

# Determinants of home deliveries - Findings from India DLHS 4 analysis

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## ABSTRACT

**Background:** Place of delivery has major implication on decreasing maternal morbidity and mortality. India has adopted various policies to encourage institutional births, still there are large numbers of deliveries which occur at home. Thus, it is imperative to understand the risk factors associated with home deliveries among women in India. **Methods:** The national representative district level household data-4 (2012-13) have been used for this analysis. A multiple logistic regression model has been used to determine the significant factors associated with home deliveries. **Results:** A total of 22,363 live births were selected for analysis for the year 2012. Out of which 3,602 (15.4%) are found to be home delivery births, remaining are either private or government institutional births. North-east states are found to be high prevalence of home deliveries. The potential factors viz., age of women, educational level of both husband and wife, age at first birth, higher order parity and not registered for ANC check-up, etc., are significantly associated with home delivery birth preferences among women in India. **Conclusion:** Our analysis demonstrates that targeting the significant predictors particularly education of family members and compulsory registration for ANC check-up will significantly reduce the preference for home delivery.

**Keywords:** DLHS, home delivery, institutional deliveries, logistic regression, women health status

## Introduction

India being the second most populous country in the world, women and preschool children constitute about one third of the total population; any neglect or delay in care can adversely affect the wanted outcome.<sup>[1]</sup> One in every five maternal deaths globally happened in India which accounted for 20% of total mortality in this respect. Gaps in these areas are alarming for South Asia, particularly for India. According to the recently released SRS bulletin (2016), India has shown impressive gains in reduction of maternal mortality with 22% reduction since 2013. Maternal Mortality Ratio (MMR) of India has declined

from 167 in 2011–2013 to 122 in 2015–2017 and the ambitious target set to reduce MMR to 100/lakh live births by 2020 under the National Health Policy 2017.

In developing regions, the proportion of deliveries attended by skilled personnel raised from 55% in 1990 to 66% in 2011, still, in about 46 million of the 135 million live births in 2011, women delivered alone or with inadequate care.<sup>[2]</sup> As per data available through National Family Health Survey (NFHS), Institutional delivery in rural areas has increased more than double in a decade that is from 31.1% in 2005-06 (NFHS-III) to 75.1% in 2015–16 (NFHS-IV).

Globally, there is evidence that most maternal deaths can be averted but for the “three delays”—delay in decision to seek professional care, delay in reaching the appropriate health facility, and delay in receiving care after arriving at a hospital. Tackling

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and averting this trio of delays will help the world as also India to reduce the burden of maternal mortality.<sup>[3]</sup>

In 2005, India launched a conditional cash transfer (CCT) program called Janani Suraksha Yojana (JSY), to reduce MMR through promotion of institutional births, there are large numbers of deliveries still occurring at home.<sup>[4]</sup> Government of India (GOI) program JSY and *Janani Shishu Suraksha Karyakaram* (JSSK) has been a major driver of this momentous increase in Institutional deliveries. There can be varied reasons proposed for these home deliveries like preference to deliver at home, facility located at far off location, lack of preparedness, decision of husband, or family members. Home deliveries pose risk to the life of both mother and baby. This article attempts to explore prevalence and determinants of home deliveries in India so that those factors can be looked upon by policy makers to further leverage institutional deliveries and hence further reduce preventable maternal deaths.

## Material and Methods

### Data source

This study used secondary data from large population-based national survey viz. District Level Household Survey (DLHS-4) conducted by the Government of India which is available in public domain (accessed from <http://www.ipsindia.ac.in/>). It is the fourth round in the series following RCH-I in 1998-99, RCH-II in 2002-2004 and DLHS-3 in 2007-08. It covers 20 states and 6 union territories of India. The data from the selected states viz., Himachal Pradesh, Punjab, Haryana, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, West Bengal, Maharashtra, Andhra Pradesh, Karnataka, Goa, Kerala, Tamil Nadu and Telangana were used for analysis in this study.

### Study design

A multi-stage, stratified, probability proportional to size sample with replacement design was adopted by DLHS-4. Each district was divided into rural and urban areas. For rural areas primary sampling unit (PSU) was village and the Census of India 2001 was the sampling frame. For urban areas PSU were NSSO Urban Frame Survey (UFS) blocks. UFS blocks in each district have been stratified into million-class cities and non-million class cities and allocation of sample was proportional to relative sizes. Twenty-five households have been selected from each rural and urban PSU. Further detailed description of sample methodology and survey process of DLHS-4 has been mentioned elsewhere.<sup>[5]</sup> The survey obtained detailed information on socio demographic details, maternal characteristics, pregnancy, and delivery from ever married woman aged 15–49 years.

### Data analysis

The individual dataset of all live births for the year 2012 (1 January to 31 December) was used for analysis. Delivery which was conducted in healthcare facilities either public or private was considered institutional deliveries whereas those

delivered at home or transit was considered as home delivery for analysis purposes. The proportion and percentages were computed and univariate Chi-square test was performed for the categorical variables. Multiple Logistic Regression was used to check independent association of different factors affecting the place of deliveries. Only clinically and statistically significant variables were included in the logistic regression model. All the statistical analysis was carried out using SPSS version- 20.0. In all case the *P* value < 0.05 was considered as statistically significant.

## Ethical considerations

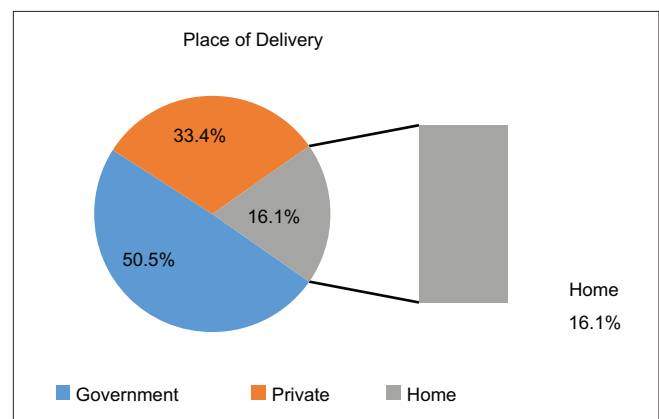
The study is based on the data available in the public domain for use. Therefore, no ethical clearance is required.

## Results

A total of 22,363 births were selected for analysis for the year 2012. Results shows 83.9% of the deliveries took place in healthcare facilities (50.5% public and 33.4% private) and remaining 16.1% at home or transit [Figure 1].

Figure 2 shows the spatial distribution of prevalence of home delivery among selected states in India. From this map it clearly reflects that home deliveries in the Southern states/UTs is less prevalent as compared to other parts of the country. Particularly, the North-east states are high prevalence of home delivery cases. The state of Nagaland had distinction of the highest prevalence of home deliveries with 68.7%, followed by the state of Meghalaya and Arunachal Pradesh with 57.7% and 50% home deliveries, respectively. The demographically sound states like Kerala and Puducherry had zero prevalence of home deliveries.

The Table 1 shows the association of different independent variables with place of delivery. The independent predictors such as women's age, education, education of her husband, parity, pregnancy registered, received of ANC, awareness of pregnancy-related complication and supplementary nutrition provided from AWC are found to be significantly associated with her place of delivery (*P*-value < 0.05). An



**Figure 1:** Prevalence of home deliveries in current study

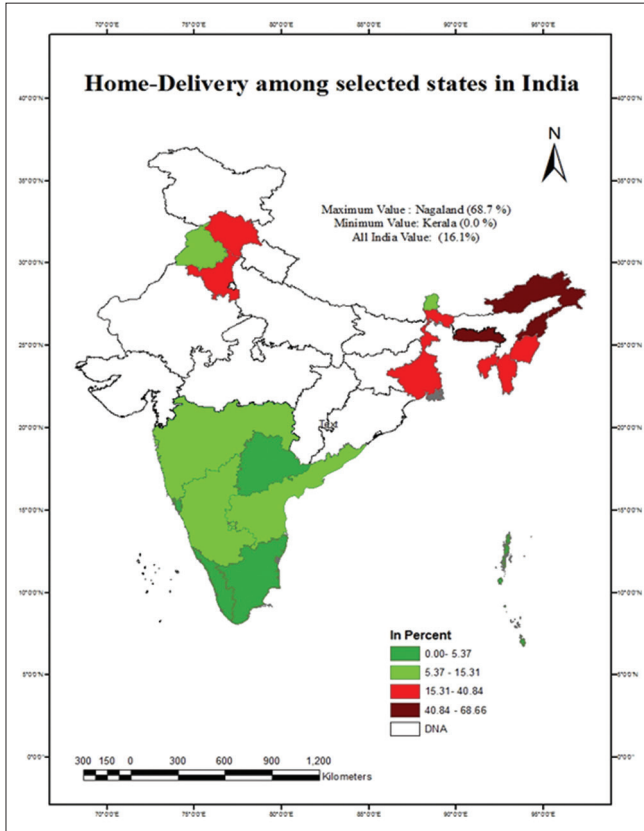
**Table 1: Characteristics and factors associated with Home deliveries Vs. Institutional deliveries was further explored in the analysis**

Categories	n (%)			Chi Square	P
	Total	Institutional Delivery	Home Delivery		
Age of woman					
<20 years	3043	2548 (83.8)	495 (16.2)	100.66	0.000
20-25 years	9792	8399 (85.8)	1393 (14.2)		
25-30 years	6562	5500 (83.8)	1062 (16.2)		
>30 years	2966	2315 (78.1)	651 (21.9)		
Educational level (husband)					
Illiterate/Below primary	1081	730 (67.5)	351 (32.5)	611.55	0.000
Primary to Secondary	11386	9654 (84.8)	1732 (15.2)		
Higher	6357	5925 (93.2)	432 (6.8)		
Educational level (woman)					
Illiterate/Below primary	948	627 (66.1)	311 (32.8)	838.16	0.000
Primary to Secondary	11399	9770 (85.7)	1629 (14.3)		
Higher	5783	5566 (96.2)	217 (3.8)		
Age when delivered first child					
<20 years	9774	7770 (79.5)	2004 (20.5)	255.04	0.000
20-25 years	9262	8051 (86.9)	1211 (13.1)		
25-30 years	2709	2404 (88.7)	305 (11.3)		
>30 years	534	467 (87.5)	67 (12.5)		
Total number of live children (parity)					
<=1	9882	8896 (90.0)	986 (10.0)	1321.58	0.000
(2-3)	10578	8786 (83.1)	1792 (16.9)		
>=4	1903	1079 (56.7)	824 (43.3)		
Did you register your last pregnancy					
Yes	19469	17336 (89.0)	2133 (11.0)	2962.57	0.000
No	2886	1418 (49.1)	1468 (50.9)		
When was pregnancy registered					
Within 12 weeks of pregnancy	15626	14148 (90.5)	1478 (9.5)	185.01	0.000
After 12 weeks of pregnancy>	3930	3260 (83.0)	670 (17.0)		
ANC Received					
<=4	7251	6015 (83.0)	1236 (17.0)	530.11	0.000
> 4	10592	9932 (93.8)	660 (6.2)		
Received abdomen check + BP + bloodtested + urine tested atleast once					
Yes	18466	16532 (89.5)	1934 (10.5)	2506.2	0.000
No	3881	2213 (57.0)	1668 (43.0)		
Ultrasound at least once					
Yes	13947	12972 (93.0)	975 (7.0)	2286.43	0.000
No	8400	5773 (68.7)	2627 (31.3)		
During ANC visit told about vaginal bleeding as sign of pregnancy complication					
Yes	2680	2379 (88.8)	301 (11.2)	53.58	0.000
No	19682	16381 (83.2)	3301 (16.8)		
During ANC visit told about convulsions as sign of pregnancy complication					
Yes	1912	1703 (89.1)	209 (10.9)	41.46	0.000
No	20450	17057 (83.4)	3393 (16.6)		
During ANC visit told about prolonged labor as sign of pregnancy complication					
Yes	3063	2717 (88.7)	346 (11.3)	60.8	0.000
No	19299	16043 (83.1)	3256 (16.9)		
Did you receive supplementary nutrition from AWC					
Yes	11863	10298 (86.8)	1565 (13.2)	158.93	0
No	10499	8462 (80.6)	2037 (19.4)		

increasing maternal age (>30 years) had a greater percentage of home delivery as compared to institutional delivery. Not unexpectedly, woman (32.8%) or her husband (32.5%) who was illiterate/below primary had delivered at home. A higher

proportion of women who had four or more number of children delivered at home (43.3%). Home delivery was higher for the women who had not registered their last pregnancy (50.9%). Higher proportion of home deliveries

among the women who were not receiving any supplementary nutrition provided from AWC.



**Figure 2:** Spatial distribution of prevalence of home deliveries in selected states in India, 2012

The Table 2 shows the results of multiple logistic regression model. It demonstrates that how the selected variables are associated with home delivery. Younger age (<20 years) women had a less odds of experiencing home delivery as compared to the women of age group (>30 years) [OR = 0.533, P value = 0.002]. Mothers with education level (secondary/higher) had a lower odds of home delivery as compared to mothers who were illiterate. There is a low risk of home delivery if the last pregnancy was registered [OR = 0.71, P value = 0.000]. Mothers received supplementary nutrition from AWC during last pregnancy had a lower odds of preferring home delivery. There is an increased odds ratio (OR = 1.883) of home delivery for the women who had less than 4 times ANC visit. The odds of home delivery was 2.6 times higher for mothers having more than 4 live children (OR = 2.582, P value = 0.000).

### Discussion

The findings of the current study show 16.1% of births were delivered at home. The institutional deliveries in the country have increased from 38.7% as per the National Family Health Survey (NFHS-III)<sup>[6]</sup> in 2005-06 to 46.9% as per District Level Household Survey (DLHS-III)<sup>[7]</sup> in 2007-08. As per NFHS4<sup>[8]</sup> (2015-16) % of institutional versus home deliveries in India is 79.9% and 21.1%, respectively. Our findings also suggest that significant regional variation exists with respect to choosing the place of delivery. Especially in the north eastern part of India high prevalence of home deliveries are reported. Promoting institutional deliveries is one of the key strategies of Government of India to reduce morbidity and mortality of pregnant women. Under the National Health Mission, the key steps taken by the Government of India to universalize the facility of institutional delivery in the country are: Promotion of institutional deliveries through JSY, a conditional cash transfer scheme. JSSK entitles all pregnant women delivering in public health institutions to free and no expense delivery, including caesarean section. Similar entitlements have been put in place for all sick infants accessing public health institutions for treatment.<sup>[9,10]</sup>

Findings show advanced maternal age and higher parity are strong predictors for home deliveries. This has been shown previously by various studies that poor pregnancy experience during previous deliveries lead to decreased utilization in subsequent pregnancies.<sup>[11-14]</sup> As expected, higher education of pregnant woman is associated with lesser home deliveries as they are more aware of hazards of home deliveries. Woman who received nutrition from Anganwadicenter, registered for ANC and >4 ANC is associated with lesser number of home deliveries. Various studies have supported the role of ANC in increasing institutional deliveries. Higher proportion of woman who registered after 12 weeks delivered at home. Greater number of contacts of pregnant woman with healthcare professionals during ANC check-up leads to better counselling, increased awareness and early detection of high-risk pregnancy hence increased institutional deliveries in this group. Similar findings have been reported in earlier studies too.<sup>[15]</sup> Higher proportion

**Table 2: Results of Multiple logistic Regression models for selected variables**

Variable	Exp (B)	95% C.I. for Exp (B)		P
		Lower	Upper	
Age Group				
>30 years	Ref			0.012
<20 years	0.533	0.357	0.796	0.002
20-25 years	0.752	0.55	1.028	0.074
25-30 years	0.819	0.619	1.085	0.164
Education of Woman				
Illiterate/Below Primary	Ref			0.000
Higher	0.291	0.208	0.409	0.000
Primary to Secondary	0.484	0.39	0.601	0.000
Last pregnancy registered (Yes)	0.71	0.602	0.836	0.000
No. times received ANC (<=4)	1.883	1.629	2.177	0.000
Received supplementary nutrition from AWC during last pregnancy (Yes)	0.796	0.685	0.926	0.003
Total no. of Live Birth (parity)				
<=1	Ref			0.000
>=4	2.582	1.874	3.556	0.000
2-3	1.649	1.259	2.159	0.000



of woman whose pregnancy was uncomplicated (no bleeding, convulsion, prolonged labor) delivered at home. Many studies have shown similar finding that if pregnancy is uneventful woman consider it's safe to deliver at home. It has major implications as woman with inadequate antenatal check-up might not be detected during pregnancy and land up in emergency situations right during the delivery period. The Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) has been introduced with the aim of conducting special ANC check-ups for pregnant women (in their 2<sup>nd</sup>/3<sup>rd</sup> Trimesters of pregnancy) in the country on the 9<sup>th</sup> of every month by Medical Officer/OBGY specialist in the government health facilities and also through private sector on voluntary basis for tracking of high-risk pregnancy to ensure institutional deliveries.

Here role of primary care physician is of prime importance. They act as connecting link between community and higher healthcare facilities. They can act as catalyst to allay apprehensions and counsel woman and family on hazards of home deliveries as they are preserved closer to the community with good understanding of local need and culture. The ASHA also plays an important role in improving access to institutional deliveries by motivating the pregnant mother and her family for continued contact with the health system and ensuring at-least four antenatal check-ups at health facilities, also spreading awareness on the benefit of institutional delivery. Studies have shown positive impact of friendly environment, behavior of healthcare provider and importance given to woman's interest on increasing institutional births. To achieve these one landmark step taken by government of India is launch of LaQshya-labor room and maternity OT quality improvement initiative and midwifery initiative. LaQshya facilities will provide quality health care services to pregnant woman, specially intrapartum and immediate postpartum period and increase beneficiary satisfaction so that they avail services in public health facilities.<sup>[16]</sup> Midwives would build confidence in pregnant woman and promote natural birthing and respectful maternity care.<sup>[17,18]</sup>

It is worth here to mention the limitation of our study that the cross-sectional nature of the data prevents elucidating the direction of the cause and effect relationship of the independent variables with the choice of delivery place. Besides the determinants used in the study there may be some other factors associated with home delivery.

## Conclusion

To reduce preventable maternal deaths deliveries which happen at home needs to be minimized. As this study shows policy makers should focus on increasing awareness of pregnant woman regarding safe deliveries. Though there have been impressive gains in institutional deliveries still the existing gap can be overcome by increasing the quality of healthcare services so as to promote better utilization of healthcare services by pregnant woman and have a positive birthing experience.

## Key messages

1. Though various efforts have been put by Government of India, still considerable number of woman do deliver at Home. Hence current strategies needs to be updated so that every woman delivers in institution and hence further decline in MMR can be achieved.
2. Early registration, antenatal care services along with education plays critical role in promoting institutional deliveries.
3. Importance of primary healthcare professionals needs to be stressed upon to gel the gap between community and healthcare facilities.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. World Health Report. The World Health Report 2005 Make every mother and child count The World Health Report 2005. World Health; 2005.
2. Millennium development goals report. available from: [https://www.un.org/millenniumgoals/pdf/2012\\_Progress\\_E.pdf](https://www.un.org/millenniumgoals/pdf/2012_Progress_E.pdf). [Last accessed 2020 July 30].
3. UNICEF. Maternal and Perinatal death inquiry and response. 2008.
4. Randive B, Diwan V, De Costa A. India's conditional cash transfer programme (the JSY) to promote institutional birth: Is there an association between institutional birth proportion and maternal mortality? *PLoS One* 2013;8:e67452.
5. District level household & facility survey (DLHS-4) [Internet]. Mumbai: International Institute for Population Sciences. Available from: <http://rchiips.org/DLHS-4.html>. [Last accessed on 2020 Apr 29].
6. National Family Health Survey (NFHS-3), 2005-06. India. Mumbai: IIPS; 2007. International Institute for Population Sciences (IIPS), Macro International.
7. District level household & facility survey (DLHS-3) [Internet]. Mumbai: International Institute for Population Sciences. Available from: <http://rchiips.org/PRCH-3.html>. [Last accessed 2020, 30 July].
8. International Institute for Population Sciences. National Family Health Survey-4, State fact sheet Madhya Pradesh, 2015-16: India. Mumbai: IIPS; 2016. Available from: [http://rchiips.org/NFHS/pdf/NFHS4/MP\\_FactSheet.pdf](http://rchiips.org/NFHS/pdf/NFHS4/MP_FactSheet.pdf).
9. Gupta SK, Pal DK, Tiwari R, Garg R, Shrivastava AK, Sarawagi R, *et al.* Impact of Janani Suraksha Yojana on institutional delivery rate and maternal morbidity and mortality: an observational study in India. *J Health Popul Nutr* 2012;30:464-71.
10. Lahariya C. Cash incentives for institutional delivery: Linking with antenatal and post natal care may ensure 'Continuum of care' in India. *Indian J Community Med* 2009;34:15-8.
11. Nwankwo ONO, Ani OE, Akpoke M, Ugwa EA. Determinants of choice of place of delivery among women attending two

- referral Hospitals in Kano North-West Nigeria. *Niger Med J* 2019;60:68-75.
12. Idris SH, Sambo MN, Ibrahim MS. Barriers to utilisation of maternal health services in a semi-urban community in Northern Nigeria: The clients' perspective. *Niger Med J* 2013;54:27-32.
  13. Abuya T, Warren CE, Miller N, Njuki R, Ndwiwa C, Maranga A, *et al.* Exploring the prevalence of disrespect and abuse during childbirth in Kenya. *PLoS One* 2015;10:e0123606.
  14. Sando D, Ratcliffe H, McDonald K, Spiegelman D, Lyatuu G, Mwanyika-Sando M, *et al.* The prevalence of disrespect and abuse during facility-based childbirth in urban Tanzania. *BMC Pregnancy Childbirth* 2016;16:236.
  15. Devkota B, Maskey J, Pandey AR, Karki D, Godwin P, Gartoulla P, *et al.* Determinants of home delivery in Nepal - A disaggregated analysis of marginalised and non-marginalised women from the 2016 Nepal Demographic and Health Survey. *PLoS One* 2020;15:e0228440.
  16. LaQshya Guideline, MoHFW, 2017. Available from: [https://nhm.gov.in/New\\_Updates\\_2018/NHM\\_Components/RMNCH\\_MH\\_Guidelines/LaQshya-Guidelines.pdf](https://nhm.gov.in/New_Updates_2018/NHM_Components/RMNCH_MH_Guidelines/LaQshya-Guidelines.pdf). [Last accessed on 2020 Jun 27].
  17. Broda A, Krüger J, Schinke S, Weber A. Determinants of choice of delivery place: Testing rational choice theory and habitus theory. *Midwifery*. 2018;63:33-8.
  18. Midwifery Guideline, MoHFW 2018. Available from: [https://nhm.gov.in/New\\_Updates\\_2018/NHM\\_Components/RMNCHA/MH/Guidelines/Guidelines\\_on\\_Midwifery\\_Services\\_in\\_India.pdf](https://nhm.gov.in/New_Updates_2018/NHM_Components/RMNCHA/MH/Guidelines/Guidelines_on_Midwifery_Services_in_India.pdf). [Last accessed on 2020 Jun 27].