

A Comprehensive Study of Socio-Economic Determinants of Antenatal care dropout in Bihar

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Abstract- This study analyses antenatal care (ANC) dropout and its socioeconomic determinants in Bihar, focusing on differences between aspirational and non-aspirational districts using NFHS-5 data. Out of total 13,823 women, the study finds a 53.13% ANC dropout, with aspirational districts (54.98%) showing higher dropout compared to non-aspirational districts (52.15%). Division-wise, Kosi reports the highest dropout at 56.18%, while Saran has the lowest at 45.08%. Analysis shows that women with lower education, poorer wealth, rural residence, Scheduled Caste, and higher birth order are more likely to discontinue care. Aspirational districts have stronger associations of ANC dropout with education, caste, and wealth. Primary education, caste categories and pregnancy intention are significant only in aspirational districts. These findings address the need for targeted, community-based interventions to address sociocultural barriers, ensuring optimum ANC visits. Digital interventions especially in high prevalent districts and among high-risk groups can provide an effective way to monitor registration, number of visits and follow up. Simple interventions like reminder model using mobile phones for pregnant women and health care provider can be effective to improve maternal and child health.

Keywords: *ANC dropout, Maternal health, Aspirational Districts Programme, Socioeconomic Determinants*

I. INTRODUCTION

Antenatal care (ANC) is the critical component of continuum of care provided by skilled health professionals to pregnant women to ensure the best possible health outcomes for both the mother and the unborn baby throughout pregnancy. Healthcare services include nutritional counselling and supplementation, maternal and foetal assessments such as blood pressure monitoring, urine and blood tests, vaccinations, and preventive measures against infections. It also offers health education on healthy

behaviours, preparation for safe delivery, birth planning, and counselling on postpartum care and family planning.

The World Health Organization (WHO) originally recommended at least four antenatal care (ANC) visits, starting in the first trimester, to make sure pregnant women get proper care early on. In 2016, they updated their guidelines and now suggest a minimum of eight ANC contacts to help support a healthier and more positive pregnancy experience. At present, many low- and middle-income countries, including India, continue to use four visits as the standard benchmark for evaluating ANC completion. First visit is recommended as soon as pregnancy is suspected, second between 4-6 months (around 26 weeks), third in the 8th month (32 weeks) and fourth in the 9th month (36-40 weeks).

Antenatal care dropout

Antenatal care dropout refers to the discontinuation of ANC services before completing the recommended minimum number of visits during pregnancy. Most studies and systematic reviews define ANC dropout as ceasing to receive ANC before attending at least four visits, the earlier WHO standard for adequate care. ANC dropout interrupts the continuum of care, leading to missed opportunities for preventive interventions, health education, and timely management of complications.

Aspirational Districts Programme

Agarwal, S. K., & Mishra, S. (2024) described the Aspirational Districts Programme (ADP), launched in 2018 by the Government of India, aims to accelerate development in 112 backward districts, including 13 in Bihar (Katihar, Begusarai, Sheikhpura, Araria, Khagaria, Purnia, Aurangabad, Banka, Gaya, Jamui, Muzaffarpur, Sitamarhi, and Nawada), by tracking 49

indicators categorised under Six major themes across Health & Nutrition, Education, Agriculture, Financial Inclusion, Skill Development, and Infrastructure. Health & Nutrition, with a 30% weightage, emphasizes maternal health indicators like ANC coverage and institutional deliveries, addressing disparities in access and quality, particularly in aspirational districts, which lag non-aspirational districts in health and socio-economic outcomes. The Aspirational Districts Programme lays high emphasis on health and nutrition, allotting it 30 percent of the total weightage in attempts to drive improvement in underserved districts. One of the primary focuses here is maternal health. The programme looks towards ensuring that women get adequate antenatal care, institutional delivery in safe conditions, and a decrease in maternal mortality. The aim is to Enhance healthcare service and outcomes for underserved districts by emphasizing safer pregnancies, promoting awareness, and ensuring women can access timely maternal health services.

II. LITERATURE REVIEW

Overview of Antenatal Care (ANC) in India

Antenatal Care (ANC) plays an important role in improving maternal health in India because it connects pre-pregnancy services with childbirth and postnatal care. Even though it is so important, statistics shows that ANC coverage is still low and the quality of care is often not good enough.

Girotra et al. (2023), ANC is a key service that helps in protecting the health of both the mother and the through screenings, counselling, education, and basic medical care. Their study of NFHS-5 data found that just over half of the women around 59.25 percent completed the minimum recommended four ANC visits during their last pregnancy. At the same time, only 19.49 percent were able to meet the updated WHO guideline of eight or more visits, and 6.12 percent did not receive any ANC at all. This shows that there are still major gaps in coverage. When looking at quality, only 20.28 percent of women received antenatal care that included key services like blood pressure checks, blood and urine tests, and the tetanus toxoid vaccine. The study also shows major regional and socioeconomic disparities, particularly affecting rural and disadvantaged groups in states like Bihar.

State-level data further confirm these challenges. *Singh et al. (2021)* report that in Bihar, a high-priority state, only 25.2% of women had four or more ANC visits, with a mean of 3.10 visits. Likewise, *Prasad et al. (2022)* showed that the rate of institutional deliveries in Bihar increased, but only 14% of the mothers in the state availed of the recommended four or more ANC visits which is significantly lower than the national average. In northern Bihar, *Sultana et al. (2021)* noted that only 12% of pregnant women attained comprehensive ANC with 55% contracted partial care (4-12 visits) and 30% had inadequate coverage. Their study associates low utilization with systemic and socio-economic constraints that prevail regarding maternal health.

In the rural setting, *Tripathi et al. (2024)* highlighted that ANC is still lagging behind regarding other services stating that it remains underutilized even after some improvements at the national level. They also noted that 54.3% of mothers in rural areas received four or more ANC visits, but only 43.5% received the complete package of care, including skilled birth attendance and postnatal services. Geographic differences were stark, with southern states reporting much higher service use compared to states like Bihar and those in the northeast.

Patterns and Determinants of ANC Dropout

The continuum of care model in maternal and child health emphasizes the importance of providing healthcare services from pre-conception through pregnancy, childbirth, and early childhood. Disruptions in the maternal healthcare, especially during antenatal care (ANC), can significantly impact both maternal and neonatal outcomes. *Girotra et al. (2023)* assert that numerous social and demographic determinants in India are intricately linked with ANC dropout and poor-quality care. Women at highest risk of ANC dropout were typically younger, less educated or illiterate, rural residents, and of lower socio-economic status. Other frequent determinants were the presence of several children, no health insurance, and minimal or no access to mass media. Women with unanticipated pregnancies or some exposure to media, on the other hand, were less likely to terminate ANC. There was regional variation identified by the study as well. In northeastern and eastern India, dropout rates were greater, and the quality of care was worse,

whereas states in the south like Tamil Nadu and Kerala Performed much better. Those women who had to travel far to access health facilities were likely to dropout more frequently and had fewer opportunities to access quality services. To fill these gaps, the research recommended enhancing health insurance coverage, local health system strengthening, and conducting focused health campaigns for reducing ANC dropout.

Similar patterns have been identified in other studies. Gandhi et al. (2022) also reported that affordability has a strong influence on whether women initiate and continue ANC visits. In Bihar, it was compounded by poor education levels and poor health infrastructure. The same issues have been seen in other low- and middle-income nations. Studies conducted in Ethiopia, Nigeria, and Nepal indicate that women tend to drop antenatal care due to predominant factors such as lack of finances, social factors, and individual obstacles. Research by Andiso et al. (2024), Akinyemi et al. (2016), and Singh et al. (2016) further revealed that limited education, unawareness, long distances to health facilities, and lack of satisfaction with the services offered were some of the primary reasons why numerous women could not continue their care. Further, the extent of emotional and social support, provider attitudes, and the quality of counselling women are given all contribute significantly to whether they adhere to ANC visits.

Socio-Demographic Predictors of ANC use

Socio-demographic factors play a major role in antenatal care (ANC) and whether women complete the full continuum of care (CoC) in India. Factors such as educational level, income, caste, religion, residence, age at marriage, and health data they've been exposed to all play a role in varying access to maternal healthcare.

Based on Singh et al. (2021), education is among the most significant predictors of whether a woman will choose ANC. Their results indicate that 17% of those with no education received four or more ANC visits, as opposed to 60% of those who had 12 years or more of education. Living in urban areas also makes a difference, with ANC coverage at 32% in cities versus 24% in rural areas. Other factors like being younger, marrying early, belonging to a Scheduled Caste or Tribe, being Muslim, or coming from a lower-income

background were all linked to lower ANC use. On the other hand, Hindu women and those from higher castes were more likely to get the care they needed. Lack of access to media and health information, especially for women with little education or income, also made it harder for them to seek care.

Longchar et al. (2025) backed this up using data from NFHS-4 and NFHS-5, pointing out that women with at least secondary education - 56.9% in NFHS-4 and 56.7% in NFHS-5 were more likely to finish the full Continuum of care. This was mostly because they were more aware of what care was available and how to access it. Wealth also played a big role, since families with more money could often go to private clinics. Women who had already given birth to more than one child were less likely to continue ANC, often because of past experiences or feeling confident due to earlier healthy pregnancies. Access was much better in urban areas. In contrast, rural women often had to deal with problems like not having female health workers around or dropping out early, usually between 6 and 12 weeks into the pregnancy. Even with government efforts like the Janani Suraksha Yojana (JSY), which helped get more women in the door for early ANC, sticking with it remains a challenge.

Prasad et al. (2022) found the same trend: women with more education and higher incomes were much more likely to attend at least four ANC visits. In the meanwhile, women from SC/ST communities and rural regions of the nation remained behind compared to women from cities or upper-caste communities. Singh et al. (2022) contributed to this by examining the quality of ANC. Their research found that among high-focus states such as Uttar Pradesh and Bihar, women were significantly less likely to have good-quality care, with an odds ratio of 0.35 (95% CI: 0.30–0.41) in comparison to women in other states. Age was another determinant, with older women (40–49 years) having the highest rates of receiving no ANC (44.6%) and the lowest coverage of QANC (10.5%). Regional variation was also observed, with higher QANC rates in southern states such as Tamil Nadu (29.3%) compared to northeastern states (18.4%).

Additional studies support the significance of these socio-demographic variables. Sultana et al. (2021) found that 45% of women in their sample were aged 24–29, 48% belonged to lower-middle socioeconomic

strata, and 29% were illiterate factors strongly associated with reduced ANC access. *Gandhi et al. (2022)* similarly report that 37.24% of women were married before age 18 and 27.96% were illiterate, both conditions linked to limited maternal healthcare use. Even though women in wealthier households and urban areas had better access to services overall, wealth didn't have as strong of an effect during the early stages of ANC visits.

Health System and Infrastructural Barriers

Health system limitations continue to restrict access to antenatal care (ANC) and continuum of care (CoC) services, particularly in high-focus and rural regions. *Longchar et al. (2025)*, highlighted that systemic barriers include under-resourced public health infrastructure, poor implementation of maternal health schemes, and inconsistent availability of essential supplies and personnel in rural areas, health centres are still remain difficult to access and are often understaffed. Shortages of general practitioners, specialists, and functional referral systems further limit the delivery of timely care. These problems are compounded by unmotivated or absentee health workers, weak communication between providers and patients, and poor working conditions overall. To address these issues, initiatives like Jacha Bacha Swasthya Divas and Village Health Sanitation and Nutrition Days (VHSND) were created but they continue to face significant implementation barriers in rural and high-focus states.

Prasad et al. (2022) support this by highlighting in the paper that supply-side issues such as weak healthcare infrastructure and poor service quality in rural Bihar are major obstacles to ANC use. Their findings suggest that while Accredited Social Health Activists (ASHAs) play an important role in spreading awareness, their presence alone is not enough to ensure full service uptake. In fact, ASHA presence was linked to institutional deliveries without the recommended four ANC visits, pointing to gaps in outreach effectiveness.

Logistical difficulties remain another key challenge. *Sultana et al. (2021)* reported that 25 percent of women cited long wait times at government health centers as a reason for not seeking care. The study suggested that free health camps could improve both

access to and awareness of ANC services. *Gandhi et al. (2022)* found that women who interact with ASHAs were more likely to complete their maternal health visits, as they have better understanding of significance of antenatal care. Still, the study also highlighted that ASHA involvement remains limited, particularly in high-focus states like Bihar, reducing their overall impact.

Broader Social and Cultural Barriers

Singh et al. (2021) pointed out that issues with ANC use in places like Bihar go beyond just healthcare access. A lot of the barriers come from deeper social and cultural patterns. One clear example is early marriage. Nearly 41% of women between 20 and 24 said they got married before turning 18. That kind of early start often leads to more pregnancies during the teenage years, which makes consistent use of ANC services even harder. Gender norms and household power dynamics also play a big role, especially when decisions are influenced by dominant family members like mothers-in-law. On top of that, many women have little autonomy, limited media exposure, and live in environments where gender inequality and domestic violence are widely accepted.

Longchar et al. (2025) also point to cultural and financial constraints as key barriers to CoC utilization. Women from lower-income households often face high out-of-pocket costs, limiting access to private care. Social norms, such as a preference for male children, traditional practices like returning to the maternal home during pregnancy, and low female autonomy, can influence health-seeking behaviours. Negative experiences at health facilities, including disrespect or mistreatment, discourage many multiparous women from engaging with formal healthcare systems. *Prasad et al. (2022)* also point to how both structural and cultural barriers make it harder for women to access ANC. They identified that low education and low income account for around 83% of the instances in which women failed to use these services. And to add to this, caste-based disparities and unfamiliarity with the significance of pregnancy registration make it even harder for most women to access the care they require. Cultural factors associated with high birth ranks and brief birth spans also lower the chances of completing the suggested four ANC visits.

Study Rationale

Ensuring proper maternal healthcare remains a challenge for Bihar, one of India's most socioeconomically disadvantaged states. Poor maternal and neonatal outcomes are a result of high ANC dropout rates, especially in aspirational districts. The continuum of care is undermined because many pregnant women stop taking ANC before finishing the recommended visits, despite state and national initiatives. There is, however, little data is available comparing the maternal health services, specifically ANC dropout, in aspirational and non-aspirational districts.

Drawing on the latest available data from the National Family Health Survey (NFHS-5), this study tries to bridge the existing gap by providing a comprehensive analysis of ANC dropout rates in Bihar's aspirational and non-aspirational districts.

III. OBJECTIVES

1. To estimate the prevalence of antenatal care (ANC) dropout between the first and fourth ANC visits in aspirational and non-aspirational districts of Bihar.
2. To examine the association among socioeconomic and demographic factors and ANC dropout across the districts.

IV. METHODOLOGY

The study analysed NFHS-5 dataset collected during 2019-2021 for Bihar. In Bihar total household surveyed was 35,834 covering 42,483 women aged 15–49. Women of reproductive age group (15–49 years) who had a live birth during the last five years preceding the surveys were 13,874. In this study, ANC dropout was defined as a woman who received first antenatal care (ANC) visit during the first trimester of pregnancy but did not complete the recommended minimum of four ANC visits throughout the pregnancy. This approach aligns with the way the National Family Health Survey (NFHS) presents ANC data in its fact sheets. NFHS tracks two main indicators the percentage of mothers who had their first ANC visit in the first trimester, and the percentage who completed at least four ANC visits. By using this

definition, this study ensures comparability with NFHS data while staying consistent with national and global ANC standards.

This variable used for analysis is constructed using two indicators from the NFHS dataset. The timing of the first ANC visit was taken from variable M13, records the month of pregnancy when first ANC was received for this pregnancy. This was recoded into a new variable ANC in first trimester, where women receiving ANC in the Zero, first, second, or third month were coded as 1 (Yes), those receiving ANC from the fourth to eleventh month were coded as 0 (No). The number of ANC visits was derived from variable M14, the total number of antenatal visits for this pregnancy. This was recoded as ANC visits to reflect the actual number of visits (0, 1, 2, 3, or 4). Using these two variables, ANC dropout was created. Women who received their first ANC visit in the first trimester and completed four or more ANC visits were considered as non-dropouts and were coded as 0 (No) and women who initiated ANC in the first trimester but did not complete at least four visits were considered as ANC dropouts and were coded as 1 (Yes).

Statistical analysis

Data analysis was conducted using SPSS. Descriptive statistics were used to report the sample characteristics.

Prevalence of ANC dropout is calculated using the formula:

$$\text{Dropout from ANC (\%)} = ((\text{ANC in First Trimester} - 4 + \text{ANC Visits}) / \text{ANC in First Trimester}) \times 100$$

The outcome variable was ANC dropout, categorized as a dichotomous variable (Yes/No). Inferential analysis was done to assess associations, Chi-square tests were performed between ANC dropout and the following predictor variables: mother's education, age of mother, place of residence, wealth index, birth order, religion, caste, marital status, and pregnancy intention. Variables that were found to be statistically significant ($p < 0.05$) in the chi-square analysis were included in a binary logistic regression model to assess their association with ANC dropout. The model estimated adjusted odds ratios (AOR) with 95% confidence intervals (CI) and p-values, with statistical significance at $p < 0.05$.

V. RESULTS

Descriptive analysis

Table 1: Distribution of ANC Dropout by Socio-Demographic and Pregnancy-Related Predictor Variables in Bihar

Variable	Category	ANC Dropout		Total (n)
		No (%) [n]	Yes (%) [n]	
Age Group	15–19	41.8% [157]	58.2% [219]	376
	20–24	38.7% [1039]	61.3% [1649]	2688
	25–29	37.5% [988]	62.5% [1648]	2636
	30–34	35.0% [428]	65.0% [795]	1223
	35–39	30.4% [147]	69.6% [337]	484
	40–44	24.3% [33]	75.7% [103]	136
Education Level	No education	26.5% [744]	73.5% [2068]	2812
	Primary	32.7% [296]	67.3% [608]	904
	Secondary	43.0% [1314]	57.0% [1739]	3053
	Higher	56.6% [438]	43.4% [336]	774
Wealth Index	Poorest	28.5% [925]	71.5% [2322]	3247
	Poorer	36.8% [755]	63.2% [1297]	2052
	Middle	43.2% [506]	56.8% [665]	1171
	Richer	52.8% [389]	47.2% [348]	737
	Richest	64.6% [217]	35.4% [119]	336
Residence	Urban	42.3% [330]	57.7% [451]	781
	Rural	36.4% [2462]	63.6% [4300]	6762
Caste Group	SC	28.2% [571]	71.8% [1451]	2022
	ST	35.8% [78]	64.2% [140]	218
	OBC	38.2% [1594]	61.8% [2583]	4177
	None of them	49.1% [534]	50.9% [554]	1088
	Don't know	33.3% [11]	66.7% [22]	33
Birth Order	1	46.9% [958]	53.1% [1086]	2044
	2	37.7% [804]	62.3% [1327]	2131
	3	34.1% [547]	65.9% [1057]	1604
	4	30.1% [281]	69.9% [652]	933
	5	29.8% [134]	70.2% [316]	450
	6+	17.8% [68]	82.2% [313]	381
Wanted Pregnancy	Then	37.1% [2472]	62.9% [4196]	6668
	Later	42.2% [198]	57.8% [271]	469
	No more	30.0% [122]	70.0% [284]	406
Religion	Hindu	37.0% [2426]	63.0% [4124]	6550
	Muslim	36.9% [364]	63.1% [623]	987
	Christian	25.0% [1]	75.0% [3]	4
	Buddhist / Neo-Buddhist	0.0% [0]	100.0% [1]	1
	Other	100.0% [1]	0.0% [0]	1
Marital Status	Never in union	33.3% [1]	66.7% [2]	3
	Married	37.1% [2773]	62.9% [4711]	7484
	Widowed	22.6% [7]	77.4% [24]	31
	Divorced	66.7% [2]	33.3% [1]	3
	Separated	40.9% [9]	59.1% [13]	22

Prevalence of ANC dropout

Out of 13,874 pregnant women given birth in last 5 years, 7,574 reported receiving their first ANC visit

during the first trimester. Among them, 3,552 complete the recommended four ANC visits, resulting in an ANC dropout prevalence of 53.13%. When analysed

for district classification, aspirational districts recorded a slightly higher dropout rate (54.98%) compared to non-aspirational districts (52.15%). Division-wise analysis revealed the highest ANC dropout in Kosi Division (56.18%), followed by Munger (54.86%), and Magadh (54.34%). In contrast,

Saran Division reported the lowest dropout prevalence at 45.08%, while other divisions such as Tirhut (53.85%), Darbhanga (52.32%), Patna (51.79%), Purnia (51.97%), and Bhagalpur (53.83%) showed moderate levels of dropout.

Table 2: District-Wise ANC Dropout Prevalence Bihar

District	ANC in First Trimester	4+ ANC Visits	ANC dropout prevalence
Araria	190	117	38.42
Arwal	217	127	41.47
Aurangabad	188	99	47.34
Banka	249	113	54.62
Begusarai	169	75	55.62
Bhagalpur	195	92	52.82
Bhojpur	147	111	24.49
Buxar	208	100	51.92
Darbhanga	166	77	53.61
Gaya	231	92	60.17
Gopalganj	180	94	47.78
Jamui	307	157	48.86
Jehanabad	195	59	69.74
Kaimur	214	87	59.35
Katihar	151	56	62.91
Khagaria	195	71	63.59
Kishanganj	139	63	54.68
Lakhisarai	276	120	56.52
Madhepura	207	82	60.39
Madhubani	221	113	48.87
Munger	269	134	50.19
Muzaffarpur	187	93	50.27
Nalanda	239	104	56.49
Nawada	264	123	53.41
Paschim Champaran	191	86	54.97
Purba Champaran	180	87	51.67
Patna	139	47	66.19
Purnia	105	45	57.14
Rohtas	225	116	48.44
Saharsa	133	43	67.67
Samastipur	196	88	55.10
Saran	165	112	32.12
Sheikhpura	244	102	58.20
Sheohar	180	87	51.67
Sitamarhi	221	79	64.25
Siwan	183	84	54.10
Supaul	251	134	46.61
Vaishali	157	83	47.13
Bihar	7,574	3,552	53.13

GIS Mapping of ANC Dropout Prevalence Across Bihar Districts

Figure 1: The map shows the prevalence of ANC dropout across all districts in Bihar. Districts are color-coded based on dropout percentage categories.

Live Map: <https://datawrapper.dwcdn.net/CnYqW/1/>

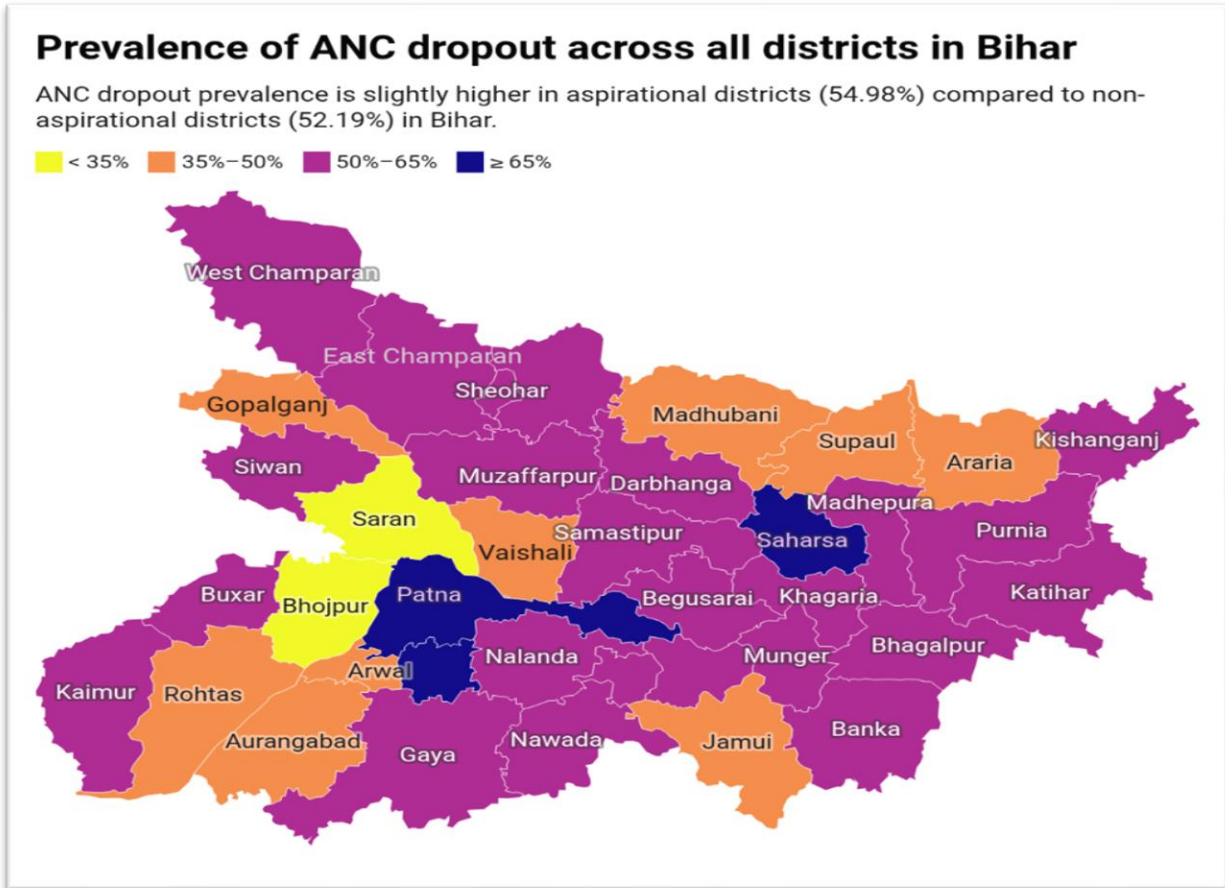


Table 3: ANC Dropout Prevalence in Aspirational and non-aspirational districts

Region	ANC in 1st Trimester	4+ ANC Visits	ANC Dropout Prevalence (%)
Bihar	7574	3552	53.13
Aspirational	2701	1222	54.78
Non-Aspirational	4873	2330	52.15

Table 4 Division-Wise ANC Dropout Prevalence Bihar

Division	ANC in 1st Trimester	4+ ANC Visits	ANC Dropout Prevalence (%)
Patna	1172	565	51.79
Magadh	1095	500	54.34
Saran	528	290	45.08
Purnia	585	281	51.97
Bhagalpur	444	205	53.83
Darbhanga	583	278	52.32
Kosi	591	259	56.18
Munger	1460	659	54.86
Tirhut	1116	515	53.85

VI. INFERENCE ANALYSIS

Chi square

Out of the nine variables analysed, seven were found to have statistically significant associations with ANC dropout in Bihar as well as non-aspirational districts, while religion and marital status were not significant. In non-aspirational districts, addition to religion and marital status, place of residence and wanted pregnancy were also non-significant.

Table 5: Chi-square Test Results for Predictors of ANC Dropout in Bihar, Aspirational, and Non-Aspirational Districts

Variable	Bihar	Aspirational	Non-Aspirational
Age of Mother	0.000	0.000	0.031
Birth Order	0.000	0.000	0.000
Highest Education	0.000	0.000	0.000
Wealth Index	0.000	0.000	0.000
Place of Residence	0.001	0.003	0.074 *
Ethnicity (Caste/Tribe)	0.008	0.000	0.000
Current Marital Status	0.397 *	0.187 *	0.673 *
Religion	0.636 *	0.366 *	0.390 *
Wanted Pregnancy at Conception	.001	0.001	0.126 *

* Indicates non-significant p -values ($p > 0.05$)

Table 6: Binary Logistic regression

Variable (Reference Category)	Category	AOR (95% CI)		
		Bihar	Aspirational	Non-Aspirational
Mother's Age (15–19)	20–24	1.02 (0.81–1.29) *	1.26 (0.86–1.85) *	0.89 (0.67–1.20) *
	25–29	0.87 (0.68–1.12) *	1.22 (0.80–1.85) *	0.72 (0.53–0.99)
	30–34	0.82 (0.62–1.08) *	1.01 (0.63–1.61) *	0.73 (0.52–1.03) *
	35–39	0.81 (0.58–1.13) *	1.05 (0.60–1.86) *	0.69 (0.46–1.05) *
	40–49	0.80 (0.48–1.33) *	1.16 (0.46–2.96) *	0.65 (0.35–1.20) *
Education (No education)	Primary	0.84 (0.71–0.99)	0.68 (0.52–0.90)	0.94 (0.76–1.16) *
	Secondary	0.66 (0.58–0.75)	0.60 (0.48–0.74)	0.69 (0.59–0.81)
	Higher	0.56 (0.45–0.68)	0.69 (0.48–0.99)	0.50 (0.39–0.65)
Place of Residence (Rural)	Urban	1.31 (1.10–1.56)	1.26 (0.92–1.71) *	—
Wealth Index (Poorest)	Poorer	0.81 (0.72–0.92)	0.78 (0.63–0.95)	0.85 (0.73–0.99)
	Middle	0.73 (0.62–0.85)	0.78 (0.60–1.01) *	0.74 (0.61–0.89)
	Richer	0.52 (0.43–0.63)	0.44 (0.31–0.62)	0.61 (0.49–0.77)
	Richest	0.37 (0.28–0.48)	0.24 (0.14–0.41)	0.49 (0.36–0.67)
Caste (Scheduled Caste)	Scheduled Tribe	0.72 (0.53–0.97)	0.76 (0.63–0.93)	0.78 (0.54–1.11) *
	OBC	0.75 (0.67–0.85)	0.61 (0.46–0.80)	0.75 (0.65–0.87)
	None of them	0.62 (0.52–0.73)	0.67 (0.18–2.44) *	0.62 (0.51–0.77)
	Don't know	0.69 (0.33–1.46) *	0.58 (0.34–1.01) *	0.75 (0.30–1.86) *
Birth Order (1st child)	2nd	1.45 (1.27–1.66)	1.68 (1.33–2.13)	1.35 (1.14–1.59)
	3rd	1.52 (1.29–1.79)	1.54 (1.17–2.03)	1.51 (1.24–1.84)
	4th	1.65 (1.34–2.02)	1.74 (1.23–2.47)	1.60 (1.25–2.05)
	5th	1.60 (1.23–2.08)	1.63 (1.04–2.56)	1.59 (1.15–2.20)
	6th+	2.96 (2.11–4.16)	3.76 (2.08–6.79)	2.57 (1.71–3.87)
Pregnancy Intention (Wanted then)	Wanted later	0.86 (0.71–1.05) *	0.72 (0.52–0.99)	—
	Wanted no more	1.10 (0.87–1.39) *	1.20 (0.80–1.81) *	—

AOR = Adjusted Odds Ratio; CI = Confidence Interval; * = p -value > 0.05 (not significant)

Among the predictor variables, education was significantly associated with ANC dropout across Bihar and both types of districts. Women with secondary education had lower odds of ANC dropout compared to those with no education, with the effect strongest in aspirational districts (AOR: 0.60, 95% CI: 0.48–0.74), followed by Bihar overall (AOR: 0.66, 95% CI: 0.58–0.75) and non-aspirational districts (AOR: 0.69, 95% CI: 0.59–0.81). Similarly, those with higher education had even lower odds, especially in non-aspirational districts (AOR: 0.50, 95% CI: 0.39–0.65).

In terms of wealth index, the odds of ANC dropout decreased progressively with increasing wealth. Compared to the richest, the poorest women had significantly higher odds of ANC dropout in all settings Bihar (AOR: 0.81, 95% CI: 0.72–0.92), aspirational districts (AOR: 0.78, 95% CI: 0.63–0.95), and non-aspirational districts (AOR: 0.85, 95% CI: 0.73–0.99). The lowest odds were observed in the richer and middle groups, especially in aspirational districts (middle: AOR: 0.44, 95% CI: 0.31–0.62; richer: AOR: 0.24, 95% CI: 0.14–0.41).

Caste also showed significant associations. OBC women had lower odds of ANC dropout compared to Scheduled Castes across all areas, especially in aspirational districts (AOR: 0.61, 95% CI: 0.46–0.80). Similarly, women not belonging to SC, ST, or OBC had significantly lower odds in Bihar and non-aspirational districts, though the estimate was imprecise in aspirational districts (AOR: 0.67, 95% CI: 0.18–2.44).

The birth order had a strong positive association with ANC dropout. As birth order increased, the odds of dropout also increased across all categories. For example, women with a sixth or higher birth order had nearly three times the odds in Bihar (AOR: 2.96, 95% CI: 2.11–4.16), and even higher in aspirational districts (AOR: 3.76, 95% CI: 2.08–6.79).

Pregnancy intention was significantly associated only in aspirational districts, where women who wanted the pregnancy later had lower odds of ANC dropout (AOR: 0.72, 95% CI: 0.52–0.99) compared to those who wanted it at that time. No significant associations were found for the "wanted no more" category across the groups. Mother's age and place of residence did not show significant associations in both district groups. Urban residence was significantly associated with higher odds of ANC dropout only in Bihar overall

(AOR: 1.31, 95% CI: 1.10–1.56), and not in aspirational districts.

VII. DISCUSSION AND CONCLUSION

This study examined the prevalence of antenatal care (ANC) dropout and its association with socioeconomic determinants in aspirational and non-aspirational districts of Bihar. The overall ANC dropout prevalence in Bihar is 53.13%, indicating that over half of the pregnant women fail to receive the recommended 4 antenatal care visits. This highlights an important public health concern as inadequate ANC coverage is associated with higher risks of maternal and neonatal complications. While comparing aspirational versus non-aspirational districts, aspirational districts exhibited a slightly higher dropout prevalence (54.98%) compared to non-aspirational districts (52.15%). Indicating that despite targeted policy interventions under the Aspirational Districts Programme, challenges in healthcare access, service quality, and awareness persist.

The overall ANC dropout rate across divisions ranged from 45.08% in Saran to 56.18% in Kosi, with an average prevalence of approximately 52%. Districts such as Jehanabad (69.74%), Patna (66.19%), and Saharsa (67.67%) has high dropout rates, indicating programmatic and systemic barriers that impeded pregnant women from completing the recommended minimum of four ANC visits. In contrast, lower dropout rates in districts like Bhojpur (24.49%) and Saran (32.12%) may reflect better healthcare access, awareness, or effective outreach mechanisms in those regions.

Inferential analysis by chi-square test and binary logistic regression revealed statistically significant associations between ANC dropout and several socioeconomic factors. Women's education was strongly associated with ANC dropout, with higher dropout rates observed for women with no formal education. Economic status, measured by wealth index, also showed a significant correlation, with women in the lower quintiles more likely to discontinue ANC. Similarly, caste and place of residence were significant, with Scheduled Castes/Scheduled Tribes and rural women experiencing disproportionately higher dropout rates. Importantly, birth order is a strong predictor of ANC dropout. Women with higher birth orders are more

likely to discontinue ANC, possibly due to a reduced perceived need for care in subsequent pregnancies, coupled with more domestic responsibilities and time constraints. Intersectionality and compounded vulnerabilities make women more prone to adverse maternal health outcomes. These findings are consistent with previous literature that highlights the role of socioeconomic determinants in maternal and child health care. As early initiation of ANC is an important step, the inability to complete 4 visits, reflects barriers such as education, economic status, place of residence, distance to health facilities, lack of transport, inadequate counselling, and low perceived benefit of visits which affect majority of the populations.

One limitation of this study is that it does not include women who never initiated ANC, and therefore they are not represented in any part of the analysis.

VIII. RECOMMENDATIONS

1. Policy level changes are required, promoting early registration to ensuring optimum ANC visits through continuous monitoring, health worker follow-up, and addressing socioeconomic barriers.
2. Digital interventions especially in high prevalent districts and among high-risk groups can provide an effective way to monitor registration, number of visits and follow up. Simple interventions like reminder model using mobile phones for pregnant women and health care provider can be effective to improve maternal and child health.

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