

Effect of Complete Antenatal Care on Birth Weight of Children in India: Evidence from National Family Health Survey (NFHS) Data

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Abstract

Prenatal care consists of counseling, medical care and supplementary nutrition. As per WHO guidelines are concerned then all the pregnant women are expected to visit four times to health care staff, hospitals and get the counseling, medical care and supplementary food. We have used National Family Health Survey (NFHS)-1, 2, and 3 data and analyzed such data in STATA@10 software. We found that, lower access to health care facilities; education and poverty, religion and caste background do not support the pregnant women to have minimum four required prenatal visits. The multi-nominal logic regression result shows that poor, illiterate, lower age group, Scheduled caste and Tribe pregnant women do not get the minimum required prenatal care. Such variables are positively correlated and statistically significant with low birth weight babies in India. India has high infant, child mortality, malnutrition and morbidity. Adequate prenatal visits by all pregnant women will certainly reduce the incidence of mortality, illness and malnutrition in country. Government must broadcast prenatal related programs on television and radio. Government must open up more sub centers in villages and in urban areas. Government must promote private clinics/hospitals to provide prenatal care especially to poor pregnant women. Such efforts will certainly improve health status of women and children and reduce the prevalence of child malnutrition, morbidity and mortality in India.

Keywords: Nutrition; Breastfeeding; Healthcare; Malnutrition; Pregnancy; Antenatal care

Introduction

Developing countries have high incidence of neonatal, infant, child mortality and malnutrition [1]. Governments, international organizations and non-government organizations have taken number of steps over the period of time to reduce infant, child mortality and malnutrition and maternal mortality. In India, incidence of child malnutrition and mortality is not declining and still it is observed as very high. High malnutrition among children affects physical and intellectual growth. They become less educated and un-productive adults in the long term. Malnutrition in the long run effects on total productivity, economic growth of country. In order to reduce the low birth weight babies, neonatal, infant mortality and malnutrition, prenatal care is one of the best instruments [2]. The study also indicates that adequate use of prenatal care increases birth weight, holding other factors constant [3]. The maternal health production function explains that early onset of prenatal care and having a minimum number of prenatal care visits is important for improvement in health of mother as well as unborn child.

The prenatal care as per World Health Organization (WHO) consists of four visits by pregnant women to health care facility and health specialists. The four antenatal care ensures adequate nutrition, vitamin intake, proper vaccination, exercise, negative behavioral modification and institutional delivery. Pregnancy constitutes one of the most sensitive period of a woman's life, both physically and mentally [4]. Good care during pregnancy is important for the health of mother and the development of the unborn baby. During pregnancy, healthy behaviors as well as care and parenting skills, medicines are

required. Antenatal care is an umbrella term used to describe the medical procedures and care that are carried out during pregnancy. In promoting antenatal care, it is essential that the effectiveness of this service leaves no room for doubt [5]. Prenatal care is a key strategy for achieving public health goals, primary healthcare objectives, and the Millennium Development Goals [6].

During four antenatal visits, the health care facility and skilled health staff certainly plans delivery, understand danger signs during pregnancy through various physical tests and modify unhealthy behaviors and advice healthy diets. The health staff get chance to work for normal delivery. In the literature, it is well documented that those women received four antenatal care have lower rates of maternal and infant mortality as well as good pregnancy outcome. A proper utilization of prenatal care is co-related to high birth weight of babies and gestational age. The preterm deliveries and low birth weight babies contribute neonatal and infant mortality [6,7]. In the literature, it is stated that children of mothers did not receive prenatal care are twice as likely to die during infancy as children of mothers who received prenatal care. Despite the evidence that prenatal care is associated with desirable birth outcomes, it is not an easy step to conclude cost effectiveness. Although, the incidence of low and very low birth weights, premature labor, transfers to acute-care facilities, and early death was significantly greater for those women who had no prenatal care, the combined impact on total cost of care is not large in an absolute sense [8]. The major objective of this paper is to study the impact of prenatal care on birth weight of babies in India [9-13].

Data and Methodology

We collected secondary data from three National Family Health Surveys. The NFHS-1 (1992-1993), NFHS-2 (1998-1999) and NFHS-3

(2005-2006) data is collected in different states in India. International Institute for Population Science provides the state-wise health data with different health indicators. We studied the prenatal care related data from three surveys. We classified and analyzed the prenatal care data in spss@20 and stata@10.

The pregnant woman had either no antenatal visit or they have multiple antenatal visits. We classified the total antenatal visits of each woman in different states and socio-economic characteristics. For the regression, the number of visits took as dependent variable and women's socio-economic and demographic factors are considered as independent variables. We have used multinomial logit regression model to find the co-relation of dependent variable with independent variable.

Economic Model

We have developed economic model for prenatal care in India. The prenatal visits are categorized as follows:

$$PV=(NV, OV, TWV, THV, FMV)$$

The prenatal visits to health care facility and health specialist by pregnant women is categorized as No Visit (NV), One Visit (OV), Two Visits (TWV), Three Visits (THV) and Four or More (FMV) visits. All the pregnant women are expected to visit to health care facility and health care specialist. But due to socio-economic, demographic factors, the pregnant women either do not visit or visit less number of times to health care facility. The variables such as religion, caste, education and place of residence are considered as follows. The education of the women is considered into following categories:

$$E=(P, S, HS, C)$$

Education of pregnant women is considered as primary, secondary, high school and college.

$$R=(H, M, C, S, O)$$

Religion of pregnant women is categorized as Hindu, Muslim, Christian, Sikh and Others.

$$Wq=(PST, PER, MLE, RER, RST)$$

Wealth quintiles of pregnant women are classified as poorest (PST), poorer (PER), middle (MLE), richer (RER), richest (RST).

$$C=(SC, ST, OBC, O)$$

Caste background of pregnant women is categorized as Scheduled Caste (SC), Scheduled Tribe (ST), Other Back ward Class (OBC) and Other (O) caste. We have used above variables to examine the prenatal care among pregnant women in selected states in India.

The WHO Recommendations for Prenatal Care

The World Health Organization recommends (WHO) 9 at least four antenatal visits to health care facility during pregnancy of each women. We have used such standards for this study. The first visit is recommended before the end of the first trimester or before 12 weeks of pregnancy. The first visit to health care facility is expected to take 30-40 minutes. In this visit, pregnant woman's medical and obstetric history is collected, certain physical examinations are done and some advice is given to avoid certain risks during pregnancy. The second visit is recommended during the 2nd trimester or 24-26 weeks.

It takes around 20 minutes. Blood test measurement, uterine height and some tests for urinary infection are performed in this period. The third visit should take place around the 32nd week and it is supposed to take place for 20 minutes. Routine check-up and any necessary test are recommended in this period. If the 2nd visit is missed then all test of 2nd visit should be performed during 3rd visit. The period of third visit should comprise as 32 weeks. The fourth or final visit should take place between 36 and 38 weeks. At this time, the fetus's condition will be checked and if any abnormality found then the mother is advised to go to an obstetrician.

Health Care during Prenatal Visits

During four visits, variety of enquiries, testes, check-ups are conducted and advices are given to pregnant women and relatives. Usually the first contact of women to the health care staff takes place to confirm pregnancy. Suppose the pregnancy is confirmed then antenatal care should start immediately. Antenatal care (ANC) services are considered to be the key element in the primary health care delivery system of a country, which aims for a healthy society.

Over the past 60 years, the maternal health situation in the country has been staggering despite several changes in a rapidly evolving socioeconomic environment. The roles and responsibilities of primary care physicians have also been revised continuously in this context. Under their leadership, different cadres of health workers have been appointed to address the problem [10]. Therefore this study is making an attempt to understand the antenatal care among pregnant women and information provided about antenatal care to pregnant women.

Access and Visits of Prenatal Care in India

The prenatal access is very low among pregnant women in India. The doctors, nurses and midwives are the main providers of antenatal care. But they do not know potential barriers to utilization of antenatal care services. There are many barriers in utilization of prenatal care. Health care staff must be sensitive to women's socio-economic situation and their cultural and traditional beliefs and their communication skills. We have computed the total antenatal visits of each pregnant woman to health care facilities in India (Table 1).

Survey	Area	No ANC	Three ANC visits	Four and above ANC
NFHS-1	Rural	40.97	38.81	20.22
	Urban	17.19	33.29	49.52
NFHS-2	Rural	36.36	39.05	24.59
	Urban	11.55	29.91	58.54
NFHS-3	Rural	19.67	41.29	39.05
	Urban	8.94	25.49	65.57

Table 1: The prenatal visits by pregnant women in India (%).

Above table shows that in NFHS-1, around 40.97% women never received ante-natal care in rural area. The coverage of antenatal care is very low due to location of health care facilities. But in urban area, women without antenatal care are only 17.19% in NFHS-1. In NFHS-2, 36.36% women never received any antenatal care in rural area. In this survey, small increase in prenatal care is observed. It may be because of

awareness of health care and development of transportation and communication technology.

In the urban area, 11.55% pregnant women never received any antenatal care at all. In the NFHS-3 survey, 19.67% pregnant women have not received antenatal care. In urban area, health care access is more. Therefore, only 8.94% of pregnant women have not received antenatal care. The coverage of antenatal care is higher in urban area as compare to rural area in India. It is simply because health facilities in rural area are located far away. The pregnant women cannot travel long distance for antenatal care.

In urban area, health care facilities are not far away. Therefore, access and utilization of antenatal care is more. We have also measured the outcome of the prenatal care. The study has pointed out the birth weight and that a delays in antenatal care. The study states that delay in obtaining prenatal care or receiving no prenatal care have been associated with increased frequencies of low birth weight and other adverse pregnancy outcomes [11].

We have studied the relationship of different socio-economic factors with the antenatal care of pregnant women. We have studied the prenatal care among pregnant women in relation to standard of living index. The standard of living index consists of holding various assets by the family members of pregnant women. The score of different assets is given as standard of living index (Table 2).

SLI	No ANC		Three ANC		Four ANC	
	Rural	Urban	Rural	Urban	Rural	Urban
Low	49.9	29.6	38.1	21.65	24	7.1
Medium	44.9	55.61	50.6	53.67	51.8	43.86
High	5.23	14.8	11.4	24.68	24.3	49.04

Table 2: Prenatal visits according to standard of living Index in NFHS-2 (%).

The table shows that half of pregnant women from rural area with low standard of living index had not received antenatal check-ups. Poverty is the main reason of not getting the four antenatal care. But only 5.23% pregnant women from high standard of living index had not received antenatal care. In urban area, 55.61% pregnant women with medium standard of living index have not received any antenatal care. Half of pregnant women from rural area with medium standard of living index have received three antenatal cares. In urban area, 53.67% of pregnant women have received the three antenatal care. As far as four antenatal cares are concerned then 51.75% pregnant women of medium standard of living index have received four antenatal cares. In urban area, 49.04% of pregnant women of high standard of living

index have received four antenatal cares. It means that women of higher socioeconomic status are more likely to receive early and adequate prenatal care, compared to those of a lower socio-economic status. In fact, continuity of care during pregnancy is influenced by financial resources and social support. Above data and results also show that poor pregnant women from rural area have either no or few visits of antenatal care. We have also studied the coverage of prenatal care as per the wealth quintile of households of pregnant women in India. The results are presented in the following table (Table 3).

Wealth quintile	No ANC		Three ANC		Four ANC	
	Rural	Urban	Rural	Urban	Rural	Urban
Poorest	42	13.17	28.6	4.43	10	0.94
Poorer	30.6	19.49	27.8	11.29	16.6	2.97
Middle	19.2	27.73	24	21.79	26	10.64
Richer	7.09	27.89	15	36	27.2	27.46
Richest	1.18	11.71	4.69	26.49	20.2	57.98

Table 3: Prenatal visits according to wealth quintile in NFHS-3 (%).

It is found that 41.97% pregnant women of poorest quintile of rural area have not visited for any antenatal care. In urban area, 27.89% of pregnant women of richer quintile have not visited for prenatal care. It means they have missed all four tests which are performed during pregnancy. In poorest quintile, the 28.59% pregnant women have received three antenatal cares. Only 4.69% pregnant women of richest quintile in rural area have received three antenatal cares. In the urban area of country, 4.43% pregnant women of poorest quintile have received three antenatal cares as far as NFHS-3 data is concerned. Only 10.03% pregnant women of poorest quintile have received four antenatal cares in rural area. Such coverage of four antenatal cares is very low among poor women.

The 20.22% pregnant women of richest quintile in rural area have received four antenatal cares. The 2.97% pregnant women of poorer quintile of urban area have received four antenatal cares. The 57.98% women of richest quintile of urban area have received four antenatal check-ups. We have also considered the age related factor of pregnant women for antenatal care in India. One key medical and health issue of adolescent reproduction is its association with poor pregnancy outcomes for the mother and child. The study 12 has compared to women of more mature age, pregnancy and childbearing during the teen years have been observed to present much higher risks of low birth weight, neonatal mortality, infant mortality and pregnancy-related medical complication. This study is more practical and significant for birth outcome (Table 4).

Age group	Region	NFHS-1			NFHS-2			NFHS-3		
		No ANC	Three visits ANC	Four and above ANC	No ANC	Three visits ANC	Four and above ANC	No ANC	Three visits ANC	Four and above ANC
15-19	R	38.82	39.7	21.48	37.02	41.22	21.76	22.76	49.15	28.09
	U	35.89	39.89	24.23	12.41	42.11	45.49	11.19	36.06	52.75
	T	37.21	39.8	22.99	32.83	41.37	25.8	19.74	45.74	34.52

20-24	R	37.11	38.65	24.24	34.1	40.28	25.62	19.44	44.81	35.75
	U	31.42	38.16	30.43	10.62	31.53	57.85	8.17	28.12	63.71
	T	33.83	38.36	27.8	28.09	38.04	33.86	15.27	38.64	46.09
25-29	R	40.52	35.51	23.97	38.66	36.97	24.36	22.83	40.36	36.81
	U	32.68	34.35	32.97	10.52	26.22	63.26	7.74	24.06	68.2
	T	35.9	34.82	29.28	30.47	33.84	35.68	16.31	33.32	50.37
30-34	R	48.64	31.54	19.82	46.58	34.19	19.23	27.95	39.4	32.64
	U	40.2	30.41	29.39	12.51	28.94	58.55	8.65	22.35	69
	T	43.7	30.88	25.42	36.84	32.69	30.47	19.59	32.02	48.39
35-39	R	56.98	28.76	14.27	52.72	31.97	15.3	37.51	36.14	26.35
	U	49.02	29.92	21.06	18.63	27.94	53.43	13.1	25.27	61.63
	T	52.43	29.42	18.15	44.32	30.98	24.7	28.38	32.08	39.54
40-44	R	58.94	28.14	12.93	58.1	29.89	12.01	44.82	37.63	17.56
	U	54.09	28.12	17.79	19.4	38.81	41.79	22.09	27.13	50.78
	T	56.25	28.13	15.62	52	31.29	16.71	37.97	34.46	27.57
45-49	R	68.6	23.67	7.73	59.79	28.87	11.34	58.14	25.58	16.28
	U	65.29	22.73	11.98	33.33	55.56	11.11	36.17	27.66	36.17
	T	66.82	23.16	10.02	57.55	31.13	11.32	53.42	26.03	20.55

Table 4: Age of women and prenatal visits (%).

In NFHS-1, 65.29% pregnant women of 45-49 age groups have not received any antenatal care. In NFHS-2, nearly 57.55% pregnant women of 45-49 age groups have not received any antenatal care. In NFHS-3, 53.42% of same age group has not received any antenatal care. It means pregnant women without antenatal care are declining but it is declining at very lower rate. In NFHS-1, nearly 38.81% women of 15-19 age groups have received up to three antenatal care. In NFHS-2, 39.05% women of 15-19 age groups have received up to three antenatal care. In NFHS-3, 41.29% women of same age group have received up to three antenatal care. NFHS-1 data shows that, 32.97% pregnant women of 25-29 age groups have received four and above antenatal care.

The NFHS-2 shows that, 35.68% pregnant women of 25-29 age groups have received four and above antenatal care. In NFHS-3, 50.37% pregnant women of 25-29 age group have received three and above antenatal care. It means the antenatal care is increasing among pregnant women in India over the period of time. But there is need of more coverage of prenatal care. Health care staff must take more efforts for providing universal antenatal care in urban and rural area. Most of the time, health care staff is not available in hospitals for antenatal care. The four antenatal visits by pregnant women are also depends on the educational attainment. Highly educated women have more antenatal care as compare to illiterate and less educated women (Table 5).

Education	Region	NFHS-1			NFHS-2			NFHS-3			
		No ANC	Three visits ANC	Four and above ANC	No ANC	Three ANC visits	Four and above ANC	No ANC	Three visits ANC	Four and above ANC	
Illiterate	R	52.97	33.99	13.05	44.65	38.36	16.98	26.32	50	23.68	
	U	50.04	35	14.96	22.58	29.03	48.39	30	30	40	
	T	51.37	34.54	14.09	41.05	36.84	22.11	27.08	45.83	27.08	
Primary	R	25.27	43.39	31.34	18.99	42.95	38.06	14.69	39.87	45.44	
	U	21.56	43.08	35.36	5.34	27.91	66.75	4.6	23.77	71.62	

	T	23.11	43.21	33.68	14.25	37.72	48.03	10.02	32.42	57.56
Secondary	R	12.56	36.77	50.67	19.36	37.41	43.22	10.12	36.03	53.85
	U	8.95	32.89	58.16	3.86	20.89	75.25	3.14	17.78	79.08
	T	10.22	34.25	55.52	12.48	30.08	57.43	6.39	26.27	67.34
High Secondary	R	3.09	19.75	77.16	5.74	24.36	69.89	2.19	18.88	78.93
	U	1.46	13.17	85.36	0.77	12.66	86.57	0.7	8.21	91.09
	T	1.72	14.22	84.06	2.55	16.85	80.59	1.03	10.58	88.39

Table 5: Women's education and prenatal visits (%).

In NFHS-1, only 14.09% illiterate pregnant women have received four or more antenatal care. In NFHS-2, it has increased up to 22.11%. In NFHS-3, 27.08% pregnant women have received four and above antenatal care. Illiterate women do not know much about minimum required antenatal care during pregnancy. Most of the time, they avoid the prenatal cares. In NFHS-1, 33.68% pregnant women have received four and above antenatal care but they are primary studied. In NFHS-2, 48.03% primary studied pregnant women have received four and above antenatal care.

In NFHS-3, 57.56% pregnant women have received four and above antenatal care. Nearly 55.52% secondary studied pregnant women have received four and above antenatal care. In NFHS-2, the prenatal

coverage among pregnant women has increased. In this survey, 57.43% pregnant women have received four and above antenatal care. In NFHS-3, 67.34% secondary studied women have received four and above antenatal care. The 84.06% higher secondary studied pregnant women have received three and above antenatal care in NFHS-1.

In NFHS-2, 80.59% pregnant women have received four and above antenatal care. As far as NFHS-3 is concerned then 88.39% pregnant women have received four and above antenatal care and they are higher secondary studied. It means with increase in education, the antenatal care is also increases. The religious factors are also important in use of prenatal care by pregnant women (Table 6).

Religion	Region	NFHS-1				NFHS-2				NFHS-3			
		No ANC	Three visits	ANC	Four and above ANC	No ANC	Three visits	ANC	Four and above ANC	No ANC	Three visits	ANC	Four and above ANC
Hindu	R	42.21	36.04	21.75	39.6	38.57	21.83	22.05	43.38	34.57			
	U	35.72	35.33	28.95	11.45	30.01	58.54	7.56	24.24	68.19			
	T	38.49	35.64	25.87	32.83	36.51	30.65	16.53	36.1	47.37			
Muslim	R	45.46	34.84	19.7	42.44	33.07	24.49	28.89	39.7	31.41			
	U	38.13	35.21	26.66	15.87	33.52	50.62	14.28	29.62	56.1			
	T	41.01	35.06	23.93	33.25	33.22	33.53	21.81	34.81	43.38			
Christian	R	40.32	28.68	31	30.11	39.34	30.56	36.99	34.31	28.7			
	U	31.8	27.55	40.66	2.83	25.85	71.32	9.13	30.02	60.84			
	T	35.37	28.02	36.61	22.34	35.5	42.16	26.84	32.74	40.42			
Sikh	R	14.83	55.51	29.66	28.95	35.52	35.52	12.71	30.63	56.67			
	U	12.36	51.11	36.53	8.86	12.66	78.48	0.64	9.62	89.74			
	T	13.42	52.99	33.59	23.37	29.17	47.45	9.75	25.47	64.78			
Other	R	54.23	25.71	20.06	42.13	41.7	16.17	28.57	38.22	33.2			
	U	41.54	28.09	30.37	5.88	29.41	64.71	3.7	17.28	79.01			
	T	46.73	27.12	26.15	33.99	38.94	27.06	19	30.17	50.83			

Table 6: Prenatal visits and religion (%).

In Hindu religion, only 25.87% pregnant women have received four and above antenatal care in NFHS-1. But in same survey, 23.93% women of Muslim religion have received four and more antenatal care. In NFHS-2, only 30.65% women of Hindu religion have four and more antenatal care. They must have more access to health care facilities.

But utilization of antenatal care is very low. The 47.45% pregnant women of Sikh religion have four and more antenatal care. In NFHS-3,

64.78% pregnant women of Sikh religion have received four and more antenatal care.

In NFHS-1 and 2, pregnant women from Hindu religion have received consistently lower access to antenatal care in India (Table 7).

Ethnicity	Region	NFHS-1			NFHS-2			NFHS-3		
		No ANC	Three ANC visits	Four and above ANC	No ANC	Three ANC visits	Four and above ANC	No ANC	Three ANC visits	Four and above ANC
Scheduled Caste	R	45.16	37.77	17.07	42.12	39.09	18.78	25.04	45.98	28.97
	U	40.97	38.81	20.22	15.97	38.88	45.15	10.45	33.25	56.3
	T	42.82	38.35	18.83	36.36	39.05	24.59	19.67	41.29	39.05
Scheduled Tribe	R	54.77	31.29	13.94	45.07	40.55	14.38	34.96	42.43	22.61
	U	50.69	31.74	17.57	11.58	33.12	55.31	11.42	34.02	54.56
	T	52.59	31.53	15.88	40.09	39.45	20.46	29.6	40.52	29.88
Other Backward Classes	R	38.52	36.4	25.08	39.74	35.65	24.61	24.84	42.48	32.68
	U	31.61	35.07	33.32	12.84	28.53	58.63	12.35	26.23	61.42
	T	34.44	35.62	29.94	33.52	34	32.48	20.08	36.29	43.63

Table 7: Prenatal visits and ethnicity (%).

In NFHS-1, around 42.82% pregnant women of Scheduled Caste background have not received any antenatal care. The 36.36% female of Schedule Caste have not received antenatal care in NFHS-2. In NFHS-3, 19.67% women have not received any antenatal care. The number of women may have low birth weight babies, neonatal and infant mortality. In NFHS-1, nearly half of pregnant women of Scheduled Tribe (50.69%) have not received any antenatal care in India. The awareness and access of prenatal is very low among such women. In NFHS-2, 40.09% women of Scheduled Tribe have not received any antenatal care. In NFHS-3, 29.60% pregnant women of Scheduled Tribe have not received any antenatal care. The access to prenatal is increasing but it is increasing at very rate. As far as Other Backward Caste is concerned, then 34.44% pregnant women have not received any antenatal care. In NFHS-2, 33.52% pregnant women have not received any antenatal care. In NFHS-3, 20.08% pregnant women have not received any antenatal care of this caste. It means pregnant women with different ethnic background; the access to prenatal care is increasing but it is increasing at very slow rate in India.

The Multi-nominal Logit Regression Results

We have used multinomial logit regression model 13 to understand the different socio-economic and demographic factors responsible for antenatal care among pregnant women in India. The regression model is defined as follows.

$$Pr(y_i = j) = \frac{Exp(X_i B_j)}{1 + \sum_j^J exp(X_i B_j)}$$

$$Pr(y_i = 0) = \frac{1}{1 + \sum_j^J exp(X_i B_j)}$$

Where for the i^{th} women, y_i is the observed outcome and X_j is a vector of explanatory variable. The parameters B_j are estimated by maximum likelihood. The positive and negative parameters are compared with the reference category of pregnant women those had four prenatal cares. The results are presented in the following table (Table 8).

NFHS-1	Rural				Urban			
	No ANC		Three ANC		No ANC		Three ANC	
Variables	Co-efficient	Z-test	Co-efficient	Z-test	Co-efficient	Z-test	Co-efficient	Z-test
13-14	-3.67** (1.15)	10.14	-0.45 (0.63)	0.52	-2.03** (0.64)	10.04	-0.18 (0.51)	0.12
15-19	-0.0915	16.51	-0.17 (0.15)	1.23	-0.0564	15.03	-0.01 (0.13)	0.01
20-24	-0.042	17.83	-0.14 (0.10)	1.92	-0.0272	17.75	-0.04 (0.08)	0.21

25-29	-0.0196	14.78	-0.12 (0.07)	2.34	-0.0138	15.16	-0.04 (0.65)	0.52
30-34	-0.18** (0.06)	8.81	-0.09 (0.06)	2.14	-0.14** (0.04)	9	-0.04 (0.04)	0.75
35-39	-0.10*** (0.05)	3.79	-0.06 (0.05)	1.29	-0.06*** (0.04)	2.75	-0.01 (0.04)	0.1
40-44	-0.09** (0.04)	4.17	-0.05 (0.04)	1.28	-0.07*** (0.03)	3.63	0.02 (0.00)	0.47
Illiterate	-0.17 (0.39)	0.19	-0.74*** (0.38)	3.7	-0.14 (0.34)	0.16	-0.2574	5.55
Primary	-0.636	16.23	-1.23** (0.38)	10.19	-0.544	21.45	-1.28** (0.33)	14.92
Secondary	-0.9438	37.42	-0.627	18.28	-2.60 (0.34)	56.38	-0.594	29.53
High secondary	-1.8792	41.28	-0.9143	28.7	-1.616	98.4	-0.9588	68.15
Hindu	0.21* (0.05)	13.46	0.09 (0.05)	2.54	0.12** (0.04)	6.94	0.06 (0.04)	1.97
Muslim	0.16** (0.09)	3.33	-0.0208	9.83	0.08 (0.08)	1.14	-0.0217	18.45
Christian	-0.1274	56.88	0.24* (0.09)	7.18	-0.95* (0.11)	64.27	0.21** (-0.07)	7.54
Sikh	0.25** (0.14)	3.06	-0.26*** (0.14)	3.1	0.28** (0.12)	4.87	-0.12 (0.11)	1.13
Scheduled caste	0.08*** (0.05)	2.55	0.09** (0.05)	3.13	0.13** (0.04)	7.59	0.14** (0.04)	10.3
Scheduled tribe	0.79* (0.06)	151.57	0.45* (0.06)	48.29	0.92* (0.06)	242.71	0.52* (0.05)	78.96
Lbw	-0.0264	685.66	-0.0036	648.76	-0.0168	1063.29	-0.0034	1029.89
Intercept	2.56* (0.49)	26.88	2.13* (0.49)	18.49	2.18* (0.41)	27.07	1.81* (0.41)	18.88
	-2log likelihood=3169.19		Chi ² =7194.97		-2log likelihood=3169.19		Chi ² =7194.97	
	Sig=0.00		Cox and Snell=0.23		Sig=0.00		Cox and Snell=0.23	
	Nagelkerke=0.26		McFadden=0.12		Nagelkerke=0.26		McFadden=0.12	

Table 8: Multi-nominal regression results of prenatal visits with NFHS-1 [@*significant at 1%, **significant at 5%, *** significant at 10%].

The pregnant women without antenatal care in NFHS-1 are positively co-related with women of Hindi, Muslim and Sikh religion. The pregnant women of Christian religion have negative relationship with no antenatal care. The women of Christian community visit to health care facilities. Therefore such women have complete antenatal care. But there is possibility that the other women may not have antenatal check-ups. Therefore the no antenatal visits are positively co-related with women of Hindi, Muslim and Sikh religion. The pregnant women of scheduled tribe caste have no antenatal care. The relationship with no antenatal care is statistically significant and positively co-related. The health care facilities are located far away. The pregnant women do not have access to such facilities. They do not have knowledge about required antenatal care during pregnancy. As far as age of the pregnant women is concerned then no antenatal care is negatively co-related to all age group categories. It is clear that antenatal care is not provided on the basis of age. Any age category pregnant women can get the complete antenatal care in all health care facilities. Therefore, based on the age group of pregnant women, there is no difference in antenatal care. That is the reason where no antenatal care is negatively co-related and statistically significant. The pregnant women with primary, secondary and higher secondary school have negative co-relationship with no antenatal care. Any woman with more than primary education has more antenatal visits.

Therefore, it is negatively co-related and statistically significant. The lower weight babies have negative co-relationship with no antenatal

care. The women of Muslim and Sikh religion do not have adequate prenatal care. No antenatal care is negatively co-related with women of Muslim and Sikh religion. The women of Christian religion have three antenatal care visits. It is statistically significant and positively co-related. The women of the scheduled caste and tribe have positive co-relationship with three antenatal care. The women of scheduled caste and tribe are economically poor. They do not have knowledge of required antenatal care. An access to health care facilities is also low. Due to high opportunity cost of time, they do not visit health care facilities and get the four antenatal cares. Therefore it is positively co-related and statistically significant. The illiterate, primary, secondary and higher secondary educated women have negative co-relationship with three antenatal care. There is no difference in three antenatal cares as far as education of women is concerned. The three antenatal cares is negatively co-related and statistically significant with low birth weight babies. During pregnancy, the women have not visited four times to health care facilities. Therefore, the women delivered low birth weight babies. In order to have healthy child, at least four antenatal visits are required by each pregnant woman. But it is negatively co-related and statistically significant.

In the urban area of county, no antenatal care is positively correlated to women of Hindu religion. The women of Hindu religion have not visited for antenatal care to hospitals in urban area. That is why it could be negatively co-related and statistically significant. The pregnant women of Christian religion have negatively co-relationship with no

antenatal care. They have knowledge of minimum required prenatal care. Therefore, they visit to health care facilities and health specialist. That is why the relationship is negatively co-related and statistically significant. The women of Sikh religion in urban area have negative co-relationship with no antenatal care. The women of scheduled caste and tribe have positive co-relationship with antenatal care. This is mainly because the women from such community are poor and they have less educational achievement and knowledge. They have also less knowledge of health care facilities and required antenatal care during pregnancy.

Therefore, it is positively co-related and statistically significant. The women of all age groups have negative co-relationship with antenatal

care. There is no any discrimination in prenatal care on the basis of age of pregnant women. Any pregnant women can get the prenatal care in each health care facility. Therefore, it is statistically significant and negatively co-related with no antenatal care. The women with primary, secondary and higher secondary are negatively co-related with no antenatal care. The pregnant women with primary and secondary education can visit health care facility for prenatal care. Therefore they can have more than one antenatal care but certainly they do not have zero antenatal care. The low birth weight is negatively co-related with the no antenatal care (Table 9).

Variables	Rural				Urban			
	No ANC visits		Three ANC visits		No ANC visits		Three ANC visits	
	Co-efficient	Z test	Co-efficient	Z test	Co-efficient	Z test	Co-efficient	Z test
15-19	0.77*** (0.44)	3.08	-0.28 (0.41)	0.48	-1.32 (1.24)	1.14	-0.90 (1.14)	0.63
20-24	-0.4452	6.44	-0.00 (0.40)	0	-1.26 (1.23)	1.04	-1.19 (1.13)	1.1
25-29	-0.4961	8.49	-0.22 (0.40)	0.3	-1.28 (1.29)	1.08	-1.37 (1.13)	1.44
30-34	-0.4662	7.05	-0.30 (0.40)	0.55	-1.09 (1.23)	0.98	-1.19 (1.14)	1.1
35-39	-0.91** (0.42)	4.6	-0.23 (0.40)	0.32	-0.82 (1.24)	0.43	-1.26 (1.14)	1.22
40-44	-0.96 (0.45)	1.02	0.08 (0.43)	0.03	-0.84 (1.29)	0.42	-0.84 (1.17)	0.5
Illiterate	0.35 (0.82)	0.18	-0.33 (0.79)	0.18	-0.77 (0.49)	2.46	-0.89** (0.44)	4.1
Primary	-0.148	494.93	-0.0465	294.54	-0.176	262.67	-0.0574	128.01
Secondary	-0.224	494.93	-0.063	454.57	-0.2665	240.25	-0.088	185.97
Higher secondary	-	-	-	-	-15.79 (74422.58)	0	-16.94 (4617.35)	0
Hindu	-0.3052	14.33	-0.41*** (0.21)	3.96	0.75 (0.59)	1.6	0.43 (0.36)	1.42
Muslim	-0.61** (0.29)	4.33	-1.09 (0.21)	0.25	0.83 (0.60)	1.88	-0.50 (0.37)	1.8
Christian	-0.56*** (0.29)	3.61	-0.16 (0.21)	0.59	-0.25 (0.65)	0.15	0.29 (0.37)	0.62
Sikh	-2.92** (1.05)	7.74	-1.27** (0.34)	13.41	0.36 (0.67)	0.28	-0.61 (0.44)	1.92
Buddhist	-0.8164	8.96	-0.294	10.76	0.54 (0.82)	0.44	0.37 (0.46)	0.65
Jain	-1.84*** (1.05)	3.05	-0.7752	8.9	1.03 (0.97)	1.12	-0.47 (0.65)	0.52
Jewish	-16.22 (0.00)	1.03	-16.29 (677.75)	0	-13.07 (0.00)	0	-15.37 (654.35)	0
No religion	-17.66 (39.64)	0	-0.45 (1.03)	0.19	-1.97*** (1.12)	3.07	0.85 (0.77)	1.21
Scheduled caste	1.36 (0.22)	38.43	1.16* (0.13)	76.23	-1.30** (0.60)	4.72	-0.5457	4.36
Scheduled tribe	1.44 (0.23)	37.41	1.15* (0.14)	64.55	-0.29 (0.31)	0.88	-0.42 (0.26)	2.57
Other backward caste	1.44 (0.20)	48.55	0.85* (0.12)	45.26	-0.8201	5.46	-1.41** (0.51)	7.57
None of above	0.79 (0.21)	14.32	0.61* (0.12)	23.52	-0.9735	7.7	-1.45** (0.51)	8.03
Lbw	1.43 (0.06)	512.08	0.71* (0.02)	609.62	-0.3042	403.98	-0.336	469.51
	-6.17 (0.60)	105.3	-1.6121	52.01	-2.40 (1.47)	2.64	2.86 (1.29)	4.9
Intercept	-2log likelihood=1319.30		McFadden=0.11		-2log likelihood=2458.70		McFadden=0.181	

	Sig=0.00	Chi ² =727.84	Sig=0.00	Chi ² =2516.13
	Nagelkerke=0.24	Cox and Snell=0.21	Nagelkerke=0.338	Cox and Snell=0.285

Table 9: The regression results for antennal care in NFHS-2 [@*significant at 1%, **significant at 5%, ***significant at 10%].

Age of the women is positively co-related to no antenatal visits. In India, girls get marry at early age. After marriage, women conceive too early. They do not have knowledge of contraceptives. The antenatal care is not observed among the young women. During pregnancy, they do not visit to health care facilities. Therefore, the antenatal care among different age groups is negatively co-related to no antenatal visits. They do not visit regularly to health care facilities. Therefore, no antenatal visits by pregnant women in all age groups are statistically significant and negatively co-related. The women with primary and secondary education have negative relationship with no antenatal visits. Women are not discriminated on the basis of education. They easily get the antenatal care in public or private health care facilities.

Therefore, primary and secondary education of pregnant women is negatively co-related with no antenatal visits. The religion of pregnant women of Hindu, Muslim, Christian, Sikh, Buddhist, Jain and no religion is negatively co-related to no antenatal visits. The antenatal care is not discriminated on the basis of religion of women in India. All pregnant women of different religion have equal access to health care facilities. Therefore, it is negatively co-related and statistically significant. The women of scheduled caste, tribe, Other Backward Class (OBC) and none of above religion have negative co-relationship with no antenatal visits. The women of any caste background have negative co-relationship with prenatal care. The women of scheduled caste, tribe and other backward caste are poor. They do not have knowledge of minimum required antenatal care. They do not visit to health care facilities.

Therefore, no antenatal visits are negatively co-related and statistically significant. The lower birth weight of children is positively co-related to no antenatal visits. The pregnant women during pregnancies do not get antenatal care. It results into lower birth weight of children. The antenatal cares during pregnancies involve variety of methods such as counseling of food, breastfeeding, medicines. Therefore, every pregnant woman is expected to get four antenatal visits to avoid the lower birth weight babies, morbidity and mortality.

As far as three antenatal cares are concerned then they are negatively co-related with primary and secondary education of pregnant women. The pregnant women do not find any problem for getting up to three antenatal visits. The women of Hindu, Sikh, Buddhist and Jain have negative relationship with three antenatal visits. These women do not get the three antenatal visits and the visits are negatively co-related and statistically significant. The women of scheduled caste, tribe, other back ward caste and none of the above religion are positively co-related with three antenatal care in NFHS-2. The lower birth weight is positively co-related to three antenatal visits. It is clear that below three antenatal care leads to lower birth weight among children in NFHS-2 data. Therefore, every pregnant woman must have the four antenatal visits. We have also studied the prenatal care to pregnant women and its access with NFHS-3 data (Table 10).

Variables	Rural				Urban			
	NO ANC visits		Three ANC visits		NO ANC visits		Three ANC visits	
	Co-efficient	Z test	Co-efficient	Z test	Co-efficient	Z test	Co-efficient	Z test
15-19	-0.28 (0.25)	1.31	0.76** (0.26)	8.39	-0.3388	3.08	0.28 (0.41)	0.48
20-24	-0.60** (0.24)	6.28	0.50** (0.25)	3.85	-0.106** (0.42)	6.44	-0.00 (0.40)	0
25-29	-0.55 (0.24)	5.31	0.34 (0.25)	1.76	-1.21** (0.42)	8.49	-0.22 (0.40)	0.3
30-34	-0.39** (0.24)	2.72	0.36 (0.25)	1.95	-0.111** (0.41)	7.05	-0.30 (0.40)	0.55
35-39	-0.15 (0.25)	0.4	0.26 (0.26)	1.74	-0.91 (0.42)	4.6	-0.23 (0.40)	0.32
40-44	-0.20 (0.27)	0.6	0.66** (0.28)	5.47	-0.46 (0.45)	1.02	-0.08 (0.43)	0.03
Illiterate	-0.52 (0.50)	1.07	-0.09 (0.43)	0.05	-0.35 (0.50)	0.18	-0.33 (0.79)	0.18
Primary	-0.0695	735.4	-0.028	290.12	-0.148	494.93	-0.0465	294.54
Secondary	-0.1044	693.35	-0.0352	346.23	-0.224	494.44	-0.063	454.57
Hindu	-0.49** (0.15)	9.77	-0.11 (0.14)	0.66	-0.109** (0.28)	14.33	-0.41 (0.21)	3.96
Muslim	-0.28** (0.16)	2.86	0.03 (0.15)	0.04	-0.61 (0.29)	4.33	-0.10 (0.21)	0.25
Christian	0.26*** (0.13)	2.62	0.03 (0.15)	0.04	-0.56*** (0.13)	3.61	-0.16 (0.21)	0.59

Sikh	-0.2684	29.19	-0.51** (0.18)	7.83	-3.066	7.74	-0.4318	13.41
Buddhist	-0.15 (0.24)	0.4	-0.06 (0.21)	0.08	-01.57 (0.52)	8.96	-0.294	10.76
Jain	-19.25 (0.00)	1.04	0.23 (01.16)	0.04	-1.84 (1.05)	3.05	-1.52** (0.51)	8.9
No religion	-0.60 (0.83)	0.52	-0.48 (0.89)	0.29	-17.66 (3964.58)	0	-0.45 (1.03)	0.19
Scheduled caste	1.25* (0.12)	108.15	0.73* (0.09)	63.62	1.36* (0.22)	38.43	1.16* (0.13)	76.23
Scheduled tribe	1.50* (0.12)	153.75	0.93* (0.09)	97.42	1.44* (0.12)	37.41	1.15* (0.14)	64.55
Other backward class	1.22 (0.11)	117.67	0.62* (0.08)	53.12	1.44 (0.23)	48.55	0.85* (0.12)	45.26
None of above	0.91 (0.11)	65.87	0.44* (0.08)	26.99	0.79 (0.21)	14.32	0.61* (0.12)	23.52
Lbw	1.09 (0.2)	1589.15	0.59* (0.01)	0.01	1.43 (0.3)	512.08	0.71* (0.02)	609.62
	-1.8909	288.82	-03.46 (0.31)	124.48	-2.03709	105.3	-1.6121	52.01
	-2log likelihood=5589.66		McFadden=0.14		-2log likelihood=4145.46		Chi2=3895.45	McFadden=0.159
Intercept	Nagelkerke=0.295		Chi2=6738.67		Nagelkerke=0.289		Cox and Snell=0.235	

Table 10: The antenatal visits and its determinants in NFHS-3 [*significant at 1%, **significant at 5%, ***significant at 10%].

In NFHS-3, not received any antenatal check-ups are negatively co-related to age group of 20-24 and 30-34. The pregnant women's primary, secondary education is negatively co-related to no antenatal check-ups. The religion of pregnant women such as Hindu, Muslim and Sikh is negatively co-related with no antenatal check-ups but it is positively co-related to pregnant women of Christian community. As far as pregnant women's caste is concerned then scheduled caste, tribes have positive co-relation with no antenatal check-ups. It is statistically significant and positively co-related with no antenatal care.

As far as three antenatal visits are concerned then they are negatively co-related to 15-19, 20-24 and 40-44 age group. In this age group, pregnant women have not received antenatal care. They must get four antenatal cares to avoid the low birth weight babies. The three antenatal visits are negatively co-related to primary and secondary education. Basically all pregnant women should get the antenatal care irrespective of their education. The Prenatal care relates to any event or condition that occurs or exists in the embryo or the mother during the period between conception and delivery of the infant [14].

The study does not differentiate on the basis of education of women and nature of antenatal care. The pregnant women of Sikh community have negative co-relationship with three antenatal care. The women of scheduled tribes and scheduled caste, other backward caste and none of above caste have negative relationship with below three antenatal visits. The below three antenatal visits are also negatively co-related to low birth weight babies. In rural areas, the pregnant women must get the four antenatal care in order to avoid infant, child mortality, morbidity and malnutrition.

In the urban area, no antenatal check-ups are negatively co-related with pregnant women of Muslim religion. These women of Muslim religion visit health care facilities more frequently in urban areas. Therefore, the prenatal visits are negatively co-related and statistically significant. The pregnant women of Sikh community have three antenatal visits and it is statistically significant and positively co-related. They do not complete required four antenatal cares. The

women of scheduled caste and scheduled tribe have up to three antenatal visits. They do not complete all four antenatal care. They are poor and do not have health care knowledge as well as access to health care in urban area. The health care facilities are overcrowded and each visit has high opportunity cost of time. That is why minimum antenatal visits are not completed. An illiterate, primary, secondary, higher secondary studied women have negative co-relationship with three antenatal care. The three antenatal visits are negatively co-related with the educational background of women. The three antenatal visits are negatively co-related with low birth weight of babies. The low birth weight babies in NFHS-3 do not have three antenatal visits during pregnancy of women. The low birth weight could occur below three antenatal cares. Therefore pregnant women should have four antenatal visits in order to eliminate low birth weight babies in India.

Policy Implication and Conclusion

There are number of studies linked to prenatal care and birth weight of babies. Adequate utilization of prenatal health care services positively associated with improved maternal and neonatal, infant and mortality, morbidity and other health outcomes. The full prenatal care is expected to have impact on the development of the fetus and infant as well as mothers health. This can only be achieved through early antenatal visits and regular attendance of antenatal clinic. The trend of maternal mortality in developing countries has been increasing and various international organizations have reported that an important factor related to maternal and infant mortality has been linked to lack of antenatal care [15]. This study is important as an impact factor of birth weight to low birth weight, mortality and morbidity. Therefore, the prenatal care is significant determinant of birth weight, mortality and morbidity in India. The high stunting, wasting and underweight among children are observed in urban and rural area. All the pregnant women in urban and rural areas must get four antenatal cares. The four antenatal cares are expected to reduce the prenatal complexities and improve the birth weight of babies through counseling medical check-ups, medicines, balanced diet and breastfeeding awareness. But the

women with low educational status are less likely to visit to health care facilities for the antenatal care. They do not have knowledge of minimum four antenatal visits and what tasks are performed in four visits. They do not visit hospitals and health care experts because they do not find pregnancy is a health problem.

The pregnant women of Hindu, Muslim, Sikh religion do not visit health care facilities for prenatal care. The women of scheduled caste and tribe are less likely to visit to health care facilities for antenatal care. The hospitals are located far away in rural areas. The opportunity cost of using health care facilities is very high. Due to high waiting cost, medicines and transport cost, the poor women do not visit frequently to health care facilities. Therefore the poor women skip the number of prenatal visits. It is found that the pregnant women of the poorer wealth quintiles often skip the number of antenatal visits than the pregnant women of richest wealth quintiles. The richer class women have more economic resources and they can visit to health care facilities. The poor women are daily wage earners or depend on family members for health care. In order to visit to health care facility, they required to take leave from work or ask the family members to accompany them. The direct cost of prenatal care is high for poor pregnant women. We have used multi-nominal logic model to examine the socio-economic and demographic factors with prenatal care. We found positive co-relationship with age, educational status, religion and caste of pregnant women. In order to reduce the incidence of malnutrition among children and mothers, government must establish more health centers in urban and rural area. Government must fill the vacancies of doctors on urgent basis which are lying since many years. Central and state governments must spend more money on health care facilities. Government must prepare the prenatal care related programs and must broadcast on the radio and television. It will provide more awareness about prenatal care among pregnant women in rural and urban area. In urban areas, more hospitals are required as per the density of population.

All the prenatal care related policies are required on urgent basis to tackle the lower coverage of prenatal care. We estimated that the full coverage of prenatal care will be possible after 2034 in rural area and 2040 in urban area. The health care staff must promote healthy practices during delivery period of each pregnant woman. Most of the pregnant women have fear of caesarean deliveries than normal deliveries. They avoid visiting health care facilities during such period. The present speed of antenatal care and its coverage is very low. There are number of socio-economic, demographic, psychosocial and behavioral factors are also responsible for the low coverage of antenatal care. All these factors are associated with reductions in mean birth weight and with increases in the odds of low birth weight. Smoking, drinking and using drugs during pregnancy all had very strong, adverse effects on outcomes, even after we controlled for other psychosocial, socio-economic and demographic factors [16].

For Indian sample, this study is not much useful because pregnant women do not take drugs and smoke. Poor perinatal outcomes impact individual families, society, and an overburdened health-care system. Because of technological advances in medicine, babies born too early are surviving. If longer gestation periods and higher birth weights could be achieved through improved models of prenatal care and education, a significant beneficial impact on birth outcomes could be achieved. With the growing trend toward evidence-based practice, nurses not only have a strong voice but also have a responsibility to change perceptions regarding the need to adopt research evidence into nursing practice. The patients receiving medical and/or nursing care in

a group format is not a new concept. Group medical appointments have evolved in the management of patients with chronic diseases, such as diabetes, hypertension, and chronic obstructive pulmonary disease. The group care format is one alternative to the traditional delivery of medical care [17]. The study shows that despite various efforts by the Government of India, utilization of antenatal care (ANC) services continue to be low among women from rural areas particularly those belonging to the Scheduled Tribes [18]. Therefore, central government must focus on tribal women for complete antenatal care. It will reduce the malnutrition, morbidity and mortality among children.

The study suggested that the utilization of maternal health services is a complex phenomenon and it is influenced by several factors [19]. Antenatal care may play an indirect role in reducing maternal mortality by encouraging women to deliver with assistance of a skilled birth attendant or in a health facility [20]. The study highlights the need for coordinated effort from government and stakeholders to improve women's education, as well as strengthen community participation. Furthermore, the study recommended the need to scale up the quality of ANC and family planning services backed by improved and equitable access, availability and quality of skilled delivery care services [21]. Awareness and perception creation towards skilled maternity service utilization need to be enhanced. Facilities and transport services should be more accessible as pointed out by this study [22]. To ensure safe motherhood initiative, government should pay special attention to reduce inequality in seeking skilled delivery assistance [23]. The study shows that women's autonomy was significantly associated with the maternal health care utilization by skilled attendants [24].

The study emphasized that the use of institutional delivery services was very low even among antenatal care attendees. Targeted programmatic efforts are necessary to increase skilled attendant-assisted births, with the ultimate goal of reducing maternal mortality [25]. Addressing the underlying determinants for the inequities and bridging the quality gaps in maternal and newborn services with due emphasis on respectful care for migrant women need tailored intervention and prioritization [26]. The long term sustainable policies for universal prenatal care are an urgent requirement to reduce mortalities, improve birth weights and reduce morbidities in India. Present study will certainly help to create awareness, understand present coverage, future challenges and policies for universal pre-natal care among pregnant women in India.

Important Notes

- Government of India along with International Institute for Population Science (IIPS) conducted National Family Health Survey (NFHS) three times in India. First NFHS was conducted in 1992-1993 period. The second NFHS survey was conducted in 1998-99. The third NFHS was conducted in 2005-06 in India. We have used same data for this analysis.
- We have considered four antenatal visits to health care facility by each pregnant woman as per World Health Organization (WHO) standards and guidelines.

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