



Research Article

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Effects of Antenatal Care (ANC) on Institutional Delivery Among Women Living in Low-Income Housing in *Delhi*, National Capital Region (NCR)



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Abstract

Background: Access to health care services during pregnancy, childbirth and also postpartum are important for the overall well-being and survival of mother and child.

Methods and Objective: A cross-sectional study design was utilized to study the impact of ANC utilization on institutional delivery among urban poor women living in low-income housing in *Delhi*.

Results: The study findings emphasized that women who accessed ANC in the 1st trimester were more likely to deliver at an institution (91%) compared to those who used services in the 2nd/3rd trimester (79%). Moreover, 21% of those who accessed ANC in the 2nd/3rd trimester delivered at home compared to 9% who accessed ANC in the 1st trimester (chi-square= 8.120, p=.017). Regarding place of delivery, this study found those who accessed ANC at a government (90%) or a private hospital (90%) delivered at an institution. Whereas 76% of those who accessed ANC at a NGO clinic delivered at an institution. Most importantly, 24% of those who accessed ANC at a NGO clinic delivered at home compared to women who accessed ANC at a government (10%) or a private hospital (10%) (chi-square=19.983, p=.001).

Conclusion: ANC utilization and institutional delivery have increased significantly among women in low-income housing in *Delhi*. Home delivery remains high among women who utilize ANC services in the 2nd/3rd trimester (21%) and at NGO clinics (24%). Strengthening the health system is essential for improving access to ANC services and institutional delivery among underprivileged urban women in *Delhi*.

Keywords: Antenatal care; Home delivery; Institutional deliver

Introduction

Although the Maternal Mortality Ratio (MMR) is declining in India, it is still high by global standards. MMR was estimated at 482.1 in 1990, 416.7 in 2000 and 247.6 in 2015 compared to the global estimates of 281.5 in 1990 and 195.7 in 2015 [1]. Of the Sustainable Development Goals (SDG), the SDG 3.1 aims to reduce maternal mortality to less than 70 per 100,000 (SDG, 2019) [2]. To achieve this goal, the Global Burden of Disease (GBD) report suggests that 91% of pregnant women should access at least one antenatal care visit (ANC) and efforts should be made to increase 4 ANC visits to 78%, in-facility delivery to 81%, and skilled birth attendance (SBA) to 87% [1]. In India, according to National Family Health Survey-4 (NFHS-4), the proportion of women age 15-49

years old who received ANC has increased from 77% in 2005-06 to 84% in 2015-16. The first ANC visit, during the first trimester increased from 44% in 2005-06 to 59% in 2015-16. During these visits, a greater proportion of women had their weight and blood pressure measured (91% and 89% respectively), blood and urine sample taken (87% and 88% respectively), and abdomen examined (89%). Thirty percent consumed Iron and Folic Acid (IFA) tablets for at least 100 days, and 18% used intestinal parasitic drugs. A marked increase in institutional deliveries, up from 39% in 2005-2006 to 79% in 2015-2016, was noted [3]. Access to health care services during pregnancy, childbirth and also postpartum are important for the overall well-being and survival of mother and child. Screening for complications during ANC can reduce risks

for mothers and infants. Delivery at an institution, by a skilled medical provider can reduce risks of complications and infections during delivery [3].

ANC and Institutional Delivery

The findings of a meta-analysis by Fekadu et al. [4] suggested that women who used antenatal services at least once or more were 4 times more likely to deliver at an institution. Additionally, women who used 4 or more antenatal visits were 4.38 times more likely to deliver at an institution in comparison to women who had fewer visits. These women may have a better understanding of benefits associated with institutional delivery, hence would be more inclined to use health services subsequently [4]. Another community-based, cross-sectional study found mothers who accessed ANC services were 2 times more likely to deliver at an institution [5]. Demographic Health Survey (DHS) data from Bangladesh indicated that an increase in number of ANC visits led to a subsequent increase in use of skilled birth attendants (SBA) and institutional delivery [6]. Studies show that several factors positively influence utilization of ANC such as, mother's age, mother's and husband's level of education, household wealth quintile, working status of a woman, health insurance enrollment, religion, and woman's decision-making autonomy [7,8]. Tarkegan et al. [8] found that women with higher education were more likely to utilize ANC and SBA. Those who used ANC services were more likely to use birth attendants. Another study conducted in six South East Asian countries found that various components of ANC (tetanus injection, height, weight, blood pressure measurement, blood and urine tests, breastfeeding counselling and information about pregnancy complications) were strongly associated with institutional delivery. They emphasized the significance of improving quality of ANC to promote institutional delivery [9]. Dixit et al. [10] analyzed National Family Health Survey-IV to explore the relationship between ANC and institutional delivery. Their findings showed that women who used ANC once or twice had a 6.6% higher chance of delivering at an institution [10].

ANC Utilization in India

The health infrastructure in India is relatively strong, but healthcare resources are inequitably distributed between rich and poor [11]. Prusty et al. [12] found a positive association between utilization of maternal healthcare services and economic conditions. Women in the richest wealth quintile were 1.8 times more likely to have full ANC; 4 times more likely to deliver safely in an institution or at home with a trained provider such as doctor, nurse, Auxiliary Nurse Midwife (ANM), or Lady Health Visitor; and 1.7 times more likely to have PNC compared to women from the poorest wealth quintile. A study conducted in Punjab urban slums found that 59% of poor women had completed 3 ANC visits, 49% delivered at home, 81% of these deliveries were conducted by a trained *dai* (midwife) while 19% delivered without SBA. Janani Suraksha Yojna (JSY) is an ambitious cash transfer scheme

launched by the Indian government to provide cash incentives to promote institutional delivery [13]. Approximately 89% of those who were eligible for JSY cash benefits did not receive them; 49% revealed that it was due to non-filing of the JSY card by the ANM [11]. In addition, the trained Social Health Activists (ASHA) have been envisioned by the government to receive performance-based incentives for motivating women to receive MCH services under the Reproductive and Child Health Program [13]. In a study conducted to evaluate the maternal healthcare utilization among women in *Delhi* slums, the authors found that awareness of and accessibility to a well-equipped modern healthcare facility can increase health service utilization. In their study, 76% received ANC from a hospital or a peripheral health post. Sixty-eight percent of the deliveries were conducted by a doctor/nurse at a hospital, and 66.6% of the home deliveries were conducted by a *dai*. It may not be possible to establish a well-equipped health facility near every slum in the *Delhi* area, but effort should be made to increase awareness about the benefits of utilizing a modern healthcare facility within the vicinity of the slum [14]. Gupta et al. [15] found that government hospitals were an important source of ANC services for women living in Bhopal urban slums; in fact 90% of women accessed services at a government hospital and 6% at a private hospital. However, 86.49% of the deliveries were performed at home by an untrained *dai* (63.33%) [15]. In contrast, 93.9% of women in Aurangabad urban slums delivered at a facility, and 67.6% had their first antenatal visit in the 1st trimester [16].

A plethora of research shows that ANC services tend to increase institutional delivery [17-22]. A majority of these studies were conducted on the African continent. No studies to our knowledge have explored the relationship between ANC services and institutional delivery in India. The current study will fill gaps in the literature by evaluating the effect of antenatal service utilization on institutional delivery among women living in low-income housing in *Delhi*, NCR.

Material and Methods

The setting of this cross-sectional quantitative study was low-income housing communities in *Delhi*, NCR (*Gurugram* and *Delhi*). One hundred and five (105) mothers with children below 3 years of age were recruited from slums and low-income housing located in *Delhi*, NCR and neighboring villages such as *Saraswati Kunj*, *Neemtala*, *Wazirabad*, *Rangpuri padai/Indercamp*, *Ullawas*, *Nalapar*, *Bhanwadi*, and *Ghata*. The participants were recruited from Mother and Child Health (MCH) camps offered by a Sukraya (NGO) or immunization camps at aangan wadi's (head start programs in *Gurugram*). The lead investigator trained three (3) interviewers for 3 hours on 2 consecutive days to help administer the survey. The survey questions were taken from 4 peer-reviewed studies and reports [11-15]. The team conducted one-on-one interviews after participants signed an informed consent form. Those who consented were interviewed outside under a tree or in a courtyard. The interviews lasted 30 minutes. The data were

collected from April 2 to April 30, 2018. The data were entered in an Excel spreadsheet and transferred to SPSS 26. The data were analyzed using descriptive statistics and chi-square test.

Results

In this study, a majority of the mothers (67%) were between the ages of 20-25 years old and lived in Gurugram (72%) and

Delhi (28%). Thirty percent of women had infants between the ages of 8 and 12 months old, and 45% of the infants were first-born. Seventy-four percent of the mothers lived in a rental home; 52% had less than an INR10,000 household income (\$142US per month or \$4.70US per day); 67% were literate, and 69% were not working (see Table 1).

Table 1: Demographic Variables.

Variables	n	%
Location		
Gurugram	76	72.4
Delhi	29	27.6
	105	100
Slum/Poor Quality Home Location		
Saraswati Kunj	11	10.5
Neemtala	4	3.8
Wazirabad	2	1.9
Rangpuri Padai/Indercamp	11	10.5
Ullawas	49	46.7
Nalapar	18	17
Bhanwadi	1	1
Ghata	9	8.6
	105	100
Mother's Age		
Less than 20	14	13.3
20-25	70	66.7
26 plus	21	20
	105	100
Mother's Literacy		
Illiterate	35	33.3
Literate	70	66.7
	105	100
Household Income		
Rs. 10,000 or less	55	52.4
Rs. 10,000 or more	50	47.6
	105	100

In terms of service utilization, 100% of women utilized ANC services, although 57% lived more than 5 km away from a Mother and Child Health (MCH) center. Fifty percent had less than 4 ANC visits; 54% utilized ANC services in the first trimester; 94% received 2 doses of Tetanus Oxide (TT) injection; 48% had >100 Iron and Folic Acid (IFA) tablets during pregnancy; and 76% did not experience any health problems during pregnancy, although 14% experienced some, and 10% experienced serious health problems. Some examples of health problems included: bleeding, hypertension, diabetes, measles, pain, and swelling. Eighty percent were satisfied with ANC; 69% delivered at a government

hospital, 14% at home and 17% at a private hospital. Some reasons cited for non-institutional delivery were: convenience of home (3.8%), normal pregnancy (1%), no one to accompany (1%), distance (2.9%) and untimely delivery (9.5%). Among those who delivered at home, 40% were assisted by an untrained person and 60% by a *dai*. Eighty-three percent delivered vaginally, and 16% had C-sections; 40% stayed less than a day at the hospital post-delivery. Thirty-five percent traveled to the place of delivery by auto rickshaw, 20% by car, and 24% by ambulance or taxi. Only 40% received postnatal care, and 83% were satisfied with PNC. Some examples of postnatal services received were: BCG (95%),

Zero polio (94%), breastfeeding advice (80%), and complete immunization (89%). Fifty-one percent of the women indicated receiving less than optimal help from ASHA, whereas 45% received optimal help. Some of the ways in which ASHA assisted included: referral to ANC (45%), helped register for ANC (43%), counselled

on ANC (57%), ASHA visits during delivery (33%), counselled regarding child immunization (58%) and breastfeeding advice (60%). It is important to note that only 9% of the women received Janani Suraksha Yojna (JSY) cash benefits (see Table 2&3).

Table 2: Service Utilization.

Variables	n	%
JSY Benefits Received		
Yes	9	8.6
No	96	91.4
	105	100
ANC During Pregnancy		
Yes	105	100
	105	100
Number of ANC		
<4 Visits	53	50.4
4 visits or more	49	46.7
Missing	3	2.9
	105	100
Time of ANC		
1st Trimester	57	54.2
2nd and 3rd Trimester	47	44.8
Missing	1	1
	105	100
Tetanus Toxide (2 doses)		
Yes	99	94.3
No	6	5.7
	105	100
No. IFA Tablets		
None	10	9.5
<100	45	42.9
>100	50	47.6
	105	100

Table 3: Service Utilization.

Variables	n	%
Health Problem During Pregnancy		
No	80	76.2
Yes Some	15	14.3
Yes Significant	10	9.5
	105	100
Satisfaction with ANC		
Not Satisfied	7	6.7
Somewhat satisfied	2	1.9
Satisfied	84	80
Very Satisfied	11	10.4

Missing	1	1
	105	100
Place of Delivery		
Government Hospital	72	68.6
Home	15	14.3
Private Hospital/Clinic	18	17.1
	105	100
ASHA Help		
Less help	54	51.4
More help	47	44.8
Missing	4	3.8
	105	100
PNC Received		
Yes	42	40
No	63	60
	105	100

The bivariate analysis indicated that only 2 variables (time of ANC and place of ANC) were significantly associated with place of delivery. The study findings emphasized that women who accessed ANC in the 1st trimester were more likely to deliver at an institution (91%) compared to those who used services in the 2nd/3rd trimester (79%). Moreover, 21% who accessed ANC in the 2nd/3rd trimester delivered at home compared to 9% who accessed ANC in 1st trimester (chi-square= 8.120, p=.017). The place of receiving ANC was also significantly associated with place of delivery. Antenatal services were accessed from multiple locations, such as a government hospital, private hospital and NGO clinic. Those who accessed ANC at a government (90%) or a private hospital (90%) delivered at an institution. Whereas

76% of those who accessed ANC at a NGO clinic delivered at an institution. Most importantly, 24% who accessed ANC at a NGO clinic delivered at home compared to women who accessed ANC at a government (10%) or a private hospital (10%) (chi-square=19.983, p=.001). In this study, number of ANC visits were not significantly associated with place of delivery (chi-square=1.064, p-value=.587). Additionally, mother's education, mother's occupation and ASHA help were not associated with place of delivery. The significant variables (time of ANC and place of ANC) were no longer significantly associated with place of delivery after they were entered in a logistic regression model (see Table 4).

Table 4: Bivariate Association Between Mothers' Education, Occupation, ASHA help, Time of ANC, Place of ANC, Number of ANC visits and Place of Delivery.

Variables	Govt. Hospital		Home		Private Hospital/Clinic		Chi	df	p-value
	n	%	n	%	n	%			
Mother Edu									
Illiterate	25	71.4	7	20	3	8.6	3.513	2	0.173
Literate	47	67.1	8	11.4	15	21.4			
Mother Occ									
Unskilled	16	72.7	3	13.6	3	13.6	2.514	4	0.642
Skilled	9	81.8	0	0	2	18.2			
Not Working	47	65.3	12	16.7	13	18.1			
ASHA help									
Less help	33	61.1	10	18.5	11	20.4	2.14	2	0.343
More help	35	74.5	5	10.6	7	14.9			
Time of ANC									
1st trim.	38	66.7	5	8.8	14	24.6	8.12	2	.017*
2nd or 3rd	34	72.3	10	21.3	3	6.4			

Place ANC									
Govt Hos	42	84	5	10	3	6	19.983	4	.001*
Private institution	9	45	2	10	9	45			
NGO clinic	20	60.6	8	24.2	5	15.2			
No. of ANC									
Less than 4 visits	39	73.6	7	13.2	7	13.2	1.064	2	0.587
More than 4 visits	32	65.3	7	14.3	10	20.4			

Discussion

In this study, trimester of first antenatal visit ($\chi^2=8.120$, $p=.017$) and place of ANC ($\chi^2=19.983$, $p=.001$) were significantly associated with place of delivery. The study findings emphasized that women who accessed ANC in the 1st trimester were more likely to deliver at an institution (91%) compared to those who used services in the 2nd/3rd trimester (79%). Moreover, 21% who accessed ANC in the 2nd/3rd trimester delivered at home compared to 9% who accessed ANC in the 1st trimester ($\chi^2=8.120$, $p=.017$). Early access to ANC increased the chance of institutional delivery. In another study conducted in the urban slums of Punjab, only 46% of women used ANC services in the first trimester [11] compared to 54% in this study. Improvement in access to MCH services among poor women could be responsible for these gains. Additionally, satisfaction with the ANC services could have further motivated women to deliver at an institution. It is important to note that 80% of women in this study were satisfied with ANC services. According to Dixit et al, if the content of ANC services fulfills the needs and expectation of the woman, it can further motivate her to deliver at an institution [9]. Perhaps important factors such as level of care, ANC content, and knowledge of delivery complications motivated women to access ANC in 1st trimester and deliver at an institution. An interesting observation in this study was that only 14% of women delivered at home and 86% or 8 out of 10 delivered at an institution; 40% of the home deliveries were performed by an untrained person and 60% by a *dai*. Some reasons for home delivery included: convenience of home (4%), normal pregnancy (1%), distance from delivery institution (3%), nobody to accompany (1%) and untimely delivery (10%). It seems that efforts focused on increasing institutional delivery are bearing fruit. Some examples of interventions that appeared to increase institutional delivery included: improved access to ANC services at government/private hospitals and NGO clinics; assistance from ASHA workers; satisfaction with ANC services; and access to ANC in 1st trimester. However, only 9% of women in this study received the JSY benefits and 45% received optimal services from ASHA workers as compared to less than optimal services (51%). Some ways in which ASHA assisted women included: counselling on ANC (57%), referral (45%) and registration for ANC (43%), ASHA visit during delivery (33%), counselling regarding child immunization (58%) and breastfeeding advice (60%). Twenty-four percent noted that they did not receive any help from ASHA.

Previous studies have not explored the relationship between place of ANC and institutional delivery. This study found a significant association between place of ANC (government hospital, private hospital or NGO clinic) and institutional delivery. In terms of place of delivery, this study found those who accessed ANC at a government (90%) or a private hospital (90%) delivered at an institution. Whereas 76% of those who accessed ANC at an NGO clinic delivered at an institution. Most importantly, 24% who accessed ANC at an NGO clinic delivered at home compared to women who accessed ANC at a government (10%) or a private hospital (10%) ($\chi^2=19.983$, $p=.001$). Clearly an increase in access to ANC services has increased utilization of institutional delivery among women living in slums/low-income housing. However, home births remain high among those who used ANC services from NGO clinics. Thus, public health endeavors need to focus on marginalized women who depend on NGO clinics for ANC care; these women need to be educated and incentivized to deliver at an institution. In addition, 100% of women in this study had utilized ANC services; 50% had less than 4 visits, whereas 47% had 4 visits or more. Ninety-four percent received 2 TT doses during these visits, and 48% had consumed more than 100 IFA tablets. Dabade et al. [16] in their study in urban slums of Aurangabad, found that 88.9% of women had received 2 doses of TT, but IFA tablets were consumed by only 41.7% women. The majority (93%) of the women delivered at an institution, and 1.9% of those who delivered at home were assisted by an untrained person [16]. Findings of this study were mostly similar to Dabade et al. [16] although 9 out of 10 women in their study delivered at an institution compared to 8 out of 10 in this study. According to NHS-4 (2015-2016) [3], nationally, 51% of women had 4 ANC visits compared to 47% in this study, WHO recommends at least 4 visits. Fifty-nine percent had their first visit in the 1st trimester [3], compared to 54% in this study. Eighty-nine percent of births were protected by TT injection [3], whereas it was 94% in this study. Eighty-nine percent received services from a skilled provider [3] whereas 100% in this study received ANC services from a skilled provider at a government hospital, private hospital or NGO clinic. Seventy-nine percent of the deliveries were institutional [3], whereas in this study 86% delivered at an institution. The Ministry of Health and Family Welfare (MoHFW) recommends that all postpartum women receive a postnatal check within 24 hours, if they deliver in a facility. Those who deliver outside a facility should receive a check within 12-hours of birth

[3]. In this study, an alarming number (40%) stayed less than a day (24 hours) in the hospital after delivery. Only 40% utilized PNC services, but 95% of the infants received the BCG vaccine; 94% received zero polio, and 89% had complete immunization. The authors recommend further strengthening of the mother and child health services in poor urban settings to encourage access to ANC in the first trimester.

Conclusion

Institutional delivery was highest among those who accessed ANC from a government (90%) or a private (90%) hospital. A majority (91%) of those who utilized ANC in the 1st trimester delivered at an institution. However, home delivery remains high among women who utilize ANC services in the 2nd/3rd trimester (21%) and at NGO clinics (24%). Thus, it's imperative for government, NGOs, private and public health institutions to improve access to quality antenatal services and institutional delivery among poor women in urban settings. Programs such as ASHA and JSY can be further strengthened to improve ANC utilization and institutional delivery among marginalized urban women.

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