

Original Research Article

Awareness of preconception care among married women in West Champaran and Banka districts of Bihar

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ABSTRACT

Background: Preconception care (PCC) is vital for maternal and child health, but awareness in India remains very low, especially in rural and tribal areas. This study examines PCC awareness and its socio-economic determinants among married women in Bihar's West Champaran and Banka districts.

Methods: Primary data were collected from 300 married women aged 15–49 years using a multistage sampling design. Districts were purposively chosen for tribal population and high prevalence of early pregnancy. Data were analysed using chi-square tests and bivariate analysis. Variables included residence, caste, education, employment, income, age at marriage, media exposure and place of delivery.

Results: Awareness of PCC was higher in West Champaran (24.0%) than Banka (9.3%). Urban women were more aware than rural women (West Champaran: 44.0% vs. 23.0%, $\chi^2=7.00$, $p<0.008$; Banka: 36.0% vs. 5.0%, $\chi^2=24.67$, $p<0.001$). Education showed strong influence: 75.0% of graduates versus 13.8% of illiterate women in West Champaran ($\chi^2=26.78$, $p<0.001$) and 37.5% versus 3.2% in Banka ($\chi^2=18.47$, $p<0.002$). Employment raised awareness (West Champaran: 56.4% employed vs. 14.7% homemakers, $\chi^2=28.74$, $p<0.001$; Banka: 28.9% vs. 8.2%, $\chi^2=11.19$, $p<0.001$). Media exposure also showed significant effects ($p<0.001$). Place of delivery had the strongest link: 92.3% awareness among private facility users vs. 10.0% home deliveries in West Champaran ($\chi^2=65.21$, $p<0.001$) and 43.5% vs. 3.1% in Banka ($\chi^2=22.01$, $p<0.001$).

Conclusions: PCC awareness is very low, with marked gaps across districts and social groups. Urban residence, higher education, employment, media access and private deliveries significantly improve awareness. Focused education and rural outreach are essential.

Keywords: Awareness, Bihar, Preconception care, Socio-economic determinants

INTRODUCTION

Preconception care refers to any kind of intervention provided to women and couples of childbearing ages, regardless of their pregnancy status or intentions, with the aim of enhancing health outcomes for women, new-born and children before pregnancy.¹ Preconception care encompasses all actions that can be taken before conception to support the health of the future mother and her child. It aims to ensure a healthy pregnancy and the

birth of a healthy baby. Defined as any intervention offered to women and couples of childbearing ages, irrespective of their pregnancy status or intentions, preconception care seeks to enhance health outcomes for women, new-born and children.²

Preconception care involves implementing a range of promotive, preventive and curative health interventions that have proven effective in enhancing maternal and child health. This care positively impacts the health of both mother and new-born by providing necessary

interventions for women and couples before conception.³ Preconception care primarily focuses on enhancing maternal and child health, benefiting adolescents, women and men regardless of their parenting intentions. The WHO supports regions and countries in implementing preconception care interventions to improve accessibility and availability, aiming to reduce maternal and new-born mortality rates.²⁻⁴ Globally, preconception care interventions are recognized as crucial for defining preconception health as a key determinant of the health of the next generation. The *Lancet*, a highly esteemed medical journal, introduced a series on preconception health in 2018. The editorial, "Campaigning for Preconception Health," emphasizes the need for focused attention on a frequently overlooked phase in the lifecycle that has significant implications throughout an individual's life".⁶

The global burden of maternal, new-born and child mortality are rising. In 2023, approximately 260,000 women died due to pregnancy and childbirth complications. From 2000 to 2023, the global maternal mortality ratio (MMR) decreased by about 40%, reaching around 197 deaths per 100,000 live births. In 2020 alone, the MMR was estimated at 223 deaths per 100,000 live births, resulting in roughly 287,000 maternal deaths equivalent to 800 deaths per day or one every two minutes. Despite progress, the global burden of maternal and newborn mortality remains alarmingly high.⁷

A recent study highlights that social and racial disparities have significantly influenced adverse birth outcomes in the United States over several decades. This study provides a structured theoretical framework to examine how preconception social conditions, particularly place and social relationships, are linked to perinatal health. The authors argue that both the physical environment and the quality of social connections prior to conception play a critical role in shaping maternal and infant health outcomes.⁸ This work adds to existing research that underscores the importance of social determinants in understanding disparities in perinatal health.

Social customs and cultural practices also affect the preconception care. Different studies have indicated the association of cultural practices and preconception care and subsequent pregnancy outcomes. For example, a study conducted among women who belong to ethnically diverse and disadvantaged community in setting of the UK. Women had modest or poor awareness of preconception health issues. Challenges for engaging women in preconception care more routinely were underlined. The reason of poor awareness about preconception care among women was the prevailing cultural practices of maintaining secrecy when they try to conceive. They are preparing for pregnancy and the realities of their pregnancies often being unplanned.⁹

Maternal and child health in low- and middle-income countries (LMICs) is heavily influenced by underlying health determinants such as poverty, inadequate water

and sanitation and food scarcity. Additionally, weak education and healthcare systems, along with sociocultural norms that enforce gender inequality, often leave women without the empowerment needed to access healthcare or make decisions about their own health.⁴ Reducing maternal and child mortality and morbidity rates is a critical and urgent priority in LMICs, particularly in specific regions. Preconception care can effectively target these populations by providing appropriate care packages.⁹

Awareness towards preconception care

Awareness of preconception care is low among adolescent women, with around 222 million women in LMICs lacking access to contraception, leading to unplanned pregnancies and unsafe abortions. Many women in these regions begin pregnancy with poor nutritional status, being underweight, having micronutrient deficiencies or facing mental health issues and other complications. From a public health standpoint, preconception care is crucial as it can reduce health risks and improve outcomes for women, mothers and babies globally. In LMICs, counselling on preconception care among married women in developed communities has yielded positive results.⁴

In developing countries like India, preconception care is a relatively new and not widely practiced concept. Promoting the health of women, men and families before pregnancy is crucial for family-centered maternal and new-born care, yet many people in India are unaware of it. Various literature and survey reports highlight the high rates of maternal and new-born morbidity and mortality in India, where preconception care is not as valued as in Western countries. The goal of preconception care is to identify and minimize health risks for parents, particularly the mother and the fetus before pregnancy. A cross-sectional study in Karnataka found that only 43% of women receiving antenatal care were aware of preconception care, indicating that the majority had poor knowledge on the subject.¹⁰

Preconception care addresses the issue of many adolescents entering motherhood without the necessary consent, knowledge, skills or support. Maternal mortality rates are at least twice as high for women who become pregnant between the ages of 15-19 compared to those aged 20-29. Preconception care is a crucial factor influencing pregnancy outcomes. However, many women of reproductive age are unaware of its importance and do not practice it.

This study aims to assess the awareness and practice of preconception care among married women aged 15-49 in the West Champaran and Banka districts of Bihar. Given the lack of specific studies on preconception care interventions in Bihar, this research seeks to evaluate the knowledge and awareness related to preconception care among married women in the region.

METHODS

The sampling procedure followed a multistage sampling. Initially, the districts of West Champaran and Banka were selected purposively based on both availability of tribal population and trends in prevalence of early pregnancy. Within each district, blocks were chosen based on accessibility and demographic diversity. Villages and urban wards within these blocks were then selected using purposive sampling. Finally, within each selected village or ward, households with eligible married women (aged 15–49 and having had a recent birth) were selected randomly. Currently married women, within the reproductive age group (15–49 years), permanent residents of the study area and willing to provide informed consent were included in the present study. Exclusion criteria included unmarried, widowed or divorced women, temporary migrants or visitors and those unwilling or unable to provide informed consent. This multistage approach combined purposive and random sampling methods to ensure both representativeness and feasibility.

Data source

This study is based on primary data and used a quantitative research approach to know the awareness of preconception care among married women in study area of Bihar. The field work was conducted from March to September 2023 at West Champaran and Banka districts of Bihar. West Champaran and Banka are two of the 38 districts of Bihar. The study was conducted among 300 married women within the age group of 15–49 years. The awareness regarding preconception care was assessed using interview schedule.

The selection criteria of districts are prevalence of early pregnancy and availability of tribal population. Firstly, the districts have been selected with positive and negative trend of prevalence of early pregnancy during period of fourth and fifth round of NFHS which was conducted in 2015–16 and 2019–21 respectively in India. The districts Sheohar (10.7%), Gaya (7.7%), West Champaran (7.4%) and Kaimur (6.2%) shows higher percent of decline in prevalence of early pregnancy during the fourth to fifth round of NFHS. This is the positive trend of decline in prevalence of early pregnancy.

On the other hand, the districts Saharsa (11.7%), Purnia (9.1%), Banka (8.6%) and Bhagalpur (6.1%) show higher percent of incline in prevalence of early pregnancy during the fourth to fifth round of NFHS. This indicates the negative trend of incline in prevalence of early pregnancy. Finally, keeping the selecting criteria (availability of tribal people) and convenience in field work of the study in mind, the districts West Champaran and Banka are selected for the present study according to the census 2011. The prevalence of early pregnancy has declined from 19.5% to 12.5% during fourth to fifth round of NFHS in West Champaran which shows a

positive figure of prevalence of early pregnancy but on other hand, Banka shows a negative figure of increased prevalence of early pregnancy from 10.6% to 19.2% as per NFHS-4 (2015–16) to NFHS-5 (2019–21) respectively.

After finalizing the districts for the study, the next stage is selecting the blocks and village/urban wards for the study. The selection criteria of blocks and villages/urban wards are the availability of tribal people. In West Champaran, the villages Manguraha and Mahuawa under Gaunaha block and Ward-2 in Narkatiyaganj have been selected. In Banka district, the study area as Bhelwa and Salaiya Kalan villages in Katoria block and ward 4, Deoda in Banka block have been finalized. The study was conducted in selected villages and health facilities of West Champaran and Banka districts, Bihar. For health-related data verification from nearby facilities, including referral Government Hospital Gaunaha, West Champaran and Banka Sadar Hospital, Bihar.

Married women of reproductive age group are the respondents for the present study. The household “or respondents” have been selected randomly among married women of reproductive age group 15–49 year. Fifty respondents have been selected randomly from each study area in four blocks of both districts (West Champaran and Banka). Thus, the total number of respondents are 300, in which 200 are from rural area and 100 from urban area. Stata 16 software has been used for analysis of the present study.

The methodology has been constructed for the present study in two ways i.e., variable construction and statistical analysis.

Variable construction

The variables for the present study have been classified into two categories: predictor variables and dependent variables, in order to meet the objectives of the study.

Dependent variable

In this study, the dependent variable is “preconception care awareness” among married women aged 15–49 years. It is constructed using three existing variables: “Aware About Preconception Care,” “Folic/Iron Advice by Health Professional,” and “Preconception Lab Test Advice by Health Professional.” Each of these components is already available in dichotomous form, coded as 0 for 'No' and 1 for 'Yes'.

Predictor variable

This study used several predictor variables. These were re-coded for better analysis and comparison. Predictor variables help to understand their link with the dependent variable. The variables included place of residence, education level, religion, caste, income status, media

exposure and place of delivery. The study looked at these socio-economic factors. It aimed to see how they influence awareness of preconception care among married women. The analysis focused on married women in West Champaran and Banka districts of Bihar.

Statistical analysis

Bivariate analysis has been performed to see the association between preconception care awareness among married women of age group 15-49 years and characteristics variables. STATA version 16 is used for the analysis. Chi-Square test is used for independence of the variables associated with the factors and p-value is used to see the significant association between the variables.

RESULTS

Socio-economic background of the study population

Table 1 shows the background characteristics of married women aged 15–49 years in West Champaran and Banka districts of Bihar. In both districts, the largest proportion of women are in the 25 and above age group. This group includes 55.3% of women in West Champaran and 67.3% in Banka. Rural areas in both districts have a higher number of young women in the age group of 15–19 years and 20–24 years as compared to urban areas. Most of the respondents in both districts identify as Hindu, with 87.3% in West Champaran and 92.0% in Banka. The Muslim respondents are 12.7% in West Champaran and 8.0% in Banka, with no urban Muslim respondents recorded in Banka. Social group wise distribution of respondents shows that, Scheduled Tribes form the majority in rural West Champaran (58.0 %) and 46.0% overall. In Banka, OBCs are the dominant group at 60.7%, followed by STs at 33.3%. The General and SC categories appear in small proportions, especially in Banka.

Family type is largely joint in both districts, with 67.3% in West Champaran and 64.0% in Banka. Urban households in West Champaran are mostly nuclear (70.0%), while urban Banka also reports a high %age (74.0%) of nuclear families. In terms of education, illiteracy is higher in rural areas (27.0% WC, 29.0% Banka), while graduate-level education is more visible in urban settings (20.0% WC, 14.0% Banka). Secondary and higher secondary levels are better represented among urban women in both districts.

Marriage before 20 years of age is common, reported by 52.0% of respondents in West Champaran and 57.3% in Banka. Marriages at age 25 and above are still limited, though more frequent in urban areas. Employment is slightly more common in urban regions, with 46.0% of urban West Champaran women and 42.0% of urban Banka women being employed, compared to 32.0% and 31.0% in their rural areas. Among employed respondents,

rural West Champaran respondents mostly work as labourers (37.5%) and cultivators (28.1%), while urban women are more engaged in salaried and self-employed work. In Banka, cultivation is the main occupation in rural areas (87.1%), while self-employment is dominant in urban areas (52.4 %). In terms of income, the majority of employed women in both districts earn below ₹5,000 per month 67.3% in West Champaran and 82.7% in Banka. Higher incomes are more common in urban areas, particularly in West Champaran.

Awareness of preconception care

Figure 1 presents a comparative overview of the awareness of PCC components among respondents aged 15–49 years in West Champaran and Banka districts of Bihar. The findings indicate a notable disparity between the two regions.

In terms of general awareness, 24.0% of women in West Champaran reported being aware of preconception care, compared to only 9.3% in Banka, highlighting a significant knowledge gap between the respondents of two districts. It was found while examining sources of information, doctors were the most cited source in both districts, with 58.3% of women in West Champaran and 50.0% in Banka acknowledging medical professionals as their primary source. Media exposure was also evident, with 27.8% in West Champaran and 35.7 % in Banka learning about PCC through media exposure. The role of ANM and ASHA workers appeared extremely limited, with just 2.8% of women in West Champaran and none in Banka receiving information from them. Relatives and others served as a source for 11.1% of women in West Champaran and 14.3% in Banka.

Regarding medical advice before conception, only 8.7% of women in West Champaran and 6.0% in Banka reported receiving recommendations to take iron or folic acid, indicating a general lack of counselling on essential supplements. The awareness of routine laboratory tests before conception was significantly higher in West Champaran. About 20.0% of women were informed about HIV and Hepatitis testing in West Champaran, while in Banka the figure was only 7.3%. Similar differences were found for Rubella and HBV (Hepatitis B Virus), with 19.3% in West Champaran and 7.3% in Banka. For diabetes, 18.0% of women in West Champaran were aware, compared to 5.3% in Banka. In the case of chronic hypertension, 6.7% of women in West Champaran had awareness, whereas only 2.7% did in Banka. These results reflect better communication of preventive health advice in West Champaran. Lastly, the perception of PCC effectiveness varied widely. A significant 72.2% of women in West Champaran believed that preconception care is effective in pregnancy outcomes postpartum care; whereas only 35.7% in Banka shared this view. This suggests that married women in West Champaran receive more information but also place greater trust in the value of preconception care.

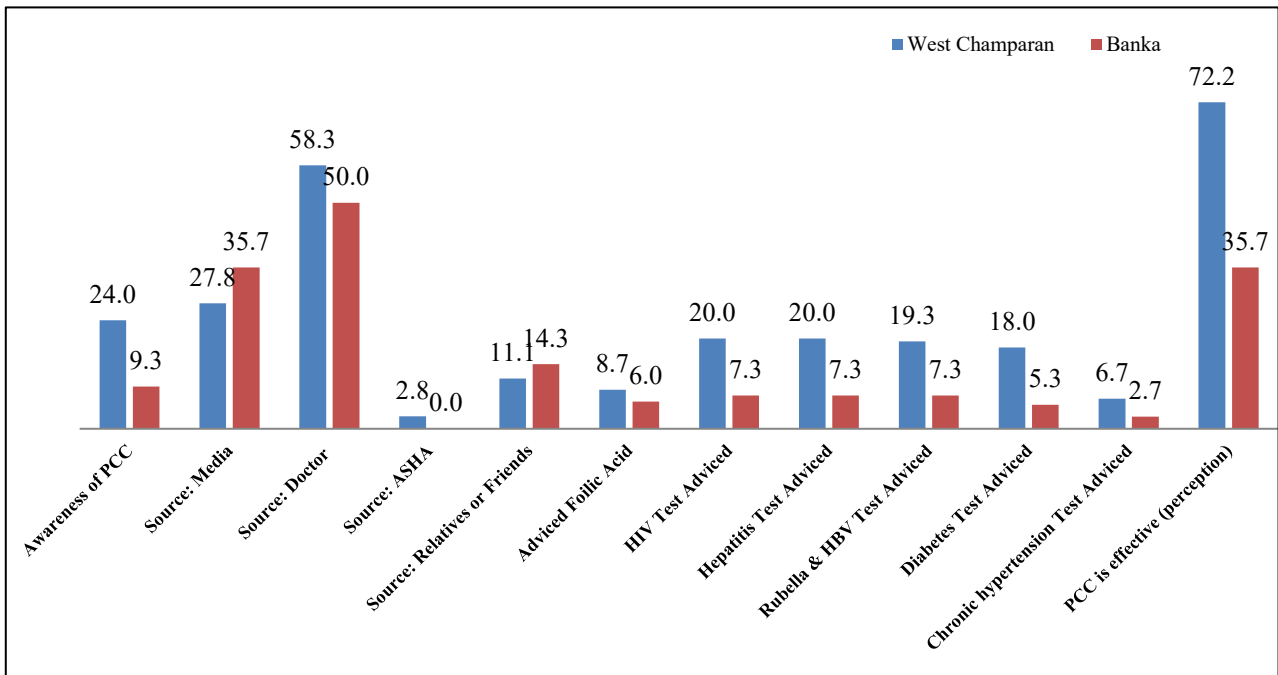


Figure 1: Comparative awareness of preconception care components among women aged 15–49 years in selected districts of Bihar.

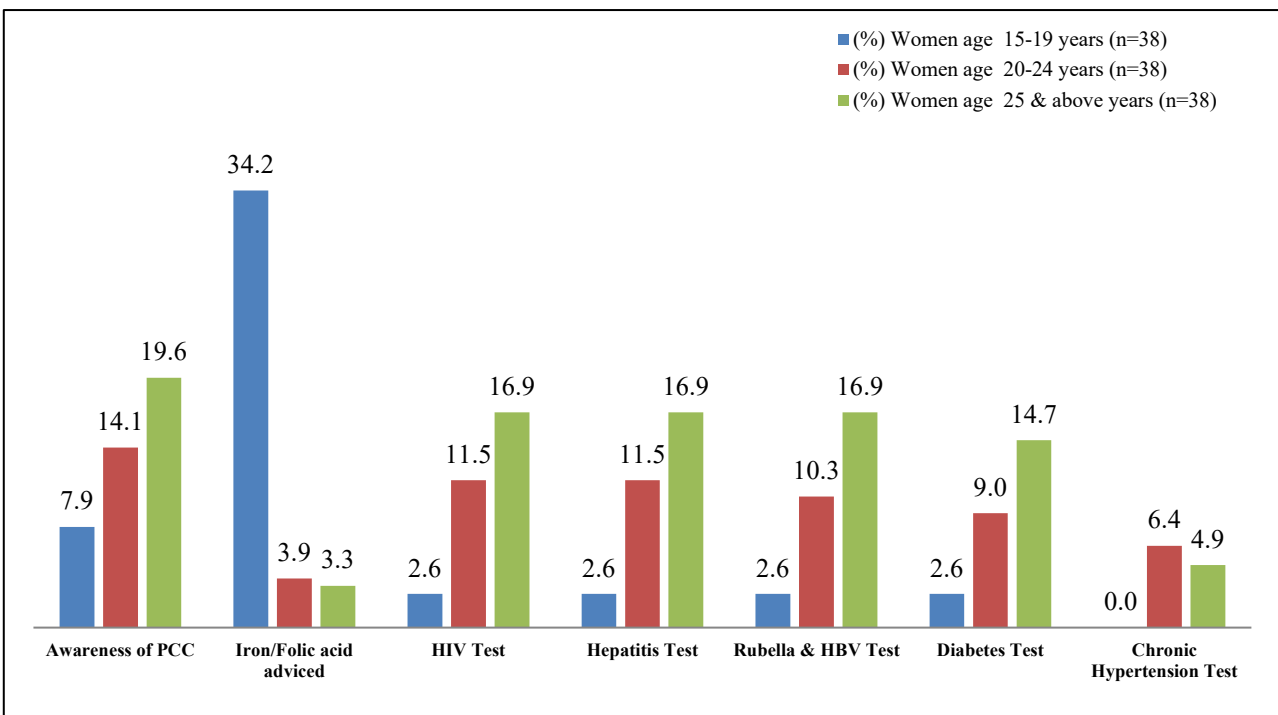


Figure 2: Age-wise distribution of preconception care awareness and recommendations among women in selected districts of Bihar.

Age group wise distribution of respondents regarding awareness towards preconception care

Figure 2 shows awareness of respondents and prescriptions by doctors on preconception care among respondents by age group. Awareness of preconception care increases with age. Women aged 25 and above had

the highest awareness (19.6%) as compared to 20-24 years (14.1%) and 15-19 years (7.9 %). Iron and folic acid supplements were prescribed highest among 15–19-year-olds (34.2%). Older women were more aware of HIV, Hepatitis, Rubella and HBV tests. Diabetes testing advice was highest among women aged 25 and above (14.7 %). Chronic hypertension testing was reported only

among women aged 20–24 and 25 and above. Overall, older women had better knowledge of lab tests before pregnancy.

Distribution of respondents according to awareness towards preconception care vis-à-vis their socio-economic status

Table 2 highlights a clear variation in preconception care awareness between women in West Champaran and Banka, which appears to be influenced by various socio-economic characteristics. These factors include place of residence, caste, educational attainment, employment status, income level, media exposure, place of delivery and age at marriage.

Preconception care awareness was higher among urban women than rural in both districts. In West Champaran, 44.0% of urban women were aware, compared to 23.0% in rural areas. In Banka, awareness was 36.0% in urban and just 5.0% in rural women (West Champaran: $\chi^2=7.00$, $p<0.008$; Banka: $\chi^2=24.67$, $p<0.001$). This suggests that urban residence is strongly associated with greater access to information and health services related to preconception care. The association was statistically significant in both cases. Social category shows a notable impact on awareness level. In West Champaran, awareness was highest among General category women (55.6%), followed by SC (35.0%), OBC (32.7%) and lowest among ST (23.2%). In Banka district, only one woman from the General category was found in the sample. She was aware of preconception care.

This shows that all sampled women from the General category had awareness. The association was significant in both districts ((West Champaran: $\chi^2=8.74$, $p<0.04$; Banka: $\chi^2=14.28$, $p<0.003$). Education was strongly linked with awareness. In West Champaran, only 13.8 % of illiterate women were aware, rising steadily with education 75.0% among graduates ($\chi^2=26.78$, $p<0.001$). Similar trends appeared in Banka, where 3.2% of illiterate women were aware compared to 37.5% among graduates. Awareness was lowest among those with no or primary education ($\chi^2=18.47$, $p<0.002$). Employment status also influenced awareness level of respondents. In West Champaran, 56.4 % of employed women were aware versus 14.7% of homemakers. In Banka, 28.9% of employed women were aware, compared to only 8.2% homemakers. The association was significant (West Champaran: $\chi^2=28.74$, $p<0.001$; Banka: $\chi^2=11.19$, $p<0.001$). Income was another factor found to be responsible for awareness on PCC.

In West Champaran, women earning ₹5001 and above showed 66.7% awareness, compared to 51.4% among those earning less. In Banka, the respective figures were 55.6% and 23.3%, with statistically significant association (West Champaran: $\chi^2=4.15$, $p<0.04$; Banka: $\chi^2=3.78$, $p<0.05$).

Age at marriage showed gradual trends. In West Champaran, 63.6% of women married at 25 or above were aware compared to 28.2% among those married at 15–19. In Banka, 53.9% of women married at 25 or above were aware, while only 14.0% of those married at 15–19 was aware. The association was stronger in Banka (West Champaran: $\chi^2=6.46$, $p<0.04$; Banka: $\chi^2=17.18$, $p<0.001$).

Media exposure also showed clear influence on awareness level among respondents in both districts. In West Champaran, only 5.4% of media unexposed women were aware, while 45.3 % of regularly exposed women were aware. In Banka, awareness was 7.1% in the unexposed group and 29.6% among those regularly exposed. Exposure was strongly associated with awareness (West Champaran: $\chi^2=28.91$, $p<0.001$; Banka: $\chi^2=13.29$, $p<0.001$).

Place of delivery is yet another factor which influences the awareness level of respondents on PCC. In West Champaran, women delivering in private facilities showed 92.3% awareness, while those delivering at home showed only 10.0% (10.0%, $\chi^2=65.21$, $p<0.001$). In Banka, 43.5% of private facility users were aware, compared to just 3.1% of home deliveries ($\chi^2=22.01$, $p<0.001$). Public facility users had low awareness in both areas. The association was statistically significant.

Religion showed only minor differences in awareness level towards PCC. In West Champaran, 29.8% of Hindu women were aware compared to 31.6% of Muslim women. In Banka, 15.9% of Hindu women were aware, while awareness among Muslim women was 8.3 %. However, religion was not significantly associated with awareness.

This may be because the number of Muslim women in the sample was very small compared to Hindu women. The small sample size for Muslims limits meaningful comparison between the two groups. The results suggest that urban residence, higher caste status, better education, employment, higher income, later age at marriage, regular media exposure and institutional (especially private) deliveries are all positively associated with preconception care awareness among women respondents of the studied districts.

Table 1: Justification for selection of study districts based on early pregnancy trends and tribal population in Bihar.

Districts	ST population (%)	Early pregnancy trend (NFHS-4 to NFHS-5)
West Champaran	High	Decline (19.5% to 12.5%)
Banka	Moderate	Increase (10.6% to 19.2%)

Table 2: Percentage distribution of married women age group 15-49 years as per background characteristics in study population of Bihar.

Background characteristics	(%) West champaran			(%) Banka		
	Rural (n=100)	Urban (n=50)	Total (n=150)	Rural (n=100)	Urban (n=50)	Total (n=150)
Women's current age						
15-19	15.0	4.0	11.3	18.0	6.0	14.0
20-24	42.0	16.0	33.3	24.0	8.0	18.7
25 and above	43.0	80.0	55.3	58.0	86.0	67.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Religion						
Hindu	86.0	90.0	87.3	88.0	100.0	92.0
Muslim	14.0	10.0	12.7	12.0	-	8.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Categories						
General	5.0	8.0	6.0	-	2.0	0.7
OBC	26.0	52.0	34.7	50.0	82.0	60.7
SC	11.0	18.0	13.3	-	16.0	5.3
ST	58.0	22.0	46.0	50.0	-	33.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Type of family						
Nuclear	14.0	70.0	32.7	17.0	74.0	36.0
Joint	86.0	30.0	67.3	83.0	26.0	64.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Education status						
Illiterate	27.0	4.0	19.3	29.0	4.0	20.7
Primary	21.0	16.0	19.3	14.0	6.0	11.3
Upper primary	24.0	20.0	22.7	29.0	20.0	26.0
Secondary	19.0	16.0	18.0	20.0	32.0	24.0
Higher secondary	7.0	24.0	12.7	7.0	24.0	12.7
Graduate and above	2.0	20.0	8.0	1.0	14.0	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Age at marriage						
15-19	62.0	32.0	52.0	69.0	34.0	57.3
20-24	37.0	48.0	40.7	30.0	42.0	34.0
25 and above	1.0	20.0	7.3	1.0	24.0	8.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Employment status						
Homemakers	68.0	54.0	63.3	69	58.0	65.3
Employed	32.0	46.0	36.7	31	42.0	34.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Main occupation (*Only employed women)			*(n=55)	*(n=52)		
Cultivators	28.1	8.7	20.0	87.1	4.8	53.9
labour	37.5	21.7	30.9	6.5	19.1	11.5
Self-employed/business	18.8	26.1	21.8	6.5	52.4	25.0
Salaried (Govt. and Pvt.)	15.6	43.5	27.3	-	23.8	9.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Monthly income (*Only employed women)			*(n=55)	*(n=52)		
below 5000	87.5	39.1	67.3	100.0	57.1	82.7
5001 and above	12.5	60.9	32.7	-	42.9	17.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 3: Percentage of preconception care awareness married women age group 15-49 years by socio-economic characteristics in study population of Bihar.

Background characteristics	West Champaran		Banka	
	(%) Preconception care awareness among women	Total no. of Women (N=150)	(%) Preconception care awareness among women	Total no. of women (N=150)
Place of residence				
Urban	44.0	50	36.0	50
Rural	23.0	100	5.0	100
(χ^2 , P value)	(7.00; <0.008)		(24.67; <0.001)	
Religion				
Hindu	29.8	131	15.9	138
Muslim	31.6	19	8.3	12
(χ^2 , P value)	(0.03; < 0.8)		(0.49; <0.5)	
Categories				
General	55.6	9	100.0	1
Other backward class (OBC)	32.7	52	18.68	91
Scheduled castes (SC)	35.0	20	37.5	8
Scheduled tribes (ST)	23.2	69	4.0	50
(χ^2 , P value)	(8.74; <0.04)		(14.28; <0.003)	
Education status				
Illiterate	13.8	29	3.2	31
Primary	10.3	29	-	17
Upper primary	23.5	34	10.3	39
Secondary	48.2	27	22.2	36
Higher secondary	42.1	19	36.8	19
Graduate and above	75.0	12	37.5	8
(χ^2 , P value)	(26.78; <0.001)		(18.47; <0.002)	
Employment status				
Homemakers	14.7	95	8.2	98
Employed	56.4	55	28.9	52
(χ^2 , P value)	(28.74; <0.001)		(11.19; <0.001)	
Monthly income (Women)				
below 5000	51.4	37	23.3	43
5001 and above	66.7	18	55.6	9
(χ^2 , p-value)	(4.15; <0.04)		(3.78; <0.05)	
Age at marriage				
15-19	28.2	78	14.0	86
20-24	26.2	61	7.8	51
25 and above	63.6	11	53.9	13
(χ^2 , P value)	(6.46; < 0.04)		(17.18; <0.001)	
Media exposure				
Not exposed	5.4	37	7.1	70
Partially exposed	-	18	7.7	26
Regularly exposed	45.3	95	29.6	54
(χ^2 , P value)	(28.91; <0.001)		(13.29; <0.001)	
Delivery place				
Public	14.7	95	17.2	58
Private	92.3	26	43.5	23
Home	10.0	20	3.1	65
Others (at ambulance and vehicle)	55.6	9	25.0	4
(χ^2 , P value)	(65.21; <0.001)		(22.01; <0.001)	

DISCUSSION

The findings of the present study reaffirm the importance of socio-economic factors play a very important role in generating awareness and exchanging knowledge level regarding preconception care among married women in Bihar. Results showed that variables such as place of residence, education, caste, employment, income, media exposure and place of delivery are significantly associated with preconception care (PCC) awareness levels. Women from urban areas, with higher education, regular media exposure and earning capacity demonstrated greater knowledge of preconception care. Previous studies from Ethiopia, Kenya and India have consistently shown that socio-economic determinants such as education, employment status, income and media exposure, remain central to improving preconception health behaviours among women of reproductive age.¹¹⁻¹³

The present study reveals a significant disparity in preconception care (PCC) awareness between the two districts West Champaran (24.0%) and Banka (9.3%). Similarly, fewer women received advice on folic/iron supplementation or suggestions for diagnostic tests (such as; HIV, hepatitis, rubella, diabetes and hypertension) in Banka as compared to West Champaran (Figure 1). This regional gap mirrors findings from Madhya Pradesh, where over half the women had not heard of PCC.¹⁴ Another important finding shows differences in preconception care awareness by age. Advice on iron and folic acid was highest among girls aged 15–19 years (34.2%). This could be because the weekly iron and folic acid supplementation (WIFS) program under RMNCH+A focuses on adolescent girls to reduce anemia.¹⁵ Respondent from urban wards consistently showed higher PCC awareness. In West Champaran, 44% of urban women were aware, compared to 23 % of rural women. In Banka, the figures stood at 36% (urban) and 5% (rural). Similar urban–rural differences have been noted in Raipur, where urban women demonstrated greater knowledge of folic acid.¹⁶

Educational status emerged as a strong determinant. In West Champaran, 75% of graduates were aware of PCC. In Banka, 37.5% of graduates reported awareness. This pattern corresponds with a Pune-based study linking higher education levels to better understanding of folic acid.¹³ Income and employment status also influenced awareness levels. In both districts, employed women earning above ₹5,000 had greater awareness 66.7% in West Champaran and 55.6% in Banka compared to lower-income homemakers. Similar findings from Ethiopia indicated that secondary education and planned pregnancy significantly increased PCC knowledge.¹¹

Media exposure played a vital role in awareness level on PCC. In West Champaran, 45.3% of women with regular media access were aware of PCC, compared to 29.6% in Banka. This supports findings from Kenya and China, where media campaigns and policy outreach improved

awareness and service uptake.^{12,17} Place of delivery also played a role in PCC awareness. In West Champaran, awareness was highest among women who delivered in private hospitals (92.3%), compared to those in public facilities. Awareness was lowest among home deliveries, at just 10%. This pattern suggests that private facilities may provide more information on PCC than public ones and supports previous findings that facility-based deliveries often improve awareness.^{3,4}

Age at marriage was closely linked to awareness of preconception care. In West Champaran, 63.6% of women who married at age 25 or above were found more aware. In Banka, the figure was 53.9% for the same age group. Women who married earlier showed much lower awareness. This supports global evidence that later marriage is often associated with better health knowledge.⁵ Social standing also plays an important role in generating awareness. In the present study, social group-based disparities were also observed. In Banka, all women from the General category were aware of PCC, whereas only 4.0% of Scheduled Tribe (ST) women reported such awareness. This supports earlier findings which indicated that PCC awareness is significantly lower among disadvantaged caste groups.¹⁸

Health professionals, especially doctors, were the main source of information. In West Champaran, 58.3% of women cited doctors, while in Banka, it was 50.0%. This pattern aligns with findings from Karnataka, where doctors were the primary informants.¹⁹ In contrast, community health workers, such as ANM/ASHA, played a negligible role. Only 2.8% of women in West Champaran and none in Banka received PCC information from ANM/ASHA workers. This reflects limited engagement of ASHA with the women, also reported in a qualitative study from Nashik.^{20,21}

Awareness towards iron and folic acid supplements prescribed to the women was poor. Only 8.7% of women in West Champaran and 6.0% in Banka reported being advised on iron or folic acid. The findings also echo earlier research that noted weak counselling and low adherence to IFA protocols in rural Bihar.²² Knowledge of recommended laboratory tests such as HIV, hepatitis, rubella, diabetes and hypertension were higher in West Champaran (19–20 %) compared to Banka (5–7%). This suggests better outreach by healthcare services in West Champaran. Similar global studies show that stronger rural health systems improve preconception care uptake.^{12,23} Awareness of preconception care was highest among women aged 25 and above (19.6%). Older women likely gained this knowledge from past pregnancies. They also had better awareness of HIV, Hepatitis, Rubella, HBV and diabetes tests. For example, 16.9% of women aged 25 and above were aware of HIV and Hepatitis tests. Diabetes test awareness in this group was 14.7%.

However, awareness of chronic hypertension tests was low across all age groups. Only 6.4% of women aged

20–24 and 4.9% of women aged 25 and above reported this. This shows clear gaps in preconception screening. Similar trends of higher awareness in older women have been reported in Ethiopia and India.^{4,11,24} Perception of PCC effectiveness was also higher in West Champaran. About 72.2% of women believed PCC was useful, compared to only 35.7% in Banka. This reflects findings from tribal Maharashtra, where low confidence in PCC services was reported.²⁵

Banka district recorded lower PCC awareness than West Champaran, with only 9.3% of women aware compared to 24% in West Champaran. This gap is partly linked to Banka's sharp rise in adolescent pregnancy, which contrasts with a decline in West Champaran. Limited PCC knowledge in Banka reduces young women's ability to make informed reproductive choices and access preventive health measures. Banka also faces greater challenges in terms of lower educational attainment, weaker media exposure, reduced access to quality health facilities, minimal engagement of health workers such as ASHAs and ANMs, lower income levels and a higher proportion of disadvantaged caste groups. Notably, Scheduled Tribe women in West Champaran mainly "Tharu" show higher PCC awareness (23.2%) than Scheduled Tribe women in Banka mainly "Santhal" where awareness is only 4%. These socio-economic and structural disadvantages, combined with higher adolescent pregnancy rates, appear to create deeper barriers to PCC awareness in Banka compared to West Champaran.^{11,21,24,26}

This study underscores that factor such as education, income, place of residence, healthcare access, media exposure and age at marriage significantly influence PCC awareness. The findings are consistent with national and international studies, which highlight these determinants as critical to improving maternal health service uptake.^{22,24} Targeted interventions including media campaigns, improved community outreach and better integration of PCC into routine maternal care are necessary to bridge existing gaps.

The study was conducted in selected villages of West Champaran and Banka districts and findings may not represent all social and geographical sections of Bihar. Self-reported responses may be affected by recall bias. The cross-sectional design limits causal interpretation. Despite these limitations, the study provides important insights into PCC awareness in underserved rural and tribal areas of Bihar.

CONCLUSION

This study shows low awareness of preconception care among women in Bihar. Awareness was higher in West Champaran than in Banka. Urban women had better knowledge than rural women. Education and employment were strong factors linked with awareness. Women with higher income and regular media exposure were more

aware. Place of delivery also influenced awareness. Women who delivered in private hospitals knew more about preconception care. Age at marriage showed clear differences. Women who married at 25 or above had better awareness. Caste differences were also seen, with Scheduled Tribe women having the least awareness. Overall, socio-economic factors shape awareness levels. There is a need for targeted programs to improve preconception care awareness. Focused health education, media campaigns and community outreach are important. Strengthening counselling by health workers can also bridge the gaps. Improving awareness will help ensure healthier mothers and babies in Bihar.

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