

## ORIGINAL ARTICLES

# PREDICTORS FOR ANTENATAL SERVICES AND PREGNANCY OUTCOME IN A RURAL AREA: A PROSPECTIVE STUDY IN WARDHA DISTRICT, INDIA

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## ABSTRACT

**BACKGROUND:** Antenatal care is essential to reduce morbidity and mortality among newborn babies and pregnant women. **AIMS:** To study the pattern of utilization of antenatal services and to find out the potential predictors, their distributions and their association with antenatal care utilization and pregnancy outcomes. **SETTINGS AND DESIGN:** A prospective longitudinal study was conducted in Deoli, a rural teaching area of a medical college of Wardha district, Maharashtra state. **MATERIALS AND METHODS:** Medical social workers contacted all the registered 305 pregnant women in 1 month. A total of 274 women were included in the study. The response rate was 89.83%. **STATISTICAL ANALYSIS USED:** Percentages, rate ratio. **RESULTS:** Mean age at marriage was  $19.8 \pm 3.6$  years, and the average age at first pregnancy was  $21.6 \pm 4.5$  years. Of the 274 pregnant women, 156 (56.9%) were pregnant for the first time (gravida 1), and the remaining 118 (43.1%) pregnant women, gravida 2 and above, had an average of 2.1 living sons and 1.9 living daughters. Only 92 (33.6%) women had undergone the minimum recommended antenatal checkup during their current pregnancy, and 188 (68.6%) women had institutional deliveries. A large proportion of women in Deoli do not receive proper health care during pregnancy and childbirth. **CONCLUSION:** In Deoli, antenatal services, in spite of being essential to the care of pregnant women, are being poorly delivered.

**Key words:** Antenatal checkup, institutional deliveries, longitudinal study, primary health center

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## INTRODUCTION

Promotion of maternal and child health has been one of the most important aspects of the National Rural Health Mission (NRHM).<sup>[1,2]</sup> Antenatal visits raise awareness and make pregnant women and their families familiar with health facilities, which enables

them to seek help more efficiently during a crisis.<sup>[3,4]</sup> The birth weight of an infant is the single most important determinant of its chance of survival, healthy growth and development.<sup>[5,6]</sup> National Family Health Survey-3 (NFHS-3) reveals that more than three quarters of pregnant women in India receive at least some antenatal care (ANC), but only half of the pregnant women make at least 3 visits to health practitioners during their pregnancy.<sup>[7,8]</sup> Delivering at medical institutions or at home with professional medical assistance has been shown to promote safe motherhood and child survival.<sup>[9]</sup> Other studies conducted in rural India also report that a large proportion of births (around 75%) in rural India continue to occur at home, most of these without the assistance of any trained health worker.<sup>[10]</sup> However, uptake of antenatal and other pregnancy-related services is far from universal even in settings where they are widely available.<sup>[11]</sup> Studies from India related to quality of antenatal care services provided are also scanty.<sup>[12,13]</sup>

As antenatal care is an important determinant for good health of both the mother and the baby and also as it consumes considerable resources, this longitudinal study was aimed to find out the pattern of utilization of antenatal services and factors affecting utilization of antenatal services and pregnancy outcome in Deoli, a rural area of Wardha district, Maharashtra state.

## MATERIAL AND METHODS

### Settings

The study was conducted in a rural area, viz., Deoli, of Wardha district in central India.

Deoli is approximately at a distance of 18 km from Wardha city. At the time of this study, the population of Deoli *taluka* was 15,681. People of Deoli have an access to health care services at a rural hospital, a primary health center, Rural Health Training Center of Datta Meghe Institute of Medical Sciences University Hospital and other private health care providers (those from allopathy and Indian systems of medicine). The participants were from Deoli, so all the participants availed the ANC services and were having the same access to health care services and had no problem of transportation as the village is well connected via road.

### Study design

This was a prospective longitudinal study conducted in Deoli *taluka*, a rural area of Wardha district.

### Participants and sample size

Information about pregnant women in Deoli was obtained from the primary health center of Deoli. There were 305 pregnant women registered at the Deoli primary health centre. Medical social workers (MSWs) met all these pregnant women. They explained the purpose of their visit and invited them to participate in this study, which was of great national importance. All those pregnant women, irrespective of their parity, were included in the study. Pregnant women who did not belong to the study area and had come to their mothers' homes (i.e., in Deoli) for delivery and were likely to go back to their husbands'/ in-laws' homes immediately after delivery were excluded from the study. In all, 274 women agreed to participate in the study. Three pregnant women were from outside the area

and were excluded from the study. Twenty-one pregnant women refused to participate, 7 pregnant women dropped out during the course of the study, and hence they were excluded from the study. They were included prospectively over a period of 1 month. The response rate was 91.05%.

### **Institutional ethical committee**

Study protocol was submitted to the institutional ethical committee. After thorough review, it was approved by the institutional ethical committee.

### **Data collection tools and variables**

Data was collected by the pre-tested structured interview questionnaire. An interview had questions related to reproductive history, antenatal care, delivery care, nutritional practices, breastfeeding, family planning and socioeconomic status. The interview questionnaire was field-tested in Deoli. Questions with ambiguous meaning were restructured. All investigators together reviewed the questionnaire, and the final questionnaire was developed with necessary additions and deletions. The questionnaire was translated into the local language (Marathi) and then retranslated into English to check the correctness of translation. The intra-rater reliability and inter-rater reliability were checked and found to be high. The final questionnaire was prepared after necessary additions and deletions.

### **Predictor variables**

Demographic characteristics, education, gravida were some of the important predictor variables.

### **Some important outcome variables**

Preference for particular antenatal care

provider, month of registration with an ANC provider, minimum recommended services availed during antenatal care, place of delivery, birth weight of the newborn baby were some of the important outcome variables. Minimum recommended antenatal care was defined as at least 3 visits to the ANC provider with 2 tetanus toxoid injections and 100 tablets of iron and folic acid (100 mg of elemental iron and 500 µg of folic acid). Place of delivery was categorized as institutional and home. In case of institutional delivery, the type of institution (government/ private and at what level of the health care system) was recorded. To study the outcome of delivery, the birth weight was also recorded. A newborn with birth weight less than 2500 g was considered as low birth weight.

### **Data collection**

Data were collected by trained MSWs under the supervision of supervisors and principal investigator by the interview technique. Prior to interview, the study purpose and objectives were explained to the participants. They were explained that they could leave the study and interview at any given moment of time. An informed written consent was obtained from the participants.

The interview was conducted at home. Information regarding socio-demographic status, reproductive history (gravida and parity), antenatal services received, place of delivery and birth weight was obtained and recorded. Height and weight of the pregnant woman were recorded. Those pregnant women who had not undergone essential antenatal investigations, like hemoglobin estimation and urinalysis for albumin and sugar, were asked to come to the Rural Health Training Center, Deoli (RHTC), for

investigations. Filled-up interview questionnaire forms were checked for completeness on the same day by the field supervisor.

### Follow-up

After getting enrolled in the study, all the participants were followed up by the MSWs at home every month till 1 month after the delivery. During follow-up visits, all necessary information related to antenatal care, like Ferrous Sulphate/folic acid (FS/FA) consumption, injection tetanus toxoid, etc., was obtained and weight was recorded. Information specific to place of delivery, type of delivery, initiation of breastfeeding and exclusive breastfeeding was obtained during the last visit, i.e., 1 month after the delivery. The study was conducted in the period from 15<sup>th</sup> December 2006 to 1<sup>st</sup> June 2008.

### Statistical analysis

Incidences of minimum recommended antenatal care and low birth weight in Deoli were estimated. The data is presented as mean (SD) and proportions. Rate ratios with confidence intervals were calculated for main outcome variables. To test the independent effect of some important predictors on minimum recommended antenatal care and birth weight, logistic regression analysis was done

## RESULTS

Table 1 lists the socio-demographic and reproductive health characteristics of the 274 pregnant women included in the study. The participants were aged between 17 and 37 years. The mean age was 23.27 (SD,  $\pm$  4.69) years. Ninety-four (34.3%) women were less than 20 years of age, and 28 (10.2%) were above the age of 30 years. As many

**Table 1: Socio-demographic and reproductive health characteristics of the study participants**

<i>Characteristics</i>	<i>No. (%)</i>
<b>Socio-demographic characteristics:</b>	
Mean age (standard deviation)	23.37 ( $\pm$ 4.69)
<b>Education of mother:</b>	
Illiterate	105 (38.3)
Primary	138 (50.4)
SSC	27 (9.9)
HSSC & above	4 (1.5)
<b>Occupation of mother:</b>	
Only household work	90 (32.8)
Farm & household work	97 (35.4)
Non-agricultural labor & household work	86 (31.4)
Teaching	1 (0.4)
<b>Reproductive health characteristics:</b>	
Mean age at marriage (years):	19.3 ( $\pm$ 3.6)
Mean age at first pregnancy (years):	21.2 ( $\pm$ 4.5)
<b>Gravida:</b>	
1	156 (56.9)
2	93 (33.9)
3	20 (7.3)
4 & above	5 (1.9)
<b>Average number of live children</b>	
Sons	2.1
Daughters	1.9
<b>Current pregnancy:</b>	
Planned (Wanted)	163 (59.5)
Unplanned (Unwanted)	111 (40.5)

as 138 (50.4%) women were educated till the primary level (i.e., completed around 4 years of schooling), and 105 (38.3%) were illiterate. With regards to occupation, majority (66.8%) of pregnant women were working for cash or other income, as well as doing daily routine household work; and 90 (38.5%) were homemakers. All women included in the study were married. Mean age at marriage was 19.3 (SD,  $\pm$  3.6) years, and the average age at first pregnancy was 21.2 (SD,  $\pm$  4.5) years. Of the 274 pregnant women, 156 (56.9 %) were pregnant for the first time (gravida 1). The remaining 118 (43.1%) women, with gravida 2 and above, had an average of 2.1 living sons and 1.9 living daughters. As many as 111 (40.5%) of the pregnant women said that they had not planned the current pregnancy. With regard to the number of ANC center visits, 112 (41.6%) women had done less than 3 visits, and almost one third of them had only

1 antenatal clinic visit/ antenatal checkup (i.e., visit at the time of registration). Of the 274 pregnant women, 160 (58.4%) had visited antenatal clinic thrice or more. On an average, 3.22 antenatal clinic visits were done by the pregnant women.

Only 92 (33.6%) pregnant women had undergone the minimum number of recommended antenatal checkups during their current pregnancy (i.e., a minimum of 3 or more ANC clinic visits, 2 doses of TT/ booster and at least 100 IFA tablets). Only 22 (7.5%) women registered in the third trimester had undergone 3 antenatal checkups as compared to 133 (48.3%) and 85 (30.8%) women registered in the first trimester and second trimester, respectively.

Table 2 reveals that 92 (33.6%) pregnant women had undergone the minimum number of

recommended antenatal checkups during their current pregnancy.

During antenatal checkup, around 253 (93%) of the women had their weight measured, but height was measured for only 131 (47.9%) women. Blood pressure was measured in almost all women, and 251 (91.2%) women said their abdominal examination was done during their antenatal visit. With regard to investigations, 80% of the women had got their blood and urine tested. As many as 113 (41%) women said that their blood group was determined, and all those who visited tertiary hospital and/ or district hospital had undergone obstetric ultrasonography. As many as 230 (84%) women had received 2 doses/ booster dose of injection tetanus toxoid. Of the 32 (11.7%) women who received only 1 TT injection, majority were registered with the ANC clinic in the third trimester. Eighty-

**Table 2: Percentages of women availing services during their antenatal visits, including at the time of ANC registration (the first visit)**

<i>Antenatal Services</i>	<i>Total</i>	<i>Registration for Antenatal Checkup</i>		
	(%) (n=274)	1 <sup>st</sup> TM (n=86)	2 <sup>nd</sup> TM (n=120)	3 <sup>rd</sup> TM (n=68)
Weight measured	253 (92.3)	86 (100)	118 (98.3)	52 (76.5)
Height measured	131 (47.9)	61 (70.9)	79 (65.8)	16 (23.5)
Blood pressure checked	270 (98.9)	37 (43.2)	51 (42.5)	32 (47.1)
Abdomen examined	251 (91.6)	56 (65.1)	73 (61.6)	44 (64.7)
Breast examination	33 (12.2)	41 (47.7)	24 (20.0)	21 (30.8)
Internal examination	113 (41.1)	39 (45.3)	42 (35.0)	28 (41.2)
Investigations:				
Blood tested (Hb)	212 (77.4)	73 (84.9)	111 (92.5)	28 (41.2)
Urine tested	236 (86.3)	76 (88.3)	112 (93.3)	48 (70.6)
USG	57 (20.8)	28 (32.7)	21 (17.5)	8 (11.8)
X-ray	6 (2.2)	0 (0)	6 (5.0)	0 (0)
Other	63 (23)	21 (24.4)	36 (30)	6 (8.8)
FS/FA tablets				
Received	241 (87.9)	79 (91.9)	120 (100)	42 (61.7)
Consumed < 100	155 (64.3)	21 (24.4)	66 (55.0)	68 (100)
Consumed ≥ 100	86 (35.7)	41 (47.7)	45 (37.5)	0
TT injection:	12 (4.4)	1 (1.2)	0 (0)	11 (16.2)
None				
One	32 (11.7)	2 (2.3)	12 (10)	18 (26.5)
Two	230 (84)	83 (96.5)	108 (90)	39 (57.3)
Minimum recommended ANC care	92 (33.6)	51 (59.3)	37 (30.8)	4 (5.8)

six (35.7%) women said they had received 100 iron and folic acid tablets and they had consumed these. We inquired about advice or health education received during antenatal visits. It was found that around 58% of women had received diet-related advice, followed by family planning-related advice (40.6%) and breastfeeding-related advice (39.1%). On categorizing antenatal services received with time of antenatal registration, it was found that women who had registered early in the course of pregnancy tended to receive better/ complete antenatal services [Table 2].

Eighty-six women delivered at home; and among these, 60 (22%) were assisted by trained birth attendants (trained *dais*) [Table 3]. Of the 188 (68.6%) institutional deliveries, nearly half (51.4%) of these were conducted at private hospitals or nursing homes, 52 (27.6%) at district hospitals and 34 (18.2%) at rural hospitals. Very few, viz., 6, deliveries were conducted at a primary health center. No delivery was conducted at the sub-center level. On an average, 59.3 (31.3%) of the women delivered in some institute had received minimum recommended antenatal care, whereas 27 (45%) of the women who had home deliveries assisted by trained birth attendants had received minimum recommended antenatal care. However, it was observed that the preference for place

of delivery was not significantly influenced by minimum recommended antenatal care [Table 3].

Overall it was observed that chances of favorable pregnancy outcome, i.e., normal birth weight, were 3 times more in women who had availed minimum recommended antenatal services as compared to those who had not (rate ratio, 3.36; 95% CI, 1.92-6.03). Similarly, in subgroup analysis, when women with babies having normal birth weight were compared with those who delivered babies having low birth weight, it was observed that the chances of delivering babies with normal birth weight were 1.5 times more in women who received the minimum recommended antenatal care than those who did not, and it was statistically significant (RR, 1.51; 95% CI, 1.27-1.78) [Table 4].

To test the independent effect of some of the important predictors on minimum recommended antenatal care, we performed a logistic regression analysis. Table 5 shows that age of pregnant women, time of ANC clinic registration, gravida and transport facilities available in the village emerged to be the important predictors significantly affecting the utilization of minimum recommended antenatal care services by the rural pregnant women.

**Table 3: Place of delivery with recommended antenatal care**

Delivery	Total	Recommended Antenatal Care		Rate Ratio (95% CI)*
	(n=274)	Yes (n=92)	No (n=182)	
Institutional	188 (68.6)	59 (31.3)	129 (68.6)	1.0
Home (By trained dai)	60 (22)	27 (45)	33 (55)	0.55 (0.30 – 1.06)
Home (By untrained birth attendants)	26 (9.4)	6 (23.1)	20 (76.9)	1.52 (0.54-4.49)

Figures in parentheses are percentages unless specified, \*CI: confidence interval.

**Table 4: Relationship of recommended antenatal care with pregnancy outcome**

Outcome	Total	Recommended Antenatal Care		Rate Ratio (95% CI)*
	(n=274)	Yes (n=92)	No (n=182)	
Live birth (birth weight > 2500 g)	169 (61.6)	81 (47.9)	88 (52.1)	1.00
Live birth (low birth weight)	92 (33.6)	18 (19.6)	74 (80.4)	3.78 (2.01-7.20)
Stillbirth	4 (1.4)	1 (25)	3 (75)	2.76 (0.25-70.33)
Abortion	9 (3.3)	3 (33.3)	6 (66.7)	1.84 (0.39-9.65)

Figures in parentheses are percentages unless specified, \*CI: confidence interval.

**Table 5: Logistic regression showing the minimum recommended ANC services utilization with different predictor variables**

Independent Variables	No. (n=274)	Availed Minimum Recommended ANC (n=92) (%)		OR (95% CI)*	Sig <sup>†</sup>
Age (years)	> 31	28	5 (17.8)	1 <sup>‡</sup>	
	26 to 30	66	11 (39.5)	0.77 (0.26-3.77)	NS
	21 to 25	86	34 (16.7)	5.13 (1.89-21.93)	S
	15 to 20	94	42 (45.6)	2.88 (1.20-12.26)	S
(Mother) Education	Illiterate	105	50 (47.6)	1 <sup>‡</sup>	
	Primary	138	24 (17.4)	0.25 (0.12-0.43)	S
	SSC	27	15 (55.6)	1.38 (0.54-3.50)	NS
	> HSSC	4	3 (75)	3.60 (0.29-5.15)	NS
Occupation	Housewife	90	38 (42.2)	1 <sup>‡</sup>	
	Farm worker	97	21 (21.6)	0.45 (0.25-1.40)	NS
	Laborer	86	32 (37.2)	0.87 (0.42-1.52)	NS
	Teacher	01	1 100		
Registration for ANC	3rd trimester	68	4 (5.8)	1 <sup>‡</sup>	
	2nd trimester	120	37 (30.8)	6.08 (2.27-24.92)	S
	1st trimester	86	51 (59.3)	22.13 (7.25-83.17)	S
Gravida	3 & above	34	6 (17.6)	1 <sup>‡</sup>	
	2	84	39 (46.4)	3.73 (1.40-12.22)	S
	1 (primi.)	156	86 (30.1)	4.68 (2.11-16.43)	S
Transport	Not available	95	19 (20)	1 <sup>‡</sup>	
	Available	179	73 (40.8)	2.67 (1.51-5.27)	S

1<sup>‡</sup> is a reference category, Figures in parentheses are percentages unless specified, <sup>†</sup>SN = not significant; S = significant.

## DISCUSSION

This study was conducted to ascertain utilization patterns of antenatal services and to find out the potential predictors, their distributions and their association with antenatal care utilization and pregnancy outcomes.

Our study revealed that just one third of pregnant women availed minimum recommended antenatal care. This was in contrast to the findings by Singh *et al.*,<sup>[14]</sup>

that nearly 53% of the pregnant women had availed of ANC services. On an average, 3.22 antenatal visits were done by the pregnant women, and around 60% had done 3 or more antenatal visits. However, NFHS-3 data states that around 83% of women in Wardha district had done more than 3 antenatal visits, which is slightly more than our findings.<sup>[8,15]</sup> Less than 2% of women were married before the legal age of marriage, viz., 18 years. These findings were almost consistent with the NFHS-3 data, i.e., the percentage of girls marrying before the legal age of marriage in Maharashtra and



Wardha was 21.1 and 5.4, respectively.<sup>[8]</sup> Nearly 40% of pregnancies were unwanted.

As studies related to quality of antenatal services are few, we tried to explore the characteristics of antenatal services availed by the pregnant women. The study reveals that weight was measured in more than 90% of pregnant women, whereas height was measured in less than 50% of pregnant women. Blood pressure was measured in almost all women, and per abdominal examination was done in more than 90% of pregnant women during their antenatal visit. In spite of being a rural area, urine and blood (for hemoglobin) examinations were done in around 80% of the pregnant women; however, blood group was tested in just 41% of these women as all these women had visited tertiary care hospital for checkup or for any other reason. With regard to IFA tablets and tetanus toxoid injection, almost 80% received the minimum recommended doses; however, only one third said they had consumed the IFA tablets.

In univariate analysis, age of the pregnant woman, time of registration with an ANC provider, gravida and transport facilities available in the village were important predictors significantly affecting the utilization of minimum recommended antenatal care services. A study conducted mentioned that education was one of the most important factors in availing the full antenatal care.<sup>[14]</sup> However, our study did not reveal any association of mother's education with minimum recommended antenatal care package. In logistic regression analysis, it was observed that age, time of registration for antenatal care, gravida and transportation

facilities in villages had significant independent association with utilization of minimum recommended antenatal care services. Regardless of reasons, other studies have also identified that the proportion of home deliveries in India is quite high — to the extent of three quarters.<sup>[5,10]</sup>

This study examines the roles of minimum recommended antenatal care services utilization and the preferred place of delivery in determining pregnancy outcome. Our study also identified that those who received the minimum recommended antenatal care were more likely to receive professional assistance during delivery; however, this finding was not statistically significant.

In our study, the incidence of low birth weight of newborn babies was 33.6% (95% CI, 26.52-40.14), incidence of stillbirth was 1.4% (95% CI, 0.02-2.14) and that of abortion was 3.3% (95% CI, 1.13-5.39). The number of women who delivered babies with normal birth weight was 3 times more among women who had availed minimum recommended antenatal care services when compared with women who had not.

Our study has some limitations. With regard to characteristics of antenatal services, we collected information from the women; and from records, which were improperly maintained. Thus the findings could be affected by under-reporting. Also, we could not validate the information given by the respondents as the records were either incomplete or poorly maintained. A better approach to study this aspect would be the observation technique. However, we could not do this due to feasibility and privacy issues. Other limitation of our study is that we did not study the



types of services received at different levels of the health care system. Wardha district has 2 medical college hospitals and a district hospital, and a pregnant woman usually has access to multiple facilities for services. Studying this aspect could give additional information related to the patterns of service delivery and utilization, as well as the choices or preferences for specific facilities for antenatal care services.

## CONCLUSION

It was found that antenatal care services, in spite of being essential to the care of pregnant women, is poorly delivered in Deoli. Antenatal care services need to be delivered more practically, as studies have proved that antenatal care is the single most important intervention that can reduce the maternal and infant morbidity and mortality in developing countries.

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