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Chronic Conditions During Pregnancy: Guidance on Complications and Healthcare Options

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Abstract

This study investigates factors influencing awareness of pregnancy complications and appropriate healthcare facilities, focusing on pregnant women with chronic conditions. Using data from the latest (2019-2021) round of National Family Health Survey, the study reveals significant gap in healthcare services with marked inter-state variations. The study also reveals that women with chronic conditions are more likely to receive information about pregnancy complications but are not necessarily aware of where to seek help and are less likely to be informed about the importance of institutional delivery. Logistic regression results indicate that women with chronic conditions and higher educational levels are more likely to be informed about pregnancy complications. However, their condition does not affect the advice they receive about the importance of institutional delivery or where to seek help in case of complications. The findings of the study highlight the need for targeted education and support for pregnant women, especially those with chronic conditions for ensuring comprehensive care for mothers and infants, thereby improving maternal and child health outcomes.

Introduction

Chronic health conditions encompass prolonged diseases influenced by genetic, physiological, environmental, and behavioral factors (World Health Organization, 2023). Pregnancy induces significant hormonal and physiological changes, heightening risks of maternal morbidity and mortality when coupled with chronic illnesses. Women of reproductive age in India are particularly susceptible to multiple chronic health conditions, termed as multimorbidity (Singh et al, 2023). It has been observed that 32.2 per cent of pregnant women had at least one chronic health issue, while 8.7 per cent had experienced multimorbidity (Hossain et al, 2021). Chronic diseases such as cancer, heart disease, stroke, liver disorder, diabetes, and respiratory diseases accounted for nearly one-third (32.9 per cent) of the deaths among women aged 15-44 years in the United States in 2017 (Hayes et al, 2020). Similarly, the Public Health Agency of Canada (2020) reported that 27 per cent of the pregnancies were experienced by women with a chronic condition.

Women with chronic conditions are more likely to undergo caesarean sections than healthy women (Kersten et al, 2014). Women with chronic hypertension face almost

eight times higher risk of developing superimposed pre-eclampsia during pregnancy (Bramham et al, 2014). Pregnancy in women with heart disease is associated with increased risks of maternal mortality and diverse complications (Roos-Hesselink et al, 2019). Chronic diseases can lead to adverse reproductive outcomes, including pre-term birth, low birth weight, intrauterine growth retardation, congenital disabilities, caesarean sections, and, to a lesser extent, low Apgar score, stillbirth, neonatal and maternal death (Jølving et al, 2016; Al-Amran et al, 2012; Ralston et al, 2021). Pregnant women with chronic illnesses often experience increased healthcare needs and stress levels impacting perinatal outcomes (Tyer-Viola and Lopez, 2014). Babies born to women with chronic diseases face less favourable outcomes, with one in every ten women with at least one chronic disease giving birth prematurely, compared to one in thirteen healthy women (Kersten et al, 2014). Adverse neonatal outcomes are at least twice as likely in women with chronic conditions as in healthier women (Bramham et al, 2014).

High risk pregnancies, such as those involving pulmonary hypertension, heart failure, insulin-dependent diabetes, thyroid disorders, cancer, kidney disorders, substance addiction, and chronic intrauterine infections, require extensive medical attention and specialised care (Kersten et al, 2014; Kuppusamy et al, 2023; Ralston et al, 2021). Managing high-risk pregnancies necessitates additional medical care for women with known diseases. The World Health Organization recommends a minimum of four antenatal care (ANC) visits for risk assessment, prevention, and management of pregnancy and associated comorbidities (WHO, 2016). In India, ANC is often provided by field level health functionaries such as Auxiliary Nurse Midwives (ANMs), working with Accredited Social Health Activists (ASHAs), Anganwadi Workers (AWWs), and local Primary Health Centres (PHCs) (Government of India, 2010). Early detection, follow-up, and management of high risk pregnancies are crucial components of antenatal care (Government of India, *nd*).

Two-thirds of the population of India resides in the rural areas, where women face higher risks due to limited awareness and access to healthcare. Vulnerable populations, particularly in rural and impoverished communities, experience the highest rates of chronic diseases linked to maternal morbidity and mortality (Singh et al, 2023). According to UNICEF, access to essential health care services often hinges on economic status and the place of residence, leading to significant disparities between urban and rural areas, as well as among wealthy and the impoverished families (UNICEF, *nd*). In the urban areas, approximately 28 per cent of women suffer from multimorbidity (Singh et al, 2023). Factors contributing to multimorbidity include age, education, employment status, marital status, parity, menopause, religion, region, wealth, tobacco use, alcohol consumption, and dietary habits. High-risk pregnancies are prevalent among the rural women, those with no formal education, and those in the poorest wealth quintiles (Kuppusamy et al, 2023). The long-term health conditions of pregnant women can impede their ability to care for their babies, underscoring the need for extended postnatal support (Lee et al, 2023).

In this paper, we examine how the healthcare system in India provides the support to pregnant women with chronic conditions by fostering the awareness about the complications during pregnancy, advising them about where to seek help in case of complications during pregnancy, and advocating the importance of institutional delivery to address pregnancy complications.

Data and Methodology

This paper is based on the data available from the fifth round of the National Family Health Survey (NFHS-5), which was conducted during the period 2019-2021. The NFHS is a comprehensive multi-phase household survey designed to provide national and state level estimates of selected indicators of fertility, infant and child mortality, family planning practices, reproductive health, maternal and child health, nutrition, anemia, and the quality and utilisation of healthcare services (Government of India, 2022). This study specifically examines national level data to compare the healthcare experiences of pregnant women distinguishing between women having chronic conditions and women do not having chronic conditions. The sample comprises of 29,949 pregnant women, among whom 2,044 women were having at least one chronic condition at the time of the survey. The paper focuses on antenatal care, pregnancy complications, and advice received regarding institutional delivery. The paper also examines disparities in healthcare based on the socioeconomic status of women.

During the NFHS-5, data were collected on the pregnancy status of currently married women aged 15-49 years and about the chronic conditions such as diabetes, hypertension, heart and respiratory diseases, kidney disorders, cancer, and thyroid problems. A new variable, 'women with at least one chronic condition' was created from the data available from the NFHS-5. This variable was used to compare pregnant women with and without chronic conditions across several factors including the place of residence (rural/urban), level of educational (less than secondary/secondary and above), wealth index (poor/middle/rich – described in this paper as living standard – low/middle/high), registration for ANC (by ANM/ASHA/AWW/Other), ANC received during the last three months, type of examination conducted during the ANC visit, advice on institutional delivery, information provided about pregnancy complications, and advice on where to go in case of complications.

Weighted percentages were calculated to estimates the indicators of healthcare for pregnant women with and without chronic conditions. We have compared number of ANC visits, examinations conducted during the last ANC visit, information provided about pregnancy complications at the visit, facilities informed or recommended for seeking help in case of complications, and advice given about the importance of institutional delivery between pregnant women with chronic conditions and pregnant women without chronic conditions. For ANC visits and chronic conditions, data were also analysed at the state level but for other indicators of healthcare, analysis was conducted at the national and regional levels because the number of women with chronic conditions receiving ANC was very small in several states. In total, 740 pregnant women with chronic conditions who received ANC were included in the national sample. We have also investigated the influence of socioeconomic status of pregnant women on the information given to them about the complications during pregnancy and about the facilities where the services to address these complications were available at the time of ANC visit. Bivariate logistic regression analysis was carried out to analyse the impact of regional and socioeconomic factors on the likelihood of the pregnant women with chronic conditions being informed about the complications of pregnancy, advice given about where to seek help in such cases and endorsing the important of the institutional delivery.

Results

Most of the pregnant women (92 per cent) received antenatal care (Table 1). The southern region of the country demonstrated the highest performance with 98 per cent of pregnant women receiving ANC, while the eastern region showed the lowest performance with only 84 per cent pregnant women receiving ANC. In Andhra Pradesh, 100 per cent pregnant women received antenatal care, whereas in Nagaland only 76 per cent did so. In Arunachal Pradesh and Bihar, nearly 80 per cent pregnant women received ANC.

Table 1 also shows the proportion of pregnant women with chronic conditions. Less than 7 per cent of the pregnant women in India suffered from at least one chronic condition, and this proportion ranged from zero in Dadra & Nagar Haveli and Daman & Diu to 33 per cent in Ladakh. At the regional level, the proportion of pregnant women with chronic conditions varied from 5 per cent in the central region to 11 per cent in the northeastern region of the country.

Table 1: Proportion (weighted per cent) of the pregnant women who received ANC and who had chronic conditions, India, 2019-21.

Region/State	Pregnant women who received ANC	Unweighted N	Pregnant women with chronic conditions	Unweighted N
North	93.4	2232	8.3	5282
Chandigarh	*	8	*	20
Delhi	95.0	117	15.70	266
Haryana	97.7	405	7.00	903
Himachal Pradesh	93.6	109	7.70	230
Jammu & Kashmir	94.6	456	13.10	1327
Ladakh	(94.0)	37	33.20	143
Punjab	90.3	215	12.70	376
Rajasthan	92.6	677	6.20	1592
Uttarakhand	89.3	208	4.40	425
Central	93.9	3514	4.9	8026
Chhattisgarh	91.9	505	2.30	1133
Madhya Pradesh	95.2	937	4.20	1898
Uttar Pradesh	93.8	2072	5.40	4995
East	84.4	2394	5.4	6441
Bihar	80.1	1329	4.80	3822
Jharkhand	89.6	525	3.00	1357
Odisha	97.0	360	6.50	776
West Bengal	92.6	180	10.60	486
Northeast	92.4	1637	10.8	5615
Arunachal Pradesh	79.9	228	6.00	966
Assam	94.7	399	8.60	1122
Manipur	92.0	199	5.30	554
Meghalaya	92.7	427	20.40	1711
Mizoram	89.5	134	14.30	481
Nagaland	75.7	180	5.90	555
Sikkim	*	15	(5.00)	48
Tripura	83.4	55	14.80	178

Region/State	Pregnant women who received ANC	Unweighted N	Pregnant women with chronic conditions	Unweighted N
West	93.1	1012	5.8	2082
Dadra & Nagar Haveli and Daman & Diu	(100.0)	43	0.00	82
Goa	*	16	(7.30)	29
Gujarat	95.5	497	3.20	1056
Maharashtra	91.6	456	7.70	915
South	98.2	1446	8.6	2503
Andaman & Nicobar Islands	*	10	*	24
Andhra Pradesh	100.0	148	6.60	224
Karnataka	97.6	463	6.50	824
Kerala	98.9	111	15.80	280
Lakshadweep	*	11	(30.00)	26
Puducherry	(100.0)	33	6.20	56
Tamil Nadu	95.9	261	6.60	448
Telangana	99.5	409	11.50	621
India	91.7	12235	6.40	29949

Source: Authors

Note: Percentages are supressed, and an asterisk is shown if unweighted cases are less than 25. If unweighted cases are between 25-49, percentages are shown in parentheses indicating that the results need to be interpreted with caution. Pregnant women who received ANC include both with and without chronic conditions.

Nearly four-fifths of the pregnant women were registered for their pregnancy through ASHA and ANM (Table 2). However, a higher proportion of the pregnant women with chronic conditions were registered with ASHA. In the rural areas, ASHA and ANM played a crucial role in ensuring access to ANC for these women.

Table 2: Proportion (per cent) of the pregnant women registered for antenatal care and who met with a healthcare worker, India, 2019-21.

ANC registration and meetings	Pregnant women	
	Without chronic condition	With chronic conditions
Registered with		
Auxiliary Nurse Midwife (ANM)	39.1	33.7
Accredited Social Health Activist (ASHA)	42.5	45.6
Anganwadi worker (AWW)	15.0	13.4
Other	3.4	7.2
Met with a healthcare worker in the last 3 months	69.8	71.7

Source: Authors

Note: Health care workers include ANM, Lady Health Visitor (LHV), ASHA, AWW and other field level health workers.

The guidelines of the National Health Mission (NHM) emphasise the higher risk of pregnancies among women with chronic conditions and stress close monitoring of these women through regular checkup. Despite significant progress, the findings reveal that the country still falls short of meeting the NHM recommendations. Notably, 8 per cent of

pregnant women with chronic conditions did not receive antenatal care, posing a higher risk to themselves and their unborn child. As pregnancies progress, especially in the last trimester, close supervision becomes crucial. The data also show that in the last three months, nearly 70 per cent of the pregnant women without chronic condition and 72 per cent with chronic conditions interacted with healthcare workers, such as ANM, ASHA, AWW, LHV, or other field health workers.

Table 3 indicates that in the northern and central regions of the country, a lower proportion of pregnant women with chronic conditions received ANC as compared to other regions. In all regions, a higher proportion of pregnant women with chronic conditions were informed about pregnancy complications compared to those without a chronic condition. More than three-fourth of the pregnant women were advised about the place to go in case there was any pregnancy complication and there was hardly any difference between the two groups at the national level. However, in the eastern region of the country, less than 70 per cent of pregnant women (66 per cent with chronic conditions) were informed about the place to go in case of any complication.

A lower proportion of pregnant women with chronic conditions (84 per cent) received advice on the importance of institutional delivery compared to those without any chronic condition (87 per cent). This pattern was observed across all regions, except for the western region (Table 3). Institutional deliveries are crucial for managing complications and improving survival chance for both mother and child.

Table 3: Proportion (per cent) of pregnant women who received ANC, advice on pregnancy complications, and institutional delivery by region, India, 2019-21.

Country/ Region	Pregnant women without complications				Pregnant women with complications			
	Received ANC	Informed about pregnancy complications	Informed about where to go for complications	Advised institutional delivery	Received ANC	Informed about pregnancy complications	Informed about where to go for complications	Advised institutional delivery
North	93.7	75.7	78.9	87.6	90.4	89.1	80.9	82.3
Central	94.1	77.1	81.9	89.0	90.8	82.3	80.9	82.4
East	84.3	66.3	69.8	83.2	85.7	68.3	66.0	82.1
Northeast	92.1	74.7	75.0	82.7	94.9	91.2	81.0	78.5
West	92.7	76.8	76.0	83.7	98.4	78.7	84.0	86.5
South	98.2	75.9	83.3	80.5	91.5	86.9	97.4	81.0
India	91.6	73.8	77.7	78.2	87.1	83.7	92.1	80.1

Source: Authors

The remaining analysis focuses on national level data due to inadequate sample size in some states, which hinder meaningful estimates. Figure 1 compares antenatal checkup for pregnant women with and without chronic conditions, focusing on five types of examinations: abdominal examination, weight measurement, blood pressure check-up, urine analysis, and blood test. Most of the women (90 per cent or more) underwent each of these tests. The graph indicates that a slightly higher percentage of pregnant women with chronic conditions received these examinations compared to those without chronic conditions. This suggests more intense monitoring for women with chronic health issues, aligning with NHM guidelines in certain ways.

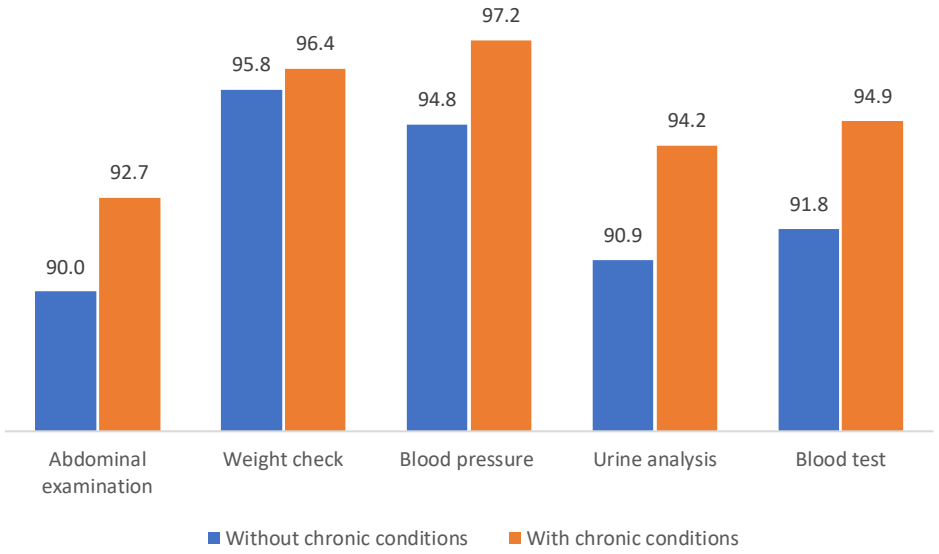

Figure 1: Proportion (per cent) of pregnant women who received antenatal checkup.
Source: Authors

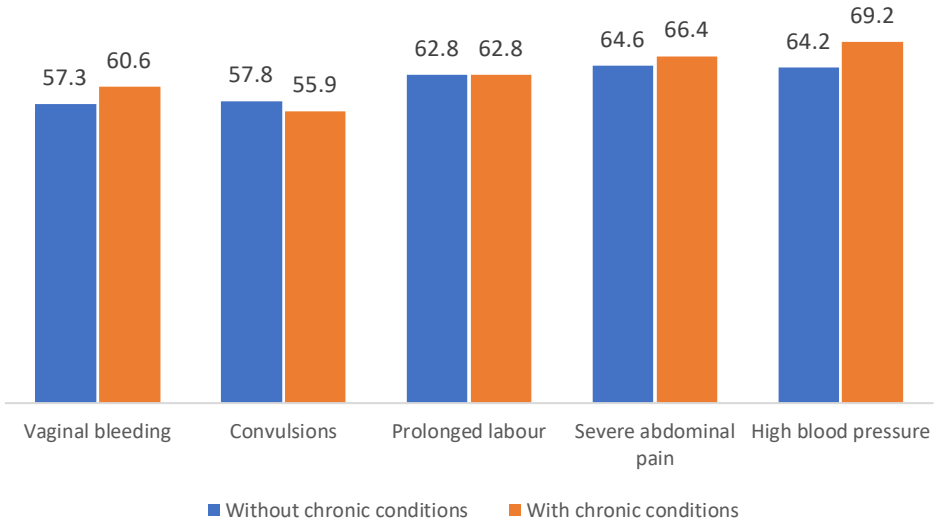

Figure 2: Proportion (per cent) of pregnant women given information about pregnancy complications.
Source: Authors

Although, majority of the pregnant women were informed about the complications during pregnancy (Table 3), a much smaller proportion (ranging from 56 to 69 per cent) were told about specific complications (Figure 2). A slightly higher proportion of pregnant women with chronic conditions were informed about issues such as vaginal bleeding, severe abdominal pain, and high blood pressure compared to pregnant women without any chronic condition. On the contrary, a smaller proportion of pregnant women with chronic conditions received information about convulsions. The difference between the two groups of pregnant women, however, is marginal.

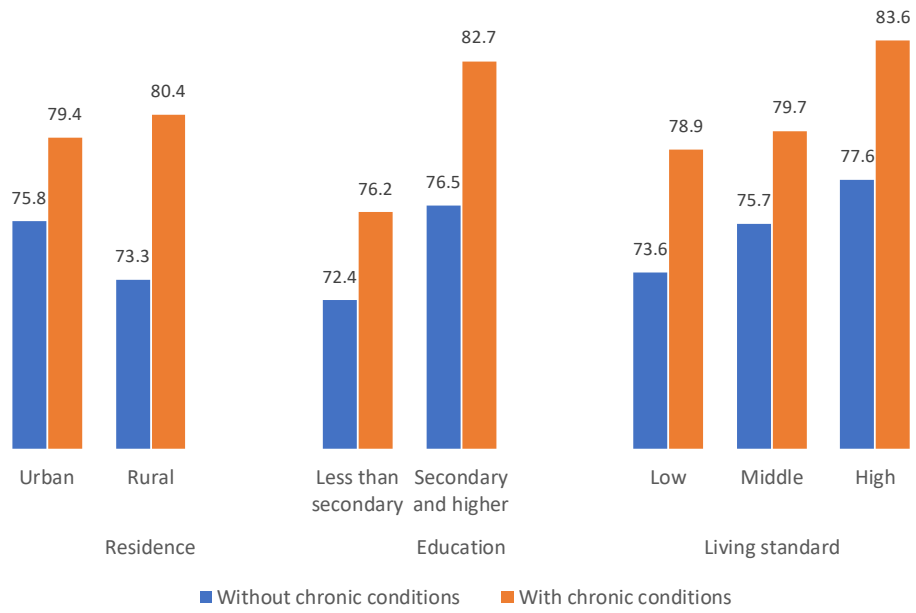

Figure 3: Proportion (per cent) of pregnant women informed about complications of pregnancy by residence, educational status and living standard.
Source: Authors

Further analysis revealed that nearly equal proportion (around 80 per cent) of pregnant women with chronic conditions were informed about complications of pregnancy regardless of their place of residence - rural or urban. This has not been the case with the educational status of pregnant woman as a higher proportion of pregnant women with chronic conditions having at least higher secondary level education reported that they were informed about the complications of pregnancy compared to pregnant women with chronic conditions having less than higher secondary education. Similarly, a higher proportion of pregnant women with chronic conditions having high living standard reported that they were informed about the complications of pregnancy compared to pregnant women with chronic conditions but having low or middle standard of living. Moreover, the proportion who received information about complications of pregnancy was higher in pregnant women

with chronic conditions as compared to pregnant women without chronic conditions irrespective of the residential and educational status and living standard. Women having high living standard often have better access to private healthcare facilities and services, which can improve their chances of safe delivery and survival.

The proportion who received information about complications of pregnancy was found to be higher in pregnant women with chronic diseases who received ANC at home as compared to pregnant women with chronic conditions who received ANC at a health facility, either public or private (Figure 4). Moreover, the proportion who received information about complications of pregnancy was lower in pregnant women without chronic conditions irrespective of the place where they received ANC. In summary, results indicate that pregnant women with or without chronic conditions but having lower educational levels and low standard of living and receiving ANC at a public healthcare facility are less likely to be informed about pregnancy complications, putting them at higher risk of adverse pregnancy outcomes.

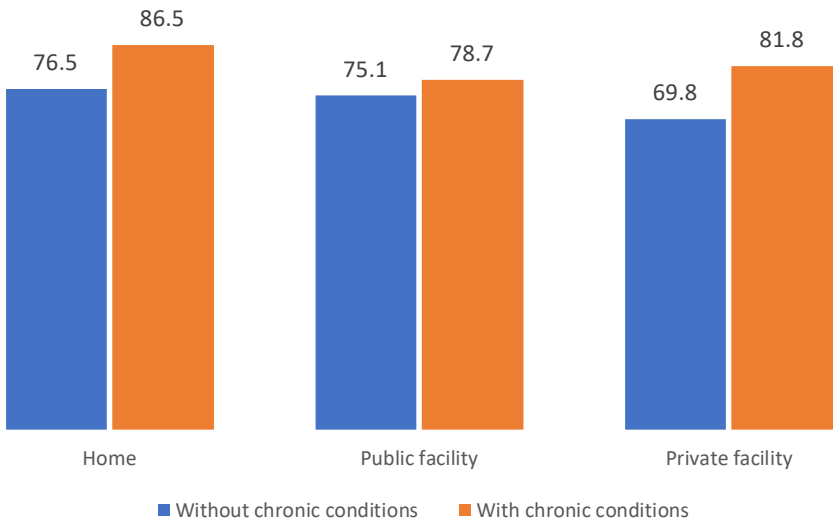

Figure 4: Proportion (per cent) of pregnant women who received information about complications of pregnancy by the place of ANC.
Source: Authors

Healthcare providers play a crucial role in informing and educating pregnant women about the appropriate healthcare facilities to visit in case of pregnancy complications, highlighting their importance in ensuring positive maternal health outcomes. More than three-fourth (78 per cent) of the pregnant women were informed about where to seek help if they encountered pregnancy complications and this proportion was found to be nearly the same in pregnant women with chronic conditions and pregnant women without chronic conditions.

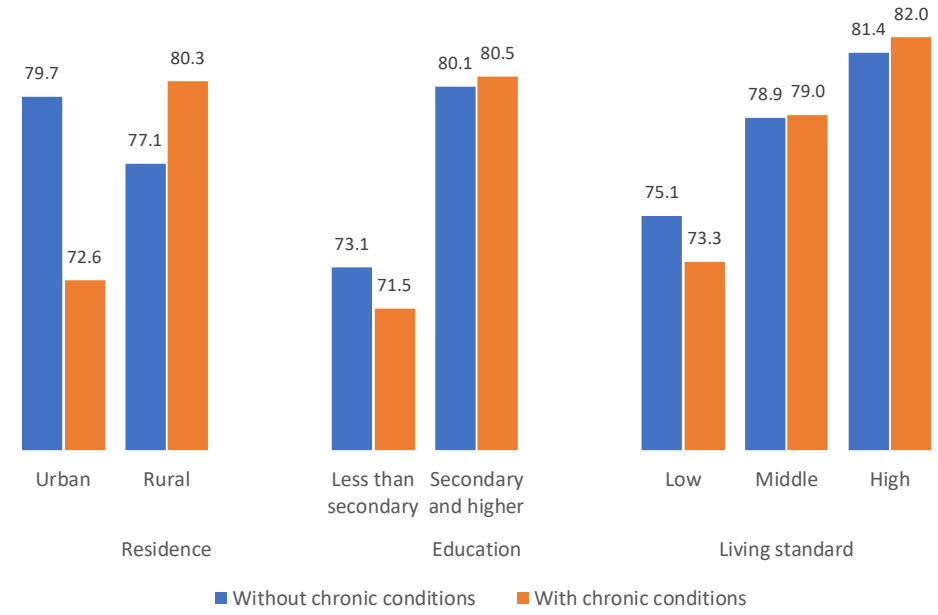

Figure 5: Proportion (per cent) of pregnant women who received information about where to go for pregnancy complications by residential and educational status and living standard. Source: Authors

Figure 5 shows how the place of residence, level of education and standard of living of women influence the information received about the place to go in case of pregnancy complications. In the urban areas, the proportion who received information about where to go in case of complications during pregnancy is found to be substantially lower in pregnant women with chronic conditions as compared to pregnant women without chronic conditions. A similar situation may also be seen in pregnant women with low educational level and low living standard. However, in the rural areas, the proportion who received information about where to go in case of pregnancy complications is found to be substantially higher in pregnant women with chronic conditions as compared to pregnant women without chronic conditions. The same situation prevails in pregnant women with at least higher secondary education and pregnant women with high living standard but the difference between pregnant women with complications and pregnant women without complications does not appear to be markedly different. These findings underscore the need of informing all pregnant women with or without chronic conditions, having low level of education, and belonging to low-income households about the place where facilities for treating pregnancy complications are available so that they can seek necessary medical assistance for addressing the complications of pregnancy as and when they occur during the course of pregnancy. Provision of such information is vital in ensuring positive health outcomes for the mother and the child.

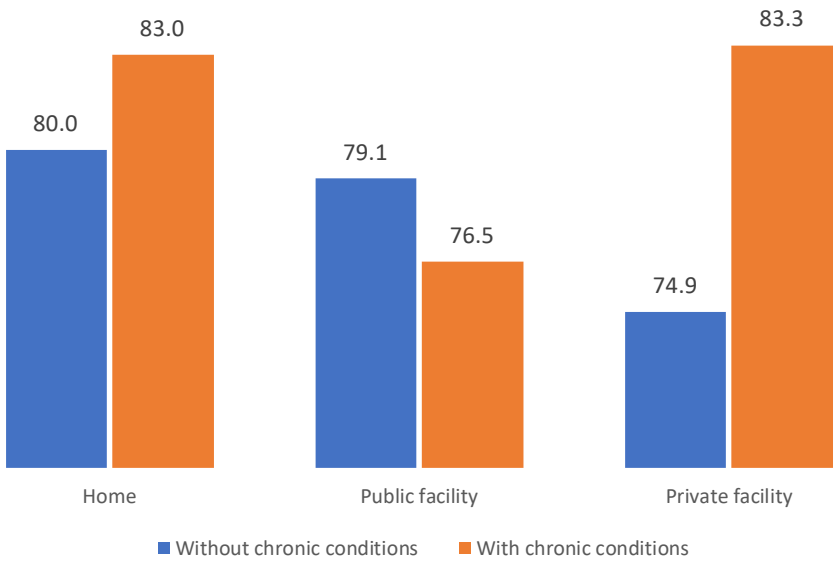

Figure 6: Proportion (per cent) of pregnant women who received information about where to go for pregnancy complications by the place of ANC visit.
Source: Authors

The provision of information about where to go in case of pregnancy complications was found to be associated with the place of ANC visit and whether pregnant women had chronic complications of not (Figure 6). Among pregnant women who received ANC at either home or at a private health facility, the proportion receiving information about the place to go for pregnancy complications was found to be higher in pregnant women with chronic conditions as compared to pregnant women without chronic conditions. However, in pregnant women who received ANC at a public health facility, this proportion was found to be higher in women without chronic conditions as compared to women with chronic conditions.

Bivariate logistic regression analysis was carried out to explore the impact of various confounding factors on the three outcomes related to healthcare information and advice during pregnancy. Results pertaining to the information about complications during pregnancy are summarised in table 4. The likelihood of being informed about the complications of pregnancy is found to be lower in the east, northeast, and south regions of the country compared to the north region as the odds ratio (OR) ranges from 0.573 to 0.762. Living in the rural areas does not have a significant effect on the likelihood of being informed about pregnancy complications compared to living in the urban areas. The standard of living also does not have a significant effect on being informed about pregnancy complications. However, having at least secondary education significantly increases the chances of being informed about pregnancy complications (OR=1.224). Pregnant women with chronic conditions are significantly more likely to be informed about pregnancy complications than women without chronic conditions (OR=1.420).

Table 4: Factors associated with the information on pregnancy complications provided to pregnant women.

Factor		B	SE	'p'	Exp (B)
Region	North - Ref				
	Central	0.038	0.069	0.587	1.038
	East	-0.526	0.073	<0.001	0.591
	Northeast	-0.557	0.078	<0.001	0.573
	West	-0.053	0.094	0.571	0.948
	South	-0.272	0.081	<0.001	0.762
Residence	Urban - Ref				
	Rural	-0.064	0.062	0.303	0.938
Living standard	Low - Ref				
	Middle	-0.023	0.059	0.701	0.977
	High	-0.018	0.062	0.775	0.982
Education level	Lower than secondary - Ref				
	Secondary and higher	0.202	0.047	<0.001	1.224
Chronic Conditions	No chronic conditions - Ref				
	With chronic conditions	0.350	0.098	<0.001	1.420

Ref – reference category
Source: Authors

Table 5 presents results of the bivariate logistic regression analysis of the information provided about where to go in case of pregnancy complications to the pregnant women. The likelihood of receiving information and advice about where to go if there are pregnancy complications is found to be higher in the central region as compared to the northern region of the country (OR=1.336). However, the likelihood of receiving information and advice about where to go in case of pregnancy complications is found to be lower in the east and the northeast regions of the country relative to the north region (OR=0.771 and 0.625, respectively). On the other hand, the likelihood of receiving information and advice about where to go if there are pregnancy complications is not found to be influenced by the place of residence of the pregnant women as the odds ratio is found to be statistically insignificant. The likelihood of receiving information and advice about where to go in case there are complications during pregnancy has, however, been found to be higher in pregnant women having at least higher secondary level education as compared to pregnant women having below secondary education (OR=1.293). The likelihood of receiving information and advice about where to go in case there are pregnancy complications has also been found to be virtually the same for pregnant women with chronic conditions and pregnant women without chronic conditions when other factors influencing the likelihood are controlled. Similarly, the living standard of the pregnant woman has not been found to have any influence of the likelihood of receiving information and advice about the place to go in case there are complications in the pregnancy as the odds ratios has been found to be statistically insignificant. Table 5 suggests that the main factors that influence the likelihood of the pregnant women receiving information and advice about where to go in case of pregnancy complications is the region of residence of pregnant women and their level of education.

Table 5: Factors associated with the receiving of information and advice about where to go in case there are pregnancy complications.

Factor		B	SE	'p'	Exp (B)
Region	North - Ref				
	Central	0.290	0.071	<0.001	1.336
	East	-0.260	0.074	<0.001	0.771
	Northeast	-0.470	0.078	<0.001	0.625
	West	0.041	0.094	0.664	1.042
	South	0.121	0.086	0.159	1.129
Residence	Urban - Ref				
	Rural	0.025	0.065	0.698	1.025
Living standard	Low - Ref				
	Middle	0.015	0.062	0.802	1.016
	High	0.090	0.065	0.168	1.094
Education level	Lower than secondary - Ref				
	Secondary and higher	0.257	0.049	<0.001	1.293
Chronic Conditions	No chronic conditions - Ref				
	With chronic conditions	-0.023	0.093	0.808	0.978

Ref – reference category
Source: Authors

Table 6: Factors associated with the advice received on institutional delivery.

Factor		B	SE	'p'	Exp (B)
Region	North - Ref				
	Central	0.222	0.103	0.031	1.249
	East	-0.290	0.108	0.007	0.748
	Northeast	-0.404	0.122	<0.001	0.667
	West	-0.148	0.135	0.270	0.862
	South	0.362	0.131	0.006	1.436
Residence	Urban - Ref				
	Rural	-0.061	0.104	0.556	0.941
Living standard	Low - Ref				
	Middle	-0.013	0.089	0.881	0.987
	High	0.165	0.100	.098	1.179
Education level	Lower than secondary - Ref				
	Secondary and higher	0.172	0.071	0.015	1.188
Chronic Conditions	No chronic conditions - Ref				
	With chronic conditions	-0.285	0.126	0.023	0.752

Ref – reference category
Source: Authors

Table 6 presents results of bivariate logistic regression analysis of whether pregnant women received information about the need of institutional delivery or not. The likelihood of receiving advice on institutional delivery by the pregnant women is found to be higher in the central and south regions of the country as compared to the north region (OR=1.249 and 1.436 respectively). However, in other regions of the country, except the

west region, the likelihood of receiving advice about the need of the institutional delivery is found to be lower than that in the north region. In the west region of the country, the likelihood of receiving the advice about the need of institutional delivery has not been found to be statistically significantly different from that in the north region. Table 5 also shows that the likelihood of receiving information about the need of institutional delivery is found to be statistically significantly higher in pregnant women with at least higher secondary level education as compared to pregnant women with lower than secondary level education (OR=1.188). However, contrary to expectation, pregnant women with chronic conditions are less likely to receive advice on the need of the institutional delivery (OR=0.752). The standard of living of the pregnant woman has, however, been found to have no effect on the likelihood of receiving information about the need of institutional delivery.

Discussion

Pregnancy can become more complex in women having certain medical conditions, but timely medical attention can ensure healthy outcomes (Johns Hopkins Medicine, *nd*). Community-level interventions that identify and counsel high-risk women early during the pregnancy may help mitigate the growing burden of cardiometabolic disorders (Nagraj et al, 2019). Chronic kidney disease (CKD) during pregnancy increases the risk of complications like preeclampsia, premature births, and low birth weight compared to pregnancies without CKD (Ibarra-Hernandez et al, 2019*).* It is, therefore, important to raise awareness about the implications of chronic health conditions to the pregnancy outcome among women and healthcare workers including long-term health implications of hypertension and diabetes (Nagraj et al, 2019).

Women with multiple chronic conditions (MCCs) experience poorest pregnancy outcomes, along with increased healthcare services utilisation, and higher hospital costs during pregnancy and at the time of delivery compared to women without chronic conditions (Admon et al, 2018). Policymakers must focus on the specific healthcare needs of these women. In India, high-risk pregnancies among women with chronic conditions are addressed under the National Health Mission. Under the Mission, First Referral Units (FRU) have been established, especially, in the rural areas with specialised services for emergency care (Government of India, 2004). However, challenges such as overcrowding, shortage of specialist doctors and paramedics, and an ineffective referral system hinder timely healthcare services and counseling of women with high-risk pregnancies (Godlee, 2015).

The present study, based on the data from the nationally represented National Family Health Survey has found that 74 per cent of the pregnant women were informed about pregnancy complications during the ANC visit and this proportion was higher in pregnant women with chronic conditions compared to pregnant women with no chronic conditions. However, a significantly lower proportion of women with chronic conditions were advised about the importance of institutional delivery, a crucial factor in reducing maternal and infant mortality. These findings highlight the need for interventions to improve advocacy for institutional delivery.

The paper also notes that a lower proportion of pregnant women with chronic conditions who received ANC at public facilities were informed about pregnancy complications compared to those who received ANC at home or in private facilities. It has been observed that providing care to high-risk pregnant women requires a team of specialists, including obstetricians, maternal-fetal medicine experts, cardiologists, nephrologists, diabetologists, and psychologists (Kuppusamy et al, 2013). Public healthcare providers in India often lack necessary resources and training to provide adequate care and advice to pregnant women with chronic conditions, leaving these women to seek treatment and care from private health facilities or private health care providers. However, private healthcare is often unaffordable for many.

Women face various medical interventions and challenges, both physical and psychological, during pregnancy, at the time of delivery, and during the postnatal period, (Lange et al, 2015). Given the high prevalence of hypertension, cardiovascular disease, and diabetes among the Indian women, there is a need of enhancing the knowledge and skills of the healthcare providers at the local level. There is also a need of creating facilities for the diagnosis of chronic conditions and standardising the testing and diagnosis of chronic conditions (Nagraj et al, 2019).

The present paper also highlights the importance of the level of education of pregnant women and their standard of living in receiving the information about potential pregnancy complications irrespective of whether they have chronic health conditions or not. Similarly, women with chronic health conditions who had higher educational level or having high standard of living are found to be better informed about where to seek help in case of pregnancy complications than women having low level of education and low or middle standard of living. The paper, however, reveals that there is virtually no effect of the standard of living once other confounding factors are controlled. A finding that is of concern is that pregnant women who receive ANC in public facilities are less likely to be informed about where to seek help in case of pregnancy complications. This underscores the need for improved training and resources for healthcare providers in the public healthcare facilities in the country.

The new antenatal care model recommended by the World Health Organization emphasises integrated delivery of all necessary antenatal care and stresses the importance of collaborative efforts and greater integration of allied fields (Lattof et al, 2020). In addition to antenatal, natal and postnatal care, the public healthcare facilities should also offer prenatal counseling to educate women on healthy pregnancy practices, such as proper nutrition, exercise, and childbirth preparation. Newborn care services are also provided to monitor the health of the newborn and ensure timely medical attention or support. It is crucial for the pregnant women to utilise these facilities for ensuring safe pregnancy outcomes.

Studies have shown that women from low-income households report poorer health outcomes compared to those from higher-income households, despite similar rates of chronic conditions (O'Neil et al, 2020). Limited resources pose significant barrier for economically disadvantaged women and prevent them from accessing essential healthcare services, especially in the private sector. Factors such as undernourishment, malnourishment, excessive workload, and lack of social support make these women highly

vulnerable to a range of health issues that may go undiagnosed and untreated (Saha and Saha, 2010). Addressing these disparities and reducing barriers to access to essential healthcare is crucial for improving healthcare utilisation among low-income and low-education mothers (Grand-Guillaume-Perrenoud et al, 2022). Creating a more equitable healthcare system that prioritises healthcare needs of these women is essential for ensuring maternal and child health.

Summary and Policy Implications

The present study has found that a large majority of pregnant women with chronic conditions from privileged backgrounds and higher level of education have been informed about where to seek help in case of the complications during pregnancy. In contrast, a notably lower proportion of pregnant women from poor families and having lower levels of education and with chronic conditions were informed about what to do in case there are complications during pregnancy. The study also found that advocacy regarding pregnancy complications was more effective when antenatal care was provided in private facilities or at home as compared to when ANC was provided at public healthcare facilities. These findings underscore the importance of educating women, at least up to higher secondary level, especially women with chronic conditions, so that they can effectively respond to potential complications and risks associated with the pregnancy and childbirth. The study also emphasises the need of tailored information and support to pregnant women with chronic conditions based on their educational attainment and regional context. Ensuring that all pregnant women, irrespective of whether they have a chronic condition or not, receive appropriate care and have access to necessary resources is crucial for promoting healthy pregnancies and reducing maternal and child morbidity and mortality which remains a critical public health concern in India.

The study also suggests that public healthcare facilities in the country should take more proactive measures to educate pregnant women, especially, with chronic conditions about potential pregnancy complications and the appropriate facilities for addressing these complications. Efforts should particularly be intensified in the east and the northeast regions of the country to ensure timely dissemination of the information regarding the importance of institutional delivery and the available support services for pregnancy complications to pregnant women. Ensuring equitable access to essential information and resources, regardless of social, economic, or regional backgrounds, is crucial for safeguarding maternal health and well-being during pregnancy.

Based on the findings of the present study, the following recommendations are proposed:

- Enhance training for healthcare providers by developing and implementing specialised training programmes for them, especially in the rural areas, to manage chronic illnesses during pregnancy. Training should include identification, monitoring, and treatment of common chronic conditions such as diabetes, hypertension, and cardiovascular diseases to enable timely interventions and complication prevention.

- Integration of antenatal care services and chronic disease management through routine screening for chronic illnesses during ANC visits and developing personalised care plans, especially, for pregnant women with chronic conditions. Implement home-based management of chronic diseases through field-based health functionaries to ensure regular care and monitoring of chronic disease conditions.
- Telemedicine and mobile health (mHealth) initiatives may be expanded to offer remote consultations and follow-up of pregnant women with chronic diseases to bridge the accessibility gap in the rural and remote areas of the country.
- Strengthening primary health care centres by providing the necessary infrastructure, equipment, and skilled personnel to manage chronic diseases in pregnant women. This includes ensuring availability of essential medications and diagnostic tools for effective care.
- Training and skill building of field-level health functionaries in the management of chronic diseases, especially, during pregnancy. The field-level health functionaries can provide education, conduct home visits, and facilitate referrals to higher-level healthcare facilities as and when needed, particularly in underserved rural and remote areas.
- Targeted health education campaigns may be launched to raise the awareness about managing chronic diseases during pregnancy. These campaigns may emphasise early detection, adherence to treatment, and the benefits of regular antenatal care visits to empower women and their families to seek timely healthcare.
- Financial support system such as conditional cash transfer or vouchers may be expanded to reduce healthcare costs for pregnant women with chronic diseases. The financial support may cover expenses like transportation, medications, and diagnostic tests to address the financial barriers that hinder access to healthcare services.
- A robust monitoring and evaluation framework should be established to monitor and evaluate interventions directed towards improving the access to healthcare by pregnant women, especially, pregnant women with chronic diseases. There is a need to track health and pregnancy outcomes, services utilisation, and patient satisfaction to identify gaps and to improve the efficiency and hence effectiveness of healthcare services delivery.

Improving access to healthcare services for pregnant women with chronic disease conditions requires a comprehensive approach that involves policy reforms, programmatic interventions, and community engagement. Addressing the unique challenges faced by pregnant women with chronic diseases can significantly contribute to improving both pregnancy and health outcomes and may contribute to broader public health objectives as a substantial proportion of pregnant women have been found to be having chronic diseases that may have an impact on the outcome of the pregnancy.

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