified healthcare professionals during delivery, low socioeconomic status, and poor prenatal care are risk factors for stillbirths and miscarriages that are exacerbated in underdeveloped nations. The rising prevalence of pregnancy wastage calls for the implementation of public health initiatives. Better access to prenatal and antenatal care, awareness about the health risks of smoking during pregnancy, and counselling and motivation to adopt healthier lifestyles are some of these initiatives. Minimising the rates of pregnancy wastage also requires addressing the larger socioeconomic determinants of health, such as poverty and education. The prevalence of pregnancy wastage can be decreased by implementing comprehensive initiatives that include policy reforms, healthcare provider training, and community education and awareness programs. These strategies can help mitigate the impact of socio-economic disparities on maternal and foetal health, ultimately reducing the incidence of pregnancy wastage.

5.2: Conclusion

The burden of pregnancy wastage due to maternal smoking among women of the EAG states in India is a complex issue that requires urgent attention and targeted interventions. This study has shed light on the multifaceted nature of the problem, highlighting the existence of pregnancy wastage among the females of the EAG states. The findings presented here have underscored the need for a comprehensive and integrated approach to address the burden of pregnancy wastage due to maternal smoking, considering the underlying determinants and socio-cultural and demographic factors like age, highest level of education attained, wealth status, place of residence, religion, caste etc that contribute to this problem in the society.

One of the key findings of this research is the increasing prevalence of pregnancy wastage due to maternal smoking among the women of the EAG states in India. Despite progress in reducing overall rates of smoking in the country, the prevalence of smoking among the females is seen to increase. This study underscores the importance of investing in area-specific interventions, such as increasing the awareness about the harmful effects of smoking among females especially during pregnancy. Additionally, addressing the underlying causes of smoking, such as poverty, lack of education, peer influences which are crucial for sustained progress for reducing smoking among the females of the EAG states.

The rising prevalence of smoking among the women in the EAG States of India is another important finding of this study. Increased smoking and consumption of other forms of tobacco has been attributed to lack of education and awareness about the detrimental effects of tobacco, poverty, changing lifestyles. This has resulted in increased pregnancy wastage and associated health risks among the females. It is critical to put into place strategies that will encourage healthy lifestyles including awareness about the harmful effects of tobacco and benefits of tobacco cessation, educating women, and providing them with employment that will bring them out of the vicious cycle of poverty, especially in this vulnerable population of the EAG States of India.

Furthermore, this research has highlighted the interconnectedness between maternal smoking and pregnancy wastage among the females of the EAG States in India. The existence of these two problems i.e., pregnancy wastage and increasing prevalence of smoking among the females of the EAG States presents a significant challenge for policy and programmatic interventions. Traditional approaches that solely focus on addressing these two issues of pregnancy wastage and increased smoking among the females of the EAG States of India in isolation are insufficient. Instead, there is a need for integrated interventions that address the underlying

determinants and root causes of both the issues, recognizing the complex interactions between socioeconomic factors, cultural practices, and individual behaviours.

5.3: Discussion

Women's lives are being impacted globally by the tobacco pandemic. Whilst there has been a documented drop in tobacco usage among women in India (GATS-2) (10), women are still disproportionately affected by the morbidity and mortality caused by tobacco use. In comparison to young men, there is currently a greater uptake of smoking among young women due to the previous higher frequency of tobacco use among men worldwide.

Early-life tobacco use increases the likelihood that young women may continue to use smokeless or smoked tobacco during pregnancy and lactation. There is ample evidence to suggest that women who smoke are more likely to experience problems specific to their gender, such as early menopause, impaired fertility, and issues during pregnancy and childbirth. Tobacco use during pregnancy and lactation is still one of the key factors contributing to poor pregnancy outcomes and prenatal death, even with these well-established dangers(70).

In India, there is still no special tobacco control programme for women, despite the WHO Framework Convention on Tobacco Control emphasising the necessity to address gender-specific risks while establishing tobacco control measures. Adequately tailored to their cultural context, education campaigns should target women who are unaware of the harmful health impacts of tobacco use and those who live with smokers. In order to prevent and regulate tobacco use among pregnant women in India, evidence-based interventions must be put into place immediately(71).

In the current study, women in wealthy and more educated groups of the EAG States of India had a lower risk of pregnancy wastage than females in poorer and less educated groups. The ability of educated, wealthy, and urban group females to decide whether to smoke or not in accordance with their knowledge and awareness about the adverse effects of smoking and their accessibility toward the smoking materials as and when required, leading to better pregnancy outcomes, is indirectly reflected in this study. There are a variety of multifaceted causes for both pregnancy wastage and smoking prevalence among the females of the EAG States that are frequently connected to one another and serve as intermediaries.

When socioeconomic status was taken into account when analysing the data, it was found that women in the EAG States of India who were economically disadvantaged were more likely to smoke and to have miscarried. Previous Indian studies like this one had showed similar

findings. Pregnancy complications, low birth weight, increased risk of stillbirth, and increased risk of developing foetal cancer have all been linked to smoking during pregnancy(72).

Additionally, females who lived in urban areas and belonged to rich households had a comparatively lower likelihood of pregnancy wastage in the EAG States. This finding may be explained by the fact that females from higher socioeconomic status and urban areas have a better availability and easy accessibility to healthcare facilities with better and quality services.

Despite having knowledge about the health risks associated with smoking among females, trend of smoking among them is seen to increase. This inadvertently demonstrates inadequate concern among people for smoking of and its adverse effects on health.

5.4: Limitations of the study

The possibility of underreporting and socially acceptable responses must be addressed in a society where tobacco use is based on social taboos and gender norms. Therefore, it's highly possible that the presence of a husband or other family member during a pregnant woman's interview may adversely affect her ability to give a good response. To create instruments that could collect information from expectant mothers on delicate risk factors, like as tobacco smoking, in a more trustworthy manner, additional investigation and debate are needed. NFHS surveys are conducted periodically therefore the data used in secondary research may not reflect the most recent situation. Changes in socioeconomic conditions, health policies, and socio-demographic trends may occur in between survey rounds, affecting the accuracy and relevance of the data for addressing the current issues of the study.

5.5: Recommendation

To effectively tackle the problem of pregnancy wastage among the smoker females in India, a multi-sectoral and multi-stakeholder approach is essential and the data can be used to inform policy and planning efforts aimed at reducing the pregnancy wastage due to smoking among women in India.

- Government should strengthen multi-disciplinary research and evidence-based research on women and tobacco to understand the gender and age-related social determinants of tobacco use.
- Empowering the women through education and skill development is critical for breaking the poverty chain for females.

- Applying gender lens to enforcement of COTPA (Cigarettes and Other Tobacco Products) Act,2003 and implementation of NTCP (National Tobacco Control Programme)
- Education not only provides knowledge and awareness about health but also enhances the socio-economic opportunities for girls, enabling them to make informed choices and improve their own and their children's' well-being.
- Prioritizing multisectoral action towards the development of a "Tobacco Free Future Generation" with women and youth as their key stakeholders for a meaningful impact.
- Adopt multi-sectoral approaches to create awareness for tobacco cessation among females by involving MoHFW (Ministry of Health and Family Welfare), and MoWCD (Ministry of Women and Child Development), as stakeholder ministries.
- Engaging community-based women self-help groups, Mahila Arogya samities, State and National Commission for women and fostering behaviour change through culturally appropriate and gender-sensitive interventions can contribute to sustainable improvements in pregnancy outcomes among the females.
- Enforcement of stringent measures to curb engagement of children and young females in tobacco industry and scale up tobacco cessation services with a special focus on women and children.

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