

## ORIGINAL ARTICLE

## Utilization of maternal health services by the migrant population living in the non-notified slums of Hyderabad city, India

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### Abstract

**Background:** Despite increase in accessibility and utilization of maternal health services in the state of Telangana, penetration of these services in vulnerable communities is inadequate. **Aims & Objectives:** To understand the determinants of utilization of reproductive health services by migrant population living in non-notified slums of Hyderabad city in the Indian state of Telangana. **Material & Methods:** It is a community based cross sectional study of 761 rural to urban internal migrant mothers with a child of less than 2 years of age residing for a period minimum of 30 days and not more than 10 years. Information was collected for socio demographic details, antenatal care and child delivery. **Results:** Mothers receiving at least 4 antenatal care visits and institutional deliveries in migrants was 69.6% and 69% respectively, compared to 85.8% and 97% in general population of Hyderabad city. The likelihood of mothers receiving adequate care is 6.7 times higher in mothers with secondary education compared to formal education. The likelihood of institutional delivery is 7.8 times higher in mothers availing adequate antenatal care versus inadequate care and 2.2 times higher in mothers with secondary education versus formal education. **Conclusion:** Utilization of antenatal care services and promotion of institutional deliveries can be improved by acting on the supply side barriers such as health care infrastructure and demand side barriers such as indirect consumer costs, financial constraints and community engagement.

### Keywords

Antenatal care; Migrant; Barriers.

## Introduction

In the developing countries, there is a wide gap between rich and poor in regard to utilization of reproductive health services especially those who are living in the urban settlements (1). UN mandate of 2015 also highlights the improvement of marginalized population living in the cities (2). Universal health care aimed at “ensuring equitable access for all Indian citizens, regardless of income level, social status, gender, caste or religion, to affordable, accountable, appropriate health services of assured quality” (3). Despite these efforts migrant population living in the non-notified slums are still not accessible to the health services and the evidence is clear (4). Studies show one fourth of the mothers in the year 2004-2005 were unable to use services because of cost of health services (5). Disparities exist in the utilization of health services between general urban population and the migrants, and inequities exist in access to care, in spite of high prevalence of health services in urban areas (4).

In India, the studies show utilization of the reproductive and neonatal health services by affluent population then the poor (6). The National Family Health Survey – 3, 4 data show that the utilization of antenatal care and medical assistance (the odds of ANC being 1.48, medical assistance in delivery 2.16) was wealthiest quintiles than the poor in urban areas (7). In India, maternal health services are free in public health centres but out of pocket health expenditure is two thirds of the total expenditure and health care costs are catastrophic (8,9). WHO recommends that every pregnant woman should have undergone at least four goal-oriented focused antenatal care visits under the supervision of skilled provider and should be commenced as early as possible in first trimester which includes all interventions on regular intervals throughout the pregnancy (10).

There is a strong relation between sufficient antenatal care and the maternal health and regular antenatal care gives opportunity to monitor and correct adverse health outcomes of the maternal related health issues (11,12).

As per the WHO randomized trial on antenatal care (13) demonstrates that four antenatal visits are essential to monitor for mother and foetus wellbeing (14). It is also reported that women who have poor socio economic background, low levels of education

had low utilization of the antenatal services (15, 16, 17).

Hence data is required to identify the barriers to access of utilizing antenatal services.

## Aims & Objectives

1. To assess the health care needs, utilization.
2. To identify demand side and the supply side barriers' in regard to the antennal care among the migrant population living in the non-notified slums.

## Material & Methods

**Study area:** The study was conducted in city of Hyderabad, the state of Telangana, India. There are 1179 notified and 297 non-notified slums. The total slum area is 80.45 square km, which is 12% of the total GHMC area. Total slum population is 19, 51, 207, which accounts 28.65% of the total population of GHMC. The total number of households in the slums is 406,000. Details of the inhabitations of the migrant population in and around Hyderabad were obtained from the Greater Hyderabad Municipal Corporation (GHMC), Hyderabad and health facilities from the District Medical Officer. The study areas were classified as per the norms of GHMC Zones and quantitative survey was carried out in all the zones.

**Functional definition of migration, migrant and non-notified slum:** Migration is defined as movements of individuals which resulted in change of the usual place of residence. Migrant is defined as person whose last usual place of residence was different from the present. Usual place of residence of a person is defined as a place (village/town) where the person had stayed continuously for a period of six months or more. Non-notified slum is defined as settlement that is not notified as a slum by the municipal authorities and consist of less than 20 households.

**Sampling:** Sources of data & Study design: cluster random sampling method was used for selecting the migrant households living in non-notified slums. Households of eligible migrants (who have migrated and residing in the city at least for 10 years, but not less than 30 days) were identified from various zones in the city. Attempts were made to identify clusters particularly from newer slums, non-notified slums and migrant camps, where newcomers usually reside. Snow-balling technique was used during pilot survey for identifying this type of habitations. We stratified migrants into two groups: recent migrants and settled migrants. Recent migrants are those

who have been residing in Hyderabad within last 5 years and settled migrants are those who have been residing for at least 6 years, but not more than 10 years.

**Sample size:** Sample size was calculated according to standard guidelines<sup>18</sup>. Assuming prevalence of utilization of government healthcare service (P) of 15% with 10% relative precision and 95% confidence interval, the sample size would be 2177. Taking the cluster design effect of 1.7, the sample size was 3265 and assuming 5% of non-response rate, the sample size was 3886. The total households surveyed for the study was 4505 and data on ANC and other maternal health care services were available from 768 households and this data was considered for analysis.

**Data Collection:** A pre-tested questionnaire was used to collect the socio-demographic and economic details, migration history, health seeking behaviours, prenatal, natal and postnatal history and immunization details from a mother who have younger child aged less than 2 years. Information was collected of past history of pregnancy, month of pregnancy registration, number of ANC visits during pregnancy, iron and folic acid tablets received and consumed during pregnancy, physical examination during ANC visits (14), place and type of delivery, complications during labour, counselling by health worker. Separate questions were asked to obtain information on reasons for not availing antenatal services. The study protocol had been approved by the institutional ethical committee of first author. The purpose of study was explained to study participants and informed consent was obtained from them before data collection.

**Measures:** The study measures two outcome variables such as: (i) the odds of mother receiving adequate care, somewhat adequate care and inadequate care (the categorical dependent variables were 1= adequate care, 2= somewhat adequate care and 3= inadequate care) and (ii) the odds of mother being delivered in institution or home. Adequate care is defined as prospective mothers availing minimum of 4 ANC visits, the first visit being in I trimester and receiving a minimum of 100 iron and folic acid tablets. Somewhat adequate care is defined as mothers availing less than 4 ANC visits, either in II or III trimester, and receiving less than 100 iron folic acid tablets. Inadequate care is defined as mothers not availing ANC visits and not receiving iron folic acid tablets.

**Statistical Analysis:** Multinomial logistic regression analysis was carried out for analysis of determinants of adequate ANC utilization. Univariate regression analysis was carried out of each variable against dependent variable to determine its independence. Those variables with minimum p-value of 0.25 were included for multiple logistic regression analysis (18). The model selected was main effects model and log likelihood ratio test was considered as a goodness of fit.

Binomial logistic regression was carried out for analysis of determinants associated with place of delivery. Univariate regression analysis was carried out to determine assumption of independence of each variable and variables with minimum p-value of 0.25 were selected. Regression analysis was carried out by backward likelihood ratio method. The fit of the model was tested by Hosmer and Lemeshow goodness-of-fit tests. All analyses were carried out using SPSS 20.0 (IBM Corp., Armonk, NY, USA).

## Results

### Differentials in maternal healthcare services utilization

[Table 1](#) reveals prospective mothers of recent migrants are of younger age-group and primi-para compared to mothers of settled migrants. 68% of prospective mothers had no formal education, 75% of them were housewives, 60% of them belong to lower social class and 80% of households are earning below 1 lakh Rupees per annum. [Table 2](#) reveals more than half of prospective mothers are availing ANC services of government. Prospective mothers registering ANC services were 10% higher in recent migrants compared to settled migrants. 70% of them had availed at least 4 ANC visits, less than quarter of them received iron and folic acid tablets, 90% of them received minimum of 2 doses of TT injection.

### Factors associated with utilization of maternal health services

[Table 3](#) presents results of frequency distribution and multinomial logistic regression of adequacy of ANC by various socio-demographic characteristic variables. Mothers who had secondary education were 6.5 times more likely (AOR 2.087-20.532) to avail adequate ANC and 6.7 times more likely (AOR 2.369-19.104) to avail somewhat adequate ANC versus inadequate ANC. Working mothers were 40% less likely to avail adequate ANC and 50% less likely to avail somewhat adequate ANC versus inadequate

ANC. The log likelihood ratio test indicates that the model is good fit.

[Table 4](#) reveals increasing trend of caesarian deliveries in mothers availing adequate ANC compared to mothers availing inadequate ANC and decreasing trend of normal deliveries. Mothers availing adequate ANC services had higher institutional deliveries compared to somewhat adequate and inadequate ANC. Janani Suraksha Yojana (JSY) scheme reception is poor among migrant mothers. Respondent mothers had poor awareness of free transport facilities for ensuring safe deliveries by state government.

[Table 5](#) reveals results of binomial logistic regression of place of delivery by various socio-demographic characteristic variables. Mothers who had secondary education were 117% more likely and primary education were 160% more likely to have institutional delivery versus home delivery than mother's with no formal education. Mothers availing at least 4 antenatal visits were 4 times more likely to have institutional delivery than mothers availing minimum 3 antenatal visits. Mothers receiving adequate ANC were 7.86 times more likely and somewhat adequate ANC were 2.76 times more likely to have institutional delivery than mothers receiving inadequate ANC. Settled migrants were 67% more likely to have institutional delivery than recent migrants.

## Discussion

The study reveals the utilization of maternal health services by poor migrants was far below the general population of Hyderabad and urban Telangana. Proportion of first ANC visit in first trimester is 90.4% and 87.4% in Hyderabad and Telangana compared to 41% in migrants of our study population (19). Mothers availing at least 4 ANC visits was 85.8% in Hyderabad compared to 69.6% in our migrant population. Mothers immunized with two doses of tetanus toxoid (TT) vaccine were 94% in general population compared to 88% in migrant population of Hyderabad. Institutional deliveries in general population of Hyderabad were 97% compared to 69% in our study population. Migrant mothers utilizing ANC services is less than the general population of city of Hyderabad. Hence underutilization of services is due to demand and supply side imbalances of maternal health services accessible to vulnerable communities (20,21).

Barriers of supply side factors include poor attitude of health care staff of public health facilities towards communities at the lower end of wealth quintile. Unavailability of medicines at the health centre had become a major share of out of pocket expenses for poor households hindering them to have institutional delivery (22). Non-availability of health providers at public health facilities is the frequent complaint received from the communities of vulnerable population and forcing them to utilize the private health facilities increasing the cost of care and a major economic burden to them (23). Therefore, availability of well-trained health staff, essential obstetric drugs, adequate equipment and 24-hour labor room will increase the institutional deliveries (24). Demand side barriers override supply is a major cause of inadequate utilization of maternal health services (22). Firstly, indirect consumer costs like transportation to health facility is a major barrier for availing ANC services and institutional deliveries. Transport costs due to distant health facility will affect the utilization of services (21, 23). Despite 63% of mothers of our study population were aware of free transport facility for delivery only 12% utilized it, might be due to lack of knowledge of free transport facility by household members. Secondly financial constraint is one of major reason for home deliveries (23), hence government of India launched Janani Suraksha Yojana (JSY) scheme on April 12<sup>th</sup>, 2015 aimed to reduce neonatal and maternal mortality rates by promoting institutional delivery. JSY scheme utilization is 11% by our study population compared to 79% of general population of Hyderabad. It might be due to lack of awareness of scheme and no health worker to motivate households in utilizing it. Thirdly lack of community engagement in seeking health care services, institutional deliveries and perinatal care is one of the barrier in utilizing services. Evidence from previous intervention studies reveal Lady Health Workers (LHW) are effective in promoting maternal health services by various approaches for example; home visits, home management and facilitated referral. Home visits involve provision of basic antenatal care (nutrition counseling, screening for common illness, iron-folic acid and tetanus toxoid administration), newborn care- preparedness and home-based perinatal care by LHW (24,25). Another approach like LHW organizing group sessions in the community to promote antenatal care, use of clean kits at delivery, institutional delivery, identifying danger signs of

pregnancy and promotion of health seeking behavior (26). Health worker visit to the non-notified slums is 10% in our study population and were consistent with findings from similar studies (27) and evidence from previous studies shows recruitment of ASHA health worker in rural areas had increased the utilization of maternal health services (registration in first trimester, ANC visits, institutional deliveries, deliveries by TBA, immunization) (28). The strategies designed for engaging the community are not meeting the targets due to lack of knowledge of community about strategies designed without understanding three fundamental influences of decision making process for the woman making health care decision. These influences are gendered decision making norms, multigenerational dialogue and appropriate communication. Gendered decision making norms play a vital role in influencing health seeking behavior and health outcomes. Gender equality and women empowerment are essential to increase utilization of maternal health services. At the household level disempowerment of women results to lowered access to resources such as education, employment and income, and limits their decision-making power (23). Factors increasing women role in decision making process in a hold is their education and contribution to household income. Our study corroborates these findings that women with secondary education had higher probability of adequate antenatal care and institutional delivery. Difference in education between wife and husband is also crucial in influencing decision making process (29). Multigenerational gaps exist as social norms, values, traditions and customs inhibit mothers to transfer knowledge and experiences to their daughters resulting in lack of sexual education and preparedness for motherhood (30,31). Generational gaps are growing reality due to increased urbanization and proliferation of nuclear families leading to increasing disconnection of urban households from their traditional roots, conflict between social beliefs can arise. Intergenerational dialogue is necessary to achieve consensus on best practices in motherhood.

The lack of communication between pregnant women and health provider leads to poor health outcomes. Antenatal care services can be delivered by frontline providers including midwives, nurses and community health workers, provided they are well trained. Health information should be designed

in consultation with local women and disseminated in two-way communication considering literacy levels of mothers.

### Conclusion

The utilization of maternal health services is low in vulnerable migrant population because of poor education status of the mothers, financial constraints and lack of awareness of households of incentives for institutional delivery. Health interventions should be designed to tackle the barriers such as recruitment of ASHA worker to educate mothers about new born and perinatal care and involve communities for women empowerment, identification of community volunteers to motivate women to seek health care.

### Recommendation

Policy measures to be adopted to periodically monitor and identify new non-notified slums developing in urban jurisdictions, improving infrastructure and quality of care of public health facilities and creating employment opportunities in organized sector to minimize the effect of inflation on vulnerable communities.

### Limitation of the study

A limitation of the study is its retrospective reporting, which involves reporting (recall) bias and thus impacts the reliability of data. Despite these limitations, the strengths of the study are that data was collected from representative sample of vulnerable migrant population dwelling in non-notified slums by a trained interviewer. The study is specifically designed to collect information on determinants and identify barriers in utilization of maternal health services.

### Relevance of the study

Limited evidence is available on documentation of determinants and barriers of utilization of maternal health services of vulnerable migrants in India. The findings of this study will be used as reference for other interventional studies to increase the uptake of utilization of these services.

### Authors Contribution

GJB, BVB, MRS: Concept, study design; KPR: Data collection; PSN, KSB: Data analysis and draft prepared.

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**Tables**

**TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANT MOTHER’S BY MIGRATION PERIOD**

Variable		recent migrants (n=315) n (%)	settled migrants (n=446) n (%)	p value
<b>Age (in years)</b>	15 to 20	102 (32.4%)	89 (20.0%)	0.000
	21 to 25	168 (53.3%)	239 (53.6%)	
	26 and above	45 (14.3%)	118 (26.5%)	
<b>Education status</b>	No formal education	207 (65.7%)	313 (70.2%)	0.396
	Primary education	30 (9.5%)	34 (7.6%)	
	Secondary education and above	78 (24.8%)	99 (22.2%)	
<b>Age at first delivery (in years)</b>	18 and below	111 (35.2%)	157 (35.2%)	0.061
	19 to 25	200 (63.5%)	268 (60.1%)	
	26 and above	4 (1.3%)	21 (4.7%)	
<b>Mother’s occupation</b>	Working women	73 (23.2%)	125 (28.0%)	0.133
	Home maker	242 (76.8%)	321 (72.0%)	
<b>Occupation of Head of Household</b>	Salaried	39 (12.4%)	67 (15.0%)	0.018
	Small business	31 (9.8%)	44 (9.9%)	
	Unskilled worker	239 (75.9%)	307 (68.8%)	
	Unemployed	65 (1.9%)	28 (6.3%)	
<b>Social group</b>	ST	87 (27.6%)	133 (29.8%)	0.001
	SC	106 (33.7%)	137 (30.7%)	
	OBC	110 (34.9%)	124 (27.8%)	
	Others	12 (3.8%)	52 (11.7%)	
<b>Religion</b>	Hindu	255 (81.0%)	351 (78.7%)	0.003
	Islam	21 (6.7%)	59 (13.2%)	
	Christian	33 (10.5%)	25 (5.6%)	
	Tribal	6 (1.9%)	11 (2.5%)	
<b>Annual income (INR*)</b>	50000 and below	102 (32.4%)	153 (34.3%)	0.002
	50001 – 100000	191 (60.6%)	224 (50.2%)	
	Above 100000	22 (7.0%)	69 (15.5%)	
<b>Parity</b>	First child	146 (46.3%)	141 (31.6%)	0.000
	2nd or 3rd child	154 (48.9%)	256 (57.4%)	
	4th and above	15 (4.8%)	49 (11.0%)	

\*INR= Indian Rupee (equivalent to US\$0.016)

**TABLE 2 UTILIZATION OF VARIOUS COMPONENTS OF ANTENATAL CARE (ANC) BY MIGRATION STATUS**

Variable		Recent migrants (n=315) n%	Settled migrants (n=446) n%	P Value for $\chi^2$
<b>ANC visits</b>	Visited Health facility for ANC at least once	92.1	91.9	-
<b>ANC sought from</b>	Government health facility	54.0	65.5	$\chi^2 = 13.949$ P=0.003
	Private health facilities	36.5	24.2	
	Both	1.6	2.2	
	Did not receive ANC	7.9	8.1	
<b>First ANC visit made/ received</b>	1st trimester	46.7	35.4	$\chi^2 = 10.638$ P=0.014
	2nd trimester	41.9	53.1	
	3rd trimester	3.5	3.4	
	Did not visit at all	7.9	8.1	
<b>Number of ANC visits made</b>	None	7.9	8.1	$\chi^2 = 0.244$
	1 to 3	23.5	22	

	4 or more	68.6	70	P= 0.885
<b>Reception of IFA tablets</b>	Received ≥100 tablets	18.1	24.9	$\chi^2 = 4.952$ P=0.026
<b>Consumption of IFA tablets</b>	Consumed ≥100 tablets	14.6	21.1	$\chi^2 = 5.153$ , P=0.023
<b>Tetanus Toxoid injection</b>	Received one TT injection	8.6	10.3	$\chi^2 = 6.104$ P= 0.107
	Received 2 TT injections	88.9	87.4	
	Not received	2.5	2.2	
<b>Other services</b>				
<b>Measured body weight</b> ( $\chi^2 = 3.902$ , P=0.142)		90.8	88.3	
<b>Measured Height</b> ( $\chi^2 = 4.029$ , P=0.133)		79	83.4	
<b>Measured blood pressure</b> ( $\chi^2 = 0.978$ , P=0.613)		90.8	89.7	
<b>abdominal examination</b> ( $\chi^2 = 1.826$ , P=0.401)		90.8	89.2	
<b>Hemoglobin test carried out</b> ( $\chi^2 = 1.480$ , P=0.477)		90.2	88.6	
<b>Informed anemic during pregnancy</b> ( $\chi^2 = 5.962$ , P=0.051)		41.9	50.4	
<b>Received treatment for anemia</b> ( $\chi^2 = 0.685$ , P=0.710)		79.6	82.8	
<b>received pregnancy related advices</b> ( $\chi^2 = 0.058$ , P=0.972)		63.8	75.3	

**TABLE 3 FREQUENCY DISTRIBUTION OF PARTICIPANTS ACCORDING TO ADEQUACY OF ANTENATAL CARE (ANC) AND RESULTS OF MULTINOMIAL LOGISTIC REGRESSION ANALYSIS**

Variable	Inadequate (n=98) ANC (%)	Somewhat adequate (n=574) ANC (%)	Adequate (n=89) ANC (%)	Adjusted odds ratio (AOR) (95% confidence interval) for adequate vs inadequate ANC	AOR (95% confidence interval) for somewhat adequate vs inadequate ANC
<b>Age of the mother (years)</b>					
<20	22 (11.5)	151 (79.1)	18 (9.4)	0.575 (0.209-1.586)	0.829 (0.400-1.721)
21-25	51 (12.5)	301 (74)	55 (13.5)	1.117 (0.507-2.561)	0.915 (0.520-1.609)
>26	25 (15.3)	122 (74.8)	16 (9.8)	Reference	Reference
<b>Migration status</b>					
Recent	37 (11.7)	248 (78.7)	30 (9.5)	0.660 (0.345-1.264)	1.042 (0.644-1.686)
Settled	61 (13.7)	326 (73.1)	59 (13.2)	Reference	Reference
<b>Education of the mother</b>					
Secondary education	4 (2.3)	149 (84.2)	24 (13.6)	6.546 (2.087-20.532)**	6.727 (2.369-19.104)***
Primary education	11 (17.2)	43 (67.2)	10 (15.6)	1.250 (0.480-3.251)	0.753 (0.363-1.560)
Formal education	83 (16)	382 (73.5)	55 (10.6)	Reference	Reference
<b>Occupation of mother</b>					
Working women	43 (21.7)	138 (69.7)	17 (8.6)	0.391 (0.196-0.780)**	0.494 (0.309-0.790)**
Housewife	55 (9.8)	436 (77.4)	72 (12.8)	Reference	reference
<b>Occupation of head of the household</b>					
Salaried	8 (7.5)	79 (74.5)	19 (17.9)	2.585 (0.637-10.489)	3.008 (0.962-9.410)
Small business	19 (25.3)	49 (65.3)	7 (9.3)	0.713 (0.170-2.986)	1.356 (0.481-3.820)
Unskilled	63 (11.5)	426 (78)	57 (10.4)	1.531 (0.472-4.960)	3.135 (1.260-7.804)*
Unemployed	8 (23.5)	20 (58.8)	6 (17.6)	Reference	reference
<b>Family size</b>					
<4	54 (10.5)	392 (76.4)	67 (13.1)	2.063 (1.017-4.187)*	1.356 (0.825-2.229)
>5	44 (17.7)	182 (73.4)	22 (8.9)	Reference	reference
<b>Parity</b>					
1	23 (8)	226 (78.7)	38 (13.2)	1.531 (0.415-5.652)	1.172 (0.463-2.971)
2-3	64 (15.6)	301 (73.4)	45 (11)	0.771(0.240-2.473)	0.687 (0.312-1.513)
4 and above	11 (17.2)	47 (73.4)	6 (9.4)	Reference	reference
<b>Household income per annum (lacs)</b>					
<0.5	38 (14.9)	179 (70.2)	38 (14.9)	1.320 (0.457-3.807)	0.653 (0.296-1.443)
0.5-1	50 (12)	323 (77.8)	42 (10.1)	0.916 (0.327-2.563)	0.794 (0.372-1.695)
>1	10 (11)	72 (79.1)	9 (9.9)	Reference	reference

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**TABLE 4 DETAILS OF OBSTETRIC AND RELATED CARE BY ANTENATAL CARE (N=761)**

Variable		Inadequate antenatal care (n=98)	Somewhat adequate antenatal care (n=574)	Adequate antenatal care (n=89)	P value for Chi square
<b>Type of delivery</b>	Normal	89.8 (83.8-95.8)	73.2 ( 69.6-76.8 )	59.6 ( 49.4-69.8 )	0.000
	Caesarean	10.2 (4.2-16.2 )	26.8 ( 23.2-30.4 )	40.4 ( 30.2-50.6 )	
<b>Place of delivery</b>	Institution	35.7 ( 26.0-45.4 )	78.4 ( 75.0-81.8 )	94.4 ( 89.5-99.3 )	0.000
	Home	64.3 ( 54.6-74.0 )	21.6 ( 18.2-25.0 )	5.6 ( 0.7-10.5 )	
<b>Health worker's home visits after delivery</b>	Yes	6.1 ( 1.4-10.8 )	10.5 ( 8.0-13.0 )	14.6 ( 7.3-21.9 )	0.164
	No	93.9 ( 89.2-98.6 )	89.5 ( 87.0-92.0 )	85.4 ( 78.1-92.7 )	
<b>Received incentive (JSY)</b>	Yes	0	15.2 ( 12.3-18.1 )	18.0 ( 10.0-26.0 )	0.000
	No	100	84.8 ( 81.9-87.7 )	82.0 ( 74.0-90.0 )	
<b>Awareness of free transport facility</b>	Yes	30.6 ( 21.5-39.7 )	74.4 ( 70.8-78.0 )	86.5 ( 79.4-93.6 )	0.000
	No	69.4 ( 60.3-78.5 )	25.6 ( 22.0-29.2 )	13.5 ( 6.4-20.6 )	
<b>Type of transport facilities for delivery</b>	government ambulance	8.6 ( 3.0-14.2 )	14.2 ( 11.3-17.1 )	15.7 ( 8.1-23.3 )	0.510
	private ambulance	0	3.5 ( 2.0-5.0 )	2.4	
	auto or taxi	77.1 ( 68.8-85.4 )	75.8 ( 72.3-79.3 )	75.9 ( 67.0-84.8 )	
	Others	14.3 ( 7.4-21.2 )	6.5 ( 4.5-8.5 )	6.0 ( 1.1-10.9 )	
<b>Delivery complications</b>	Yes	6.1 ( 1.4-10.8 )	4.5 ( 2.8-6.2 )	7.9 ( 2.3-13.5 )	0.369
	No	93.9 ( 89.2-98.6 )	95.5 ( 93.8-97.2 )	92.1 ( 86.5-97.7 )	
<b>Reception of advices on the following</b>					
Family planning	Yes	25.5 ( 16.9-34.1 )	56.8 ( 52.7-60.9 )	62.9 ( 52.9-72.9 )	0.000
	No	74.5 ( 65.9-83.1 )	43.2 ( 39.1-47.3 )	37.1 ( 27.1-47.1 )	
Breast feeding	Yes	42.9 ( 33.1-52.7 )	83.4 ( 80.4-86.4 )	87.6 ( 80.8-94.4 )	0.000
	No	57.1 ( 47.3-66.9 )	16.6 ( 13.6-19.6 )	12.4 ( 5.6-19.2 )	
Immunization	Yes	43.9 ( 34.1-53.7 )	95.6 ( 93.9-97.3 )	97.8 ( 94.8-100 )	0.000
	No	56.1 ( 46.3-65.9 )	4.4 ( 2.7-6.1 )	2.2	

**TABLE 5 RESULTS OF LOGISTIC REGRESSION OF ASSOCIATION OF VARIABLES & PLACE OF DELIVERY**

Place of Delivery			
Variable	Home (%)	Health facility (%)	Adjusted odds ratio 95% confidence interval
<b>Age of the mother (years)</b>			
<20	44 (23)	147 (77)	-
21-25	91 (22.4)	316 (71.6)	-
>26	57 (7.5)	106 (13.9)	-
<b>Age at first delivery (years)</b>			
<18	83 (31)	185 (69)	Reference
19-25	106 (22.6)	362 (77.4)	1.378 (0.900-2.111)
>26	3 (12%)	22 (88)	2.178 (0.535-8.871)
<b>Educational status of mother</b>			
No formal education	162 (31.2)	358 (68.8)	Reference
Primary education	12 (18.8)	52 (81.3)	2.602 (1.438-4.710)*
Secondary education	18 (10.2)	159 (89.8)	2.178 (1.026-4.626)*
<b>Household Income status per annum (lacs)</b>			
<0.5	72 (28.2)	183 (71.8)	Reference
0.5-1	94 (22.7)	321 (77.3)	1.000 (0.639-1.565)
>1	26 (28.6)	65 (71.4)	0.517 (0.266-1.007)
<b>Occupational status of head of the household</b>			
Salaried	18 (17)	88 (73)	Reference
Small business	30 (40)	45 (60)	0.671 (0.289-1.559)
Unskilled	133 (24.4)	413 (75.6)	1.199 (0.629-2.285)
Unemployed	11 (32.4)	23 (67.6)	0.677 (0.241-1.898)
<b>Social Group</b>			
SC	71 (29.2)	172 (70.8)	0.636 (0.379-1.067)
ST	56 (25.5)	164 (74.5)	Reference
OBC	55 (23.5)	179 (76.5)	0.569 (0.333-0.974)
General	10 (15.6)	54 (84.4)	0.347 (0.095-1.268)
<b>Family size</b>			
<4	109 (21.2)	404 (78.8)	Reference
>5	83 (33.5)	165 (66.5)	0.680 (0.434-1.064)
<b>Parity</b>			
1	39 (13.6)	248 (86.4)	1.817 (0.797-4.143)
2-3	132 (32.2)	278 (67.8)	0.720 (0.349-1.488)

Place of Delivery			
4 and above	21 (32.8)	43 (67.2)	Reference
Number of ANC visits			
<3	117 (50.2)	116 (49.8)	Reference
>4	75 (14.2)	453 (85.8)	3.948 (2.513-6.201)***
Adequacy of ANC			
Inadequate care	63 (64.3)	35 (35.7)	Reference
Somewhat adequate care	124 (21.6)	450 (78.4)	2.764 (1.588-4.811)***
Adequate care	5 (5.6)	84 (94.4)	7.860 (2.595-23.804)***
Migration status			
Recent	87 (27.6)	228 (72.4)	Reference
Settled	105 (23.5)	341 (76.5)	1.674 (1.104-2.538)*

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## National Center for Disease Control (NCDC): An Institute for Public Health Action

Dr A. C. Dhariwal, Director, NCDC, 22-Sham Nath Marg, Delhi-110054 ([www.ncdc.gov.in](http://www.ncdc.gov.in))

### Dear Readers,

The National Center for Disease Control (NCDC) erstwhile National Institute of Communicable Diseases (NICD) is the premier Public Health Organization of Government of India working with the mandate of prevention, control, elimination and eradication of the diseases. Since 2009, its role has been diversified to take care of non-communicable diseases including climate change and environmental factors and accordingly, change of name from NICD to NCDC on its centenary celebration.

The NCDC has many laurels to its credit since its inception in 1909 as Central Malaria Bureau at Kasauli, Himachal Pradesh. It was shifted to its present location in Civil Lines area of Delhi in 1938.

Smallpox, Guineaworm, Yaws Eradication, early containment of plague outbreak of Rohuru, H1N1, SARS, avian flu, CCHF, scrub typhus outbreak, disease surveillance support to States during disaster situation are some of the major public health contributions of NCDC.

Based on its contribution the institute has earned several recognitions viz. WHO Collaborating Centre for Epidemiology & Training, Rabies Epidemiology and Regional Reference Laboratory for Polio for South-East Asia Region. NCDC is also National Reference Laboratory for HIV/AIDS, Iodine Deficiency, Testing of Insecticides and National Focal Point for IHR and STH.

The Institute was entrusted with the task of country wide implementation of Integrated Disease Surveillance Project (IDSP), a World Bank funded project. A significant progress has been made in implementation of IDSP with the setting up of an IT network connecting State, District Headquarters, Government Medical Colleges and important Public Health Institutes. Toll-free number (1075) has been operationalized for reporting of unusual disease events. A 24x7 Outbreak Monitoring Cell providing vital and timely information about various epidemic prone diseases is now operational. Now, after closure of World Bank project, the same is continuing as Integrated Disease Surveillance Programme with domestic budget support.

The members of the IAPSM and other Public Health Associations can actively contribute in taking the agenda of NCDC forward by sending suggestions to NCDC as structural changes for reporting and response mechanism under IDSP are under way. The cited activities may be carried out in innovative ways through RHTC, UHTC and by allotting subjects to Under Graduate and Post Graduate students for project work.