

A STUDY ON MATERNAL HEALTH SEEKING BEHAVIOUR AND NEONATAL CARE

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Abstract

Maternal health and Neonatal health are fundamental human rights and are aligned with Sustainable Development Goals. India is a diverse country with rampant socioeconomic disparities which has resulted in uneven and slow progress in the advancement of maternal and neonatal healthcare development and utilisation. From our literature review, we found that although the propensity to seek antenatal care and institutional delivery by expectant mothers was relatively high, however, women from different socioeconomic backgrounds have consistently neglected their postpartum care. In this paper, we have used the Eligible Women and Individual dataset of IHDS 2 (2011-2012), and have used Venn diagrams, Pairwise Correlations, and Logistic Regression to study the relationship between components of Maternal and Neonatal health as dependent variable and various social and economic factors as possible regressors. Our objective is to address the determinants behind inadequate utilization of postpartum care in India. The regression analysis shows that higher income and mothers' education positively influence healthcare utilization, while husbands' education and the number of children have mixed effects. Working women who received wages and access to maternity schemes positively impact utilization of healthcare services, but exposure to mass media has varying effects. Religious and caste affiliations play a role. Women's decision-making power and autonomy influence healthcare utilization. Efforts are needed to improve access to postpartum and neonatal care, address barriers, and promote equitable healthcare services.

Keywords: Antenatal care, Institutional delivery, Postpartum Care, Neonatal Care, logistic regression.

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List of Acronyms

ANC	Antenatal Care
ASHA	Accredited Social Health Activist
DLHS	District Level Household and Facility Survey
ID	Institutional Delivery
IMR	Infant Mortality Rate
JSSK	Janani Shishu Suraksha Karyakram
JSY	Janani Suraksha Yojana
MDG	Millennial Development Goals
NFHS	National Family Health Survey
NHM	National Health Mission
NNC	Neonatal Care
NRHM	National Rural Health Mission
OBC	Other Backward Classes
PMMVY	Pradhan Mantri Matru Vandana Yojana
PNC	Post Natal Care
PPC	Postpartum Care
QAOP	Qualified Allopathically Oriented Providers

SBA	Skilled Birth Attendant
SUMAN	Surakshit Matritva Aashwasan
SC	Scheduled Caste
ST	Scheduled Tribe
UAOP	Unqualified Allopathically Oriented Providers

Glossary

Anganwadi	Anganwadi is a type of rural mother and childcare centre started by the Government of India to combat malnutrition. Its programmes include supplementary nutrition, immunisation, growth monitoring etc.
ANC	Antenatal care is a preventative health care given to pregnant women in order to monitor the progress of the fetus and to promote birth preparedness among mothers. It includes at least 4 visits interspersed between 3 trimesters, tetanus toxoid immunisation, folic acid and iodine supplements and several blood tests.
ASHA	Accredited Social Health Activist is a trained female community health activist who works as an interface between the community and public health services.
Blood transfusion	A procedure in which a patient intravenously receives blood from a healthy donor, usually during surgery or for other medical conditions.
Delivery complications	Pregnant women can face certain diseases, or certain health conditions during delivery which might create life risk for the mother and the child, this phenomenon can be described as delivery complications.
Dummy Variable	In statistics and econometrics, a dummy variable, also known as an indicator variable, is a binary variable that represents the presence or absence of a specific characteristic or category. It takes on only two values, typically 0 or 1, to indicate the absence or presence of the characteristic, respectively. Dummy variables are commonly used to represent categorical variables in regression models or statistical analyses.
Gravida level	Gravida indicates the number of times the woman has been pregnant, regardless of whether these pregnancies were carried to term. A current pregnancy, if any, is included in this count.

ID	Institutional delivery means giving birth to a child in a medical institution under the overall supervision of trained and competent health personnel.
IMR	The infant mortality rate is the number of infant deaths for every 1,000 live births.
Independent Variable	An independent variable is a variable in a functional relation wherein the value is not affected by other variables.
Intrapartum	Intrapartum period refers to the time of pregnancy from the onset of labor to delivery of the newborn and the placenta.
Logistic regression	Logistic regression is a statistical analysis method to predict a binary outcome, such as yes or no, based on prior observations of a data set.
Mahila Mandal	Mahila Mandal are voluntary service organisations working for the betterment of women in rural areas in terms of family planning, financial independence, child immunisation etc.
Maternity benefits	Refers to financial or non-financial support provided to individuals, typically employed women, during pregnancy, childbirth, and the postpartum period, including paid time off, healthcare coverage, and other related benefits aimed at ensuring the well-being and protection of both the mother and newborn.
MMR	Maternal Mortality Rate can be calculated by dividing recorded (or estimated) maternal deaths by total recorded (or estimated) live births in the same period and multiplying by 100,000.
MDG	The United Nations Millennium Development Goals (MDGs) are 8 goals that UN member States have agreed to achieve by 2015.
NNC	Neonatal care refers to that care given to the newborn infant from the time of delivery through about the first month of life.

Neonate	A neonate is called a newborn. The neonatal period is the first 4 weeks of a child's life.
Obstetric	Obstetrics is the medical field involving the care of women and their children during pregnancy, childbirth, and postnatal periods.
Pairwise correlation	Pairwise correlation treats each pair of variables separately and only includes observations that have valid values for each pair in the data set.
Postpartum period	Postpartum or postnatal period begins after childbirth and is typically considered to end within six weeks
PNC	Postnatal care is the care of mother and newborn from 1 hour after delivery upto 6 weeks post delivery
PPC	Postpartum care is the care of a mother upto 40 days post delivery.
Premature labor	Preterm labor occurs when regular contractions begin to open your cervix before 37 weeks of pregnancy. A full-term pregnancy should last about 40 weeks. If preterm labor can't be stopped, your baby will be born early.
Premature Birth	Prematurity or preterm birth is when a baby is born too early, before 37 weeks of pregnancy have been completed. A pregnancy normally lasts about 40 weeks.
Quintile	A quintile is one of five values that divide a range of data into five equal parts, each being 1/5th (20 percent) of the range.
Regression Analysis	Regression analysis is a statistical method that relates a dependent variable to one or more independent variables. A regression model is able to show whether changes observed in the dependent variable are associated with changes in one or more of the independent variables.

Self Help Groups	A self-help group is a financial intermediary committee usually composed of 10 to 25 local women between the ages of 18 and 40.
Skilled Birth Attendant (SBA)	Accredited health professional - such as midwife, doctor or nurse - who has been educated and trained to achieve proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and immediate postnatal period and in the identification, management and referral of complications in women and newborns.
SDG	Collection of 17 interlinked global goals designed to be a "shared blueprint for peace and prosperity for people and the planet, now and into the future.
UAOP	An unqualified healthcare practitioner without any formal registration practicing allopathic medicine can be called an RMP widely identified as a rural medical practitioner,

1. Introduction

The risk of maternal and neonatal deaths due to prematurity, intrapartum, or postpartum problems can be considerably decreased by having a skilled birth attendant (SBA) deliver the baby and having institutional care provided at birth (Carlo et al. 2010; de Bernis et al. 2003; Kassebaum et al. 2016; Paxton and Wardlaw 2011; Randive et al. 2014; Rooks et al. 1989; Wong et al. 2017; Yuan et al. 2014). Therefore, providing expert delivery care services to everyone has long been a global development objective (Kruk et al. 2008; Mckinnon et al. 2014; Mills 2014). However, the provision of universal coverage of institutional delivery care services is a challenge for developing countries. Additionally, there are significant socioeconomic gradients in birth locations across the nation, which exacerbates socioeconomic disparities in maternal and neonatal mortality (Kruk et al. 2008; Wong et al. 2017). 99% of maternal deaths globally occur in underdeveloped nations, according to trends in maternal health outcomes (WHO, 2015). India is no exception to this (Pathak et al. 2010). The maternal mortality rate in India was 103 per 100,000 live births in 2017-19 and the Infant Mortality Rate was 26.619 per 100,000 live births in 2023.

In the Alma Ata Conference(1978), family planning, maternal and child health care and prevention of common diseases were accepted as basic human rights (WHO, 1978). The United Nations adopted the United Nations Millennium Declaration in 2000, which led to the establishment of the eight worldwide development goals (MDGs) for the year 2015 at the United Nations Millennium Summit [b]. The objective of the fifth MDG was-

(i) Reduce by three-quarters, between 1990 and 2015, the maternal mortality:

a. Maternal mortality ratio

b. Proportion of births attended by skilled health personnel ratio

(ii) Achieve, by 2015, universal access to reproductive health:

a. Contraceptive prevalence rate

b. Adolescent birth rate

c. Antenatal care coverage

d. Unmet need for family planning.

As far as recent trends it has been seen that the percentage of women opting for Antenatal Care and Institutional delivery has improved over the years but postnatal care and neonatal care still remains underutilized. Culture, awareness, sociodemographic conditions are plausible factors which influence the health seeking behavior. It has also been seen that there is no active initiative taken by the government which promotes postpartum care. Most of the schemes launched by the government are focused on the child's health and not the mothers. There is hardly any awareness about postpartum depression. The schemes aimed for lactating mothers are mostly wage compensation and make no effort to increase the percentage of women opting for postpartum care. Two such schemes are mentioned below :

PMMVY : Pradhan Mantri Matru Vandana Yojana is a maternity benefit programme implemented by Government of India launched on 1st January 2017 as part of the larger National Nutrition Mission led by the Ministry of Women and Child Development. This scheme aims to provide cash benefits to pregnant and lactating women with the goal of meeting their nutritional needs and ensuring proper care for mothers and their unborn child. The main aim of this programme is to reduce maternal and infant mortality rates, improve the health of pregnant women, and advocate healthy practices during pregnancy and the lactation period after child delivery. The eligible women receive a cash incentive of Rs 5000 in three installments.

The eligibility Criteria to receive PMMVY schemes are :

- i) A woman must be a first-time mother.
- ii) The women must be at least 19 years old.
- iii) Live in a household that earns less than the federal poverty level.

Under specific circumstances, such as institutional delivery, birth registration, and child immunisation, PMMVY also offers maternity benefits. The program's goal is to persuade women to seek appropriate care during pregnancy and childbirth in order to protect both the mother and the unborn child.

SUMAN: SUMAN stands for Surakshit Matritva Aashwasan, a programme introduced by the Indian government in December 2016 as part of the National Health Mission (NHM) to give

lactating mothers and pregnant women access to high-quality maternal healthcare services. The SUMAN initiative aims to ensure respectful maternity care, lower infant and maternal mortality rates, and enhance the general health and wellbeing of expectant mothers and their babies.

Main elements of the SUMAN scheme are:

i) Assurance of free and cashless services in public health facilities to expectant women and nursing mothers. Antenatal check-ups, hospital deliveries, postpartum care, and emergency obstetric and newborn care are all included in this list of services.

ii) Promotion of the concept of respectful maternity care, ensuring that pregnant women are treated with dignity and respect during all stages of healthcare services. SUMAN aims to make delivery points functional round the clock to ensure immediate access to care for pregnant women and facilitate safe deliveries.

This scheme focuses on improving the quality of maternal healthcare services by conducting regular assessments, audits, and monitoring of facilities and service providers. It aims to improve access to qualified healthcare professionals, strengthen the current infrastructure for maternal healthcare, and encourage women to use these services.

Postnatal care plays a vital role in ensuring the well-being and recovery of mothers after childbirth, as well as the health and development of newborns. It allows healthcare providers to monitor and address any potential complications, provide necessary support, and offer guidance on breastfeeding, newborn care, and postpartum mental health. By understanding the factors influencing postnatal care utilization, interventions can be designed to improve maternal and newborn health outcomes. Analyzing the factors influencing postnatal care utilization can shed light on health disparities within a country. Certain subgroups of women, such as those from marginalized communities, low-income backgrounds, rural areas, or specific cultural or ethnic groups, may face additional barriers to accessing postnatal care. Identifying and addressing these disparities is essential for achieving equitable and inclusive healthcare services. Access to quality postnatal care is aligned with global health targets, including the Sustainable Development Goals.

2. Motivation

The maternal mortality rate, which is directly related to the place of delivery, is not decreased by obstetric health care practices, according to global evidence. Women who receive quality prenatal care typically have a higher chance to learn more about their health throughout pregnancy and childbirth, as well as to have any complications identified and treated early. Empirical evidence suggests that maternal care has improved in India over the last two decades, but progress has been slow overall and uneven within the country. The IMR has also decreased in the last decade but the rates are not uniform within the country. It has been seen that maternal health seeking behavior and neonatal health care practices are directly linked to socio-demographic factors. India is a diverse nation with striking income disparity. The poor conditions of the rural health care facility is also alarming.

Maternal and child health is an important public health issue affecting millions of lives. It also affects the lives of the next generations and communities in different ways. It is thus important to study the factors influencing maternal and neonatal health seeking behavior and practices in order to improve the quality of life and public health. By understanding the factors influencing the percentage of women opting for postnatal care, policymakers, healthcare providers, and public health professionals can design targeted interventions, improve service delivery, address barriers, and promote maternal and newborn health. It ultimately contributes to reducing maternal and neonatal morbidity and mortality, promoting healthy child development, and building stronger and more inclusive healthcare systems. These factors inspired and motivated us to delve deep into this topic. Given the disparity in IMR (Infant Mortality rate) and diverse socio-economic factors in India, we are motivated to take up a study on maternal health care and neonatal care in India in recent years. We were particularly driven by evidence of underutilisation of postpartum care, as it spoke volumes about the least importance given to the mother's health unless the child's health is attached to her.

3. Literature Review

In terms of ANC utilisation some of the major findings are

Rani et al. (2008), investigated (i) quality of antenatal care and socioeconomic differentials in the content and self-reported technical and interpersonal quality of antenatal care in four north Indian and four south Indian states; and (ii) correlation between quality of antenatal care and utilization of antenatal care services. The data from NFHS-2, between November 1998 and December 1999, were used in this study. A 3-year retrospective pregnancy history was obtained from married women, aged 15 –49 years, who gave births in the 6 months preceding the survey. Total 3810 women were taken into account. The women in south India utilized antenatal care significantly more than those in north India and the difference was wider among the socially disadvantaged group. The socioeconomic differentials within each region and between the North and the South were even more acute for ‘four or more antenatal care consultations’. Similar differences were observed by caste and education. The overall index of clinical quality on a scale of 0–5 varied significantly from 2.1 in the North to 4.1 in the South. However, women at the same socioeconomic levels were likely to report better interpersonal quality in the South and in the private sector than in the North and in the public sector, respectively. Region, education and the type of the provider were the main reason for differentials in interpersonal care. The results showed that quality is a more significant predictor of utilization of antenatal care than access. Lower utilization of services due to lack of information often leads to inappropriate policy choices. However, poor quality of services—both clinical and interpersonal— women receive mainly partly shape some of the attitudes leading to under-utilization of antenatal care. The much better quality of antenatal care in the southern states for the disadvantaged group of women suggested that better quality for disadvantaged women could also be achieved in the northern states. Strategies to improve access through increasing deployment of health workers such as ASHA by NRHM (National Rural Health Mission) would be successful only if the quality of services provided by them is good.

Jat et al. (2011) concentrated on the effects of individual, community, and district-level variables on the consumption of maternal health services with particular reference to prenatal care (ANC), skilled attendance at birth, and postnatal care (PNC) in the state of Madhya Pradesh in India. For this study, data from 15,782 ever-married women between the ages of 15 and 49 who lived in the Indian state of Madhya Pradesh and took part in the District Level Household and Facility Survey (DLHS-3) 2007-08 were used. For characteristics affecting the

usage of maternal health care services at the individual, community, and district levels, multilevel logistic regression analysis was utilised. According to the study's findings, only 37.4% of women received PNC within two cycles whereas 61.7% used ANC at least once during their most recent pregnancy. In the last delivery, skilled health professionals helped 49.8% of the mothers. The main determinants of ANC use and skilled attendance at delivery were the socioeconomic position of the household and the mother's education. Community-level variables were significant for ANC and skilled delivery attendance, but not for PNC. In summary, there is enough diversity in each of the three indicators of the utilisation of maternal health services within the neighbourhood and district of residence.

Zuhair and Roy (2017), tried to study the effect of health insurance on the use of antenatal care as well as use of antenatal care and child vaccination are positively related to wealth. The data have been taken from the third round of National Family Health Survey (NFHS-3) for an age group of 15-49 years for women and 15-54 years for men from more than 29 states. The survey covers 99% of the population with 124355 women respondents and 109041 men respondents. Wealth index and other variables such as age, coverage of health insurance, average years of women's education, place of residence, geographical region, and exposure to mass media are also considered. A Generalised Linear Model (GLM) has been used to study the relationship between outcomes and predictor variables. The study found that women in the south zone have higher odds of receiving ANC than those in the north zone. Penetration of health insurance is very low in the poorest quintile (0.10%) compared to the richest quintile (12.80%). 59.2% of the women in the poorest quintile had received antenatal care compared to 97.5% of the richest quintile. Only 12.4% women had opted for institutional deliveries in the poorest section compared to 84.2% in the richest quintile. The major obstacle in the path of institutional delivery was the cost. The major inequality exists in 4 or more antenatal visits, while the least inequality exists for folic acid and iodine supplements. There is a huge disparity regarding ANC services in terms of urban and rural divide. Health insurance coverage, average years of education and place of residence have positive effects on use of ANC services. Health insurance also increases the rate of ANC care as well as postnatal care. The low enrolment rates in the lowest quintile is responsible for the high percentage for not delivering a baby at a health centre. These suggest the need for reaching out to the poorest quintile women with an effective health care financing system to increase the utilisation of ANC care services. Mass media is a cost-effective tool to spread public health information and it has been proved that women with higher exposure to mass media and campaigns are more likely to use ANC and postnatal care, especially among poor and middle income groups.

From Institutional Delivery we see that,

Pathak et al. (2010), focused on the use of PNC and SBA in India. Data was taken from the first three rounds of NFHS. Analysis was performed on trends in prenatal care (PNC) utilisation in the first trimester among poor and non-poor mothers with four or more antenatal visits and skilled birth attendance (SBA), which was broken down by area of residence in India and three contrasting provinces. Results indicated slow-moving progress in the utilization of PNC and SBA in India and selected provinces during 1992–2006. There were disparities in the use of PNC and SBA, with the poor being the most disadvantaged. The use of PNC and SBA remained much lower among poor mothers in India irrespective of the area of residence and province. It was evident that the underprivileged lacked SBA and, even if they had, were more likely to turn to private facilities.

Saravanakumar et al. (2017), highlighted the present situation of utilization of institutional delivery service in the urban slums of Tamil Nadu. Recent studies have shown that socio demographic position of women, their economic and educational status, their age at marriage, gravida level of women along with the availability, distance and cost and quality of services are the important indicators of institutional delivery. Two municipal corporations of Tamil Nadu namely, Dindigul and Madurai were studied in detail in an analytical method. A sample size of 460 women were chosen aged between 15-49 years and a detailed investigation was carried out using Chi square and logistic regression analysis in SPSS 16. The study showed that a higher percentage of women in urban slums preferred to deliver at public health facilities, while only 25 percent of women preferred delivery at private health facilities and the remaining 6 percent of women delivered at home. While 75 percent of the deliveries were normal, 23 percent deliveries were Cesarean. The Chi square analysis showed that the factors like age at marriage, level of gravida of women, type of delivery and delivery complications indicated women delivering at public or private institutions and were significant at 5% level while all the other factors namely religion, caste, education and occupation of wife, standard of living index, age of mother, post-delivery complications, pregnancy complications, empowerment of women, mass media exposure and health seeking behavior of women were not so significant at 5% level. Although the government had taken various health steps like improving the public hospital infrastructure, specialty care services, maternity benefit schemes and educating pregnant women about their health facilities through ASHA, and various kinds of assistance programs like JSY, ASHA, NRHM, JSSK to educate pregnant mothers about their health facilities still we saw that a significant proportion of women in the urban slums of Tamil Nadu belonging to the lower socio economic strata in the economy still preferred private delivery

services instead of public delivery facilities due to hygiene related issues, availability of proper doctors and gynecologists at the right time, availability of proper equipment etc. Creating awareness among pregnant women, proper mass media exposure on safe institutional delivery at government health facilities, filling up the hospitals with better equipment and good gynecologists, and ensuring availability of female officers would help these women with a lower standard of living in the urban slums of Tamil Nadu to avail free delivery services at government hospitals or public health institutions free of cost.

Mondal et al. (2022) looked into the relationship between women's autonomy and their use of maternal healthcare services. Women's autonomy is a multifaceted concept that denotes control over resources and ideologies; it suggests self-assurance and an inner alteration of one's awareness to go beyond obstacles or conventional ideologies on the outside. Three factors are typically used to quantify autonomy: freedom of movement, involvement in decision-making, and access to and control over resources. The goal of the study was to investigate the relationship between married women in India at the time and the usage of maternal healthcare services. The NFHS 2015–16 collected data on autonomy from 32,698 currently married women between the ages of 15 and 49 who had at least one live birth in the five years preceding the survey. Antenatal care (ANC), delivery care, and postnatal care were the three indicators used in this study to measure the consumption of maternal healthcare services (PNC). In this study, women's autonomy in making decisions was the main predictor. When compared to women who had less decision-making autonomy at home, those with higher levels of autonomy used maternal healthcare services more frequently. Results indicated that increasing probabilities of maternal healthcare services in India were substantially correlated with women's autonomy. When compared to women with low autonomy, those with high autonomy were 37% and 33% more likely to receive ANC and PNC care, respectively. Interestingly, in the adjusted study, no significant correlation between women's autonomy and institutional delivery was found.

From literature review on Neonatal Care we find that,

Willis et al. (2009), pointed out that even though gender based health disparity was prevalent in India there was a lack of documentation on how gender differences express themselves in the care seeking process during neonatal period. Uttar Pradesh being a poor state with one of the least girl-to-boy ratio (0.90) was the focus of the study with the objectives-

- Quantitative assessment of gender differences in perception of any neonatal illness

- Quantitative assessment of gender differences in the type and amount of curative care used for sick neonates and the role of household members in this process.
- Documentation of reasons for non-use of curative care in sick neonates.

255 women in Shivgarh district UP, India were interviewed; most of them were Hindu, close to one-half of the mothers were illiterate and three-fourth were from a low socioeconomic background. There was gender bias noted in the perception of illness as compared to male neonates, female neonates were less likely to be perceived as sick. Households with male neonates spent 4 times more on neonatal health care services than households with female neonates. Female newborns were cared for by less expensive public caregivers, while male newborns were cared for by private, unqualified professionals who were thought to provide better care. These findings implied that, in comparison to males, girls are less likely to seek care during the neonatal period.

Willis et al. (2011), in his paper, surveyed in Shivgarh, a rural block of Uttar Pradesh, India. It had 153 households as participants, who had utilised a healthcare provider for their sick neonates. They measured neonatal health improvement, satisfaction, overall care, interactions with providers, waiting time and explanations about immediate and follow up care. Healthcare providers were defined as individuals who offered services to neonates. Among those households, 153 used allopathically oriented providers as their first healthcare provider, 110 mother-newborn pairs utilized Unqualified Allopathically Oriented Providers (UAOPs) and 43 used Qualified Allopathically Oriented Providers (QAOPs). A multiple logistic regression analysis showed that 80% ranked UAOPs as the best while only 15% voted for QAOPs. 96% of those households utilizing UAOPs ranked them the 'best' provider in their area for sick newborn infants. On the other hand, among those utilizing QAOPs, 49% ranked them as the 'best' provider. The remaining 51%, utilizing QAOPs, voted UAOP (40%) and non-allopathically oriented providers (11%) as the 'best' provider. It is seen that even though both qualified and unqualified allopathic treatment providers are present, people are voluntarily choosing to visit the unqualified allopathically oriented providers. Usually more literate mothers chose QAOPs rather than their non-literate counterparts. 80% of people prefer UAOPs and 15% choose QAOPs. This may be because QAOPs were treating more complicated cases than UAOPs and hence the mothers could not comprehend the severity of the cases. Due to this reason, they are unable to differentiate between UAOPs and QAOPs. It was found in the paper that community perception favored the healthcare services of UAOPs over that of QAOPs. It was noted that

people using UAOPs perceived better neonatal health outcomes and higher satisfaction levels than those using QAOPs.

Iyengar et al. (2012) discussed in her paper about the postpartum maternal morbidity among rural women of Rajasthan. For this study a rural area of Rajasthan was selected and an intervention on postpartum care for women was conducted. In this intervention, there was a meticulous system of receiving reports of a defined population and home level postpartum care was provided to all women (home and institutional deliveries both). Postpartum anaemia was found to be the most common morbidity. A large proportion (46%) of the women suffered from moderate anaemia, while 7.4% suffered from severe anaemia. Fever, breast conditions & perineal conditions were other common morbidities. Of all the women, 7.6% were detected for life-threatening postpartum morbidities, for both home deliveries & institutional. Since postpartum anaemia was found to be the main reason for morbidity, it was important to address that. Controlling antenatal anaemia was not enough to reduce the prevalence of postpartum anaemia as blood loss during delivery could be a reason for anaemia. Women who were moderately anaemic in pregnancy, were likely to become severely anaemic if they had blood loss of even moderate amounts during delivery. Very few of those women in low resource settings were likely to receive treatment or blood transfusion after delivery and hence they are likely to remain severely anaemic and suffer from mortality or morbidity due to that. Analyses showed a linear correlation between severe anaemia and perinatal death, delivery at home, socio-economically underprivileged SC or ST and parity of three or more. But there was no significant correlation with antenatal care. The author suggested that health programmes should make investments to provide postpartum care to all women starting from the first week so that these conditions can be detected and managed in time and this was essential especially for those delivering at homes. However, as it was observed from the study that a proportion of women who had institutional deliveries, also faced life-threatening postpartum morbidities.

4. Research Gap

The above literature shows that considerable study has been done on the health seeking behaviour of expectant mothers and institutional delivery. However, relatively less importance has been given to postpartum check up of mothers and neonatal check up of newborns. Interestingly, the data shows that this is where the numbers are the lowest. It seems that after the birth of the child, the health of mothers are given less importance. So in this study, we will focus on the postpartum and neonatal care of mothers and its determinants.

5. Objectives

Our study has given us four objectives which we will vividly discuss in the entire paper.

Our first objective is to analyze the percentage of women opting for antenatal care (ANC), institutional delivery (ID), postpartum care(PPC), and neonatal care (NNC). Venn Diagram has been used for this.

Our second objective is to analyze the impact of the mother's education and father's education, household income, religion, caste, exposure to mass media, confidence in institutions, access to health insurance, maternity benefits, and anganwadi benefits on the propensity to take ANC, ID, PPC, NNC.

Our third objective is to analyse the effect of the number of children, i.e mother's experience on ANC, ID, PPC and NNC utilisation. Along with this we want to see if delivery complications during childbirth affect a mother's propensity to opt for PPC services.

Lastly, we want to see the effects of women's autonomy in terms of their decision making with regards to their children's health and their own health, whether they require permission to visit health centers alone, and their occupation status on ANC, ID PPC and NNC services.

6. Data Sources and Methodology

For the purpose of our project, we have used the Eligible Women Household Individual dataset from 2011-2012 IHDS 2. Data. For pictorial representation, we have used Venn diagrams. According to the prominent logician and mathematician John Venn, who popularized the use of these diagrams, “A Venn diagram is a diagrammatic representation of the relationships between sets, using circles or closed curves that overlap to show commonalities and differences among sets. “

Four logistic regression analysis were conducted to examine the relationship between Antenatal care, Institutional Delivery, Postpartum Care, Neonatal Care and various independent variables. The first logistic regression analysis looked at the relationship between Antenatal care and the independent variables, including log of per capita income, women’s education, husband’s education, religion to the woman, caste of the woman, confidence in both government and private institutions exposure to mass media, health insurance, and the number of children. The second logistic regression analysis examined the relationship between institutional delivery and the same set of independent variables as the first analysis. The third logistic regression analysis analysed the relationship between Postpartum care and the independent variables, including all those in the first two analysis as well as delivery complications. Finally, the fourth logistic regression analysis examined the relationship between neonatal care and the same set of independent variables as the first two analysis.

Pairwise correlation refers to the measurement of the strength and direction of the linear relationship between two variables when considered individually. It is a statistical technique used to assess the degree of association between two variables and is represented by a correlation coefficient. In the project, we have used this method to see the relationship between income and exposure with different maternal health-seeking components and income with confidence in private and government institutions.

7. Descriptive Statistics

Table 1: Table for descriptive statistics

Variable	Frequency	Percentage	Mean
h_edu1 (illiterate)	7521	20.41	-
h_edu2 (primary)	3190	8.66	-
h_edu3 (secondary)	18221	49.45	-
h_edu4 (upper secondary)	7914	21.48	-
w_edu1 (illiterate)	15163	38.37	-
w_edu2 (primary)	2876	7.28	-
w_edu3 (secondary)	16146	40.86	-
w_edu4 (upper secondary)	5335	13.50	-
mm_exposure	30208	76.43	-
Confidence in Govt institutions			-
Great deal of confidence	21418	54.27	
Only some confidence	13787	34.94	
Hardly any confidence	4258	10.79	
Confidence in Private institution			
Great deal of confidence	28749	72.87	
Only some confidence	9022	22.87	
Hardly any confidence	1683	4.27	
Age group			
15-21	2201	5.57	
22-28	8092	20.48	
29-35	8960	22.67	
36-42	8942	22.63	
43-49	7086	17.93	
50-56	3752	9.49	
57-63	438	1.11	

Variable	Frequency	Percentage	Mean
religion1 (Hindu)	32326	81.79	-
religion2 (Muslim)	4774	12.08	-
religion3 (Christian)	926	2.34	-
religion4 (Others)	1497	3.79	-
caste1 (Brahmin/General)	11222	28.44	-
caste2 (OBC)	16023	40.61	-
caste3 (SC)	8415	21.33	-
caste4 (ST)	3274	8.30	-
caste5 (Others)	523	1.33	-
health_insurance	4357	11.02	-
LB_delivery_complications	30306	76.68	-
no_children (0)	2861	7.24	-
no_children (1)	6119	15.49	-
no_children (2)	12712	32.17	-
no_children (3)	9114	23.07	-
no_children (4)	4644	11.75	-
no_children (5)	2189	5.54	-
no_children (6)	1071	2.71	-
no_children (7)	477	1.21	-
no_children (8)	206	0.52	-
no_children (9)	75	0.19	-
no_children (10)	27	0.07	-
no_children (11)	8	0.02	-
no_children (12)	4	0.01	-
no_children (13)	2	0.01	-
INCOMEPC	-	-	27700.86

8. Variable Description

Anganwadi Benefit: The variable `anganwari_benefit` was created to indicate whether mothers received Anganwadi Center benefits for immunization and supplementation during their last birth. It is derived from the variable LB48, where 0 indicates no benefits, and 1, 2, and 3 represent receiving benefits while pregnant, while lactating, or both, respectively.

Age group: The variable `age_group` was created by categorizing the individual age of the women into different age groups for providing a broader perspective of the distribution of individuals across various age ranges. It is categorized into : Group1- age 15 to 21 years, Group 2- age 22-28 years, Group 3- age 29-35 years , Group 4- 36-42 years , Group 5- 43-49, Group 6- 50-56 years, Group 7- 57 years and older.

ANC: The variable represents the number of women opting for Antenatal check-up at least once in their last pregnancy and the women who did not receive any antenatal check-up.

Caste: This variable is used as an indicator of the caste of the women. It is divided into 5 categories: the brahmin and forward caste(except brahmin) are clubbed together and taken as General caste, OBC-Other Backward Caste, SC- Scheduled Caste, ST-Scheduled Tribe and others.

Child health Autonomy: This variable represents whether the woman decides what to do when her child falls sick.

Confidence in Government hospitals and doctors: The variable "`confidence_govt`" represents the level of confidence in government hospitals and doctors to provide good treatment. The responses are categorized into three levels: "A great deal of confidence" (coded as 1), "Only some confidence" (coded as 2), and "Hardly any confidence at all" (coded as 3).

Confidence in Private hospitals and doctors: The variable "`confidence_pvt`" represents the level of confidence in private hospitals and doctors to provide good treatment. The responses are categorized into three levels: "A great deal of confidence" (coded as 1), "Only some confidence" (coded as 2), and "Hardly any confidence at all" (coded as 3).

Decision about number of children: This variable indicates whether the respondent decides the number of children they have.

Decision about own sickness: This variable indicates whether the respondent decides what to do when they fall sick.

Government health insurance: The variable "insurance_govt" represents whether individuals have government health insurance. The responses are categorized as "No" (coded as 0) and "Yes" (coded as 1).

Husband's education: It represents the education level of the husband of the woman. It is categorical variable divided into 4 categories: illiterate, primary level(from class 1 to class 4), secondary level(from class 5 to class 10) and Above secondary level (from class 11 to above bachelor's degree).

ID: The variable "ID" was created based on the variable "Place of delivery" in a sample of 13,841 women. To create the variable "ID," a binary indicator was constructed. It takes the value of 1 if the place of delivery was either a government hospital or clinic (category 1) or a private nursing home (category 2). For all other categories (home and other), the variable "ID" takes the value of 0.

Last birth delivery complication: The variable "LB_delivery_complications" represents the presence of delivery complications during the last birth. It was created by summing up the individual variables related to different delivery problems: LB17A (water broke early), LB17B (baby stuck), LB17C (long labor pain), LB17D (wrong baby position), LB17E (delayed placenta), LB17F (bleeding from vagina), LB17G (premature labor), and LB17H (any other problem). For each delivery problem variable, "No" is coded as 0 and "Yes" is coded as 1. By summing up these variables, a cumulative count of delivery complications is obtained. To simplify the analysis, the variable "LB_delivery_complications" was recorded such that a value of 1 indicates the presence of one or more delivery complications ($LB_delivery_complications \geq 1$), while a value of 0 indicates the absence of any complications.

Mass media exposure: The variable "awareness_index1" was created by summing up several variables related to awareness and exposure to media. These variables include MM12Y- indicating if the individual owns mobile or not, MM13- Indicating if the individual's mobile phone has access to internet and email or not, MM14- indicating if the individual uses her phone for SMS purpose(representing different media sources), women_radio (indicating

radio exposure among women), and women_TV (indicating TV exposure among women). For each variable, different response options are assigned numeric codes. The values of these variables are then summed to create the awareness index. To further simplify the analysis, a new variable "mm_exposure" was created based on the "awareness_index1". If the value of "awareness_index1" is greater than or equal to 3 (indicating moderate to high awareness/exposure), "mm_exposure" is coded as 1. Otherwise, it is coded as 0.

Maternity Benefit: The variable "maternity_benefits" represents whether individuals receive any income as maternity benefits.

NNC : The variable "NNC" was created based on the variable "2-month period post-natal checkup" in a sample of 13,814 women. It takes the value of 1 if the post-natal checkup was done either for both the mother and the baby's health or only for the baby's health. For all other categories (no checkup and only the mother's health checkup), the variable "NNC" takes the value of 0. It represents the number of women who opted for Neonatal care and the number of women who did not.

Number of children alive: The variable "no_children" represents the number of children alive for each respondent, eligible women. It ranges from 0 to 13, with corresponding frequencies and percentages out of a sample size of 39,509.

Occupation status: This variable indicates whether individual respondents have ever worked for pay or wages.

Own Health Autonomy: This variable signifies whether individuals can visit a health center alone without needing permission.

PPC: The variable "PPC" was created based on the variable "2-month period post-natal checkup" in a sample of 13,814 women. It takes the value of 1 if the postpartum checkup was done either for both the mother and the baby's health or only for the mother's health. For all other categories (no checkup and only the baby's health checkup), the variable "PPC" takes the value of 0. It represents the number of women who opted for postpartum care and the number of women who did not.

Private health insurance: The variable "insurance_priv" represents whether individuals have private health insurance. The responses are categorized as "No" (coded as 0) and "Yes" (coded as 1).

Religion: The variable represents the religion of the woman. It is categorical variable and is divided into 4 categories: Hindu, Muslim, Christian and Sikh, Buddhist, Jain, Tribal, others and none were clubbed together as the 4th category.

Women's education: It is a categorical variable representing the level of education of the women. It is divided into 4 categories: illiterate, primary level (from class 1 to class 4), secondary level (from class 5 to class 10) and Above secondary level (from class 11 to above bachelor's degree).

9. Results and Analysis

We have used Venn diagrams to look at the percentage of women receiving antenatal care (ANC), postpartum care (PPC), institutional delivery (ID) and neonatal care (NNC). It has been found that a substantial percentage of eligible women opt for antenatal care (88%) and institutional delivery (70%). This indicates a positive trend where a large portion of women are accessing healthcare services during pregnancy and prefer delivering their babies in healthcare facilities. But the proportion of women receiving postpartum care is distinctly lesser. While 46% receive postpartum care, 56% receive neonatal care. This suggests that there may be barriers or challenges in accessing postpartum care services after delivery.

Moreover, 36% of women receive antenatal care, postpartum care, and institutional delivery, while 45% of women opt for antenatal care, postpartum care and neonatal care. All these findings lead us to believe that the primary focus after delivery is on the neonates' health. It highlights the importance of ensuring adequate care for neonates, possibly due to a recognition of the vulnerability of newborns during the early stages of life.

30% of the women go for antenatal care and institutional delivery but not postpartum care, whereas only 6% go for antenatal care and postpartum care but not institutional delivery. It implies that ANC plays a role in increasing the likelihood of women giving birth in healthcare facilities, emphasizing the importance of ANC as a gateway to other maternal health services.

30% of the women opt for antenatal care and institutional delivery but not postpartum care, while 22% receive antenatal care and institutional delivery but not neonatal care.

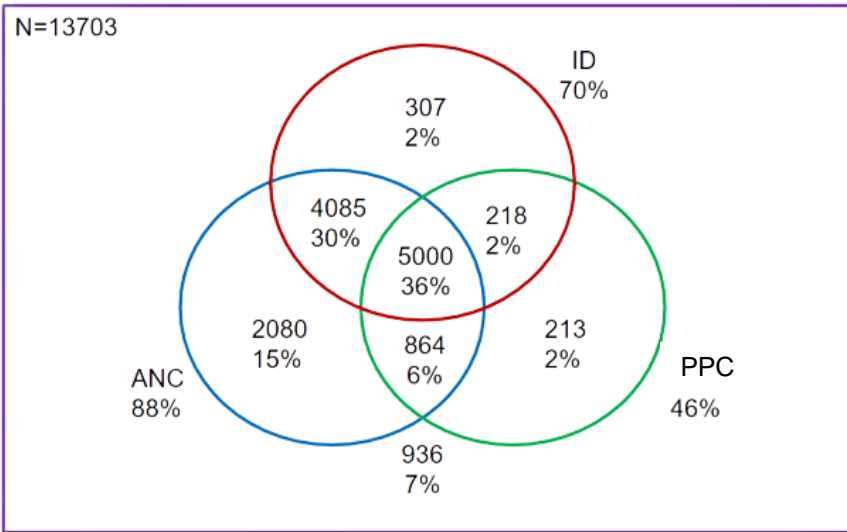


Figure 1:Venn diagram relating ANC, PPC and ID

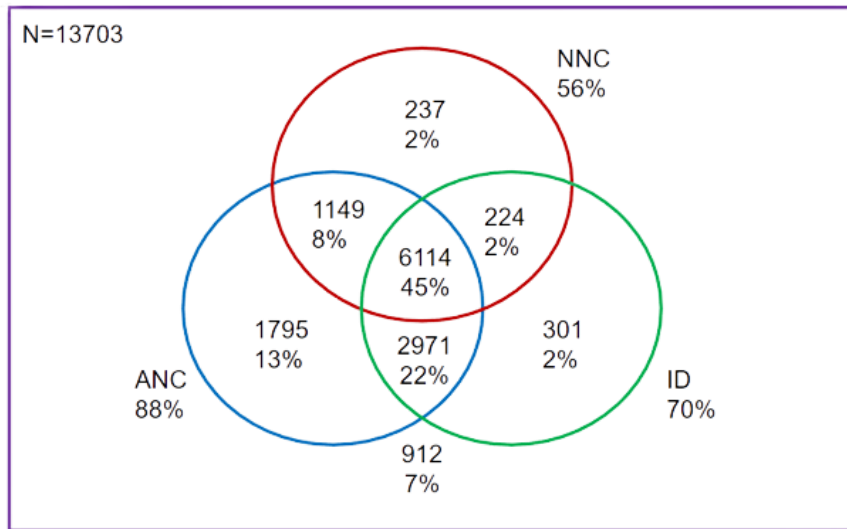


Figure 2:Venn diagram relating ANC, NNC and ID

Table 2:Correlation coefficients between maternal healthcare usage and log of per capita income

	ANC	ID	PPC	NNC
log income	0.2089**	0.2552**	0.1095**	0.1599**

Table 2 depicts the correlation between maternal healthcare service utilization with per capita income (denoted as “log income” in Table 1). In the case of ANC services, we can see there is a positive and significant (at 5% significance level) correlation with per capita income. Similarly, in the case of Institutional Delivery, we can see there is a positive and significant (at 5% significance level) correlation with per capita income. In the case of both PPC and NNC, we can see there is a positive and significant (5% level of significance) correlation with per capita income. From the results given in the table, we can infer that, though both per capita income impact all kinds of usage of maternal healthcare services positively and significantly.

Education and Maternal and Neonatal Health

Table 3:Percentage of women opting for ANC, ID, PPC, NNC against level of Education of Mother and Father of the child

	ANC	ID	PPC	NNC
Mother's Education				
Illiterate	72.29	50.31	36.95	43.70
Primary	87.93	62.01	36.64	51.47
Secondary	93.73	76.14	49.53	60.59
Above Secondary	98.57	92.09	55.91	70.36
Father's Education				
Illiterate	72.98	49.65	35.59	43.49
Primary	83.67	59.55	36.86	49.08
Secondary	89.34	71.26	47.30	57.27
Above Secondary	95.74	85.78	53.78	66.89

(All values are in percentage)

Table 3 presents the percentage of women who opt for antenatal care (ANC), institutional delivery (ID), postnatal care (PNC), and neonatal care (NNC) against educational levels

In terms of maternal education, as education levels increase, the propensity to use ANC, ID, PNC, and NNC increases consistently. As evident in the table, women educated beyond the secondary level make maximum use of maternal healthcare services in terms of ANC (98%), ID (92%), PNC(55.91%) as well as NNC(70%). However, overall we see that utilization of post-natal care has been the least among women irrespective of their education levels. For illiterate women, PNC use was 36.95%, for those educated up to the primary level it was 36.64%, for those educated till the secondary level PNC was opted by 49% of women and above the secondary level it was the highest, 55.91%.

In terms of the husband's education, we have found similar results. The more educated the husband is, the higher the propensity for the women to opt for ANC, ID, PNC, and NNC. The propensity to opt for ANC, ID, PNC, and NNC by women whose husbands were illiterate was 72.98%, 49.65%, 35.59%, and 43.49% respectively. For husbands educated beyond the secondary level, the propensity to opt for ANC, ID, PNC, and NNC by their spouses was 95.74%, 85.78%, 53.78%, and 66.89% respectively. Here also we see women opt for less PNC irrespective of their husband's education. Thus, the education levels of the mother and the father play a crucial role in accessing maternal healthcare services to ensure a safe pregnancy.

Religion and Caste and Maternal and Neonatal Health

Table 4:Percentage of women opting for ANC, ID, PPC, NNC against religion and caste of women

	ANC	ID	PPC	NNC
Religion				
Hindu	87.63	71.03	46.44	57.47
Muslim	84.35	62.58	39.83	49.11
Christian	96.75	83.52	55.68	64.39
Sikh, Buddhist, Jain, Tribal, others, none	93.3	70	56.52	61.96
Caste				
Brahmin,Forward/General (except Brahmin)	92.97	75.99	46.60	58.07
OBC	85.47	71.23	48.83	57.95
SC	85.92	65.67	43.72	55.63
ST	83.64	54.92	37.97	45.70
Others	96.36	89.63	53.37	68.10

(All values are in percentage)

In table 4, we study how religion and caste affect maternal health-seeking behaviour.

In terms of religion we find, Muslim women opt for least ANC (84%) , ID (62.58%), PNC (39.83%) and NNC (49.11%) services, whereas Christian women make maximum use of ANC (96.75%), ID (83.52%), PNC (55.68%) and NNC (64.39%) services. This higher utilisation by Christian women maybe attributed to active community outreach programmes by Church and several missionary associations. On the other hand, Muslim women maybe reluctant to opt for these services because of social and cultural factors, discrimination resulting in mistrust towards institutions and low literacy rates. Sikh women, Jain women, Tribal women and others have displayed high propensity to opt for maternal healthcare services.

In terms of Caste, Brahmin and Forward Caste women come in second place in terms of ANC, ID, PNC and NNC utilisation, whereas the Others category comes in first place. 92.97% of Brahmin and Forward Caste women opt for ANC services, 75.99% of them opt for ID, 46.6% of them use PNC services and 58.07% of them use NNC services. On the other hand, ST women

make least utilisation of ANC (83.64%), ID (54.92%), PNC (37.97%) and NNC (45.70%). Higher percentage of women from other castes like Scheduled Castes (SCs) and OBC use ANC services. However, for all the religions and castes across India, utilisation of PNC services has been the least.

Confidence in institution and Maternal and Neonatal Health

Table 5:Percentage of women opting for ANC, ID, PPC, NNC against confidence in government and private hospitals and doctors

	ANC	ID	PPC	NNC
Confidence in Govt. Institution				
Great deal of confidence	89.29	71.14	47.21	57.48
Only some confidence	85.81	68.80	43.62	54.66
Hardly any confidence	84.21	67.61	46.90	56.97
Confidence in private Institution				
Great deal of confidence	87.20	69.90	47.84	56.88
Only some confidence	88.38	69.67	40.78	55.29
Hardly any confidence	87.80	71.78	39.66	54.89

(All values are in percentage)

From table 5, we see that for women who have a great deal of confidence in government healthcare facilities, 89% of them opt for ANC, 71% of them opt for ID and 57% of them opt for NNC. Here also we see a majority of women are not taking postpartum care despite having confidence in health facilities. For women having only some confidence in government health facilities, we see the highest percentage for ANC (85%) and the least for PPC (43.62%). For women with hardly any confidence in government facilities, most of them opt for ANC (84%) and the least of them opt for PPC (46.90%). In general, we see that confidence in government institutions plays a positive role as those with the highest confidence tend to opt for more maternal services than those with hardly any confidence.

In terms of confidence in private health institutions, we find that 87.20% of women who have a great deal of confidence in private health facilities go for ANC, 69.90% of them go for ID, PPC is

taken by 47.84% of them, and NNC is taken by 56.88% of them. But we find that women who have only some confidence in these health facilities, opt for more ANC (88.38%), but a lesser percentage of them opt for ID, PNC, and NNC. Lastly, in terms of women who hardly have any confidence in these institutions, the majority of them, 71.78% opt for ID, even more than those women who do have more trust in these facilities. But here we also find that the least percentage of women are taking PPC, only 39%. These results can be due to the fact that women perceive public facilities to be in worse condition than private facilities, which overshadows their lack of confidence in private facilities leading to a majority of them opting for institutional deliveries. However, here also PPC utilisation has been the least irrespective of confidence in healthcare facilities.

Self-help group, Mahila Mandal membership and Anganwadi benefits and Maternal and Neonatal Health

Table 6:Percentage of women opting for ANC, ID, PPC, NNC against different parameters of membership and Anganwadi benefits

	ANC	ID	PPC	NNC
Member & benefits				
Self Help Group	94.49	78.69	47.68	63.23
Mahila Mandal	96.66	80.47	54.15	68.69
Anganwadi benefit				
Yes	92.16	70.08	45.33	58.80
No	82.61	69.65	46.62	53.77

(All values are in percentage)

From table 6 we see that, Mahila Mandal and Self Help Groups (SHGs) members have opted for ANC, ID, PPC, and NNC services substantially more. 94.5% of members of SHGs used ANC services, 78% opted for ID, 47% used PPC services and 63% used NNC services. On the other hand, 96% of members of Mahila Mandal used ANC services, 80% of them opted for ID, 54% of them used PPC services, and 68% of them used NNC services post-delivery. This highlights the positive role of community involvement at the grassroots level in maternal health care services. Women who have got Anganwadi Benefits during pregnancy or during lactating period

or during both the periods have a higher chance of seeking antenatal care. 92.16 percent of the women who have got the Anganwadi Benefits, have opted for antenatal care and 82.61 percent of women who haven't got the benefits have taken antenatal care. Clearly there is a positive impact of Anganwadi centres on the behaviour of women seeking antenatal care. Similar results are found for neonatal care as well. Almost 59% of the women who have got the benefits, have taken neonatal care for their child. Only 53.77% from the rest of the women have taken neonatal care for their newborns. Not much difference was seen in the percentage of opting for institutional delivery between the women who got the Anganwadi Benefits (70.08%) and women who haven't received the benefits (69.65%). Infact a slight less percentage of women have opted for postpartum care who got the Anganwadi Benefits(45.33) than the women who haven't got(46.62).

Age group and Maternal and Neonatal Health

Table 7:Percentage of women opting for ANC, ID, PPC, NNC against age group of women

	ANC	ID	PPC	NNC
Age group				
15-21	90.66	77.46	45.16	53.49
22-28	90.62	74.32	47.25	57.87
29-35	86.66	67.13	46.27	57.73
36-42	77.56	57.66	41.37	51.48
43-49	63.25	38.66	33.90	37.71
50-56	50.00	12.50	23.53	23.53
57 and above	25.00	25.00	25.00	25.00

(All values are in percentage)

From the above Table-7, we find that the percentage of women opting for ANC services decreases with increasing age groups. The highest percentage of women opting for ANC is in the age group 15-21 (90.66%), it is substantially high for age group 22-28 and the lowest is in the age group 50-56 (50%). The trend suggests that young mothers are more conscious and aware about taking Antenatal check-ups compared to mothers who conceive at an older age who are more experienced. The percentage of women opting for ID services also decreases with increasing age. The highest percentage of women opting for ID is in the age group 15-21

(77.46%), and the lowest is in the age group 50-56 (12.50%). This indicates that younger women are more likely to opt for Institutional delivery compared to older women. The percentage of women opting for PPC services follows a similar pattern as ANC and ID, with a decrease in percentage as the age group increases. The highest percentage of women opting for PPC is in the age group 15-21 (45.16%), and the lowest is in the age group 50-56 (23.53%). It is to be noted here that the percentage of women opting for postpartum care is significantly less compared to that of ANC and ID across all age groups. Similar trend is seen in the case of the percentage of women opting for Neonatal care. The highest percentage of women opting for NNC is in the age group 15-21 (53.49%), and the lowest is in the age group 50-56 (23.53%). Younger women are more likely to seek non-natal care services compared to older women.

Overall, younger women, particularly in the age group 15-21, are more likely to utilize healthcare services such as ANC, ID, PPC, and NNC. As the age increases, there is a decrease in the percentage of women accessing these services. The plausible reasons for this could be older women are more experienced and not as conscious as young mothers. Hence, older women could prioritize their family and work more than seeking maternal and neonatal health services or they could be tied to cultural beliefs or traditions. Young mothers could be more open to modern healthcare services, they are aware about its importance and tend to seek it more.

Autonomy and Maternal and Neonatal Health

Table 8:Percentage of women who have autonomy with respect to taking decisions about their own health, child health, number of children, ability to visit health centers alone and working status

	ANC	ID	PPC	NNC
Decides the number of children to have	87.8	70.26	45.27	56.2
Decides what to do if the child falls sick	88.14	70.23	45.59	56.44
Decides what to do if own falls sick	88.36	70.33	45.56	56.91
Can visit health center alone	88.53	70.07	46.61	57.16
Ever worked for wages/ pay	84.81	62.53	46.79	56.47

(All values are in percentage)

In table 8, we see the percentage of women opting for Antenatal Care (ANC), Institutional Delivery (ID), Postpartum Care (PPC), and Neonatal care (NNC) against various measures of autonomy.

We see that 87% of women who make the decision regarding the number of children to have opted for receiving antenatal care during their pregnancy, 70% opt for institutional delivery and 56% opt for receiving neonatal care after delivery but the majority of women (54%) have not opted for Postpartum care after childbirth.

In terms of women who decide their child's course of treatment in the event of their sickness, we see similar results. 88% take ANC, 70% opt for ID, 56% opt for neonatal care, but only 45% of women take postpartum care.

We see similar results for women who can visit health centers alone, without taking anyone's permission. Here also we see that women are opting for less postpartum care. (46.61%)

For women who are working for wages, the percentage of women opting for ANC stands at 84.81%, women opting for ID is 62%, PPC is 46.79% and NNC is 56.47%.

From the table, we see women who have autonomy regarding their own treatment as well as their child's treatment, and the number of children they want, a substantial percentage of them are opting for ANC and ID. Although utilization of NNC services is not at par with ANC and ID, the majority of women are opting for it. However, for all the factors of autonomy that we have considered, utilisation of PPC services is the least, with most opting out of it. Several factors are responsible for this: limited accessibility, lack of awareness, personal preference, social and cultural norms, and duties and responsibilities post birth play a significant role.

10. Model:

We have run four separate logistic regression with ANC, ID, PPC, NNC as our independent variable and log income, women's education (which has been subdivided into four categories: illiterate, primary, secondary and higher secondary where illiterate has been taken as the reference category), husband's education (which has been subdivided into four categories: illiterate, primary, secondary and higher secondary where illiterate has been taken as the reference category), mass media exposure, confidence in government institution(Only some confidence(2) and hardly any confidence(3) and where great deal of confidence(1) is taken as dummy variable), confidence in private institution(Only some confidence(2) and hardly any confidence(3) and where great deal of confidence(1) is taken as dummy variable), government health insurance, private health insurance, religion (which has been subdivided into four categories: Hindu, Muslim, Christian, Others where Hindu is taken as the reference category), caste (which has been subdivided into five categories: Forward caste/general, OBC, SC, ST, Others where Forward caste was taken as the reference category), last birth delivery complication(only taken for the logit regression where NNC is the dependent variable), maternity benefit, occupational status, women's autonomy about her own health, women's autonomy about her child's health, anganwadi benefit are the dependent variables.

$$\begin{aligned} \text{ANC}_i = & \beta_0 + \beta_1 \ln_income_i + \beta_2 w_primary_i + \beta_3 w_secondary_i + \beta_4 w_above_secondary_i + \beta_5 \\ & h_primary_i + \beta_6 h_secondary_i + \beta_7 h_above_secondary_i + \beta_8 mm_exposure_i + \beta_9 no_children_i + \\ & \beta_{10} confidence_govt_2_i + \beta_{11} confidence_govt_3_i + \beta_{12} confidence_priv_2_i \\ & + \beta_{13} confidence_priv_3_i + \beta_{14} insurance_govt_i + \beta_{15} insurance_pvt_i + \beta_{16} Muslim_religion_i + \beta_{17} \\ & Christian_religion_i + \beta_{18} Others_religion_i + \beta_{19} OBC_caste_i + \beta_{20} SC_caste_i + \beta_{21} ST_caste_i + \beta_{22} \\ & Others_caste_i + \beta_{23} maternity_benefits_i + \beta_{24} occupational_status_i + \beta_{25} own_health_autonomy_i \\ & + \beta_{26} child_health_autonomy_i + \beta_{27} anganwadi_benefit_i + \epsilon_i \end{aligned}$$

$$\begin{aligned} \text{ID}_i = & \beta_0 + \beta_1 \ln_income_i + \beta_2 w_primary_i + \beta_3 w_secondary_i + \beta_4 w_above_secondary_i + \beta_5 \\ & h_primary_i + \beta_6 h_secondary_i + \beta_7 h_above_secondary_i + \beta_8 mm_exposure_i + \beta_9 no_children_i + \\ & \beta_{10} confidence_govt_2_i + \beta_{11} confidence_govt_3_i + \beta_{12} confidence_priv_2_i + \beta_{13} \\ & confidence_priv_3_i + \beta_{14} insurance_govt_i + \beta_{15} insurance_pvt_i + \beta_{16} Muslim_religion_i + \beta_{17} \\ & Christian_religion_i + \beta_{18} Others_religion_i + \beta_{19} OBC_caste_i + \beta_{20} SC_caste_i + \beta_{21} ST_caste_i + \beta_{22} \\ & Others_caste_i + \beta_{23} maternity_benefits_i + \beta_{24} occupational_status_i + \beta_{25} own_health_autonomy_i \\ & + \beta_{26} child_health_autonomy_i + \beta_{27} anganwadi_benefit_i + \epsilon_i \end{aligned}$$

$$\begin{aligned}
PPC_i = & \beta_0 + \beta_1 \ln_income_i + \beta_2 w_primary_i + \beta_3 w_secondary_i + \beta_4 w_above_secondary_i + \beta_5 \\
& h_primary_i + \beta_6 h_secondary_i + \beta_7 h_above_secondary_i + \beta_8 mm_exposure_i + \beta_9 no_children_i + \\
& \beta_{10} confidence_govt_2_i + \beta_{11} confidence_govt_3_i + \beta_{12} confidence_priv_2_i + \beta_{13} \\
& confidence_priv_3_i + \beta_{14} insurance_govt_i + \beta_{15} insurance_pvt_i + \beta_{16} Muslim_religion_i + \beta_{17} \\
& Christian_religion_i + \beta_{18} Others_religion_i + \beta_{19} OBC_caste_i + \beta_{20} SC_caste_i + \beta_{21} ST_caste_i + \beta_{22} \\
& Others_caste_i + \beta_{23} maternity_benefits_i + \beta_{24} occupational_status_i + \beta_{25} own_health_autonomy_i \\
& + \beta_{26} child_health_autonomy_i + \beta_{27} anganwadi_benefit_i + \epsilon_i
\end{aligned}$$

$$\begin{aligned}
NNC_i = & \beta_0 + \beta_1 \ln_income_i + \beta_2 w_primary_i + \beta_3 w_secondary_i + \beta_4 w_above_secondary_i + \beta_5 \\
& h_primary_i + \beta_6 h_secondary_i + \beta_7 h_above_secondary_i + \beta_8 mm_exposure_i + \beta_9 no_children_i + \\
& \beta_{10} confidence_govt_2_i + \beta_{11} confidence_govt_3_i + \beta_{12} confidence_priv_2_i + \beta_{13} \\
& confidence_priv_3_i + \beta_{14} insurance_govt_i + \beta_{15} insurance_pvt_i + \beta_{16} Muslim_i + \beta_{17} Christian_i + \beta_{18} \\
& Others_religion_i + \beta_{19} OBC_i + \beta_{20} SC_i + \beta_{21} ST_i + \beta_{22} Others_caste_i + \beta_{23} maternity_benefits_i + \beta_{24} \\
& occupational_status_i + \beta_{25} own_health_autonomy_i + \beta_{26} child_health_autonomy_i + \\
& \beta_{27} anganwadi_benefit_i + \beta_{28} LB_delivery_complications_i + \epsilon_i
\end{aligned}$$

Table 9:Table showing the results of logistic regression

VARIABLES	ANC	ID	PPC	NNC
ln_income	0.343*** (0.0361)	0.299*** (0.0272)	0.0826*** (0.0224)	0.186*** (0.0229)
w_primary	0.547*** (0.121)	0.254*** (0.0883)	-0.103 (0.0845)	0.156* (0.0812)
w_secondary	1.118*** (0.0804)	0.562*** (0.0551)	0.292*** (0.0502)	0.409*** (0.0500)
w_above_secondary	2.357*** (0.212)	1.366*** (0.102)	0.378*** (0.0716)	0.618*** (0.0738)
h_primary	0.246** (0.114)	0.0712 (0.0871)	-0.0711 (0.0836)	-0.0135 (0.0814)
h_secondary	0.324*** (0.0749)	0.214*** (0.0610)	0.196*** (0.0570)	0.129** (0.0559)
h_above_secondary	0.546*** (0.125)	0.456*** (0.0852)	0.255*** (0.0720)	0.242*** (0.0721)
mm_exposure	-0.121 (0.0745)	0.155*** (0.0501)	-0.128*** (0.0427)	-0.113*** (0.0436)
no_children	-0.271*** (0.0203)	-0.302*** (0.0175)	-0.102*** (0.0151)	-0.115*** (0.0150)
confidence_govt_2(only some confidence)	-0.210*** (0.0658)	-0.0771 (0.0471)	-0.148*** (0.0397)	-0.101** (0.0401)
confidence_govt_3(hardly any confidence)	-0.382*** (0.0946)	-0.145** (0.0702)	0.0381 (0.0595)	0.0136 (0.0611)
confidence_pvt_2(only some confidence)	0.0566 (0.0732)	-0.0154 (0.0526)	-0.274*** (0.0444)	-0.0507 (0.0443)
confidence_pvt_3(hardly any confidence)	0.0688 (0.173)	0.0607 (0.115)	-0.332*** (0.0976)	-0.114 (0.0970)
insurance_govt	-0.327*** (0.100)	-0.223*** (0.0787)	0.211*** (0.0666)	0.176*** (0.0684)
insurance_priv	0.398 (0.383)	0.498** (0.219)	-0.123 (0.136)	0.0501 (0.146)
Muslim_religion	0.306*** (0.0905)	-0.160** (0.0637)	-0.157*** (0.0558)	-0.133** (0.0558)
Christian_religion	1.367*** (0.454)	0.450** (0.191)	0.259* (0.134)	0.138 (0.137)
Others_religion	0.463** (0.221)	-0.284** (0.115)	0.394*** (0.101)	0.150 (0.104)

VARIABLES	ANC	ID	PPC	NNC
OBC_caste	-0.447*** (0.0907)	0.144** (0.0577)	0.231*** (0.0473)	0.141*** (0.0483)
SC_caste	-0.285*** (0.105)	-0.0722 (0.0667)	0.00386 (0.0558)	0.0561 (0.0569)
ST_caste	-0.391*** (0.126)	-0.451*** (0.0866)	-0.193** (0.0786)	-0.321*** (0.0779)
Others_caste	0.458 (0.468)	1.082*** (0.280)	0.326* (0.170)	0.482*** (0.183)
LB_delivery_complications			0.0624 (0.0386)	
maternity_benefits	0.322** (0.130)	2.069*** (0.147)	0.201*** (0.0730)	0.0880 (0.0747)
own_health_autonomy	0.168*** (0.0638)	0.0140 (0.0457)	0.0485 (0.0390)	0.000464 (0.0395)
child_health_autonomy	0.362*** (0.0861)	0.201*** (0.0658)	-0.0993* (0.0567)	-0.0689 (0.0576)
anganwari_benefit	1.042*** (0.0651)	0.0761* (0.0448)	-0.0384 (0.0378)	0.264*** (0.0384)
occupation_status	-0.00644 (0.0661)	-0.243*** (0.0469)	0.247*** (0.0402)	0.191*** (0.0408)
Constant	-1.792*** (0.381)	-2.095*** (0.287)	-0.985*** (0.242)	-1.714*** (0.245)
Observations	12,955	12,890	12,870	12,870

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

11. Analysis:

In this segment we will discuss our regression results from Table-9. From our regression analysis, it is evident that as income per capita increases, the probability of women taking maternal healthcare also increases. So, with improved financial ability individuals can afford maternal healthcare as well as healthcare for their neonates.

Women's education plays an important role in maternal healthcare. It is seen that as women become more educated, they are more likely to take antenatal care and also neonatal care for their newborns. Education empowers women to make more informed decisions about their own health as well as their child's health. But in case of postpartum care women having primary education do not play any significant role. Other factors like cultural, social, economical determinants may overshadow women's education in this context which cannot be analysed in our result due to lack of variables and other limitations.

As husband's education increases, the probability of women taking maternal healthcare also increases. Husband's having higher degrees of education have a positive significant effect on women's maternal seeking behaviour. This could be for several reasons like well educated husbands may have better understanding about the benefits of taking maternal health care. Also in many societies husbands may have a strong decision making role in their wives lifestyle. So more educated husbands have a positive effect on women taking maternal healthcare.

Though in our analysis we have found that husband's having primary education have no significant effect on women taking postnatal care and institutional delivery.

As the number of children of an individual woman increases, the probability of women taking maternal care decreases. As women with more children have responsibilities related to childcare and household duties, they are less likely to prioritize their own health over these factors. Also, women having multiple children may face financial constraints which may discourage them from seeking maternal healthcare. One more reason could be that with more children women may feel more experienced about childbirth and as a result they may reduce taking antenatal and postnatal care.

Women who have worked as casual workers may have more financial independence than unemployed women. As a result, they have a higher probability of taking postpartum care and also neonatal care for their newborns. Also, it may increase their healthcare awareness regarding pregnancy. But it does not have any significant impact on women taking antenatal care. Casual workers have time constraints and their opportunity cost may be higher. So, it may discourage them from taking antenatal care as it requires frequent health check-ups. It has a negative significant effect on women opting for institutional delivery as the opportunity cost is also higher for women who have worked as a casual worker.

Women who have access to maternity schemes also have a higher probability of taking maternal healthcare and opting for institutional delivery as well. So maternity schemes reduce the financial barrier and also increase the awareness among women regarding pregnancy.

Anganwadi Benefits also have significant impact on healthcare seeking behaviour of women. It may increase the accessibility of antenatal and neonatal care in remote areas and also it helps to increase awareness among people through several programs.

Delivery complications also do not have any significant impact on women taking postpartum care. Again, financial and time constraint, lack of awareness could be the reasons for this result.

Exposure to mass media has a positive significant effect on women opting for institutional delivery. But it has a negative significant impact on postpartum care and neonatal care. Hence we can say that exposure to mass media is not sufficient. If it has no adequate and targeted ads, it won't be able to influence the healthcare seeking behaviour of women.

Also, mass media could sometimes provide misleading information which may create a reason for the negative effect on the healthcare seeking behaviour of women. Also it has no significant effect on the probability of women taking antenatal care.

Postpartum care includes both physical and psychological well being of a woman after childbirth. Even though there is a lot of awareness about mental health in today's world. There is still a large proportion of women who are unaware about postpartum depression, anxiety etc. So, exposure to mass media does not ensure awareness about postpartum care.

Women having hardly or some confidence in government hospitals are less likely to take postpartum care in comparison to women who have great deal of confidence. Also women having hardly or some confidence over government hospitals have a negative significant effect

on the probability of taking antenatal care. The similar results could be seen for neonatal care and institutional delivery as well. The quality of care and other factors may influence their confidence over government hospitals. Women who have no confidence over private hospitals are also less likely to take postpartum care. This result reflects the fact that confidence in institutions does play a major role in health seeking behaviour of women.

Women who have access to government insurance may have a higher probability of taking postpartum care and going for neonatal care for their newborns. But a lower probability of taking antenatal care and also lower probability of opting institutional delivery. One possible reason could be that the government insurance package may provide coverage for postpartum care only. Also antenatal care may require some amount of out of pocket expenditure which may influence the maternal healthcare seeking behaviour of women. Antenatal care requires frequent check-ups, so the cost associated with several visits to the clinic may not be covered by the government insurance completely. The out of pocket expenditure may contain transportation cost, medication costs etc. which cannot be analysed in our result due to lack of variables and other limitations. Not only the money cost, the time cost may also play a significant role in determining the healthcare seeking behaviour of women.

But women having private insurance coverage are more likely to opt for institutional delivery.

While Muslims tended to opt more for antenatal care than the Hindus, their tendency to opt for institutional delivery, neonatal care and postpartum care were significantly lower. This may be due to the low level of literacy among the Muslims. Also socio economic factors and cultural beliefs may influence their healthcare seeking behaviour.

Christians tended to opt more for antenatal care, institutional delivery and postnatal care than the Hindus. This may be due to the existence of active community outreach programmes by the Church and grass-root level effort by several missionary associations.

Other religions tended to opt for antenatal care and postpartum care more than the Hindus whereas their tendency to opt for institutional delivery was significantly less.

While OBC's tended to opt for antenatal care less than the Forward castes/General castes, their tendency to opt for institutional delivery, neonatal care, and postpartum care was significantly lower. This may be due to the existence of social barriers and the position of OBC castes in the lower socio-economic strata of the society.

The tendency of SC's to opt for antenatal care was significantly less than Forward/ General castes. This may be a result of casteism because in society they are marginalised in all spheres.

The tendency of ST's to opt for antenatal care, postpartum care, institutional delivery, neonatal care was significantly less than Forward/ General castes. This may also be a result of casteism. This may be due to the presence of ST's in geographically remote areas and the lack of availability of infrastructural amenities like transportation.

The tendency of Other castes to opt for institutional delivery, postpartum care, neonatal care was significantly more than Forward castes.

There's a positive and significant relationship between antenatal care and women's decision making power about her own and her child's health. Women who go for antenatal checkups get better information about their and their child's health and the complications that can occur during pregnancy, helping them make well-rounded decisions.

There's a positive but insignificant relationship between institutional delivery and women's autonomy about their own health, while this relationship is positive and significant when we consider women's autonomy regarding their child's health. During delivery, the healthcare facilities may prioritize the child's health, which may lead to women feeling that their well-being is not that important during delivery.

The positive and insignificant relationship between postnatal care and women's autonomy about their own health may be attributed to the interactions they've had with the healthcare officials. Moreover, financial and time constraints, geographical location, and cultural norms may have an adverse effect on the decision making power of women about their own health. The negative but significant relationship between postpartum and women's autonomy regarding their child's health may occur when healthcare providers adopt a dominant approach while making decisions concerning the child's health. Hence, women will have limited information regarding their child's wellbeing, and won't be able to make decisions about their health. These are also the possible reasons behind a negative and insignificant relationship between neonatal care and women's autonomy about their child's health.

12. Conclusion:

The analysis suggests positive trends in ANC and ID utilization but highlights the need to improve access to postnatal care services and strengthen the focus on neonatal care. Enhancing postnatal and neonatal care utilization, particularly for women who already access ANC and ID, can contribute to better maternal and new-born health outcomes.

Maternal education, husband's education, community involvement through Mahila Mandals and Self Help Groups (SHGs), as well as religious and caste affiliations significantly impact the utilization of maternal healthcare services. Women with higher education levels and husbands with higher education show greater propensity for ANC, ID, PPC, and NNC. Christian women have the highest utilization rates, while Muslim women exhibit lower utilization due to cultural factors and mistrust in institutions. Brahmin and Forward Caste women rank second in utilization, while ST women have the lowest utilization rates. Overall, PPC services have the lowest utilization across all religions and castes. Community involvement and addressing barriers to healthcare access are essential for promoting safe pregnancies and maternal health. Young women are more prone to seek health care services than older mothers.

Women with greater autonomy in decision-making regarding family planning, child's treatment, and the ability to visit health centers independently show higher utilization rates of ANC, ID, and NNC services. However, PPC services have the lowest utilization across all measures of autonomy, indicating barriers such as limited accessibility, lack of awareness, and cultural factors. Efforts should focus on addressing these barriers to promote postpartum care and ensure comprehensive maternal and child healthcare.

Women's education is positively associated with maternal healthcare utilization, it is important to consider the influence of other factors and limitations in analyzing the impact. Cultural, social, and economic determinants, as well as the number of children a woman has, can overshadow the role of education. Similarly, the nature of employment, such as casual work, can have varying effects on different aspects of maternal healthcare utilization. To address these complexities, a comprehensive approach is needed to ensure that all women have access to quality maternal healthcare services, irrespective of their educational background, number of children, or employment status. the availability of maternity schemes and access to Anganwadi benefits have a positive impact on women's healthcare seeking behaviour, increasing the likelihood of receiving maternal care and opting for institutional delivery. However, delivery

complications do not significantly affect postpartum care utilization, suggesting that other factors such as financial constraints and lack of awareness may play a more prominent role.

Postpartum care, including mental health aspects, still lacks awareness among a significant proportion of women, even in a media-saturated world. The findings highlight the complex interplay of various factors that influence women's healthcare seeking behavior. It underscores the importance of comprehensive approaches that address financial barriers, improve awareness, ensure quality care, and empower women in decision-making processes to promote optimal maternal and child health outcomes.

Further work can be done on how the Post Natal Care health seeking behavior varies due to the gender of the child but due to lack of data our research was limited.

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