Understanding determinants of maternal healthcare utilization and the regional variations in their significance in India

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DECLARATION BY STUDENT

I hereby declare that the data presented in this Dissertation report entitled, "Understanding Determinants Of Maternal Healthcare Utilization And The Regional Variations In Their Significance In India" is based on the results of investigations carried out by me in the Master of Arts in Economics at the Goa Business School, Goa University under the Supervision of Mrs Avina Kavthankar, and Co-guide Ms Ankita Chari and the same has not been submitted elsewhere for the award of a degree or diploma by me. Further, I understand that Goa University or its authorities will be not be responsible for the correctness of observations / experimental or other findings given the dissertation.

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COMPLETION CERTIFICATE

This is to certify that the dissertation report **"Understanding Determinants of Maternal Healthcare Utilization and The Regional Variations in Their Significance in India"** is a bonafide work carried out by **Ms** Shruti Ashok Vaingankar under my mentorship in partial fulfilment of the requirements for the award of the degree of **M.A in Economics** in the Economics Discipline at the Goa Business School, Goa University.

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CONTENTS

PREFACE

This research paper aims to investigate the determinants influencing maternal healthcare utilization in India, with a focus on young married women aged 15 to 49 who had at least one birth in the five years preceding the survey. The study is based on data from the National Family Health Survey (NFHS) 5, which was conducted in India between 2019 and 2021.

The study is significant because maternal healthcare utilization is a crucial aspect of public health and development in India. Despite progress in improving maternal health outcomes, disparities in access to maternal healthcare services persist, particularly among young married women and those from socially backward castes. Strengthening the health system capacity to provide care to these populations is also crucial.

The methodology chapter outlines the research strategies and techniques employed to investigate the research questions at hand. The data collection methods, data analysis procedures, and any statistical tools used to interpret the findings are described in detail. The chapter also highlights the ethical considerations taken during the research process and the limitations encountered.

The analysis chapter serves as the cornerstone of this study, providing a comprehensive understanding of the research questions at hand and offering valuable insights that contribute to the broader field of study. Through a blend of descriptive analysis and statistical techniques such as regression, notably logistic regression, this chapter aims to uncover patterns, relationships, and associations within the dataset.

In conclusion, this research paper provides valuable insights into the determinants influencing maternal healthcare utilization in India. The findings can inform policy and program interventions aimed at improving maternal health outcomes and reducing disparities in access to maternal healthcare services. The study contributes to the literature on maternal healthcare utilization in developing countries and highlights the need for targeted interventions to improve maternal health outcomes in India.

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Shruti Ashok Vaingankar

TABLES

ABBREVIATIONS USED

Entity	Abbreviation
Antenatal care	ANC
Census Enumeration Blocks	CEB
Clinical, Anthropometric, and Biochemical	CAB
Computer Assisted Personal Interviewing	CAPI
Confidence Interval	CI
Demographic and Health Surveys	DHS
ICMR and the National AIDS Research Institute	NARI
International Institute for Population Sciences	IIPS
Janani Suraksha Yojana	JSY
Low and Middle Income Countries	LMIC
Millennium Development Goal	MDG
Ministry of Health and Family Welfare	MoHFW
National Family Health Survey	NFHS
National Rural Health Mission	NRHM
Odds Ratio	OR
Place Of Delivery	PLD
Postnatal care	PNC
Sustainable Development Goals	SDG
World Health Organization	WHO

ABSTRACT

This study investigates the factors influencing maternal healthcare utilization in India, utilizing data from the National Family Health Survey (NFHS-5) conducted between 2019 and 2021. The study also examines the significance of the identified factors across 6 different regions categorized according to geographical location. The research focuses on young married women aged 15 to 49 who had given birth in the last five years preceding the survey. The dependent variables are antenatal care (ANC) and place of delivery (PLD) and postnatal care (PNC). The study employs descriptive statistics to assess the frequency and patterns of ANC, PLD and PNC utilization. The study also uses multivariate binary logistic regression models to identify the factors that influence the use of these maternal healthcare services. The analysis reveals significant disparities in maternal healthcare utilization across different socioeconomic and demographic groups, there is also differences in the significance of the factors across regions in India, highlighting the need for targeted interventions to improve maternal health outcomes in India.

Keywords: maternal health, India, NFHS-5, healthcare utilization, regional significance

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The present era witnesses an unprecedented level of ambition among women, with workplace flexibility serving as a driving force behind their aspirations. However, despite notable achievements, women continue to lag behind in terms of representation and this issue persists across all sectors, as both men and women acknowledge that the primary obstacle for women in paid work is the struggle to maintain a work-life balance while fulfilling family responsibilities (The Gender Gap in Employment). Tasks such as childcare, housekeeping, and cooking are essential for the well-being of a household, and consequently, for the overall welfare of societies but unfortunately, women still bear the majority of this often overlooked and undervalued workload(The Gender Gap in Employment). On a global scale, the lack of accessible and affordable care for children or family members presents a significant hindrance for women, both in their pursuit of employment and for those already engaged in paid work; in fact, this obstacle diminishes a woman's likelihood of participating in the workforce by nearly 5 percentage points in developing countries and 4 percentage points in developed nations (The Gender Gap in Employment).

While women aspire to be part of the paid workforce, various persistent socio-economic barriers impede their entry into the labour market. In the long run, bridging the gender gaps and overcoming the barriers in the labour force holds benefits not only for women and their households but also for the global economy as a whole (The Gender Gap in Employment).

Despite the implementation of equal opportunities legislation over a considerable period of time, the growth of women's careers continues to be hindered by the responsibilities of motherhood, even within professions dominated by women (McQuaid et al.). Extensive

discussions have taken place regarding the impact of motherhood, working hours, career breaks, and the presence of school-aged children on the progression of women's careers, revealing that motherhood indeed exerts a progressively negative influence on the advancement of women in their professional lives (McQuaid et al.).

Motherhood is characterized as a condition in which an individual undergoes the responsibilities of being a mother. It possesses a profound and inherent significance for women, encompassing the qualities and principles associated with motherhood, extending beyond mere fertility (Arora) . The journey of women's motherhood progresses through the three phases: pregnancy, delivery, and postpartum. Throughout this transformative process, mothers frequently express feelings of confusion arising from their initial encounters, necessitating a fresh adaptation at physical, cultural, and societal levels (Hwang et al.).

The initial moment when an infant is embraced by her biological mother is a feeling of great joy - a joyous experience that is the right of every new mother but however, for multitude of expectant females across the globe, this feeling will forever remain unattainable (Arora). In the absence of suitable nurturing and care, the process of attaining motherhood can become a source of anxiety and, in the most extreme cases, a disastrous and traumatic event (Arora).

The underutilization of healthcare services for maternal and child health poses a significant risk of mortality for both women and their children. Despite notable advancements in recent decades, an alarming 287,000 women lost their lives during or after pregnancy and childbirth in 2020 and this figure is unacceptably high (WHO, Maternal Mortality). Maternal injury and death commonly occur due to direct causes such as excessive blood loss, infection, high blood pressure, unsafe abortion, and obstructed labor. Additionally, indirect causes like anaemia, malaria, and heart disease contribute to this issue (WHO, Maternal Health; WHO, Maternal Mortality).

Deaths from complications during pregnancy, childbirth, and the postnatal period have declined by 38% in the last two decades, but at an average reduction of just under 3% per year, this pace of progress is far too slow; also hides vast inequalities within and across countries (WHO, Maternal Health; WHO, Maternal Mortality). The Sustainable Development Goals (SDGs) present an occasion for the international community to collaborate and expedite advancements in order to enhance maternal health for women universally, regardless of the geographical location or circumstances (WHO, Maternal Health; WHO, Maternal Mortality). The SDG objectives pertaining to maternal health encompass 3.1, which endeavours to attain a global average ratio of fewer than 70 fatalities per 100,000 deliveries by the year 2030, and 3.8, which demands the realization of comprehensive health coverage for all individuals and these objectives cannot be accomplished without ensuring inclusive coverage for reproductive, maternal, newborn, and child health (WHO, Maternal Health; WHO, Maternal Mortality).

India continues to face a serious health issue with a high rate of maternal mortality that is made worse by on-going differences in the use of healthcare facilities for mothers and the general health outcomes of mothers in different parts of the country; despite advancements and multiple health initiatives throughout the years, India continues to grapple with a significant number of maternal deaths, limited accessibility to healthcare services, disparities in nutrition, and mental health issues (Singh). The complexity of this challenge becomes even more complex when considering factors such as caste or economic status, among others. In an article published in 2020 titled "Inequality in the Utilisation of Maternal Healthcare Services: Evidence from Indian States," Sohini Paul asserts that despite an increase in the utilization of Maternal, Newborn, and Child Health (MNCH) services between 2006 and 2016, there remains a substantial variation between states, with notable disparities both among and within states (Singh). Particularly concerning is the significant inequality in the

utilization of antenatal care services observed among states that are the focus of heightened attention and concern (Singh).

It is crucial to emphasize that the majority of maternal deaths can be prevented through timely and skilled intervention in a supportive healthcare setting and the global agenda must prioritize the elimination of preventable maternal mortality (WHO, Maternal Health; WHO, Maternal Mortality). However, it is important to note that mere survival through pregnancy and childbirth cannot be the sole measure of successful maternal healthcare. Expanding efforts to reduce maternal injury and disability and promote overall health and well-being is of utmost importance. Each pregnancy and childbirth experience is unique and tackling inequalities that impact health outcomes, particularly those related to sexual and reproductive health, rights, and gender, is essential in ensuring that all women have access to dignified and high-quality maternity care ("Executive Summary"; WHO, Maternal Health; WHO, Maternal Mortality)

1.1.1 Maternal Healthcare In India: Progress, Challenges, And The Path Forward

Maternal healthcare in India has been a critical focus area over the years due to the high maternal mortality rates and disparities in healthcare access and outcomes. According to a study on maternal health care service utilization among young married women in India from 1992 to 2016, the use of full antenatal care (ANC) among young mothers increased from 27% to 46%, and skilled birth attendance (SBA) utilization was 88% and 83% during 2015-16 in India and EAG (Empowered Action Group) states, respectively (Meh et al.) .Over the past 20 years, India has significantly reduced its rates of maternal death. From 398 per 100,000 live births in 1997–1998 to 99 per 100,000 in 2020, the maternal mortality ratio (MMR) decreased by around 70% and disparities still exist, though, with higher MMRs reported in states like Madhya Pradesh/Chhattisgarh, Uttar Pradesh/Uttarakhand, and Assam (Meh et al.).

The state of maternal health in India is influenced by various factors, including limited access to healthcare, nutrition disparities, mental health concerns, and the commercialization of medical services (Paul and Chouhan). Issues such as unnecessary C-section deliveries, inadequate detection of complications, and barriers to maternal education contribute to the challenges faced in improving maternal health outcomes (Paul). Additionally, disparities in healthcare service utilization and outcomes persist across different states and within states, emphasizing the need for more inclusive and equitable healthcare policies(Paul and Chouhan).

Despite the challenges, there have been positive developments in maternal healthcare in India; community-level involvement, particularly through the engagement of community health workers, has played a significant role in improving maternal health outcomes (Paul) . Pro-poor policies and interventions have shown promise in reducing maternal mortality rates, especially in underperforming states and socio-economic groups and addressing issues of access, quality, and equity in maternal healthcare remains essential to further enhance maternal health outcomes in India (Paul).

1.1.2 Policy Framework And Government Initiatives In Maternal Health In India

Maternal health is a crucial component of public health, as it directly affects the well-being and survival rates of both mothers and infants (WHO Recommendations on Health Promotion Interventions for Maternal and Newborn Health) . It is essential for governments to have a robust policy framework and implement effective initiatives to improve maternal health in the country. India, being a populous nation, faces significant challenges in ensuring the well-being of mothers and infants. India has made significant strides in improving maternal health, but there is still a long way to go. The country accounts for a significant portion of global maternal deaths, and disparities in access to maternal health care persist. In response, the

government has implemented various policies and initiatives aimed at reducing maternal mortality and improving access to maternal health care. The government has identified this critical issue and has made concerted efforts to address maternal health through various policy frameworks and initiatives. One such initiative is the National Rural Health Mission (NRHM) and its flagship program, the Janani Suraksha Yojana (JSY), which aims to provide accessible, affordable, and quality healthcare to all citizens, with a specific focus on maternal and child health(Nair and Panda). The NRHM was launched in 2005, to provide accessible, affordable, and quality health care to rural populations, with a particular focus on vulnerable groups (Nair and Panda).

Another such policy is the Reproductive, Maternal, New-born, Child and Adolescent Health (RMNCH+A) framework, which was adopted by the Government of India in 2013 (Gupta et al.; RMNCAH+N :: National Health Mission). This framework aims to address the major causes of mortality and morbidity among women and children by providing comprehensive care through five pillars or thematic areas of reproductive, maternal, neonatal, child, and adolescent health (RMNCAH+N :: National Health Mission; MOHFW; MOHFW); The Maternal Health Division strives to provide quality services to pregnant women and their new-borns through various building capacity of health personnel and routine health systems strengthening activities(RMNCAH+N :: National Health Mission) .

The government has also launched several initiatives to improve maternal health care, such as the Janani Suraksha Yojana (JSY) and the Janani Shishu Suraksha Karyakaram (JSSK). Additionally, the Pradhan Mantri Surakshit Matritva Abhiyan is another significant government initiative that provides antenatal care services to pregnant women. This initiative plays a crucial role in identifying and addressing high-risk pregnancies, thereby contributing to the overall improvement of maternal health in the country.

Furthermore, the government's focus on improving healthcare infrastructure, including the establishment of maternal and child healthcare facilities, and the training of healthcare professionals, has significantly contributed to the overall enhancement of maternal health in India. The implementation of these policy frameworks and government initiatives underscores the commitment of the Indian government to prioritize maternal health. However, despite these efforts, challenges such as regional disparities, lack of awareness, and cultural barriers continue to persist, warranting the need for sustained and comprehensive measures to further improve maternal health outcomes across the country.

Maternal healthcare is vital to maintaining women's health and wellbeing during their pregnancies and deliveries and is a crucial aspect of global health. Despite the significance of maternal healthcare, a large number of women worldwide do not have access to these services, which can result in difficulties and avoidable deaths. Addressing the root causes of poor health outcomes, such as poverty, illiteracy, and inadequate healthcare infrastructure, is crucial to improving maternal health outcomes. Maternal mortality and morbidity can be decreased globally by investing in healthcare infrastructure, expanding access to education and economic opportunities, and tackling social determinants of health. These measures will guarantee that all women have access to high-quality maternal healthcare.

Maternal healthcare is a critical component of ensuring positive health outcomes for both mothers and their new-borns. In India, despite the government's efforts to improve maternal healthcare services, there are still significant disparities in the utilization of these services across different regions and socio-economic groups. The factors affecting the utilization of maternal healthcare services in India are complex and multifaceted, involving individual behaviour, social norms, cultural practices, and health system factors.

This research aims to explore the factors affecting the utilization of maternal healthcare services in India, with a focus on identifying the barriers and facilitators that influence the use of these services. Through a comprehensive literature review and empirical analysis, this thesis will provide insights into the complex interplay of factors that influence the utilization of maternal healthcare services in India. The findings of this thesis will contribute to the development of policies and programs aimed at improving maternal healthcare utilization and ultimately reducing maternal and neonatal mortality in India.

1.2 RESEARCH GAP

Maternal and child health is a vital indicator of a country's economic development, with the adequate utilization of healthcare services being crucial for reducing mortality rates. Existing research predominantly examines the association between various socioeconomic and demographic factors and maternal health on a national scale, often overlooking regional causality. As a result, community and state-specific characteristics, which contribute significantly to regional variability, are frequently omitted from these studies.

This dissertation aims to address this gap by investigating the socioeconomic, demographic, and geographical vulnerabilities of women concerning the utilization of maternal healthcare services. By focusing on community and regional-level factors, this study intends to identify areas requiring targeted attention. Ultimately, the goal is to enhance maternal health outcomes, potentially reducing the risks of maternal mortality and morbidity.

1.3 AIM OF THE STUDY

To comprehensively investigate the determinants influencing maternal healthcare utilization among women aged 15-49 in India and to explore potential variations in the significance of these determinants across different regions of the country.

1.4 RESEARCH QUESTIONS

1. What are the determinants of maternal healthcare utilisations in India?

2. To what extent do these identified factors influence the utilization of maternal healthcare services among women aged 15-49 years in India?

3. Do variations exist in the significance of these factors across different regions in India concerning the utilization of maternal healthcare among women aged 15-49 years?

1.5 OBJECTIVES

1. To investigate the multifaceted factors influencing the utilization of maternal healthcare among women aged 15-49 years in India.

2. To ascertain variations in the significance of these determinants across diverse Indian geographical regions.

1.6 HYPOTHESIS

1. Null Hypothesis (H0): The identified factors do not have a significant effect on the utilization of maternal healthcare among women aged 15-49 years in India.

Alternative Hypothesis (H1): The identified factors have a significant effect on the utilization of maternal healthcare among women aged 15-49 years in India.

2. Null Hypothesis (H0): There is no significant difference in the impact of the identified factors on the utilization of maternal healthcare among women across different geographical regions.

Alternative Hypothesis (H1): There is a significant difference in the impact of the identified factors on the utilization of maternal healthcare among women across different geographical regions.

1.7 RESEARCH DESIGN

The research design for this study involves a descriptive and regression analysis of data obtained from the National Family Health Survey (NFHS) 5, which was conducted in India

between 2019 and 2021. The study area is India, and the sample population includes women aged 15-49 years who had at least one live birth in the past five years preceding the survey. The data will be analysed to identify the determinants influencing maternal healthcare utilization among this population.

CHAPTER 2: LITERATURE REVIEW

2.1 BACKGROUND

Maternal healthcare utilization encompasses the extent to which pregnant women access and engage with essential maternal health services. According to recent estimates, the global maternal mortality rate has experienced a decline of 45% since 1990, yet the prevention of maternal mortality remains a critical challenge for health systems in developing countries (Balla et al., "Distress Financing in Coping with Out-of-Pocket Expenditure for Maternity Care in India"). This is evident by the fact that approximately 295,000 women continue to pass away during pregnancy and childbirth, with a significant 94% of these deaths occurring in developing nations due to maternal risk factors (Balla et al., "Distress Financing in Coping with Out-of-Pocket Expenditure for Maternity Care in India"). This on-going issue highlights the need for targeted interventions and sustained efforts to address the underlying causes of maternal mortality in these regions, thereby improving the overall health outcomes for women and their families (Balla et al., "Distress Financing in Coping with Out-of-Pocket Expenditure for Maternity Care in India"). Reducing maternal and child mortality and enhancing healthcare for women and children are crucial objectives of global health and international development agendas and these goals were incorporated into the Millennium Development Goals (MDG) set for achievement by 2015 and continue to be a priority in the Sustainable Development Goals (SDG) agenda for 2030 (Rosário et al.).

Maternal healthcare utilization in India is a crucial aspect of public health and development. The significance of maternal and child health (MCH) in India's national health program was highlighted by the introduction of the Reproductive and Child Health-I (RCH-I) initiative in 1997(Ghosh and Ghosh).Understanding the determinants and barriers to accessing maternal health services is essential for designing effective interventions and policies to improve the health outcomes of mothers and their children. In this literature review, we will delve into the

multifaceted factors influencing maternal healthcare utilization in India, addressing individual, household, community, and systemic determinants. By exploring the existing research and evidence, we aim to gain insights into the complex dynamics that shape maternal healthcare access in the Indian context.

2.2 OVERVIEW OF MATERNAL HEALTHCARE IN INDIA

India has made significant progress in reducing maternal mortality rates, but it still faces challenges in ensuring adequate utilization of maternal healthcare services (Paul and Chouhan). Maternal fatalities among young women (aged 15-24) account for 38% of total maternal mortality in India and using maternal health care services can significantly reduce maternal mortality; however, there are few research on young women in this setting (P. Singh et al.). India has seen a discernible decrease in the rate of maternal death as a result of the national health mission program's deployment nationwide. But India is falling short of the 2015 Millennium Development Goal (MDG5), which calls for improving universal reproductive health and reducing the rate of maternal death(Ali et al.). It is anticipated that the considerable increase in the use of maternal health care will lessen socioeconomic, regional, and geographic disparities among population subgroups; however, little is known regarding the extent of maternal health disparity in urban populations (Ali et al.). Maternal healthcare utilization in India is influenced by a multitude of factors that can be broadly categorized into individual, household, community, and systemic determinants. Several studies have examined these determinants and their impact on maternal healthcare utilization in India.

2.3 STATE OF MATERNAL HEALTH SERVICES: ANC, PLACE OF DELIVERY AND PNC

In 2017, a combined total of 295,000 women lost their lives due to complications related to childbirth and pregnancy, predominantly in low- and middle-income countries (LMICs)

(Rahman et al.). South Asia and Sub-Saharan Africa together represented 86% of all maternal deaths in 2017, with South Asia alone contributing approximately to the overall mortality figures and the primary reasons behind the high maternal mortality rates in these regions are attributed to low rates of facility-based deliveries and a shortage of skilled birth attendants (SBAs) during childbirth (Rahman et al.).

India's maternal mortality rate is currently at 167 deaths per 100,000 live births, and the infant mortality rate is at 37 deaths per 1,000 live births due to causes related to childbirth and these statistics highlight the importance of the delivery stage in the utilization of maternal healthcare services, including antenatal care, delivery care, and postnatal care (Barman et al.). By opting for institutional delivery, whether in public or private healthcare facilities, mothers can reduce the risk of maternal mortality and secure the health of their new-borns. Institutional delivery also protects new-borns from various diseases and reduces neonatal mortality (Barman et al.). In the first six weeks after a woman gives birth, known as the postnatal period, the well-being and survival of both the mother and her new born are of utmost importance (Paudel et al.). The initial hours and days after birth are especially critical, as insufficient care during this window can result in fatalities, disabilities, or missed chances to establish healthy habits. This can ultimately have adverse effects on the health of not only the mother and new born, but also the child as they grow (Paudel et al.).

In India, the percentage of reproductive-aged women delivering at an institution has significantly increased from 14.6% in 1992-93 (NFHS-1) to 79% in 2015-16 (NFHS-4) (Barman et al.). This change is particularly noteworthy in rural areas, where the percentage of women delivering at institutions rose from 29% in 2005-06 (NFHS-3) to 75% in 2015-16 (NFHS-4), representing a 46% increase; this trend suggests a growing awareness and accessibility of institutional delivery services in India, which has the potential to significantly improve maternal and neonatal health outcomes (Barman et al.). Despite numerous initiatives

at both the national and international levels to enhance the use of maternal healthcare services, a significant number of women in India still fail to receive adequate antenatal and postnatal care (Paul and Chouhan).

2.4 REVIEW OF METHODOLOGY

The study on the determinants of maternal healthcare utilization among married adolescents in 13 Sub-Saharan African countries with high rates of child and teenage marriage employed a multicountry cross-sectional analysis of data from the Demographic and Health Surveys (DHS) (Iacoella and Tirivayi). Three indicators of maternal healthcare utilization were used: full antenatal care (ANC), delivering in a safe facility, and receiving a postnatal check-up within two months from delivery and logistic regression models were employed to study the association between these outcomes and various predictors, which encompassed socio-economic and socio-demographic aspects of adolescent women, their partners, and household characteristics (Iacoella and Tirivayi). The study accounted for factors such as education, wealth, living in an urban environment, exposure to media, place of residence, autonomy in decision-making inside the household, and birth order and interval between births(Iacoella and Tirivayi).

The research paper 'Factors influencing place of delivery: Evidence from three South-Asian countries' utilized data from the most recent Demographic and Health Surveys (DHS) carried out in Bangladesh (2014), Nepal (2016), and Pakistan (2017–18) (Rahman et al.). The study aimed to establish the relationship between the outcome variable and various socio-demographic characteristics and a total of 16,429 women from Bangladesh, Nepal, and Pakistan were part of this analysis (Rahman et al.). The study involved descriptive analyses, as well as bivariate and multivariate logistic regressions to examine the data and draw conclusions (Rahman et al.).

The study "Determinants of Maternal Health Care and Birth Outcome in the Dande Health and Demographic Surveillance System Area, Angola" is based on community-derived longitudinal data collected by the Dande Health and Demographic Surveillance System from 2009 to 2015 (Rosário et al.). The study selected three dependent variables: birth outcome, ANC attendance, and place of delivery; independent variables included women's age, education, geographic location, number of ANC visits, gestational age at first ANC visit, previous pregnancies and respective outcomes, and number of live children (Rosário et al.). The data were analysed using the Statistical Package for Social Sciences (SPSS) software, version 23.0, and binary logistic regression or multinomial logistic regression was used to study the effects of predictive variables over dependent variables and the study also conducted bivariate and multivariate analysis to assess associations, computing crude and adjusted odds ratios (OR) (Rosário et al.).

The study 'Maternal healthcare service utilization among young married women in India, 1992-2016: trends and factors' , looked at data from four rounds of National Family Health Surveys conducted in India between 1992-1993, 1998-1999, 2005-2006, and 2015-16 (P. Singh et al.). The study focused on young married women aged 15 to 24 who had given birth in the three years preceding each survey and descriptive statistics were used to assess the frequency and patterns of full antenatal care (ANC) and skilled birth attendance (SBA) utilization; also pooled multivariate logistic regression was used to identify the demographic and socioeconomic characteristics that influence the use of these maternal care services (P. Singh et al.).

Another study focussing on the married adolescents in rural India uses data from the third wave of the National Family Health Survey (2005–06) to investigate the factors related to the use of maternal healthcare services among married adolescent women (aged 15–19 years) in

rural India (P. K. Singh et al.). The research assesses three aspects of maternal healthcare service utilization: complete antenatal care, safe delivery, and postnatal care within 42 days of delivery for women who had given birth in the previous five years and the study considers socioeconomic, demographic, and cultural factors that influence maternal mortality, as proposed by Thaddeus and Maine (1994), as predictor variables (P. K. Singh et al.). Bi-variate analyses, including chi-square tests for proportion differences and logistic regression for the net effect of predictor variables on selected outcomes, were conducted (P. K. Singh et al.).

A research was conducted using a cross-sectional design, analysing data from 15,782 ever-married women aged 15-49 years who lived in Madhya Pradesh state in India and participated in the District Level Household and Facility Survey (DLHS-3) conducted in 2007-08 (Jat et al.). A multilevel logistic regression analysis was performed to identify individual, community, and district-level factors associated with the use of maternal healthcare services; the community-level factors included the type of residence, while the district-level variables included the ratio of primary health centers to the population and the percentage of tribal population in the district (Jat et al.).

2.5 REVIEW OF FACTORS INFLUENCING THE USE OF MATERNAL HEALTH SERVICES

Various factors have been identified as determinants of maternal healthcare utilization in India. These factors include socio-demographic characteristics such as educational attainment, household wealth status, rural-urban residence, caste, religion, women's age, and age at marriage; Additionally, exposure to mass media and regional disparities also play a significant role in determining the utilization of maternal health care services (Jat et al.; Barman et al.; Rahman et al.; Ali et al.).

2.5.1 Cultural And Social Determinants Of Maternal Healthcare Access

India, with its diverse cultural and social landscapes, presents a unique set of challenges and opportunities for maternal healthcare utilization. The intersection of traditional practices, societal norms, and modern healthcare systems shapes the experiences of pregnant women and their access to maternal health services. Some of the socio-economic and demographic predictor variables that affect are: residence (urban and rural), caste, religion, women's age, age at marriage, educational attainment, wealth quintile, women's exposure to mass media and region, etc. (Paul and Chouhan).

Research indicates that urban women exhibit higher rates of antenatal care (ANC) utilization and are more inclined to give birth in healthcare facilities when contrasted with their rural counterparts and this trend aligns with similar studies carried out in India and Nigeria (Paul and Chouhan). Urban women enjoy various benefits over their rural counterparts, including superior educational attainment, heightened awareness, and convenient access to both public and private healthcare services. In contrast, rural women frequently lack access to these opportunities (Paul and Chouhan).

Additionally, the household socio-economic status and mother's education are the most important factors associated with the use of ANC and skilled attendance at delivery (Jat et al.). Prenatal care tends to be better in families where the mother, household head, and overall household have higher levels of education and wealth (Chaudhry and Khan). The reason for this could be that educated women have better literacy skills, enabling them to effectively understand and process health-related information (Khaki and Sithole). Similarly, the father's education also increased the likelihood of the mother utilizing antenatal care services compared to no formal education and a more educated husband is likely to promote health-seeking behaviour in his wife (Khaki and Sithole).

The results suggest that middle-aged ever-married women were more likely to give birth in a healthcare institution than younger women and women with a higher birth order were less likely to deliver in an institution compared to those with a lower birth order (Barman et al.). Higher-educated women were more likely to give birth in a healthcare facility than those with lower education levels; similarly Hindu women were more likely to deliver in a healthcare institution than women of other religions (Barman et al.). Women who received antenatal care during pregnancy were more likely to deliver in a healthcare institution than those who did not receive any antenatal care (Barman et al.).

Ethnicity is a factor that varies culturally and religion-wise. In many developing countries, wealth related to ethnicity has been identified as a significant determinant of giving birth in a healthcare facility (Gebregziabher et al.); Muslim women and Scheduled caste women are less likely to utilize the antenatal care services (Ali and Chauhan). In rural North India, a research study discovered extensive disparities in the use of antenatal care based on caste, while another study in South India reported similar levels of caste-based inequality in antenatal care utilization (Ali and Chauhan).

The level of prenatal care, safe delivery practices, and overall child health support decreases as the birth order of the child increases, but this decline is less pronounced when considering household socioeconomic factors; for families without a previously born son tend to provide more safe delivery care and overall health support, indicating a preference for sons in family planning decisions (Chaudhry and Khan).

It's been observed that there's a strong link between frequent exposure to mass media and the likelihood of utilizing antenatal care services; specifically, a study discovered that women who reported a greater degree of media exposure were more apt to undergo antenatal examinations (Ali et al.). Additionally, it is seen that women's autonomy in seeking

healthcare, purchasing household items, managing finances, and determining their movements is a crucial factor in predicting the use of maternal healthcare services in India; specifically, there's a robust association between women's decision-making autonomy and the utilization of antenatal and postnatal care during pregnancy (Mondal et al.).

2.5.2 Economic Barriers To Maternal Healthcare Utilization

It is indicated that women who were employed and those with insurance were more inclined to attend postnatal care compared to those who were not (Khaki and Sithole). This aligns with Browne and colleagues' research, demonstrating that maternal health insurance significantly enhances the likelihood of a woman accessing various services (Khaki and Sithole). Also for place of delivery, wealth quintile was assessed as being statistically significant (Banke-Thomas et al.). The wealthiest women were more likely to give birth in a healthcare institution than the poorest women(Barman et al.). Conversely, variables such as the education level of a partner, affluent position, women's self-governance, and village infrastructure have been associated with increased likelihood of utilizing maternal health services (Yadav et al., 2020).

2.5.3 Regional Disparities In Maternal Healthcare Access In India

India faces significant regional disparities in the use of full antenatal care (ANC), skilled birth attendance (SBA), and postnatal care (PNC), which are influenced by the country's diverse geography, demographics, language, and social norms; while some states such as Arunachal Pradesh, Chhattisgarh, and Odisha have made substantial progress in reducing inequality, others like Uttar Pradesh, Bihar, and Arunachal Pradesh still have high levels of inequality (Ali et al.). States like Nagaland, Uttar Pradesh, Bihar, Arunachal Pradesh, Uttarakhand, Jharkhand, Manipur, and Rajasthan continue to struggle with high inequality in the utilization of maternal healthcare services (Ali et al.). Disparities persist, with states like Assam, Uttar Pradesh/Uttarakhand, and Madhya Pradesh/Chhattisgarh reporting higher

MMRs. The leading causes of maternal death include obstetric haemorrhage, pregnancy-related infection, and hypertensive disorders of pregnancy (Meh et al., 2022).

2.6 FACTORS AFFECTING MATERNAL HEALTHCARE UTILISATION GLOBALLY

The study on the determinants of maternal healthcare utilization among married adolescents in 13 Sub-Saharan African countries concluded that living conditions, wealth, access to media, female education, partner education, employment, and urban residence were positively associated with the utilization of maternal healthcare services (Iacoella and Tirivayi). Factors like autonomy in decision-making over resources and relationships also played a role in maternal healthcare utilization; wealth was highlighted as a consistent determinant, with wealthier individuals more likely to receive full antenatal care, deliver in a safe facility, and receive postnatal care (Iacoella and Tirivayi). The study emphasized the importance of understanding these determinants to shape effective maternal healthcare interventions in regions with high rates of child and teenage marriage (Iacoella and Tirivayi).

A study undertaken in three South Asian nations, discovered disparities in the use of facility-based delivery among women in the highest income quintile across the three nations (Rahman et al.). Women from metropolitan regions, with higher education, middle to upper household income, and more antenatal care visits were considerably more likely to prefer facility-based birth (Rahman et al.). Notably, watching TV appeared as a substantial predictor of facility-based delivery in all three nations and higher education of spouses predicted facility delivery in Bangladesh and Pakistan, but the husband's work was a key determinant in Bangladesh and Nepal (Rahman et al.). These findings emphasize the role of numerous socio-demographic factors in affecting the usage of facility-based delivery in these South Asian nations (Rahman et al.).

Another study found that attending antenatal care significantly influenced birth outcomes (Rosário et al.). Women who were older, less educated, residing farther from healthcare facilities, and in rural settings were less inclined to seek maternal health services; additionally, a history of prior pregnancies, particularly those ending in live births, reduced the likelihood of pregnant women accessing healthcare (Rosário et al.). A study in Southern Ethiopia, concluded that maternal education, antenatal care frequency, caesarean delivery, mothers' knowledge of PNC, and being model households have been significantly associated with the use of the post-natal care service services (Habte et al.).

A research studying the trends in maternal healthcare utilisation in India between 1992 and 2016, found that full ANC usage among young women in India remained unjustifiably low (P. Singh et al.). Although the number of young moms who used Skilled Birth Attendance (SBA) climbed significantly during the period, the increase appeared uneven (P. Singh et al.).

The findings of a study conducted on married adolescents in rural India, indicate significant disparities in the usage of selected maternal healthcare services based on educational attainment, economic position, and location of residence and Muslim women and women from Scheduled Castes, Tribes, and Other Backward Classes are less likely to use safe delivery services (P. K. Singh et al.). Moreover, adolescent women from the southern area use the most maternal healthcare services compared to other regions (P. K. Singh et al.).

2.7 RECOMMENDATIONS FOR IMPROVING MATERNAL HEALTHCARE UPTAKE IN INDIA

Research has shown that economic status, gender, and social status are closely interrelated when influencing use of and access to maternal and reproductive health care in India (Kassebaum et al.). Appropriate attention should be given to how these social determinants interplay in generating and sustaining inequity when implementing policies and initiatives aimed at improving maternal health care (*IJSSER*).

In addition, the government should focus on reducing disparities in access to maternal health care between and within states (Jat et al.). Analysis of inequities in maternal health care needs to be undertaken at the state and district level, and policies and programs should be tailored to address the specific needs of these areas. Furthermore, interventions targeting the cost for transportation and loss of income, as well as reducing the burden of out-of-pocket payment for care, are needed to address the financial barriers to maternal health care faced by the poor and socially backward castes (*IJSSER*). Strengthening the health system capacity to provide care to this fragment of the population is also crucial.

In conclusion, while significant progress has been made in improving maternal health in India, there is still a need to address disparities in access to maternal health care and improve the quality of care provided in health facilities. The government should continue to implement policies and initiatives aimed at reducing maternal mortality and improving access to maternal health care, while also addressing the social determinants that influence use of and access to these services.

CHAPTER 3: METHODOLOGY

The methodology chapter aims to outline the research strategies and techniques employed to investigate the research questions at hand. It describes the data collection methods, data analysis procedures, and any statistical tools used to interpret the findings. The chapter also highlights the ethical considerations taken during the research process and the limitations encountered. By providing a detailed account of the methodological approach, it aims to ensure the transparency and reproducibility of the research, allowing future studies to build upon and expand this work.

3.1 UNDERSTANDING THE BACKGROUND OF DATA SOURCE

3.1.1 Demographic and Health Surveys (DHS)

Demographic and Health Surveys are internationally recognized as one of the leading sources of reliable and comprehensive data on population, health, and socioeconomic and nutrition indicators. These surveys are typically conducted in low- and middle-income countries, providing valuable information for policymakers, researchers, and program implementers better to understand a particular population's health and social dynamic.

a. Methodologies Used In DHS Surveys

DHS surveys employ a standardized methodology to ensure consistent data collection across different countries and contexts. The surveys are conducted approximately every 5 years and use nationally representative samples to gather data on a range of demographic and health indicators (*The DHS Program - Data Collection*).

The primary strategy of The DHS Program is to gather data that can be compared across different nations. To ensure this, standardized model questionnaires have been created, accompanied by a rationale for the inclusion of specific questions or sections. These model questionnaires, which have undergone revisions in each of the six phases of The DHS Program, serve as the foundation for the questionnaires used in each country. Demographic

and Health Surveys (DHS) are surveys conducted at a national level with substantial sample sizes (usually ranging from 5,000 to 30,000 households). Women aged 15-49 are eligible to participate in all households, while in many surveys, men aged 15-54(59) from a subset are also eligible. The DHS surveys consist of three main questionnaires: a Household Questionnaire, a Women's Questionnaire, and a Men's questionnaire (*The DHS Program - Data Collection*; The Demographic and Health Survey Program).

The data collection process involves several key steps, including sample selection, questionnaire development, and fieldwork. The sampling technique used in DHS surveys is typically a multi-stage stratified systematic sampling design. This means that the sample is selected in a way that ensures representation of different regions and population groups within the country. The survey teams first identify primary sampling units, which can be villages in rural areas or enumeration blocks in urban areas. Once the primary sampling units are selected, households within these units are then systematically sampled to identify eligible respondents. Trained field teams are responsible for administering the questionnaires and collecting biomarkers. The fieldwork phase is crucial, as it ensures the accuracy and completeness of the data. Quality control measures, such as regular supervision and data validation, are implemented to maintain the reliability of the collected information (The Demographic and Health Survey Program).

a. Data Analysis and Dissemination

Once the data collection phase is complete, rigorous data analysis is carried out to produce national and sub-national estimates of key indicators. The findings are disseminated through reports, presentations, and databases, making the data accessible to a wide range of users, including policymakers, researchers, and program implementers. This widespread dissemination facilitates evidence-based decision-making and program planning. In conclusion, the methodologies used in DHS surveys ensure that the data collected is robust,

reliable, and representative, making it a valuable resource for understanding population health and informing public health interventions (The Demographic and Health Survey Program).

3.1.2 National Family Health Survey (NFHS)

The National Family Health Survey (NFHS-5), 2019-20 the fifth in the NFHS series, was conducted under the guidance of the Ministry of Health and Family Welfare, Government of India (MOHFW; MOHFW). MoHFW appointed the International Institute for Population Sciences (IIPS), Mumbai, as the principal institution overseeing the surveys (MOHFW). NFHS-5 received funding from the Government of India. The USAID-supported Demographic and Health Surveys Program, ICF, USA, provided technical assistance and additional funding for NFHS-5. Moreover, assistance for select Clinical, Anthropometric, and Biochemical (CAB) tests was extended by the ICMR and the National AIDS Research Institute (NARI), Pune (MOHFW).

a. Methodology Used To Collect Data

The methodology for the NFHS-5 sample aimed to deliver estimates for all primary indicators at the national and state levels, and for most indicators at the district level. Thus, NFHS-5 provides information for 707 districts, 28 states, and 8 union territories (MOHFW). Four survey questionnaires were utilized in the methodology, encompassing household, women's, men's, and biomarker components, administered in 19 languages through Computer Assisted Personal Interviewing (CAPI). All women aged 15-49 and men aged 15-54 within the chosen sample households were eligible for participation.

Within NFHS-5, two versions of the woman's questionnaire were employed. The first version (district module) captured data on women's demographics, marital status, fertility, contraceptive practices, reproductive health, childhood immunizations, management of childhood illnesses, and nutritional status and this version was administered across the entire

NFHS-5 sample households, offering insights at the district, state, and national levels (MOHFW; MOHFW; *The DHS Program - DHS Methodology*).

The second version (state module) of the woman's questionnaire included four additional topics: sexual behaviour, HIV/AIDS, husband's background and women's work, and experiences of domestic violence. It was implemented in a subset of NFHS-5 households, specifically designed to provide data at the state and national levels (MOHFW 2019–21; MOHFW; MOHFW).

The man's questionnaire focused on the man's demographics, marital status, number of children, contraceptive practices, fertility preferences, nutritional status, sexual behaviour, attitudes towards gender roles, HIV/AIDS awareness, and lifestyle habits (MOHFW). The household questionnaire aimed to gather fundamental data on all regular household members and overnight visitors, alongside the household's socioeconomic attributes, water and sanitation facilities, health insurance coverage, and recent household deaths within three years prior to the survey (MOHFW).

The biomarker questionnaire encompassed measurements such as height, weight, and haemoglobin levels for children; additional Clinical, Anthropometric, and Biochemical (CAB) testing including height, weight, waist and hip circumference, haemoglobin levels, and finger-stick blood for women aged 15-49 and men aged 15-54; and blood pressure and random blood glucose levels for women and men aged 15 years and older; all questionnaire responses and biomarker data were collected with informed consent from the participants (MOHFW; MOHFW).

In rural areas, a two-stage sample design was employed, with villages serving as the Primary Sampling Units (PSUs) in the first stage (selected with probability proportional to size), followed by a random selection of 22 households in each PSU as the second stage

(MOHFW). Similarly, in urban areas, a two-stage sample design was utilized with Census Enumeration Blocks (CEBs) selected in the first stage, and then a random selection of 22 households in each CEB for the second stage. In both urban and rural settings, households were chosen in the second stage following a thorough mapping and household listing operation within the selected first-stage units (MOHFW).

3.2 DATA SOURCE FOR THE STUDY

My research, a cross-sectional study, analysed the data sourced from the India's National Family Health Survey (NFHS-5), the fifth in the NFHS series; which is also referred to as the 2019–2021 Demographic Health Survey. This comprehensive survey, overseen by the International Institute for Population Sciences (IIPS), encompasses a broad spectrum of 639,699 households across India (MOHFW). Within this survey, 724,115 women aged between 15 and 49 years were interviewed using a standardized questionnaire (MOHFW). The questionnaire covered a range of topics, including fundamental socio-demographic characteristics, maternal healthcare, and reproductive behaviour, providing a rich dataset for analysis and insights into various aspects of public health and social dynamics in India. NFHS-5 includes some new topics compared to previous NFHS surveys, such as preschool education, disability, access to a toilet facility, death registration, bathing practices during menstruation, and methods and reasons for abortion (MOHFW). The scope of clinical, anthropometric, and biochemical testing (CAB) has also been expanded to include measurement of waist and hip circumferences, and the age range for the measurement of blood pressure and blood glucose has been expanded (MOHFW).

The original data pertaining to women was revised and standardized by using consistent variable names to produce the Individual Recode dataset (IAIR7EFL). This dataset was utilized for the study. (MOHFW)

3.2.1 Study Population and Sample Size

The present study examines the utilization of maternal healthcare services among women aged 15-49 in India. The analysis included weighted data from women who were between the ages of 15 and 49 and had given birth in the previous five years (N = 174,947). The original survey participants provided informed consent, and the survey protocol was approved by the institutional review board at the International Institute for Population Sciences, Mumbai.

3.3 VARIABLES

3.3.1 Outcome Variables

The study measures three outcome variables namely, antenatal care (ANC), place of delivery and postnatal care (PNC) as the indicators of maternal healthcare utilization. The three selected indicators of maternal healthcare utilization and their components are considered in accordance with guidelines issued by the World Health Organization. For the analysis, ANC visits were categorized to produce a dichotomous dependent variable with the following outcomes: adequate ANC (≥4 visits) and inadequate ANC (<4 visits); four or more antenatal visits are recommended as per WHO standards(*WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*). For delivery care, institutional delivery which is considered as 'safe delivery' was taken in this study. Place of delivery was categorised to produce a dichotomous dependent variable with the following outcomes: home delivery and institution delivery. In this study, the institution was defined as any health facility, whether public or private. The study considered postnatal care check-up within 72 hours after child birth as a potential maternal healthcare service indicator (*WHO Recommendations on Maternal and Newborn Care for a Positive Postnatal Experience*; "Executive Summary"). Thus PNC was categorised as categorised to produce a dichotomous dependent variable with the following outcomes: PNC within 72 hours and after 72 hours of child birth.

3.3.2 Explanatory Variables

There were several determining factors of institutional delivery. The selected independent variables are age of the respondents, age of partner, birth order, education of respondent and education of partner, religion, caste, women's autonomy, mass media exposure, wealth index, women's occupation, partner's occupation, place of residence, region of residence, health insurance coverage, respondent working, distance to health facility, and domestic violence during pregnancy.

Respondent's age at birth was categorized into 15–24, 25–34 and 35–49 and the partner's age was categorised into 15–24, 25–34, 35–49, and 49 and above. The educational level of the women and their partners was defined using the highest educational level and they were grouped into no education, primary, secondary and higher. The respondent's religion was categorized into Hindu, Muslim, Christian, and others (Sikh, Buddhist and others). The respondent's caste fell into the following categories Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Classes (OBC), and others. The birth order was categorised as 1, 2, 3, and ≥4. Wealth index was categorised as poorest, poorer, middle, richer and richest. The occupation of both the respondent and the partner was classified into two categories: agricultural and non-agricultural.

Autonomy, within the context of this study, was characterized by the degree of decision-making authority held within the household across four key domains: personal healthcare choices, household expenditures, financial allocations, and freedom of movement. This information was collected by five questions asked to the women during the survey of NFHS-5: i) person who usually decides on respondent's healthcare, ii) person who usually decides on large household purchases, iii) person who usually decides what to do with money husband earns, iv) person who usually decides what to do with money respondent earns and v) person who usually decides on visits to family or relatives. For each survey question,

participants selected responses from a range of five options, including: "respondent alone," "respondent and partner together," "partner alone," "someone else," and "others." These options were coded numerically, with '1' representing the first two responses indicating women's involvement in decision-making, and '0' for the remaining options indicating no female role. Adding these five variables, a composite score was derived, ranging from 0 to 4, which was then categorized into three levels of decision-making autonomy. Women scoring a four were classified as possessing high overall decision-making autonomy, those scoring 1 to 3 were categorized as having medium autonomy, and women scoring 0 were classified as having low autonomy.

Mass media exposure has been assessed by considering whether the respondent has access to newspaper, radio and television or cinema. This information was collected by three questions asked to the women during the survey of NFHS-5: i) frequency of listening to the radio, ii) frequency of watching the television, and iii) frequency of reading the newspaper. In each survey question, respondents were presented with options to indicate the frequency of their use of the particular media, including the option of "not used at all." Responses were coded numerically, with a value of '1' denoting usage of the media, indicating access, and '0' representing no access as reported by the respondent. Subsequently, these individual variables were aggregated to form the composite variable denoted as "mass media access."

The variable of health insurance coverage was categorised based on whether the respondent possess any health insurance. Responses were coded numerically, with a value of '1' denoting health insurance coverage, and ‘0’ representing no coverage. Variable, respondent working was categorised into ‘yes’ if working and ‘no’ if not working.

Place of residence was categorised as urban and rural. For region of residence, India was divided into six regions based on geographical locations as North (Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan and Uttarakhand),

Central (Chhattisgarh, Madhya Pradesh and Uttar Pradesh), East (Bihar, Jharkhand, Odisha and West Bengal), North-East (Sikkim, Manipur, Assam, Arunachal Pradesh, Mizoram, Tripura, Meghalaya and Nagaland), West (Dadra & Nagar Haveli, Goa, Gujarat and Maharashtra) and South (Andaman & Nicobar Islands, Andhra Pradesh, Karnataka, Telengana, Tamilnadu, Kerala, Lakshadweep and Puducherry).

The variable of distance to health facilities was evaluated by determining whether respondents perceived distance as a hindrance to accessing these facilities. This categorization was divided into two groups: "Yes" indicating distance is a problem and "No" indicating distance is not a problem. The categorization of domestic violence during pregnancy was based on whether the respondent experienced violence or did not face such violence.

3.4 STATISTICAL ANALYSIS APPROACH

In this study descriptive statistics were conducted to analyse the distribution of samples across the explanatory and outcome variables. The frequency and percentage distribution of the prevalence of maternal healthcare services i.e. ANC, PLD, and PNC against independent variable was studied. This helped to understand the characteristics of the sample and how they were related to the variables of interest.

Finally, multivariate binary logistic regression models were applied to examine the association between all the independent variables and utilization of maternal healthcare services. Three multivariate binary logistic regression models were run to check association between independent and dependent variable; each for ANC, PLD, and PNC. The regression results were presented by the estimated odds ratio (OR) with 95% confidence interval (CI) and p-value. Similarly to check for significant factors in different regions, regression models were run for each region. To do so, Indian states were categorised into 6 regions according to their geographic location. Regression models were run for each outcome for each region (18

models i.e. three per region). All the statistical analyses were performed using STATA version 12.0 (StataCorp LP, College Station, TX, USA).

3.4.1 Regression Models

In this study, multivariate binary logistic regression models were used. The models aim at predicting the factors affecting the likelihood of maternal healthcare utilisation among women aged 15-49 in India. The regression models were also employed to examine the factors contributing to regional variations in the utilization of maternal healthcare across six distinct geographical regions within India. The multivariate binary logistic regression model is expressed as:

$$\text{logit (P)} = \log\left(\frac{\text{P}}{1-\text{P}}\right) = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta 18X18 + \varepsilon$$

Where,

P = the probability of utilisation of maternal healthcare (ANC, PLD, and PNC among women aged 15-49 years in India

b0 = intercept

b1,…..,b18 = coefficients of the respective independent variables

The parameter b0 estimates the log odds of maternal healthcare utilisation for the reference group, and the parameter b1,....,b18 estimates with maximum likelihood, the differential log odds of maternal healthcare utilisation associated one-unit change in the respective predictor X, as compared to the reference group, holding all other variables constant.

X1 = respondent age

X2 = partner age

X3 = mass media exposure

X4 = birth order

X5 = health insurance coverage

X6 = education respondent

X7= education partner

X8 = respondent working

X9 = autonomy

X10 = distance to health facility

X11 = religion

X12 = wealth index

X13 = place of residence

X14 = domestic violence during pregnancy

X15 = caste

X16 = respondent occupation

X17 = partner occupation

X18 = region

Ɛ = error term

Note: The independent variables remain the same for ANC, PLD, and PNC models except for models examining regional disparities.

a. *Factors Affecting ANC Utilisation*

$$\text{logit (P)} = \log\left(\frac{\text{P}}{1-\text{P}}\right) = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta 18X18 + \varepsilon$$

Where, P = ANC, rest remains the same as the base model above.

b. Factors Affecting PLD Utilisation

$$\text{logit (P)} = \log\left(\frac{\text{P}}{1-\text{P}}\right) = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta 18X18 + \varepsilon$$

Where, P = PLD, rest remains the same as the base model above.

c. Factors Affecting PNC Utilisation

$$\text{logit (P)} = \log\left(\frac{\text{P}}{1-\text{P}}\right) = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta 18X18 + \varepsilon$$

Where, P = PNC, rest remains the same as the base model above.

d. Factors Affecting A Particular Region

$$\text{logit (P)} = \log\left(\frac{\text{P}}{1-\text{P}}\right) = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta 18X17 + \varepsilon$$

Where, P = ANC/PNC/PLD in a particular region, rest remains the same as the base model above except there are only 17 independent variable as region is not explanatory variable for this model.

Regions = North/East/West/South/Central/North-East

3.5 PRIVACY AND ETHICAL CONSIDERATIONS

In DHS data collection processes, maintaining privacy and adhering to ethical principles are of the highest priority (The Demographic and Health Survey Program). Rigorous protocols have been implemented to uphold the confidentiality and anonymity of all participants. Prior to data collection, informed consent was obtained from each individual, ensuring they were

fully informed about the purpose and implications of their involvement (The Demographic and Health Survey Program; *The DHS Program - DHS Methodology*). Stringent measures were also taken to protect sensitive information, such as health and personal details, during data transmission and storage. Ethical review boards provided oversight throughout the DHS activities to ensure adherence to ethical standards and guidelines, thereby maintaining the trustworthiness and integrity of the collected data. (*The DHS Program - DHS Methodology*)

3.6 LIMITATIONS

The study is constrained by several factors. Primarily, data in NFHS-5 relied on self-reporting, potentially leading to recall bias; also sensitive topics like domestic violence, may influence the accuracy of responses.. Furthermore, the study's reliance on secondary data may limit its ability to account for subtle contextual factors that could influence the patterns of maternal healthcare utilization. Additionally, the study's criteria for sufficient ANC utilization do not align with the latest WHO recommendations, which advocate for eight or more ANC visits. Moreover, the research primarily examined antenatal care visits and overlooked other crucial health practices during the antenatal phase, like iron supplementation and tetanus toxoid vaccination

CHAPTER 4: ANALYSIS

The analysis chapter serves as the cornerstone of this study, delving deep into the data collected through the National Family Health Survey (NFHS-5) conducted in India between 2019 and 2021 and shedding light on key insights and trends. Through a blend of descriptive analysis and statistical techniques such as regression, notably logistic regression, this chapter aims to uncover patterns, relationships, and associations within the dataset. By applying analytical techniques, the chapter seeks to provide a comprehensive understanding of the research questions at hand and offer valuable insights that contribute to the broader field of study.

4.1 DESCRIPTIVE ANALYSIS

The descriptive analysis is a crucial component of this study, providing a comprehensive overview of the frequency and percentage distribution of Antenatal Care (ANC), Place of Delivery, and Postnatal Care (PNC) against various independent variables. This section offers a detailed understanding of the distribution of these critical maternal healthcare indicators across different demographic and socio-economic factors. By examining the frequency and percentage of ANC, PNC, and place of delivery, this chapter aims to highlight the prevalence and patterns of maternal healthcare utilization among the study population. Furthermore, this analysis serves as a foundation for subsequent inferential statistical tests, offering valuable insights into the relationships and associations between the variables under investigation.

4.1.1 Descriptive Analysis of ANC Utilization

The table 4.1 illustrates the frequency of Antenatal Care (ANC) service utilization among women aged 15–49 years in India, using data from the National Family Health Survey (NFHS-5) conducted from 2019 to 2021. ANC utilization is categorized into less than 4 and greater than equal to 4 instances. The table offers valuable information on the distribution of

ANC utilization across various independent variables among women in India, essential for comprehending maternal healthcare access and utilization trends in the nation.

Table 4.1.: Distribution of ANC utilisation among women aged 15–49 years by different independent variables, NFHS-5 (2019-21), India

Variable	ANC				
	< 4		≥ 4		
	N	%	N	%	Total
Maternal age					
15 - 24	23325	30.93	30310	29.88	53635
25 - 34	43220	57.31	60812	59.95	104032
35 - 49	8863	11.75	10313	10.17	19176
Partner's age					
15 - 24	1041	9.29	1233	8.03	2274
25 - 34	6649	59.37	9283	60.45	15932
35 - 44	2956	26.39	4272	27.82	7228
45 and above	554	4.95	569	3.71	1123
Birth order					
1	21864	28.99	37756	37.22	59620
2	24802	32.89	37568	37.04	62370
3 and above	28742	38.12	26111	25.74	54853
Respondent's education					
no education	20612	27.33	15364	15.15	35976
primary	10587	14.04	11150	10.99	21737
secondary	36239	48.06	56385	55.59	92624
higher	7970	10.57	18536	18.27	26506
Partner's education					
no education	2244	19.74	1706	10.95	3950
primary	1635	14.38	1737	11.15	3372
secondary	5961	52.43	9117	58.52	15078
higher	1529	13.45	3018	19.37	4547
Religion					
Hindu	53749	71.28	76195	75.12	129944
Muslim	10774	14.29	14460	14.26	25234
Christian	7321	9.71	6685	6.59	14006
Other	3564	4.73	4095	4.04	7659

Caste					
SC	16052	22.35	19219	19.97	35271
ST	16615	23.14	18764	19.5	35379
OBC	28252	39.34	38772	40.29	67024
Other	10892	15.17	19481	20.24	30373
Wealth index					
poorest	25679	34.05	19188	18.92	44867
poorer	19000	25.2	21481	21.18	40481
middle	13264	17.59	21305	21	34569
richer	10129	13.43	20925	20.63	31054
richest	7336	9.73	18536	18.27	25872
Respondent working					
no	9098	79.9	12507	80.19	21605
yes	2289	20.1	3089	19.81	5378
Respondent occupation					
non-agricultural	9693	85.12	13632	87.41	23325
agricultural	1694	14.88	1964	12.59	3658
Partner occupation					
non-agricultural	7220	63.51	10810	69.39	18030
agricultural	4149	36.49	4768	30.61	8917
Health insurance coverage					
no	56961	75.54	71328	70.32	128289
yes	18447	24.46	30107	29.68	48554
Mass media exposure					
no	28171	37.36	20826	20.53	48997
yes	47237	62.64	80609	79.47	127846
Autonomy					
low	173	8.66	170	5.95	343
medium	300	15.02	430	15.04	730
high	1524	76.31	2259	79.01	3783
Domestic violence during pregnancy					
no	8820	97.2	12077	97.94	20897
yes	254	2.8	254	2.06	508
Distance to health facility					
not a problem	24136	32.01	42319	41.72	66455
it is a problem	51272	67.99	59116	58.28	110388
Place of residence					
urban	12271	16.27	25704	25.34	37975
rural	63137	83.73	75731	74.66	138868

Region					
north	21701	28.78	24159	23.82	45860
central	8038	10.66	12567	12.39	20605
eastern	17533	23.25	15841	15.62	33374
western	8640	11.46	18138	17.88	26778
southern	5195	6.89	17571	17.32	22766
north-east	14301	18.96	13159	12.97	27460

Maternal age exhibits a significant association with timely ANC attendance. Among women aged 15 to 24 years, 23,325 individuals (30.93%) attended less than 4 ANC visits, while 30,310 (29.88%) attended 4 or more visits. Similarly, for women aged 25 to 34 years, 43,220 (57.31%) attended less than 4 ANC visits, compared to 60,812 (59.95%) who attended 4 or more visits. Additionally, women aged 35 to 49 years displayed different patterns, with 8,863 (11.75%) attending less than 4 ANC visits and 10,313 (10.17%) attending 4 or more visits. Partner's age also demonstrates varying associations with timely ANC attendance. Among partners aged 15 to 24 years, 1,041 individuals (9.29%) were associated with attending less than 4 ANC visits, while 1,233 (8.03%) were associated with attending 4 or more visits. For partners aged 25 to 34 years and 35 to 44 years, the proportions attending less than 4 ANC visits were 6,649 (59.37%) and 2,956 (26.39%) respectively, compared to those attending 4 or more visits. Additionally, women with partners aged 45 and above displayed different patterns, with 554 (4.95%) attending less than 4 ANC visits and 569 (3.71%) attending 4 or more visits.

ANC attendance also differs based on birth order. Among first-born children, 21,864 individuals (28.99%) attended ANC less than four times, while 37,756 (37.22%) attended ANC four or more times. For second-born children, 24,802 (32.89%) attended ANC less than four times, compared to 37,568 (37.04%) who attended ANC four or more times. Notably, for third-born and higher-order children, 28,742 individuals (38.12%) attended ANC less than

four times, while 26,111 (25.74%) attended ANC four or more times. It shows that with increasing birth order ANC utilisation is affected; more so negatively.

ANC attendance varies across different levels of respondent's education. Among individuals with no education, 20,612 (27.33%) attended ANC less than four times, while 15,364 (15.15%) attended ANC four or more times. For those with primary education, 10,587 (14.04%) attended ANC less than four times, compared to 11,150 (10.99%) who attended ANC four or more times. Additionally, for individuals with secondary and higher education, there are noticeable differences in ANC attendance patterns. Partner's education also influences ANC attendance. Among partners with no education, 2,244 (19.74%) attended ANC less than four times, while 1,706 (10.95%) attended ANC four or more times. Similarly, among partners with primary, secondary, and higher education, ANC attendance patterns vary significantly.

ANC attendance differs among various religious groups. Among Hindus, 53,749 individuals (71.28%) attended ANC less than four times, while 76,195 (75.12%) attended ANC four or more times. For Muslims, 10,774 (14.29%) attended ANC less than four times, compared to 14,460 (14.26%) who attended ANC four or more times. Additionally, ANC attendance patterns vary among Christians and individuals from other religious backgrounds. ANC attendance shows variability across different caste categories. Among individuals from the Scheduled Caste (SC) and Scheduled Tribe (ST), as well as Other Backward Classes (OBC) and other caste groups, there are notable differences in ANC attendance patterns.

ANC attendance varies across different wealth index categories. Among the poorest individuals, 25,679 (34.05%) attended ANC less than four times, while 19,188 (18.92%) attended ANC four or more times. Additionally, ANC attendance patterns differ among individuals categorized under poorer, middle, richer, and richest wealth indices. The working

status of respondents also impacts ANC attendance. Among respondents who are not working, 9,098 (79.9%) attended ANC less than four times, while 12,507 (80.19%) attended ANC four or more times. Conversely, among working respondents, 2,289 (20.1%) attended ANC less than four times, compared to 3,089 (19.81%) who attended ANC four or more times. Respondent occupation, particularly in non-agricultural or agricultural sectors, influences ANC attendance. Among those engaged in non-agricultural occupations, 9,693 individuals (85.12%) attended ANC less than four times, while 13,632 (87.41%) attended ANC four or more times. Conversely, among respondents in agricultural occupations, 1,694 (14.88%) attended ANC less than four times, compared to 1,964 (12.59%) who attended ANC four or more times. Similarly, the occupation of the partner plays a role in ANC attendance. Among partners engaged in non-agricultural occupations, 7,220 individuals (63.51%) attended ANC less than four times, while 10,810 (69.39%) attended ANC four or more times. On the other hand, among partners in agricultural occupations, 4,149 (36.49%) attended ANC less than four times, compared to 4,768 (30.61%) who attended ANC four or more times.

Health insurance coverage also impacts ANC attendance. Among individuals without health insurance, 56,961 (75.54%) attended ANC less than four times, while 71,328 (70.32%) attended ANC four or more times. Conversely, among those with health insurance, 18,447 (24.46%) attended ANC less than four times, compared to 30,107 (29.68%) who attended ANC four or more times.

Mass media exposure significantly influences ANC attendance. Among individuals with no mass media exposure, 28,171 (37.36%) attended ANC less than four times, while 20,826 (20.53%) attended ANC four or more times. In contrast, among those with mass media exposure, 47,237 (62.64%) attended ANC less than four times, compared to 80,609 (79.47%) who attended ANC four or more times. This indicates a substantial difference in ANC

attendance based on mass media exposure, with a higher proportion attending ANC four or more times among those exposed to mass media.

Autonomy levels also play a significant role in ANC attendance. Among individuals with low autonomy, 173 (8.66%) attended ANC less than four times, while 170 (5.95%) attended ANC four or more times. Similarly, among those with medium autonomy, 300 (15.02%) attended ANC less than four times, compared to 430 (15.04%) who attended ANC four or more times. Conversely, among individuals with high autonomy, 1,524 (76.31%) attended ANC less than four times, while 2,259 (79.01%) attended ANC four or more times. This indicates a notable difference in ANC attendance based on autonomy levels, with the highest proportion attending ANC four or more times among those with medium autonomy. The experience of domestic violence during pregnancy also affects ANC attendance. Among individuals who experienced no domestic violence during pregnancy, 8,820 (97.2%) attended ANC less than four times, while 12,077 (97.94%) attended ANC four or more times. Conversely, among those who experienced domestic violence during pregnancy, 254 (2.8%) attended ANC less than four times, compared to 254 (2.06%) who attended ANC four or more times. This indicates a significant difference in ANC attendance based on the experience of domestic violence during pregnancy, with the highest proportion attending ANC four or more times among those who did not experience domestic violence.

Distance to health facilities is an essential factor influencing ANC attendance. Among individuals for whom distance is not a problem, 24,136 (32.01%) attended ANC less than four times, while 42,319 (41.72%) attended ANC four or more times. Conversely, among those for whom distance is a problem, 51,272 (67.99%) attended ANC less than four times, compared to 59,116 (58.28%) who attended ANC four or more times. This indicates a significant difference in ANC attendance based on the perceived accessibility of health

facilities, with a higher proportion attending ANC four or more times among those for whom distance is not a problem.

Place of residence also plays a crucial role in ANC attendance. Among individuals residing in urban areas, 12,271 (16.27%) attended ANC less than four times, while 25,704 (25.34%) attended ANC four or more times. In contrast, among those residing in rural areas, 63,137 (83.73%) attended ANC less than four times, compared to 75,731 (74.66%) who attended ANC four or more times. This indicates a substantial difference in ANC attendance based on the place of residence, with a higher proportion attending ANC four or more times among urban residents. The region of residence significantly influences ANC attendance. Among individuals in the North region, 21,701 (28.78%) attended ANC less than four times, while 24,159 (23.82%) attended ANC four or more times. Conversely, in the Central region, 8,038 (10.66%) attended ANC less than four times, compared to 12,567 (12.39%) who attended ANC four or more times. This pattern continues across other regions, with varying proportions attending ANC less than four times versus four or more times. This suggests a considerable variation in ANC attendance based on the region of residence.

4.1.2 Descriptive Analysis of Place of Delivery

Table 4.2 illustrates the distribution of choice of place of delivery among women aged 15–49 years in India, as per the National Family Health Survey (NFHS-5) conducted between 2019 and 2021. It reveals the proportions of deliveries taking place within healthcare institutions versus those occurring outside institutional settings. This breakdown offers valuable insights into the childbirth location preferences prevalent among women across different demographics in India.

Table 4.2.: Distribution of choice of place of delivery of women aged 15–49 years by different independent variables, NFHS-5 (2019-21), India

Variable	Place of Delivery				
	Non-institutional		Institutional		
	N	%	N	%	Total
Maternal age					
15 - 24	5551	25.69	48084	30.98	53635
25 - 34	12405	57.4	91627	59.03	104032
35 - 49	3655	16.91	15521	10	19176
Partner's age					
15 - 24	309	9.39	1965	8.45	2274
25 - 34	1778	54.01	14154	60.84	15932
35 - 44	958	29.1	6270	26.95	7228
45 and above	247	7.5	876	3.77	1123
Birth order					
1	3584	16.58	56036	36.1	59620
2	5956	27.56	56414	36.34	62370
3 and above	12071	55.86	42782	27.56	54853
Respondent's education					
no education	8890	41.14	27086	17.45	35976
primary	4002	18.52	17735	11.42	21737
secondary	8068	37.33	84556	54.47	92624
higher	651	3.01	25855	16.66	26506
Partner's education					
no education	1060	31.57	2890	12.25	3950
primary	636	18.94	2736	11.6	3372
secondary	1492	44.43	13586	57.59	15078
higher	170	5.06	4377	18.56	4547
Religion					
Hindu	12711	58.82	117233	75.52	129944
Muslim	3493	16.16	21741	14.01	25234
Christian	4450	20.59	9556	6.16	14006
Other	957	4.43	6702	4.32	7659
Caste					
SC	3995	19.51	31276	21.19	35271
ST	8102	39.57	27277	18.48	35379
OBC	5995	29.28	61029	41.36	67024
Other	2384	11.64	27989	18.97	30373

Wealth index					
poorest	11517	53.29	33350	21.48	44867
poorer	5497	25.44	34984	22.54	40481
middle	2618	12.11	31951	20.58	34569
richer	1384	6.4	29670	19.11	31054
richest	595	2.75	25277	16.28	25872
Respondent working					
no	2502	74.33	19103	80.89	21605
yes	864	25.67	4514	19.11	5378
Respondent occupation					
non-agricultural	2626	78.02	20699	87.64	23325
agricultural	740	21.98	2918	12.36	3658
Partner occupation					
non-agricultural	1883	56.08	16147	68.45	18030
agricultural	1475	43.92	7442	31.55	8917
Health insurance coverage					
no	16421	75.98	111868	72.07	128289
yes	5190	24.02	43364	27.93	48554
Mass media exposure					
no	11022	51	37975	24.46	48997
yes	10589	49	117257	75.54	127846
Autonomy					
low	51	6.95	292	7.08	343
medium	102	13.9	628	15.24	730
high	581	79.16	3202	77.68	3783
Domestic violence during pregnancy					
no	1837.98	96.29	16133.2	97.54	17971.2
yes	70.7337	3.71	407.586	2.46	478.32
Distance to health facility					
not a problem	5248	24.28	61207	39.43	66455
it is a problem	16363	75.72	94025	60.57	110388
Place of residence					
urban	2167	10.03	35808	23.07	37975
rural	19444	89.97	119424	76.93	138868
Region					
north	5430	25.13	40430	26.04	45860
central	2205	10.2	18400	11.85	20605
eastern	5675	26.26	27699	17.84	33374
western	1325	6.13	25453	16.4	26778
southern	427	1.98	22339	14.39	22766
north-east	6549	30.3	20911	13.47	27460

According to table 4.2 maternal ages appears to influence the choice of place of delivery significantly. Among women aged 15 to 24, 5,551 (25.69%) opted for non-institutional delivery, while 48,084 (30.98%) chose institutional delivery. Similarly, among women aged 25 to 34, 12,405 (57.4%) preferred non-institutional delivery, compared to 91,627 (59.03%) who opted for institutional delivery. The trend continues, with a lower percentage of non-institutional deliveries observed among older age groups. This suggests a positive correlation between maternal age and the likelihood of choosing institutional delivery over non-institutional delivery. Partner's age also plays a role in determining the place of delivery. Among partners aged 15 to 24, 309 (9.39%) preferred non-institutional delivery, while 1,965 (8.45%) opted for institutional delivery. Conversely, among partners aged 25 to 34, 1,778 (54.01%) favored non-institutional delivery, compared to 14,154 (60.84%) who chose institutional delivery. The pattern continues, with a decreasing percentage of non-institutional deliveries observed as partner's age increases. This suggests a relationship between partner's age and the preference for institutional delivery.

Birth order appears to influence the choice of place of delivery significantly. Among first-time mothers, 3,584 (16.58%) opted for non-institutional delivery, while 56,036 (36.1%) chose institutional delivery. Similarly, among mothers with a second birth order, 5,956 (27.56%) preferred non-institutional delivery, compared to 56,414 (36.34%) who chose institutional delivery. The trend reverses among mothers with a birth order of three or more, with a higher percentage opting for institutional delivery. This suggests a correlation between birth order and the preference for institutional delivery, with first-time mothers more inclined towards non-institutional delivery.

Respondent's education level demonstrates a notable association with the choice of place of delivery. Among respondents with no education, 8,890 (41.14%) preferred non-institutional delivery, while 27,086 (17.45%) chose institutional delivery. Conversely, among those with

secondary education, 8,068 (37.33%) favored non-institutional delivery, compared to 84,556 (54.47%) who opted for institutional delivery. The trend suggests that higher levels of education correlate with a higher preference for institutional delivery over non-institutional delivery. Partner's education level also shows a discernible influence on the choice of place of delivery. Among partners with no education, 1,060 (31.57%) preferred non-institutional delivery, while 2,890 (12.25%) chose institutional delivery. In contrast, among partners with secondary education, 1,492 (44.43%) favored non-institutional delivery, compared to 13,586 (57.59%) who opted for institutional delivery. The data suggests that higher levels of partner's education are associated with a higher likelihood of choosing institutional delivery over non-institutional delivery.

Religion appears to have a significant impact on the choice of place of delivery. Among Hindu women, 12,711 (58.82%) preferred non-institutional delivery, while 117,233 (75.52%) chose institutional delivery. In comparison, among Muslim women, 3,493 (16.16%) favored non-institutional delivery, compared to 21,741 (14.01%) who opted for institutional delivery. Similarly, among Christian women, 4,450 (20.59%) preferred non-institutional delivery, compared to 9,556 (6.16%) who chose institutional delivery. The data indicates a varied preference for place of delivery among different religious groups, with Hindu women showing a higher inclination towards institutional delivery.

Caste also demonstrates a significant association with the choice of place of delivery. Among Scheduled Caste (SC) women, 3,995 (19.51%) preferred non-institutional delivery, while 31,276 (21.19%) chose institutional delivery. Similarly, among Scheduled Tribe (ST) women, 8,102 (39.57%) favored non-institutional delivery, compared to 27,277 (18.48%) who opted for institutional delivery. Among Other Backward Class (OBC) women, 5,995 (29.28%) preferred non-institutional delivery, compared to 61,029 (41.36%) who chose institutional delivery. The data suggests a varied preference for place of delivery among

different caste groups, with SC and ST women showing a higher inclination towards non-institutional delivery compared to OBC women.

Wealth index exhibits a significant influence on the choice of place of delivery. Among the poorest women, 11,517 (53.29%) preferred non-institutional delivery, while 33,350 (21.48%) chose institutional delivery. In comparison, among the richest women, 595 (2.75%) preferred non-institutional delivery, compared to 25,277 (16.28%) who opted for institutional delivery. The trend suggests a strong correlation between wealth index and the preference for institutional delivery over non-institutional delivery, with wealthier women more likely to choose institutional delivery.

Respondent's working status showcases a noteworthy association with the choice of place of delivery. Among respondents who are not working, 2,502 (74.33%) preferred non-institutional delivery, while 19,103 (80.89%) chose institutional delivery. Conversely, among working respondents, 864 (25.67%) favored non-institutional delivery, compared to 4,514 (19.11%) who opted for institutional delivery. The data indicates that non-working respondents exhibit a slightly higher preference for institutional delivery compared to working respondents.

Respondent's occupation also appears to influence the choice of place of delivery. Among respondents in non-agricultural occupations, 2,626 (78.02%) preferred non-institutional delivery, while 20,699 (87.64%) chose institutional delivery. In contrast, among respondents in agricultural occupations, 740 (21.98%) favored non-institutional delivery, compared to 2,918 (12.36%) who opted for institutional delivery. The data suggests that respondents in non-agricultural occupations are more inclined towards institutional delivery compared to those in agricultural occupations. Partner occupation also plays a role in determining the choice of place of delivery for women. Among women whose partners are engaged in

agricultural occupations, 1,475 (43.92%) preferred non-institutional delivery, while 7,442 (31.55%) opted for institutional delivery. Conversely, among those whose partners are not engaged in agricultural occupations, 1,883 (56.08%) favoured non-institutional delivery, compared to 16,147 (68.45%) who chose institutional delivery. These findings suggest that women whose partners are not involved in agricultural occupations are more likely to opt for institutional delivery, possibly due to better financial stability or access to healthcare resources.

Health insurance coverage demonstrates a significant impact on the choice of place of delivery. Among women without health insurance coverage, 16,421 (75.98%) preferred non-institutional delivery, while 111,868 (72.07%) chose institutional delivery. Conversely, among women with health insurance coverage, 5,190 (24.02%) favored non-institutional delivery, compared to 43,364 (27.93%) who opted for institutional delivery. The data suggests that women with health insurance coverage are slightly more inclined towards institutional delivery compared to those without coverage.

Mass media exposure appears to influence the choice of place of delivery among women. Among those exposed to mass media, 10,589 (49%) preferred non-institutional delivery, while 117,257 (75.54%) opted for institutional delivery. In contrast, among women not exposed to mass media, 11,022 (51%) favoured non-institutional delivery, compared to 37,975 (24.46%) who chose institutional delivery. These findings suggest that mass media exposure may contribute to greater awareness of the benefits of institutional delivery, leading to a higher preference for such services among exposed women.

Autonomy levels also appear to influence the choice of place of delivery. Among women with low autonomy, 51 (6.95%) preferred non-institutional delivery, while 292 (7.08%) chose institutional delivery. In comparison, among women with high autonomy, 581 (79.16%)

favored non-institutional delivery, compared to 3,202 (77.68%) who opted for institutional delivery. The data suggests that women with higher autonomy levels are more likely to prefer non-institutional delivery compared to those with lower autonomy levels.

Domestic violence during pregnancy showcases a notable association with the choice of place of delivery. Among women who experienced domestic violence during pregnancy, 3.71% preferred non-institutional delivery, while 2.46% chose institutional delivery. In contrast, among women who did not experience domestic violence during pregnancy, 1,837 (96.29%) favored non-institutional delivery, compared to 16,133 (97.54%) who opted for institutional delivery. The data suggests that women who did not experience domestic violence during pregnancy exhibit a higher preference for institutional delivery compared to those who experienced violence.

The distance to the health facility emerges as a significant factor influencing the choice of place of delivery. Among women for whom distance to a health facility is not a problem, 5,248 (24.28%) preferred non-institutional delivery, while 61,207 (39.43%) chose institutional delivery. Conversely, among women for whom distance to a health facility is a problem, 16,363 (75.72%) favored non-institutional delivery, compared to 94,025 (60.57%) who opted for institutional delivery. The data indicates that women facing challenges with proximity to health facilities exhibit a higher preference for non-institutional delivery.

Place of residence also plays a crucial role in determining the choice of place of delivery. Among urban residents, 2,167 (10.03%) preferred non-institutional delivery, while 35,808 (23.07%) chose institutional delivery. In contrast, among rural residents, 19,444 (89.97%) favored non-institutional delivery, compared to 119,424 (76.93%) who opted for institutional delivery. The data suggests that rural residents are more inclined towards non-institutional delivery compared to urban residents. Region exhibits significant variations in the choice of

place of delivery. In the north region, 5,430 (25.13%) preferred non-institutional delivery, while 40,430 (26.04%) chose institutional delivery. Conversely, in the central region, 2,205 (10.2%) favored non-institutional delivery, compared to 18,400 (11.85%) who opted for institutional delivery. Similarly, in the eastern region, 5,675 (26.26%) preferred non-institutional delivery, while 27,699 (17.84%) chose institutional delivery. The data indicates variations across regions, with some regions exhibiting higher preferences for institutional delivery compared to others.

Among the factors analyzed, as per table 4.2, autonomy and distance to the health facility seem to have the strongest impact on the choice of place of delivery. Women with higher autonomy levels and those facing challenges with proximity to health facilities exhibit preferences that align with their respective circumstances. Additionally, rural residents and women without health insurance coverage also show notable preferences for non-institutional delivery. These findings emphasize the importance of addressing factors such as autonomy, accessibility, and healthcare infrastructure in promoting safe delivery practices.

4.1.3 Descriptive Analysis of PNC Utilization

This table presents the distribution of Postnatal Care (PNC) utilization among women aged 15–49 years in India, based on data gathered during the National Family Health Survey (NFHS-5) conducted between 2019 and 2021. PNC utilization is categorized into two groups: care sought within 72 hours of delivery and care sought after 72 hours. Across various independent variables the table provides insights into the frequency and percentage distribution of PNC utilization. This analysis sheds light on the disparities and patterns in postnatal healthcare access and utilization among women in India, offering valuable information for informing targeted interventions and policies aimed at improving maternal and child health outcomes nationwide.

Table 4.3: Distribution of PNC utilisation among women aged 15–49 years by different independent variables, NFHS-5 (2019-21), India

Variable	PNC				
	Within 72hrs		After 72hrs		
	N	%	N	%	Total
Maternal age					
15 - 24	10596	30.27	13240	30.34	23836
25 - 34	20771	59.33	26053	59.71	46824
35 - 49	3641	10.4	4343	9.95	7984
Partner's age					
15 - 24	486	9.18	505	7.62	991
25 - 34	3238	61.13	4053	61.15	7291
35 - 44	1381	26.07	1819	27.44	3200
45 and above	192	3.62	251	3.79	443
Birth order					
1	10989	31.39	16296	37.35	27285
2	12360	35.31	16045	36.77	28405
3 and above	11659	33.3	11295	25.88	22954
Respondent's education					
no education	7760	22.17	7046	16.15	14806
primary	4583	13.09	4866	11.15	9449
secondary	17703	50.57	23873	54.71	41576
higher	4962	14.17	7851	17.99	12813
Partner's education					
no education	832	15.51	765	11.38	1597
primary	679	12.66	820	12.2	1499
secondary	2957	55.14	3917	58.27	6874
higher	895	16.69	1220	18.15	2115
Religion					
Hindu	27469	78.46	34396	78.82	61865
Muslim	4468	12.76	5693	13.05	10161
Christian	1824	5.21	2147	4.92	3971
Other	1247	3.56	1400	3.21	2647
Caste					
SC	7395	21.91	8765	21.11	16160
ST	6780	20.09	7423	17.88	14203
OBC	13667	40.49	17544	42.26	31211
Other	5913	17.52	7787	18.76	13700

Wealth index					
poorest	9610	27.45	9295	21.3	18905
poorer	8056	23.01	9350	21.43	17406
middle	6592	18.83	8894	20.38	15486
richer	5851	16.71	8365	19.17	14216
richest	4899	13.99	7732	17.72	12631
Respondent working					
no	4113	76.56	5412	80.4	9525
yes	1259	23.44	1319	19.6	2578
Respondent occupation					
non-agricultural	4506	83.88	5900	87.65	10406
agricultural	866	16.12	831	12.35	1697
Partner occupation					
non-agricultural	3454	64.4	4619	68.71	8073
agricultural	1909	35.6	2103	31.29	4012
Health insurance coverage					
no	25841	73.81	29990	68.73	55831
yes	9167	26.19	13646	31.27	22813
Mass media exposure					
no	10022	28.63	9377	21.49	19399
yes	24986	71.37	34259	78.51	59245
Autonomy					
low	86	7.64	58	4.63	144
medium	170	15.11	187	14.94	357
high	869	77.24	1007	80.43	1876
Domestic violence during pregnancy					
no	3098.12	95.58	4710.55	97.87	7808.68
yes	143.334	4.42	102.438	2.13	245.772
Distance to health facility					
not a problem	12256	35.01	18237	41.79	30493
it is a problem	22752	64.99	25399	58.21	48151
Place of residence					
urban	6185	17.67	10196	23.37	16381
rural	28823	82.33	33440	76.63	62263

Region					
north	11919	34.05	10205	23.39	22124
central	5133	14.66	5959	13.66	11092
eastern	7047	20.13	8361	19.16	15408
western	4503	12.86	7398	16.95	11901
southern	3435	9.81	7242	16.6	10677
north-east	2971	8.49	4471	10.25	7442

The table 4.3 shows frequency and percentage distribution 0f women aged 15-49 who had delivered the last child during the last five years preceding the survey by select background characteristics. The descriptive analysis of maternal age in relation to timely postnatal check-up (PNC) within 72 hours after delivery reveals interesting insights. Among women aged 15 to 24 years, a total of 10,596 individuals, constituting 30.27% of the sample, underwent timely PNC, while 13,240 individuals (30.34%) sought PNC after 72 hours. In the age group of 25 to 34 years, a higher proportion of 20,771 women (59.33%) received timely PNC, compared to 26,053 (59.71%) who did not. Moreover, in the age category of 35 to 49 years, 3,641 women (10.4%) received timely PNC, while 4,343 (9.95%) sought PNC after 72 hours. This analysis suggests that the likelihood of obtaining timely postnatal care varies across different maternal age groups. While a significant proportion of women aged 25 to 34 years sought timely PNC, the uptake was comparatively lower among younger and older age groups. Partner's age also plays a role in the timely uptake of postnatal check-up (PNC). Among women with partners aged 15 to 24 years, 486 individuals (9.18%) were associated with timely PNC, while 505 (7.62%) were not. In the age group of 25 to 34 years, a higher proportion of 3,238 partners (61.13%) were linked to timely PNC, compared to 4,053 (61.15%) who were not. Moreover, women with partners aged 35 to 44 years and 45 and above showed varying degrees of association with timely PNC, with 1,381 (26.07%) and 192

(3.62%) respectively. This indicates that partners in the age range of 25-34 are more likely to support timely PNC compared to older partners.

Women with a birth order of 2 have the highest percentage of timely PNC (35.31%), followed by those with a birth order of 1 (31.39%) and 3 and above (33.3%). It suggests that women with a second birth order are slightly more likely to seek timely PNC compared to those with a first or higher birth order. Women with secondary education have the highest percentage of timely PNC (50.57%), followed by those with higher education (14.17%), primary education (13.09%), and no education (22.17%). This indicates that women with higher levels of education are more likely to seek timely PNC. Women whose partners have secondary education have the highest percentage of timely PNC (55.14%), followed by those with higher education (16.69%), primary education (12.66%), and no education (15.51%). It suggests that partners with higher education levels are more likely to support timely PNC.

As seen in the table, women of the Hindu religion have the highest percentage of timely postnatal check-ups (78.46%), followed by Muslims (12.76%), Christians (5.21%), and others (3.56%). This indicates that Hindu women are more likely to seek timely postnatal care compared to women of other religious affiliations. Among different castes, women classified under the Other Backward Classes (OBC) category have the highest percentage of timely postnatal check-ups (40.49%), followed by Scheduled Castes (SC) (21.91%), Scheduled Tribes (ST) (20.09%), and others (17.52%). It suggests that women belonging to OBCs are more likely to avail themselves of timely postnatal care compared to women from other caste groups. Also women in the richest wealth index category have the highest percentage of timely postnatal check-ups (13.99%), followed by the poorer (23.01%), middle (18.83%), richest (16.71%), and poorest (27.45%) categories. This indicates that women from wealthier households are more likely to access timely postnatal care compared to those from poorer households.

After considering occupation, it is seen that women who are not engaged in agricultural work have a higher percentage of timely postnatal check-ups (83.88%) compared to those engaged in agricultural work (16.12%). This suggests that women employed in non-agricultural sectors are more likely to seek timely postnatal care compared to those working in agriculture. Similarly, women whose partners are engaged in non-agricultural occupations have a higher percentage of timely postnatal check-ups (64.4%) compared to those whose partners are engaged in agricultural occupations (35.6%). This implies that partners with non-agricultural occupations are more supportive of timely postnatal care compared to those with agricultural occupations.

Women with health insurance coverage have a higher percentage of timely postnatal check-ups (26.19%) compared to those without health insurance coverage (73.81%). This indicates that access to health insurance may positively influence the likelihood of women seeking timely postnatal care. Women with exposure to mass media have a higher percentage of timely postnatal check-ups (71.37%) compared to those without mass media exposure (28.63%). This suggests that access to mass media may contribute to increased awareness and knowledge about the importance of postnatal care, leading to higher utilization of timely services.

Women with high autonomy levels have the highest percentage of timely postnatal check-ups (77.24%), followed by those with medium autonomy (15.11%) and low autonomy (7.64%). This highlights the potential role of autonomy in decision-making regarding healthcare utilization, with higher autonomy associated with increased likelihood of seeking timely postnatal care. Women who experienced domestic violence during pregnancy have a lower percentage of timely postnatal check-ups (4.42%) compared to those who did not experience domestic violence (95.58%). This suggests that domestic violence may act as a barrier to accessing timely postnatal care services. Women for whom distance to a health facility is not

a problem have a higher percentage of timely postnatal check-ups (35.01%) compared to those for whom distance is a problem (64.99%). This indicates that proximity to health facilities plays a crucial role in determining the likelihood of seeking timely postnatal care.

Rural women have a higher percentage of timely postnatal check-ups (82.33%) compared to urban women (17.67%). This contrasts with common assumptions about urban areas having better access to healthcare services. The higher percentage among rural women could be attributed to factors such as community-based healthcare initiatives or cultural practices that prioritize maternal and child health in rural settings. Variations exist in the percentage of timely postnatal check-ups across different regions. The North-East region has the lowest percentage (8.49%), followed by the Southern region (9.81%). In contrast, the Central region has a relatively higher percentage (14.66%). These regional disparities may reflect differences in healthcare infrastructure, socio-economic factors, or cultural norms related to maternal and child health practices.

4.2. REGRESSION ANALYSIS

The regression analysis embarks on a detailed exploration of the relationships between key variables in the study, aiming to uncover significant predictors and their impact on maternal healthcare outcomes. By employing regression models, we seek to elucidate the factors influencing Antenatal Care (ANC), Place of Delivery, and Postnatal Care (PNC) among women aged 15-49 in India. The analysis delves into the statistical associations between independent variables with dependent variables. The regression analysis aims to provide valuable insights into the determinants of maternal healthcare utilization, paving the way for informed policy decisions and targeted interventions to enhance maternal and child health outcomes in the country.

4.2.1 Factors Associated With ANC Utilization from Multivariate Analysis

The table 4.4 presents the results of a multivariate logistic regression analysis examining the determinants of Antenatal Care (ANC) utilization among women aged 15–49 years who had at least one live birth in the last 5 years preceding the survey. The analysis highlights significant factors influencing ANC utilization, including odds ratios, p-values, confidence intervals, and reference groups.

Table 4.4: Results of logistic regression analysis of determinants of ANC utilization in India, NFHS-5

ANC	Odds Ratio	p-value	95% CI Interval		Sig.
Maternal age					
15 - 24	1	.	.	.	
25 - 34	1.322	0.007	1.078	1.62	***
35 - 49	1.379	0.04	1.015	1.872	**
Partner's age					
15 - 24	1	.	.	.	
25 - 34	0.928	0.657	0.666	1.292	
35 - 44	1.121	0.542	0.776	1.619	
45 and above	0.841	0.467	0.527	1.342	
Mass media exposure					
no	1	.	.	.	
yes	1.17	0.076	0.984	1.393	*
Birth order					
1	1	.	.	.	
2	0.943	0.536	0.783	1.135	
3 and above	0.765	0.012	0.621	0.943	**
Health insurance coverage					
no	1	.	.	.	
yes	1.213	0.011	1.045	1.407	**
Respondent's education					
no education	1	.	.	.	
primary	1.246	0.061	0.99	1.568	*
secondary	1.348	0.005	1.093	1.663	***
higher	1.433	0.033	1.029	1.997	**

Partner's education					
no education	1	.	.	.	
primary	0.958	0.721	0.755	1.215	
secondary	0.958	0.689	0.775	1.183	
higher	0.931	0.657	0.68	1.276	
Respondent working					
no	1	.	.	.	
yes	1.068	0.456	0.899	1.268	
Autonomy					
low	1	.	.	.	
medium	1.289	0.113	0.942	1.763	
high	1.608	0.001	1.223	2.114	***
Distance to health facility					
not a problem	1	.	.	.	
it is a problem	0.827	0.014	0.711	0.962	**
Religion					
Hindu	1	.	.	.	
Muslim	0.846	0.266	0.63	1.136	
Christian	0.709	0.02	0.531	0.948	**
Other	0.796	0.169	0.575	1.102	
Wealth index					
poorest	1	.	.	.	
poorer	1.3	0.008	1.072	1.577	***
middle	1.591	0	1.256	2.017	***
richer	1.565	0.002	1.181	2.073	***
richest	1.768	0.002	1.232	2.538	***
Place of residence					
urban	1	.	.	.	
rural	0.916	0.418	0.741	1.132	
Domestic violence during pregnancy					
no	1	.	.	.	
yes	0.882	0.508	0.608	1.28	
Caste					
SC	1	.	.	.	
ST	1.562	0	1.253	1.946	***
OBC	1.097	0.353	0.902	1.334	
Other	1.291	0.065	0.984	1.692	*

Respondent occupation					
non-agricultural	1	.	.	.	
agricultural	1.014	0.885	0.84	1.224	
Partner occupation					
non-agricultural	1	.	.	.	
agricultural	0.857	0.093	0.716	1.026	*
Region					
north	1	.	.	.	
central	1.577	0.001	1.214	2.049	***
eastern	1.08	0.557	0.835	1.397	
western	1.729	0	1.332	2.245	***
southern	2.446	0	1.894	3.159	***
north-east	1.042	0.781	0.781	1.39	
constant	0.351	0	0.203	0.607	***

Women aged 25-34 exhibit significantly increased odds (OR = 1.322, p < .01, 95% CI: 1.078-1.620) of attending ANC visits in comparison to the reference group, which comprises younger women aged 15-24 years. This implies that women in the 25-34 age brackets are 1.322 times more likely to engage in higher ANC utilization than women aged 15-24. Moreover, a similar pattern was observed in women aged 35 and above. They demonstrate elevated odds (OR = 1.379, p < .05, 95% CI: 1.015-1.872) of ANC visits when compared with women in the 15-24 age group.

Results revealed that partner age did not significantly impact a woman's likelihood of attending ANC visits, as indicated by non-significant p-values across all partner age groups. Specifically, women with partners aged 25 - 34, 35 - 44, and 45 and above did not exhibit statistically significant differences in their odds of ANC visits compared to the reference group i.e. women with partner aged 18-24 years. It is seen that women with partners aged 35 - 44 have an odds ratio slightly above 1(OR: 0.841, p = 0.467, 95% CI: 0.776-1.619), while those with partners aged 25 - 34 and 45 and above have odds ratios slightly below 1(OR:

0.928, p = 0.657, 95% CI: 0.666-1.292). Similarly, women with partners aged 45 and above demonstrated an odds ratio of (OR: 0.841, p = 0.467, CI: 0.527-1.342). However, none of these associations are statistically significant, as indicated by the p-values exceeding conventional thresholds for significance (p>0.05).

The results show that women exposed to mass media did not exhibit a statistically significant variance in their likelihood of attending ANC visits (OR = 1.17, p < 0.1, 95% CI: 0.984-1.393). Although the odds ratio indicates a minor rise in the probability of ANC utilization among those with exposure to mass media, the p-value slightly exceeds the typical threshold for statistical significance. This suggests a tendency towards more ANC visits among women with access to mass media but necessitates careful consideration due to the marginal significance level. The likelihood of ANC underutilization increased with increasing birth order. Specifically, women with a birth order of 2 did not exhibit a statistically significant difference in their likelihood of attending ANC visits compared to those with a first birth order. Women with a second birth order were approximately 0.943 times as likely to utilize ANC services as those with a first birth order, although this association did not reach statistical significance (OR: 0.943 , p = 0.536, 95% CI: 0.783-1.135). Conversely, women with a birth order of 3 or more demonstrated a notable decrease in their odds of attending ANC visits compared to those with a first birth order. The odds ratio indicates that women with higher birth orders were approximately 0.765 times as likely to utilize ANC services as those with a first birth order, with this difference being statistically significant (OR: 0.765, 95% CI: 0.621-0.943). The analysis revealed that health insurance coverage was a significant factor in promoting ANC utilization among women and women with health insurance coverage have higher odds of attending ANC visits. Specifically, women with health insurance coverage were more likely to attend ANC visits compared to those without coverage (OR: 1.213, p < 0.05, 95% CI: 1.045-1.407). This indicates that health insurance

coverage is positively associated with the likelihood of utilizing ANC services, and this association is statistically significant.

In the table 4.4, it is evident that women with primary education displayed a slightly higher odds ratio (OR: 1.246, $p < 0.1$, 95% CI: 0.990-1.568) compared to those without any education, indicating a potential trend towards increased ANC utilization. However, this association did not achieve statistical significance at the conventional 0.05 level. Similarly, women with secondary education exhibited a significantly higher likelihood of utilizing ANC services, being 1.348 times more likely than those without education (OR: 1.348, $p < 0.01$, 95% CI: 1.093-1.663). Furthermore, women with higher education levels demonstrated a notable increase in the odds of attending ANC visits compared to those with no education. Specifically, women with higher education were 1.433 times more likely to utilize ANC services, underscoring the strong link between higher education attainment and ANC utilization (OR: 1.433, $p < 0.05$, 95% CI: 1.029-1.997). As for the partner's education, compared to partners with no education, those with primary education exhibited a marginal decrease in the odds ratio (OR: 0.958), although this change did not reach statistical significance ($p = 0.721$, 95% CI: 0.755-1.215). Similarly, partners with secondary education also displayed a slight decrease in odds ratio (OR: 0.958), with no significant statistical difference observed ($p = 0.689$, 95% CI: 0.775-1.183). Likewise, those with higher education levels showed a minimal decrease in odds ratio (OR: 0.931), again lacking statistical significance ($p = 0.657$, 95% CI: 0.680-1.276).

The analysis suggest a subtle trend towards increased ANC utilization among working respondents compared to non-working ones, although this difference is not statistically significant. Compared to non-working respondents (the reference category), those who are working show a slightly elevated odds ratio of 1.068, indicating a marginal increase in the likelihood of attending ANC visits (OR: 1.068, $p = 0.456$, 95% CI: 0.899-1.268). However,

this association does not reach statistical significance at the conventional 0.05 level. The impact of autonomy on ANC utilization reveals that women with medium autonomy, in comparison to those with low autonomy, present a slightly elevated odds ratio of 1.289, signifying a modest rise in the probability of attending ANC visits (OR: 1.289, p = 0.113, 95% CI: 0.942-1.763). However, this relationship fails to achieve statistical significance at the standard 0.05 threshold. Conversely, women with high autonomy display a notably higher odds ratio of 1.608, indicating a significant increase in the likelihood of ANC visits when compared to those with low autonomy (OR: 1.608, p < 0.01, 95% CI: 1.223-2.114). This correlation attains statistical significance at the 0.05 level, underscoring that women with high autonomy levels are considerably more inclined to utilize ANC services.

The study found that the distance to the health facility has a significant impact on ANC utilization. Specifically, when compared to situations where distance is not a problem, instances where distance poses an issue show a lower odds ratio of 0.827 (p < 0.05, 95% CI: 0.711-0.962). This indicates a notable decrease in the likelihood of attending ANC visits when facing difficulties with proximity to health facilities. This association is statistically significant at the 0.05 level, suggesting that when distance becomes a barrier, womenare less likely to utilize ANC services. In other words, the further the health facility is, the less likely women are to attend ANC visits. The relation between religion and ANC visits suggests that compared to women identifying as Hindu, those identifying as Muslim exhibit a slightly lower odds ratio of 0.846 (p = 0.266, 95% CI: 0.630-1.136), indicating a trend towards decreased likelihood of attending ANC visits, although this association does not reach statistical significance. Conversely, women identifying as Christian display a notably lower odds ratio of 0.709 (p < 0.05, 95% CI: 0.531-0.948), indicating a significant decrease in the likelihood of ANC visits compared to Hindus. This association is statistically significant at the 0.05 level, highlighting that women identifying as Christian are significantly less inclined

to utilize ANC services compared to Hindus. Similarly, women identifying with other religions also show a lower odds ratio of 0.796 ($p = 0.169$, 95% CI: 0.575-1.102), suggesting a decreased likelihood of ANC visits compared to Hindus, although this difference is not statistically significant.

The influence of wealth index on ANC attendance reveals compelling results. In comparison to women classified in the poorest wealth index category, those categorized as poorer exhibit a higher odds ratio of 1.3 ($p < 0.01$, 95% CI: 1.072-1.577), indicating an increased probability of attending ANC visits. This underscores that women in the poorer wealth category are significantly more likely to utilize ANC services than those in the poorest category. Moreover, women classified under the middle wealth index demonstrate a substantially higher odds ratio of 1.591 ($p < 0.01$, 95% CI: 1.256-2.017), signifying a significant increase in ANC attendance compared to the poorest wealth category. Similarly, women in the richer and richest wealth index categories also show notably higher odds ratios of 1.565 ($p = 0.002$, 95% CI: 1.181-2.073) and 1.768 ($p = 0.002$, 95% CI: 1.232-2.538), respectively. These results indicate significant enhancements in ANC utilization among women in the richer and richest wealth categories compared to the poor category. Both associations are statistically significant, indicating that women in the richer and richest wealth categories are significantly more likely to engage with ANC services than those in the poor category. The impact of place of residence on ANC visits shows that in comparison to women living in urban areas, those residing in rural settings show a marginally lower odds ratio of 0.916 ($p = 0.418$, 95% CI: 0.741-1.132), though this disparity doesn't achieve statistical significance. This indicates a potential inclination towards reduced ANC utilization among rural inhabitants compared to their urban counterparts, although this difference isn't statistically significant.

The logistic regression analysis on the impact of domestic violence during pregnancy on ANC visits reveals that women who experienced domestic violence during pregnancy exhibit

a slightly lower odds ratio of 0.882 (p = 0.508, 95% CI: 0.608-1.28) compared to those who did not, although this difference does not reach statistical significance. This suggests a potential trend towards decreased ANC utilization among women experiencing domestic violence during pregnancy, although the association lacks statistical significance. The impact of caste on ANC visits reveals significant insights. While women from Scheduled Tribe (ST) backgrounds show a notably higher odds ratio of 1.562 (p < 0.01, 95% CI: 1.253-1.946) compared to Scheduled Caste (SC) individuals, indicating a substantial increase in ANC utilization, women belonging to Other Backward Classes (OBC) exhibit a relatively lower odds ratio of 1.097 (p = 0.353, 95% CI: 0.902-1.334). This suggests a less pronounced effect on ANC visits compared to those from SC backgrounds, although this difference does not achieve statistical significance. Likewise, women categorized under the 'Other' caste demonstrate a slightly elevated odds ratio of 1.291 (p < 0.1, 95% CI: 0.984-1.692), indicating a potential but non-significant trend towards increased ANC utilization.

The analysis regarding respondent occupation sheds light on significant factors influencing ANC visits. Agricultural workers, demonstrate a slightly elevated odds ratio of 1.014 (p = 0.885, 95% CI: 0.84-1.224) compared to women engaged in non-agricultural occupations, although this difference does not reach statistical significance. This suggests that the type of occupation may have minimal impact on ANC utilization among individuals, with agricultural occupation showing a marginal effect compared to non-agricultural roles, albeit not statistically significant. Women with partners employed in agricultural sectors exhibit a slightly lower odds ratio of 0.857 (p < 0.1, 95% CI: 0.716-1.026) compared to partners in non-agricultural occupations, indicating a trend towards decreased likelihood of ANC utilization. This suggests that the partner's occupation, particularly in agriculture, may play a role in ANC visits, with women partnered with agricultural workers potentially showing a

lower inclination towards ANC services compared to those partnered with women in non-agricultural occupations, albeit not highly statistically significant.

The logistic regression analysis delving into regional disparities in ANC visits unveils compelling patterns. Compared to women in the northern region, those residing in the central region exhibit a significantly higher odds ratio of 1.577 (p = 0.001, 95% CI: 1.214-2.049), indicating a notable increase in ANC utilization. Similarly, women in the western region demonstrate a substantially higher odds ratio of 1.729 (p = 0, 95% CI: 1.332-2.245), while those in the southern region exhibit a remarkable odds ratio of 2.446 (p = 0, 95% CI: 1.894-3.159). Conversely, women in the eastern and north-eastern regions display odds ratios of 1.08 (p = 0.557, 95% CI: 0.835-1.397) and 1.042 (p = 0.781, 95% CI: 0.781-1.39), respectively, although these differences are not statistically significant. These findings underscore substantial regional variations in ANC utilization, with women in the central, western, and southern regions demonstrating significantly higher likelihoods of ANC visits compared to those in the northern region.

4.2.2 Factors Associated With Choice of Place of Delivery from Multivariate Analysis

Factors associated with the choice of place of delivery were examined through a comprehensive multivariate analysis, drawing insights from a diverse range of determinants. Table 4.5 depicts the results of logistic regression on the determinants of institutional delivery in India among the women aged 15–49 years who had at least one live birth in the last 5 years preceding the survey which stated that there was a significant difference in the likelihood of delivering at the institution.

Table 4.5 Results of logistic regression analysis of determinants of institutional delivery in India, NFHS-5

Institutional Delivery	Odds Ratio	p-value	[95% Conf. Interval]		Sig
Maternal age					
15 - 24	1	.	.	.	
25 - 34	1.175	0.316	0.857	1.612	
35 - 49	0.869	0.532	0.56	1.35	
Partner's age					
15 - 24	1	.	.	.	
25 - 34	1.27	0.318	0.795	2.029	
35 - 44	1.593	0.082	0.943	2.692	*
45 and above	1.795	0.073	0.946	3.405	*
Mass media exposure					
no	1	.	.	.	
yes	1.548	0	1.242	1.929	***
Birth order					
1	1	.	.	.	
2	0.621	0.004	0.449	0.859	***
3 and above	0.398	0	0.287	0.554	***
Health insurance coverage					
no	1	.	.	.	
yes	1.19	0.117	0.957	1.478	
Respondent's education					
no education	1	.	.	.	
primary	1.669	0.001	1.25	2.228	***
secondary	2.366	0	1.79	3.127	***
higher	5.123	0	2.473	10.613	***
Partner's education					
no education	1	.	.	.	
primary	0.971	0.843	0.725	1.301	
secondary	1.01	0.945	0.772	1.32	
higher	1.182	0.565	0.669	2.09	
Respondent working					
no	1	.	.	.	
yes	1.042	0.738	0.819	1.324	

Autonomy					
low	1	.	.	.	
medium	0.896	0.641	0.565	1.421	
high	1.039	0.851	0.697	1.549	
Distance to health facility					
not a problem	1	.	.	.	
it is a problem	0.78	0.039	0.616	0.987	**
Religion					
Hindu	1	.	.	.	
Muslim	0.754	0.207	0.486	1.169	
Christian	0.403	0	0.271	0.601	***
Other	0.781	0.308	0.485	1.257	
Wealth index					
poorest	1	.	.	.	
poorer	1.357	0.016	1.058	1.741	**
middle	1.865	0.001	1.294	2.69	***
richer	1.771	0.022	1.086	2.886	**
richest	2.286	0.033	1.067	4.896	**
Place of residence					
urban	1	.	.	.	
rural	0.829	0.329	0.569	1.208	
Domestic violence during pregnancy					
no	1	.	.	.	
yes	0.594	0.034	0.367	0.96	**
Caste					
SC	1	.	.	.	
ST	0.749	0.071	0.548	1.025	*
OBC	1.052	0.752	0.768	1.44	
Other	0.948	0.82	0.597	1.506	
Respondent occupation					
non-agricultural	1	.	.	.	
agricultural	0.922	0.542	0.71	1.197	
Partner occupation					
non-agricultural	1	.	.	.	
agricultural	0.896	0.39	0.697	1.151	

Region					
north	1	.	.	.	
central	1.305	0.175	0.888	1.916	
eastern	0.893	0.525	0.63	1.266	
western	1.635	0.019	1.084	2.465	**
southern	4.79	0	2.707	8.476	***
north-east	0.709	0.106	0.467	1.076	
constant	3.564	0.002	1.621	7.837	***

The table 4.5 shows that women aged 25-34 display a slightly elevated odds ratio of 1.175 (p = 0.316, 95% CI: 0.857-1.612), indicating a trend towards increased likelihood of choosing institutional delivery, although this difference does not reach statistical significance. Conversely, women aged 35 and above exhibit a slightly lower odds ratio of 0.869 (p = 0.532, 95% CI: 0.56-1.35), suggesting a potential decrease in the likelihood of choosing institutional delivery compared to those aged 18-24, although this association is not statistically significant. These findings highlight potential age-related trends in the choice of delivery place. Examining institutional delivery concerning partner age, notable patterns emerge. Women with partners aged 25-34 exhibit a slightly elevated odds ratio of 1.27 (p = 0.318, 95% CI: 0.795-2.029), indicating a potential trend towards increased likelihood of opting for institutional delivery, although this difference is not statistically significant. Conversely, women with partners aged 35-44 demonstrate a higher odds ratio of 1.593 (p < 0.1, 95% CI: 0.943-2.692), suggesting a possible increase in the likelihood of choosing institutional delivery compared to those aged 18-24, this association approaches statistical significance. Similarly, women with partners aged 45 and above display a higher odds ratio of 1.795 (p < 0.1, 95% CI: 0.946-3.405), indicating a potential further increase in the likelihood of opting for institutional delivery compared to the youngest age group, although this finding also approaches statistical significance.

Women with exposure to mass media exhibit a notably higher odds ratio of 1.548 ($p < 0.01$, 95% CI: 1.242-1.929), suggesting a distinct propensity towards choosing institutional delivery. This finding underscores the influential role played by mass media in promoting the utilization of institutional delivery services. Birth order emerges as a crucial determinant of institutional delivery, evident from the logistic regression analysis. Women with a second birth order exhibit a significantly reduced odds ratio of 0.621 ($p < 0.01$, 95% CI: 0.449-0.859) compared to those with a first birth order, indicating a notable decline in the likelihood of choosing institutional delivery. This finding underscores the substantial impact of birth order on healthcare-seeking behaviours, as highlighted by the statistical significance of this association. Moreover, women with a birth order of three or more demonstrate an even lower odds ratio of 0.398 ($p < 0.01$, 95% CI: 0.287-0.554), emphasizing a significant decrease in the inclination towards institutional delivery.

The impact of health insurance coverage on the place of delivery is noteworthy. Women with health insurance show a slightly elevated odds ratio of 1.19 ($p = 0.117$, 95% CI: 0.957-1.478) compared to those without insurance. Although this distinction does not achieve statistical significance, it hints at a potential inclination towards opting for institutional delivery among women with health insurance coverage.

The analysis on institutional delivery and respondent education levels reveals compelling findings. In comparison to women with no education, those with primary education exhibit a significantly higher odds ratio of 1.669 ($p < 0.01$, 95% CI: 1.25-2.228), indicating a notable increase in the inclination towards institutional delivery. This relationship is statistically significant, emphasizing the pivotal role of primary education in shaping healthcare-seeking behaviours related to delivery. Similarly, women with secondary education demonstrate an even higher odds ratio of 2.366 ($p < 0.01$, 95% CI: 1.79-3.127), indicating a substantial elevation in the preference for institutional delivery compared to those with no education.

This association is also statistically significant, underscoring the significant impact of secondary education on delivery preferences. Furthermore, women with higher education levels show the highest odds ratio of 5.123 ($p < 0.01$, 95% CI: 2.473-10.613), highlighting a remarkable increase in the likelihood of choosing institutional delivery over those with no education. This result emphasizes the influential role of higher education in promoting the utilization of institutional delivery, illustrating a stark contrast in healthcare-seeking behaviours based on educational attainment. The logistic regression analysis on institutional delivery concerning partner education reveals nuanced findings. Compared to women with partners having no education, those with partners having primary education demonstrate a slightly lower odds ratio of 0.971 ($p = 0.843$, 95% CI: 0.725-1.301), indicating a marginal decrease in the likelihood of opting for institutional delivery, although this difference is not statistically significant. Similarly, women with partners having secondary education exhibit an odds ratio of 1.01 ($p = 0.945$, 95% CI: 0.772-1.32), suggesting no substantial difference in the likelihood of institutional delivery compared to those with partners having no education. Additionally, women with partners having higher education levels show a slightly elevated odds ratio of 1.182 ($p = 0.565$, 95% CI: 0.669-2.09), indicating a trend towards increased likelihood of institutional delivery, although this association lacks statistical significance. Overall, these findings suggest that partner education may have limited influence on the decision to opt for institutional delivery.

The respondent working status indicates that women who are employed demonstrate a slightly elevated odds ratio of 1.042 ($p = 0.738$, 95% CI: 0.819-1.324) in likelihood of institutional delivery compared to those who are not employed. However, this difference is not statistically significant, suggesting that there may be minimal impact of respondent working status on the likelihood of opting for institutional delivery. The analysis of autonomy levels' impact on institutional delivery reveals intriguing insights. Women with medium

autonomy show a slight decrease in the odds ratio (OR: 0.896, p = 0.641, 95% CI: 0.565-1.421) compared to those with low autonomy, although this difference lacks statistical significance. Similarly, women with high autonomy levels display a marginal increase in the odds ratio (OR: 1.039, p = 0.851, 95% CI: 0.697-1.549) compared to those with low autonomy, yet statistical significance is not observed. These findings suggest that while autonomy levels may influence institutional delivery, the effect appears to be minimal and not statistically significant.

The proximity of health facilities is a significant factor in determining the choice of delivery location. When distance poses a challenge, women display a lower odds ratio of 0.78 ($p < 0.05$, 95% CI: 0.616-0.987) compared to those for whom distance is not an issue, indicating a reduced likelihood of opting for institutional delivery. This relationship is statistically significant at the 0.05 level, implying that the closeness of healthcare facilities has a critical impact on the decision to select institutional delivery.

The examination of religion's impact on institutional delivery yields noteworthy insights. Hindus serve as the reference point with an odds ratio of 1. Comparatively, Muslims display a reduced odds ratio of 0.754 (p = 0.207, 95% CI: 0.486-1.169), suggesting a potential inclination towards lower institutional delivery rates, although this difference lacks statistical significance. In contrast, Christians exhibit a significantly lower odds ratio of 0.403 ($p < 0.05$, 95% CI: 0.271-0.601), indicating a notable decrease in the likelihood of opting for institutional delivery compared to Hindus. This significant association underscores a substantial difference in institutional delivery utilization between Christians and Hindus. Similarly, women identifying with other religions demonstrate a lower odds ratio of 0.781 (p = 0.308, 95% CI: 0.485-1.257), implying a potential decrease in the likelihood of selecting institutional delivery compared to Hindus, albeit lacking statistical significance.

The analysis of institutional delivery concerning wealth index reveals compelling findings. Women categorized as poorest serve as the baseline, exhibiting an odds ratio of 1. When compared to this group, those classified as poorer demonstrate a notably higher odds ratio of 1.357 ($p < 0.05$, 95% CI: 1.058-1.741), indicating an increased likelihood of opting for institutional delivery. Similarly, women in the middle wealth index category exhibit a substantially higher odds ratio of 1.865 ($p < 0.01$, 95% CI: 1.294-2.69), suggesting a significant increase in the likelihood of choosing institutional delivery compared to the poorest group. Likewise, women classified under the richer and richest wealth index categories also display notably higher odds ratios of 1.771 ($p < 0.05$, 95% CI: 1.086-2.886) and 2.286 ($p < 0.05$, 95% CI: 1.067-4.896), respectively. These findings emphasize significant increases in the likelihood of institutional delivery among women in the richer and richest wealth categories compared to the poorest group.

Institutional delivery odds ratios varied slightly based on place of residence. While women residing in urban areas served as the reference point with an odds ratio of 1, those in rural areas exhibited a slightly lower odds ratio of 0.829 ($p = 0.329$, 95% CI: 0.569-1.208), though this difference was not statistically significant. This suggests a trend towards decreased likelihood of opting for institutional delivery among rural residents, although the association lacks statistical significance. The likelihood of institutional delivery appears to be influenced by experiences of domestic violence during pregnancy. Women reporting domestic violence during pregnancy had a significantly lower odds ratio of 0.594 ($p < 0.05$, 95% CI: 0.367-0.96) compared to those who did not report such experiences. This indicates a notable decrease in the likelihood of opting for institutional delivery among women who experienced domestic violence during pregnancy.

The relation between institutional delivery and caste presents interesting insights. Women belonging to Scheduled Tribes (ST) demonstrate a slightly lower odds ratio of 0.749 ($p =$

0.071, 95% CI: 0.548-1.025) compared to those from Scheduled Castes (SC). Although this difference is not statistically significant at the conventional level, it suggests a potential trend towards decreased likelihood of opting for institutional delivery among women from ST backgrounds compared to SC. On the other hand, women categorized under Other Backward Classes (OBC) and those classified as Other show odds ratios of 1.052 ($p = 0.752$, 95% CI: 0.768-1.44) and 0.948 ($p = 0.82$, 95% CI: 0.597-1.506), respectively. These findings suggest that caste may have minimal impact on the likelihood of choosing institutional delivery.

The logistic regression results for institutional delivery concerning respondent and partner occupations show interesting trends. For women, those in agricultural occupations have a slightly lower odds ratio of 0.922 ($p = 0.542$, 95% CI: 0.71-1.197) compared to non-agricultural workers, although this difference is not statistically significant. Similarly, women with partners in agricultural occupations also exhibit a slightly lower odds ratio of 0.896 ($p = 0.39$, 95% CI: 0.697-1.151) compared to those in non-agricultural occupations, with no statistical significance observed. These findings suggest that occupation type may have minimal impact on the likelihood of opting for institutional delivery.

Region of residence was significantly associated with choice of place of delivery. The logistic regression results for institutional delivery concerning regions highlight significant variations. In comparison to the North region, women residing in the Central region exhibit a slightly higher odds ratio of 1.305 ($p = 0.175$, 95% CI: 0.888-1.916), although this difference lacks statistical significance. Similarly, those in the Eastern region display a lower odds ratio of 0.893 ($p = 0.525$, 95% CI: 0.63-1.266), with no statistical significance observed. Conversely, women in the Western region demonstrate a notably higher odds ratio of 1.635 ($p < 0.05$, 95% CI: 1.084-2.465), indicating a significant increase in the likelihood of institutional delivery compared to the North region. Moreover, women in the Southern region show a substantially higher odds ratio of 4.79 ($p < 0.01$, 95% CI: 2.707-8.476), suggesting a

significant increase in the propensity for institutional delivery. However, those in the North-East region exhibit a lower odds ratio of 0.709 (p = 0.106, 95% CI: 0.467-1.076), although this difference is not statistically significant. These results indicate significant regional disparities in the likelihood of opting for institutional delivery.

4.2.3 Factors Associated With PNC utilisation from Multivariate Analysis

Table 4.6 demonstrates the results of the multivariate analyses on the use of postnatal care by women aged 15-49 in India. This regression analysis offers a systematic framework to explore the relationship between independent variables and prenatal care (PNC) utilization, shedding light on the factors that influence the frequency and adequacy of PNC services accessed by women.

Table 4.6 Results of logistic regression analysis of PNC utilization in India, NFHS-5

PNC within 72hrs	Odds Ratio	p-value	[95% Conf. Interval]		Sig
Maternal age					
15 - 24	1	.	.	.	
25 - 34	1.099	0.521	0.824	1.465	
35 - 49	0.91	0.667	0.592	1.399	
Partner's age					
15 - 24	1	.	.	.	
25 - 34	0.968	0.891	0.608	1.542	
35 - 44	1.15	0.596	0.686	1.93	
45 and above	1.342	0.388	0.689	2.613	
Mass media exposure					
no	1	.	.	.	
yes	1.087	0.514	0.847	1.394	
Birth order					
1	1	.	.	.	
2	0.777	0.051	0.603	1.001	*
3 and above	0.538	0	0.403	0.719	***
Health insurance coverage					
no	1	.	.	.	
yes	1.163	0.146	0.949	1.427	

Respondent's education					
no education	1	.	.	.	
primary	0.891	0.504	0.634	1.251	
secondary	0.841	0.267	0.62	1.141	
higher	1.042	0.865	0.65	1.669	
Partner's education					
no education	1	.	.	.	
primary	0.868	0.415	0.617	1.22	
secondary	0.888	0.446	0.654	1.206	
higher	0.737	0.182	0.47	1.154	
Respondent working					
no	1	.	.	.	
yes	1.076	0.557	0.842	1.376	
Autonomy					
low	1	.	.	.	
medium	1.697	0.03	1.053	2.734	**
high	1.83	0.005	1.195	2.804	***
Distance to health facility					
not a problem	1	.	.	.	
it is a problem	0.785	0.023	0.637	0.968	**
Religion					
Hindu	1	.	.	.	
Muslim	0.967	0.883	0.622	1.506	
Christian	0.827	0.389	0.537	1.274	
Other	0.715	0.238	0.41	1.248	
Wealth index					
poorest	1	.	.	.	
poorer	1.212	0.17	0.921	1.596	
middle	0.99	0.952	0.714	1.373	
richer	0.697	0.079	0.466	1.043	*
richest	1.096	0.72	0.663	1.814	
Place of residence					
urban	1	.	.	.	
rural	0.86	0.32	0.64	1.157	
Domestic violence during pregnancy					
no	1	.	.	.	
yes	0.663	0.102	0.404	1.085	

Caste					
SC	1	.	.	.	
ST	0.949	0.738	0.699	1.289	
OBC	0.999	0.993	0.762	1.309	
Other	1.153	0.484	0.774	1.717	
Respondent occupation					
non-agricultural	1	.	.	.	
agricultural	0.983	0.897	0.755	1.279	
Partner occupation					
non-agricultural	1	.	.	.	
agricultural	0.751	0.027	0.583	0.968	**
Region					
north	1	.	.	.	
central	1.492	0.026	1.049	2.122	**
eastern	1.671	0.004	1.178	2.371	***
western	2.484	0	1.723	3.582	***
southern	2.819	0	1.992	3.989	***
north-east	2.43	0	1.566	3.772	***
constant	0.728	0.422	0.335	1.581	
*** p<.01, ** p<.05, * p<.1					

The data on postnatal check-up (PNC) within 72 hours after delivery reveals interesting trends. Table 4.6 shows that the odds of women aged 25-34 demonstrate a high likelihood to get PNC done within 72hrs with a slightly elevated coefficient of 1.099 (p = 0.521, 95% CI: 0.824-1.465) compared to those aged 18-24, although this difference is not statistically significant. Similarly, the odds of women aged 35 and above receiving PNC within 72 hours show a coefficient of 0.91 (p = 0.667, 95% CI: 0.592-1.399), with no statistical significance observed. Regarding partner age, women with partner aged 25-34 exhibit a coefficient of 0.968 (p = 0.891, 95% CI: 0.608-1.542), suggesting no substantial difference compared to those aged 18-24. Likewise, women with partner aged 35-44 display a coefficient of 1.15 (p = 0.596, 95% CI: 0.686-1.93), with no significant difference observed. Women with partner aged 45 and above show a coefficient of 1.342 (p = 0.388, 95% CI: 0.689-2.613), indicating

no statistically significant difference in PNC within 72 hours after delivery compared to those aged 18-24. These results suggest that respondent age and partner age do not significantly impact the likelihood of postnatal check-up within the specified timeframe.

The odds ratio for PNC within 72 hours after delivery concerning mass media exposure indicates intriguing insights. Women with exposure to mass media, compared to those without, demonstrate a slightly elevated odds ratio of 1.087 ($p = 0.514$, 95% CI: 0.847-1.394). This suggests a trend towards increased likelihood of obtaining PNC within 72 hours among women with exposure to mass media, although this difference is not statistically significant.

The odds ratio analysis reveals insightful patterns regarding timely PNC after delivery concerning birth order. Women with a birth order of 2 show a reduced odds ratio of 0.777 ($p < 0.1$, 95% CI: 0.603-1.001), hinting at a potential decrease in the likelihood of seeking PNC promptly compared to those with a first birth order. This association approaches statistical significance, suggesting that birth order influence the timing of postnatal care. Furthermore, women with a birth order of 3 and above display a significantly lower odds ratio of 0.538 ($p < 0.01$, 95% CI: 0.403-0.719), highlighting a substantial decline in the inclination towards timely PNC. These findings highlight the importance of considering birth order dynamics in promoting timely postnatal care attendance.

The analysis of timely postnatal check-up (PNC) with respect to health insurance coverage offers valuable insights. Although women with health insurance exhibit a slightly higher odds ratio of 1.163 ($p = 0.146$, 95% CI: 0.949-1.427) compared to those without insurance, this difference does not achieve statistical significance. However, it hints at a potential inclination towards seeking timely PNC among women with insurance coverage, suggesting the

importance of exploring the role of health insurance in facilitating access to postnatal care services.

The examination of timely postnatal check-up (PNC) concerning respondent and partner education levels reveals interesting details although they are statistically non-significant. Compared to women with no education, those with primary education levels demonstrate slightly reduced odds ratios for both respondents (0.891) and partners (0.868), although these differences lack statistical significance. Similarly, women with secondary education levels display odds ratios of 0.841 for respondents and 0.888 for partners, with no statistical significance observed. Conversely, women with higher education levels show slightly elevated odds ratios for respondents (1.042) and slightly reduced odds ratios for partners (0.737), although these differences are also not statistically significant. These findings suggest that the influence of education levels on timely PNC may be minimal.

The effect of respondent working status on timely postnatal check-ups (PNC) shows that women who are employed have an odds ratio of 1.076 ($p = 0.557$, 95% CI: 0.842-1.376). This indicates that the odds of getting a timely PNC for employed women are about 1.076 times higher compared to those who are not employed. However, since the p-value is greater than 0.05, this difference is not statistically significant, suggesting that there may not be a substantial association between women working status and the likelihood of timely PNC.

The relationship between women's autonomy levels and timely postnatal check-ups (PNC) shows that, women with medium autonomy levels show a significantly higher likelihood of timely PNC compared to those with low autonomy. Specifically, the odds ratio of 1.697 ($p < 0.05$, 95% CI: 1.053-2.734) suggests that women with medium autonomy are about 1.697 times more inclined to seek timely PNC. Moreover, the results indicate an even stronger association for women with high autonomy levels. With an odds ratio of 1.83 ($p < 0.01$, 95%

CI: 1.195-2.804), women with high autonomy demonstrate a substantially higher likelihood of timely PNC compared to their counterparts with low autonomy. These findings underscore the significant impact of women's autonomy on healthcare-seeking behaviours, particularly concerning postnatal care. Higher autonomy levels appear to empower women to prioritize their health and seek timely medical attention, contributing to improve maternal and child health outcomes.

The proximity of health facilities plays a crucial role in determining PNC utilization, as distance significantly impacts PNC uptake. Interestingly, when distance becomes a hindrance, there is a notable effect on the likelihood of timely PNC. The odds ratio of 0.785 ($p < 0.05$, 95% CI: 0.637-0.968) suggests that women for whom distance is a problem are approximately 0.785 times less likely to seek timely PNC compared to those for whom it is not a concern. This finding is statistically significant, indicating that distance poses a barrier to accessing postnatal care in a timely manner.

Exploring how religion influences the likelihood of women seeking timely postnatal check-ups (PNC), in this context, Hindu women serve as the reference group, with an odds ratio of 1. Interestingly, women from other religious groups, including Muslims, Christians, and others, exhibit odds ratios below 1. For instance, Muslim women have an odds ratio of 0.967 ($p = 0.883$, 95% CI: 0.622-1.506), Christian women have an odds ratio of 0.827 ($p = 0.389$, 95% CI: 0.537-1.274), and women from other religious backgrounds have an odds ratio of 0.715 ($p = 0.238$, 95% CI: 0.41-1.248). Although these differences are not statistically significant, they suggest a potential trend towards decreased likelihood of timely PNC among women from non-Hindu religious groups compared to Hindu women. This underscores the importance of considering religious diversity in designing interventions to ensure equitable access to postnatal care for all women.

The analysing the association between women's wealth index and the likelihood of seeking timely postnatal check-ups (PNC), women categorized as poorest in terms of wealth index, the odds ratio serves as the baseline, with a value of 1. Comparatively, women in wealthier categories demonstrate odds ratios either slightly above or below 1. For instance, women classified as poorer have an odds ratio of 1.212 ($p = 0.17$, 95% CI: 0.921-1.596), indicating a slightly elevated likelihood of timely PNC, although this difference lacks statistical significance. Similarly, women in the middle wealth category exhibit an odds ratio of 0.99 ($p = 0.952$, 95% CI: 0.714-1.373), suggesting a comparable likelihood of seeking timely PNC as the poorest group. Interestingly, women in the richer wealth category show a slightly decreased odds ratio of 0.697 ($p < 0.1$, 95% CI: 0.466-1.043), indicating a potential decrease in the likelihood of timely PNC compared to the poorest group, although this finding approaches statistical significance. Conversely, women classified as richest demonstrate an odds ratio of 1.096 ($p = 0.72$, 95% CI: 0.663-1.814), indicating a likelihood similar to the poorest group. These findings underscore the complex relationship between wealth status and timely PNC utilization among women, suggesting the need for targeted interventions to ensure equitable access to postnatal care across different wealth categories.

Considering place of residence, women residing in urban areas serve as the baseline, with an odds ratio of 1. Comparatively, women in rural areas demonstrate an odds ratio of 0.86 ($p = 0.32$, 95% CI: 0.64-1.157), indicating a slightly lower likelihood of seeking timely PNC compared to their urban counterparts, although this difference lacks statistical significance. This suggests that while there may be a trend towards decreased utilization of timely PNC among women in rural areas, it is not conclusive.

The relationship between domestic violence during pregnancy and the likelihood of women receiving timely postnatal check-ups (PNC) shows that in cases where domestic violence was reported during pregnancy, the odds ratio drops to 0.663 ($p = 0.102$, 95% CI: 0.404-1.085).

For no domestic violence during pregnancy, the odds ratio stands at 1, serving as the baseline. Although this decrease in odds suggests a potential association between domestic violence during pregnancy and a reduced likelihood of timely PNC, the difference did not reach statistical significance. This indicates that there might be a trend towards lower PNC utilization among women experiencing domestic violence during pregnancy.

The examination of timely postnatal check-up (PNC) concerning caste reveals interesting findings. In the baseline group represented by the SC caste, the odds ratio is 1. When compared to this baseline, women from the ST caste demonstrate an odds ratio of 0.949 ($p = 0.738$, 95% CI: 0.699-1.289), indicating no significant difference in the likelihood of receiving timely PNC. Similarly, women from the OBC caste exhibit an odds ratio of 0.999 ($p = 0.993$, 95% CI: 0.762-1.309), suggesting no substantial variation in receiving timely PNC compared to the SC caste. Conversely, women from other castes display a slightly higher odds ratio of 1.153 ($p = 0.484$, 95% CI: 0.774-1.717), although this difference is not statistically significant. Overall, these results suggest that caste may not significantly influence the likelihood of timely PNC utilization among women.

The analysis on timely postnatal check-up (PNC) concerning women's occupation and partner's occupation yields interesting insights. In the baseline group represented by non-agricultural occupation, the odds ratio is 1. When compared to this baseline, women engaged in agricultural occupations demonstrate an odds ratio of 0.983 ($p = 0.897$, 95% CI: 0.755-1.279), indicating no significant difference in the likelihood of receiving timely PNC. Conversely, women with partners engaged in agricultural occupations display a notably lower odds ratio of 0.751 ($p < 0.05$, 95% CI: 0.583-0.968), suggesting a significant decrease in the propensity for timely PNC compared to those with partners in non-agricultural occupations. These findings suggest that the occupation of the partner, but not the woman, significantly influences the likelihood of timely PNC utilization.

The analysis of timely postnatal check-up (PNC) among women across different regions uncovers significant disparities. In the North region, which serves as the reference point with an odds ratio of 1, women residing in the Central region exhibit a higher odds ratio of 1.492 ($p < 0.05$, 95% CI: 1.049-2.122), indicating a notable increase in the likelihood of receiving timely PNC. Moreover, women in the Eastern region demonstrate an even higher odds ratio of 1.671 ($p < 0.01$, 95% CI: 1.178-2.371), suggesting a significant propensity for timely PNC compared to the North region. The disparities continue with more pronounced effects observed in the Western, Southern, and North-Eastern regions. Women in the Western region show a substantially higher odds ratio of 2.484 ($p < 0.01$, 95% CI: 1.723-3.582), indicating a significant increase in the likelihood of timely PNC. Similarly, those in the Southern region exhibit a markedly higher odds ratio of 2.819 ($p < 0.01$, 95% CI: 1.992-3.989), emphasizing a significant propensity for timely PNC utilization. Furthermore, women in the North-Eastern region also display a notable increase in the odds ratio of 2.43 ($p < 0.01$, 95% CI: 1.566-3.772), indicating a significant likelihood of receiving timely PNC compared to the North region. These findings highlight substantial regional differences in the utilization of timely PNC among women.

4.3 REGRESSION ANALYSIS – SIGNIFICANT FACTORS ACROSS REGIONS

4.3.1 Region: North

Table 4.7: Significant factors affecting maternal healthcare utilization in north region of India

Variables	ANC		Place of Delivery		PNC	
	Odds Ratio	Sig	Odds Ratio	Sig	Odds Ratio	Sig
Maternal age	1.279		1.003		1.706	*
Partner's age	0.704		0.949		0.927	
Mass media exposure	0.802		1.655		1.411	
Birth order	1.046		0.669	*	0.583	***
Health insurance coverage	0.992		0.563		2.534	**
Respondent's education	1.246		1.29		0.929	
Partner's education	0.851		0.956		0.565	***

Respondent working	0.891		0.976		1.08	
Autonomy	1.201		0.762		0.644	*
Distance to health facility	0.974		0.825		0.519	**
Religion	0.697		1.073		0.581	**
Wealth index	1.503	***	1.141		1.241	
Place of residence	0.774		1.404		0.813	
Domestic violence during pregnancy	3.546		0.649		0.498	
Caste	1.261	*	1.063		0.879	
Respondent occupation	1.894	**	1.088		1.31	
Partner occupation	0.767		0.95		0.687	
constant	0.706		5.908		13.52	**
*** p<.01, ** p<.05, * p<.1						

The table 4.7 shows that in the context of the northern region, maternal age does not exhibit a significant association with antenatal care (ANC), suggesting that age may not significantly influence the likelihood of receiving prenatal health services among women in this region. Similarly, there is no significant association between maternal age and PLD. However, for PNC, older maternal age is associated with higher odds of receiving care, indicating that age might play a role in accessing postnatal services in the north region. Partner's age does not demonstrate a significant association with any of the outcomes, suggesting that the age of the partner may not significantly impact the likelihood of receiving antenatal or postnatal care among women residing in the north region.

Mass media exposure does not significantly affect the odds of receiving ANC or PLD in the north region. Similarly, there's no significant association between mass media exposure and PNC, indicating that exposure to mass media may not significantly influence the likelihood of receiving postnatal care among women in the north region. Birth order shows no significant association with ANC in the north region, suggesting that it may not significantly impact the odds of receiving antenatal care among women. However, higher birth order is associated with lower odds of receiving PLD and PNC, indicating a potential disparity in postnatal

healthcare utilization based on birth order among women in the north region. Health insurance coverage does not show a significant association with ANC or PLD in the north region. However, having health insurance coverage is significantly associated with higher odds of receiving PNC, highlighting the importance of insurance in accessing postnatal services among women in the north region.

Respondent's education, partner's education, and respondent working do not show significant associations with any of the outcomes in the north region, indicating that education level and employment status may not significantly influence the likelihood of receiving antenatal or postnatal care among women residing in the north region. Autonomy does not significantly influence the odds of receiving ANC and PLD in the north region. However, lower autonomy is associated with lower odds of receiving PNC, suggesting that women with lower autonomy may face barriers to accessing postnatal care in the north region.

Distance to health facility does not show a significant association with ANC or PLD in the north region. However, greater distance to health facilities is associated with lower odds of receiving PNC, indicating geographical barriers to accessing postnatal services among women in the north region. Place of residence, domestic violence , and partner occupation do not show significant associations with any of the outcomes in the north region, suggesting that these factors may not significantly impact the likelihood of receiving antenatal or postnatal care among women residing in the north region.

Caste shows a significant positive association with ANC in the north region, indicating that belonging to certain castes is associated with increased odds of receiving antenatal care. However, this association is not significant for PLD or PNC, suggesting that caste may not significantly influence the likelihood of receiving postnatal care among women in the north region. Respondent occupation is significantly associated with ANC but not with PLD or

PNC in the north region, indicating that certain occupations are associated with increased odds of receiving antenatal care among women.

In conclusion, significant predictors of maternal healthcare service utilization in the north region include maternal age, birth order, health insurance coverage, autonomy, distance to health facilities, wealth index, caste, religion, and respondent occupation.

4.3.2 Region: Central

Table 4.8: Significant factors affecting maternal healthcare utilization in central region of India

Variables	ANC		Place of delivery		PNC	
	Odds Ratio	Sig	Odds Ratio	Sig	Odds Ratio	Sig
Maternal age	1.279		0.609		0.59	
Partner's age	0.704		1.54		1.375	
Mass media exposure	0.802		2.383	**	1.388	
Birth order	1.046		0.758		0.64	**
Health insurance coverage	0.992		1.27		1.189	
Respondent's education	1.246		1.426	*	0.734	
Partner's education	0.851		1.093		1.09	
Respondent working	0.891		1.08		0.572	
Autonomy	1.201		1.195		1.257	
Distance to health facility	0.974		1.555		0.872	
Religion	0.697		0.927		1.04	
Wealth index	1.503	***	1.524	*	0.862	
Place of residence	0.774		2.854	**	0.417	*
Domestic violence during pregnancy	3.546		0.141	**	1.207	
Caste	1.261	*	0.904		0.954	
Respondent occupation	1.894	**	0.712		0.798	
Partner occupation	0.767		0.637		0.731	
constant	0.706		0.328		37.069	**
*** p<.01, ** p<.05, * p<.1						

The table 4.8 shows that in the central region, several significant factors emerge that influence maternal healthcare service utilization. Wealth index proves to be a crucial determinant, showing significant associations with receiving ANC and place of delivery, indicating that higher wealth index scores correlate with increased odds of attending ANC visits and delivering at a healthcare facility. Mass media exposure also plays a notable role, being significantly associated with place of delivery, suggesting that exposure to mass media contributes to higher odds of institutional deliveries. Moreover, domestic violence during pregnancy emerges as a significant predictor, showing significant associations with place of delivery, indicating that women experiencing domestic violence during pregnancy substantially decrease the odds of institutional delivery. Caste and respondent's occupation significantly affects the ANC utilization. Place of residence demonstrates significance for place of delivery and PNC, implying that residing in certain areas correlates with increased odds of institutional delivery and postnatal care utilization. Respondent's occupation shows significance for ANC in the central region, suggesting that certain occupations are associated with increased odds of receiving antenatal care. Respondent and partner's age, health insurance coverage, autonomy, partner's education, respondent working, distance to health facility, religion, and partner's occupation doesn't significantly affect maternal healthcare utilization in the central region of India.

4.3.3 Region: Central

Table 4.9 Significant factors affecting maternal healthcare utilization in eastern region of India

Variables	ANC		Place of Delivery		PNC	
	Odds Ratio	Sig	Odds Ratio	Sig	Odds Ratio	Sig
Maternal age	1.68	**	1.131		0.922	
Partner's age	1.36	*	1.247		0.985	
Mass media exposure	1.311		1.017		1.171	

Birth order	0.709	**	0.601	***	1.142	
Health insurance coverage	1.23		1.168		2.141	**
Respondent's education	1.573	***	2.092	***	1.372	
Partner's education	1.08		0.843		0.743	
Respondent working	1.263		0.576	*	0.849	
Autonomy	0.732	*	0.727		2.42	***
Distance to health facility	1.373		1.027		1.713	*
Religion	1.139		0.604	***	1.057	
Wealth index	1.053		1.26		0.893	
Place of residence	0.559	*	1.559		0.7	
Domestic violence during pregnancy	0.674		0.412	*	0.3	*
Caste	1.022		1.359	***	1.179	
Respondent occupation	0.704		0.565	**	2.039	*
Partner occupation	1.808	**	1.911	**	0.856	
constant	0.314		2.699		0.178	
*** p<.01, ** p<.05, * p<.1						

In scrutinizing maternal healthcare utilization within the Eastern region, many significant factors surface, offering insights into the determinants influencing antenatal care (ANC), place of delivery, and postnatal care (PNC) within this specific context. The table 4.9 shows that maternal age emerges as a significant factor for ANC, revealing that older mothers exhibit higher attendance rates at ANC visits. Similarly, partner's age presents significance, indicating that older partners are associated with increased ANC attendance. Birth order plays a pivotal role in both ANC and place of delivery, suggesting that higher birth order is linked to reduced ANC attendance but heightened likelihood of opting for facility-based deliveries. The educational attainment of respondents holds considerable importance over ANC and place of delivery, with higher education levels positively influencing attendance at ANC

visits and the choice of facility-based deliveries. Furthermore, the employment status of respondents impacts the place of delivery.

Autonomy surfaces as a significant determinant of ANC and PNC attendance, while the proximity to health facilities significantly influences PNC utilization. Domestic violence during pregnancy emerges as a factor influencing both the place of delivery and PNC utilization, suggesting that experiences of domestic violence may shape decisions regarding delivery location and postnatal care uptake. Health insurance coverage also shows a significant impact on PNC utilization. Moreover, caste and respondent occupation exert notable influences on the place of delivery and PNC utilization, highlighting the impact of socio-cultural and occupational factors in maternal healthcare decision-making within the Eastern region.

Factors like mass media exposure, partner's education, wealth index seems to not have a significant impact on the maternal healthcare utilization in respect to eastern region of India

4.3.4 Region: Western

Table 4.10: Significant factors affecting maternal healthcare utilization in western region of India

Variable	ANC		Place of Delivery		PNC	
	Odds Ratio	Sig	Odds Ratio	Sig	Odds Ratio	Sig
Maternal age	1.659	**	0.77		1.139	
Partner's age	0.932		1.217		1.079	
Mass media exposure	1.458	*	0.921		1.03	
Birth order	0.69	***	0.718		0.812	
Health insurance coverage	0.756		1.906	**	0.805	
Respondent's education	1.23	*	1.428	*	0.824	
Partner's education	0.892		1.013		1.15	
Respondent working	1.011		2.896	***	1.728	*
Autonomy	1.6	***	0.977		0.841	
Distance to health	0.815		0.425	**	0.475	**

facility						
Religion	0.872		0.858		0.771	
Wealth index	0.966		1.077		0.908	
Place of residence	1.178		0.3	*	0.479	
Domestic violence during pregnancy	1.391		2.1		0.606	
Caste	1.069		1.032		1.288	
Respondent occupation	1.031		0.637		1.151	
Partner occupation	0.678	*	0.841		1.079	
constant	0.678		133.709	***	9.743	
*** p<.01, ** p<.05, * p<.1						

The table 4.10 indicates that within the Western region, several significant factors surface, emphasizing the dynamics influencing antenatal care, place of delivery, and postnatal care within the region. Maternal age emerges as an important factor for ANC, with older mothers exhibiting significantly higher attendance rates at ANC visits. Conversely, birth order reveals a contrasting trend, showing a significant negative association with ANC, suggesting that higher birth order is linked to reduced ANC attendance. Mass media exposure exhibit significant impact on ANC. Health insurance coverage demonstrates significance for place of delivery, indicating that insured individuals are more likely to opt for facility-based deliveries. Respondent's education level presents significance for both ANC and place of delivery, with higher educational attainment positively influencing attendance at ANC visits and the choice of facility-based deliveries. Additionally, respondent working status significantly impacts the place of delivery and PNC utilization, underscoring the influence of employment on maternal healthcare decisions. Autonomy emerges as a crucial determinant of ANC attendance, suggesting that increased autonomy levels correlate with higher odds of attending ANC visits. Distance to health facilities demonstrates significance for place of delivery and PNC; place of residence is significant for place of delivery highlighting the importance of geographical proximity in accessing maternal healthcare services. Religion, Partner's age, wealth index, caste, respondent occupation and domestic violence during

pregnancy does not exhibit significance across the outcomes These findings creates a need for tailored interventions to enhance access and uptake of maternal health services within this specific context.

4.3.5 Region: South

Table 4.11.: Significant factors affecting maternal healthcare utilization in southern region of India

Variable	ANC		Place of Delivery		PNC	
	Odds Ratio	Sig	Odds Ratio	Sig	Odds Ratio	Sig
Maternal age	1.057		1.567		1.124	
Partner's age	1.48	**	1.987		0.916	
Mass media exposure	1.273		2.839		0.66	
Birth order	0.818		0.483		0.836	
Health insurance coverage	0.852		0.92		1.706	**
Respondent's education	1.247	*	2.95	***	1.491	**
Partner's education	0.994		0.575		0.68	**
Respondent working	1.46	*	2.382		3.125	***
Autonomy	1.388	***	0.296	**	1.35	*
Distance to health facility	0.766		1.824		0.523	***
Religion	0.898		2.613		1.199	
Wealth index	0.949		1.7		0.822	
Place of residence	0.933		0.401		0.579	**
Domestic violence during pregnancy	0.682		0.914		0.611	
Caste	0.845	*	0.777		1.099	
Respondent occupation	1.099		1.506		1.322	
Partner occupation	0.688		0.613		0.677	
constant	1.207		13.688		3.55	
*** p<.01, ** p<.05, * p<.1						

When considering maternal healthcare utilization within the Southern region, various significant factors emerge, shedding light on the determinants impacting antenatal care, place of delivery, and postnatal care within this specific area. The table 4.11 shows that maternal age, mass media exposure, birth order, religion, wealth index, domestic violence during pregnancy, respondent occupation, and partner occupation exhibits no significant association

with the outcomes. Conversely, partner's age is significantly associated with ANC, suggesting that older partners are correlated with higher ANC attendance. Health insurance coverage shows significance for PNC, indicating that individuals with health insurance are more likely to utilize postnatal care services. Respondent's education level is significantly associated with ANC, PNC, and place of delivery, underscoring the importance of education in maternal healthcare decision-making. Additionally, respondent working status is significant for ANC and PNC, suggesting that working respondents are more likely to attend ANC visits and utilize postnatal care services. Autonomy exhibits significance for all outcomes. Distance to health facility shows significance for PNC, highlighting its roles in attendance and access to postnatal care services. These findings underscore the multifaceted nature of maternal healthcare utilization in the Southern region, emphasizing the need for tailored interventions to improve access and uptake of maternal health services within this specific context.

4.3.6 Region: North-east

Table 4.12.: Significant factors affecting maternal healthcare utilization in southern region of India

Variables	ANC		Place of Delivery		PNC	
	Odds Ratio	Sig	Odds Ratio	Sig	Odds Ratio	Sig
Maternal age	1.41		1.167		1.263	
Partner's age	0.726		1.123		0.874	
Mass media exposure	2.193		1.595		0.508	
Birth order	1.59		0.83		1.365	
Health insurance coverage	1.784		2.594	**	0.988	
Respondent's education	1.444		1.631		1.078	
Partner's education	1.009		1.51		1.367	
Respondent working	0.894		0.701		1.461	
Autonomy	1.079		1.659		1.473	

Distance to health facility	1.072		0.759		0.555	
Religion	1.065		0.61	**	0.748	
Wealth index	1.147		1.387		1.059	
Place of residence	0.621		0.168		0.34	
Domestic violence during pregnancy	0.445		0.738		0.046	
Caste	1.501	*	1.314		1.734	
Respondent occupation	0.699		1.296		1.027	
Partner occupation	0.734		0.497		0.458	
constant	0.086		5.704		2.328	
*** p<.01, ** p<.05, * p<.1						

When examining maternal healthcare utilization in the Northeast region, several significant factors come to light, offering insights into the determinants impacting antenatal care, place of delivery, and postnatal care within this area. Above table 4.12 shows that maternal age, partner's age, mass media exposure, birth order is not very significant to the outcomes.

Health insurance coverage is significantly associated with the place of delivery, indicating that individuals with health insurance are more likely to opt for facility-based deliveries. Respondent's education level, partner's education, respondent working status, autonomy and distance to the health facility, wealth index, place of residence, domestic violence during pregnancy, and respondent and partner occupation also does not demonstrate high significance across outcomes. Religion has a high impact on PLD and caste affects ANC, indicating that women belonging to certain caste and religion in North-east will have better likelihood of maternal healthcare utilisation. These findings underscore the diverse array of socio-demographic, economic, and cultural factors influencing maternal healthcare utilization patterns in the Northeast region, highlighting the importance of tailored interventions to improve access and uptake of maternal health services within this specific context.

CHAPTER 5: CONCLUSION

5.1 Discussion

This study conducted using data from the National Family Health Survey (NFHS-5) in India from 2019 to 2021, has revealed important insights into how women use healthcare services during pregnancy and after childbirth. The findings from both descriptive and more detailed regression analysis offer useful perspectives on the things that affect how often women get antenatal care (ANC) and postnatal care (PNC) in India and choose Place of Delivery (PLD).

Firstly, regarding ANC utilization, a multiple of socio-demographic variables emerged as significant determinants. Maternal age, partner's age, birth order, education levels of both the respondent and partner, religion, caste, wealth index, and occupational status were all found to influence ANC attendance. Notably, younger women aged 15-24 exhibited distinct patterns in ANC utilization, with education and wealth status playing crucial roles. Furthermore, the study highlights the intricate relationship between partner characteristics and ANC utilization, underscoring the importance of considering the broader socio-economic context in maternal healthcare access.

The analysis of place of delivery choice in India highlights several influential factors, including maternal and partner's age, birth order, education, religion, caste, wealth, occupation, health insurance, media exposure, autonomy, domestic violence, proximity to health facilities, and residence. Higher education correlates with increased institutional delivery likelihood, while higher birth orders and domestic violence decrease it. Although health insurance hints at preference for institutional delivery, this isn't significant statistically. Proximity to health facilities significantly impacts delivery location choice, underscoring its importance. Addressing domestic violence and considering factors like education and

proximity to health facilities are crucial for promoting institutional delivery and improving maternal and child health outcomes in India.

Similarly, the analysis explored the utilization of postnatal care (PNC), revealing intricate patterns influenced by various demographic and socio-economic factors. The timing of receiving PNC within 72 hours after delivery varied significantly based on age, partner's age, birth order, education levels, religion, caste, wealth index, and occupational status. Notably, women aged 25-34 exhibited higher rates of timely PNC uptake, with education and wealth status exerting considerable influence. Moreover, factors such as the respondent's employment status, level of autonomy, and proximity to healthcare facilities also played significant roles in shaping PNC utilization, highlighting the multifaceted nature of maternal healthcare access in India.

5.2 Suggestions

Improving maternal healthcare utilization in India requires a multifaceted approach that addresses various socio-economic, cultural, and structural barriers. Firstly, increasing education levels, particularly among women, emerges as a vital strategy. Educational initiatives focused on adult literacy and vocational training, coupled with community outreach programs, can enhance awareness about the importance of maternal healthcare services.

Empowering women by enhancing their autonomy and decision-making abilities is equally pivotal. Promoting gender equality, providing financial independence, and fostering supportive environments encourage women to make informed choices about their health. Additionally, addressing issues related to accessibility is crucial. Investing in infrastructure, transportation, and community-based healthcare services ensures that women have convenient access to quality maternal healthcare.

Expanding health insurance coverage emerges as another significant intervention. Affordable and comprehensive health insurance schemes can alleviate financial barriers to maternal healthcare utilization. Leveraging mass media platforms to disseminate information about maternal healthcare services can also raise awareness and encourage utilization.

Addressing cultural and social norms that hinder maternal healthcare utilization is essential. Collaborating with community leaders and local organizations to challenge harmful practices and promote positive attitudes towards maternal healthcare services is necessary. Furthermore, developing and implementing policies that ensure the availability, accessibility, and quality of maternal healthcare services is important. Through concerted efforts and collaborative action, India can make significant strides towards enhancing maternal healthcare utilization and improving maternal and child health outcomes nationwide.

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