Does The Preference of Childbirth Locations Changes for Successive Births in India? ***Evidences from States and Regions of India***

Small abstract

The study used the 4th round of National Family and Health Survey, 2015-16 to examine the patterns and shifts in childbirth locations among last two successive births and its determinants at state and regional level. About 16.4% women did switch the childbirth location. Only 1.9% births were in favour of health facility over home which varies largely across at state and regions. Chhattisgarh state observed 6.8% births shifted in favour of health facility, while Madhya Pradesh, Odisha and West Bengal observed in favour of home. The adjusted odds show that women with high parity and large birth interval have higher odds for both switching birth place and in-favour of health facility. Whereas, women with higher education, lower social group, urban areas, not received four antenatal care, and higher wealth quintile have higher odds for switching birth place in-favour of health facility despite lower odds for switching birth place.

Key Words: Successive births, shifting in place of birth, institutional delivery, National Family and Health Survey, India

Extended abstract

Introduction

Though India observed substantial improvement in utilization of health facility for childbirth in last decade[1], majority of the high-risk districts with respect to neonatal mortality are unlikely to achieve the Sustainable Development Goal-3 target for the neonatal mortality rate (NMR) and Under-five mortality rate (U5MR) by 2030[2]. Ample of studies available on factors associated with utilization of institutional birth at national and state level in India. However, these studies focused either among most recent births or average of five years' birth history. None of the studies, attempted to study the pattern of institutional delivery among two successive births at below sub-national level. Few studies attempted to examine the pattern of switch in childbirth locations in low and middle income countries[3] and in India at national level[4]. These studies were based on third round of National Family and Health Survey (NFHS-3) and focused at national level. This study attempted to focus at sub-national and below level to understand the pattern of switching in childbirth location and its direction.

This study examines the patterns and shifts in childbirth location among last two successive births in past five years and the determinants of shifting for successive place of birth at sub-national level. Shifting in place of birth is examined with respect to shifts between a health facility and home at national, state and regional level. The study attempted to address the following research questions. First, does the institutional birth varies across 640 districts and 88 regions in India, and across regions within the states? Second, does the women switch their childbirth location in-favour of health facility for successive birth? Third, does childbirth location change between public facilities and private facilities? Fourth, does the net shifting in childbirth location in-favour of health facility same across states and union territories, and regions of India?

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[1] International Institute for Population Sciences (IIPS) and ICF. 2017. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS.

[2] Bora JK, Saikia N (2018) Neonatal and under-five mortality rate in Indian districts with reference to Sustainable Development Goal 3: An analysis of the National Family Health Survey of India (NFHS), 2015±2016. PLoS ONE 13(7): e0201125. https://doi.org/10.1371/journal.pone.0201125

[3] Johnson FA, Padmadas SS, Matthews Z (2013) Are Women Deciding against Home Births in Low and Middle Income Countries? PLoS ONE 8(6): e65527. doi: 10.1371/journal.pone.0065527

[4] Dixit P and Dwivedi L K. (201). Utilization of institutional delivery services across successive births in India. *International Journal of Population Studies*, vol.2(2): 123–138. http://dx.doi.org/10.18063/IJPS.2016.02.006.

[The Introduction section is under preparation]

Data and methods

Data

The unit data from the fourth round of National Family Health Survey (NFHS-4), conducted in 2015-16, is used in the analysis. The NFHS-4 is a nationally representative population based survey that successfully interviewed 6,01,509 households and 6,99,686 eligible women. For the first time in the NFHS series, the fourth round provides indicators at the district level in addition to state/ union territory (UT), and national level. The NFHS-4 adopted stratified two-stage sample (see IIPS and ICF, 2017[1] for further details regarding sampling design of the survey). The NFHS-4 provides information on population, health, and nutrition. The survey canvased four questionnaires, namely, Household Questionnaire, Woman's Questionnaire for woman in the age group 15-49 years, Man's Questionnaire for man in the age group 15-54 years and Biomarker Questionnaire, using Computer Assisted Personal Interviewing (CAPI). The study examined the outcome variables at national, sub-national and regional level. A region or unit is a cluster of districts within a state according to homogeneity in agro-climatic feature, geographical contiguity, population densities and ecological similarities[5].

Measurements

The retrospective birth histories are analysed in this study. The women who had a live birth in the five years preceding the survey were asked about the childbirth location for all the births taken place in past five years. In this paper, switching of childbirth place is analysed among two most recent births. Thus, the sample is restricted to those women who had at least two childbirths in past five years. Here, twins or triplet births are considered as one. Childbirth at health facility includes births taken place at a public health facility, NGO or trust hospital, and private hospital/maternity home/ clinic. On the other hand, childbirth taken place at respondent's home/ parent's home/ other homes are considered as childbirth at home.

[5] Concepts and definitions used in NSS; Accessed online http://mospi.nic.in/sites/default/files/publication_reports/concepts_golden.pdf

Outcome variable

The study investigated two outcome measures; i) shifts in childbirth place for successive births among last two births indicating shifting from one place of birth to another where, 0=didn't switch, 1= did switch childbirth place (n=59629), and ii) shifts in childbirth from home where, 0=home to home, 1= home to health facility (n=18346) which measures the net shift in childbirth place in favour of health facility. Also the directions in switching of childbirth place between public and private health institutions is examined.

Explanatory variables

The explanatory variables are selected based on the previous literature on determinants of institutional delivery and based on the availability of variables in the data set. These includes maternal age, education of women, education of partner, caste, religion, place of residence, wealth quintile, birth order, birth interval, ever had a terminated of pregnancy, received minimum of four ANC visits, and geographic region.

Statistical analysis

The institutional delivery rate in the five years and separately for last two births were computed at state and regional level. Local Moran's I statistics are computed using Geoda software to examine the spatial pattern of switching childbirth locations and net shift in-favour of health facility for states and regions of India (the results are not discussed in the result section as the analysis is on progress). Multivariate binary logistic regression is used to examine the key predictors of switching of childbirth place and its direction. STATA 15.0 is used for analysis.

Results

Pattern of institutional delivery

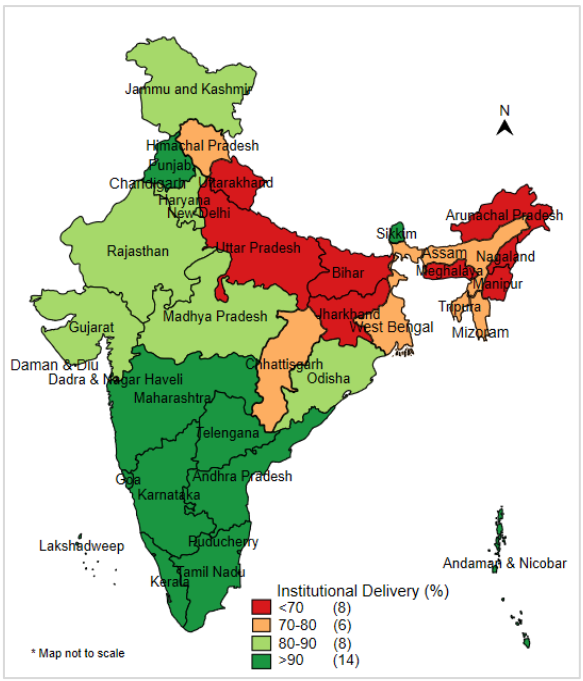
Spatial pattern of institutional delivery rate among the births in past 5 years preceding the survey is provided at state, region and district level. At the national level, 78.9% of births in last five years preceding survey were taken place at a health facility. The institutional birth rate varies widely across states and UTs of India (**Fig 1a**). The institutional delivery varies from 32.8% in Nagaland to 99.8% in Kerala, while among UTs it varies from 84.4% in Delhi to 99.9% in Puducherry. Out of 36 states and UTs, 8 have less than 70% institutional delivery, 6 have 70-80%, 8 have 80-90% and 14 have more than 90%. However, the institutional delivery

rate at regional level shows there are variations in the institutional delivery rate within the states (**Fig 1b**). District level variations are also illustrated in **Fig 1c**. A large intra-state and intra-region heterogeneity in utilization of institutional delivery is observed across the states and regions. For example, among 38 districts in Bihar, the institutional delivery rate varies from 37.2% in Sitamarhi district to 86.4% in Patna which shows nearly 50% points difference.

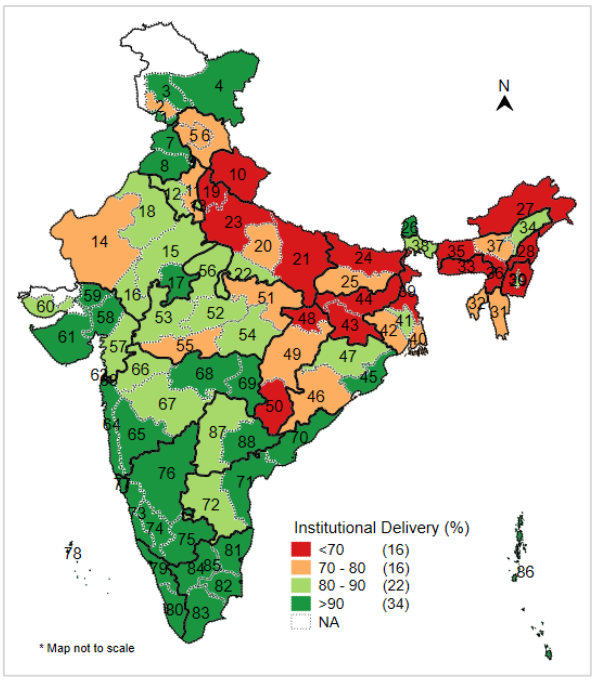
[Result section is under preparation]

Figure 1: Institutional delivery rate among births in last 5 years across states (Fig 1a), regions (Fig 1b) and districts (Fig 1c), NFHS-4

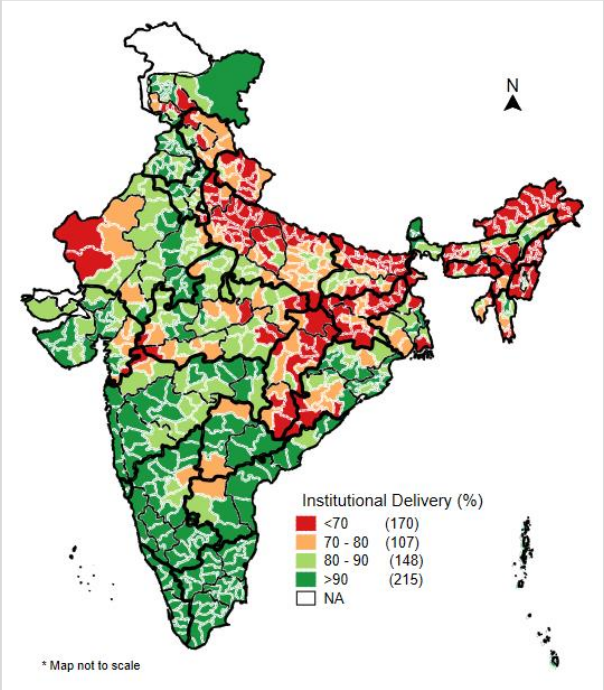
1a. State level



1b. Regional level



1c. District level



Pattern of shifting in choice of childbirth place

Shifting in choice of childbirth location between successive births among the women is evident (**Figure 2**). Majority of the women choose same place for the last childbirth as it was for the second last birth. About 83.6% choose same place of childbirth; 66% choose health facility for both and 17.6% choose home for both. About 16.4% of the women did switch their place of childbirth; 9.1% did switch from home to health facility while 7.3% did switch from health facility to home. **Table 1** presents the switch in choice of childbirth location between successive births with respect to public, private and home. It is evident that switch in childbirth location to public facilities is more (9.2%) compared to switching to private facilities (6.5%). The pattern varies across the states of India.

Figure-2: Choice of childbirth place for the last two successive births in the five years preceding survey.

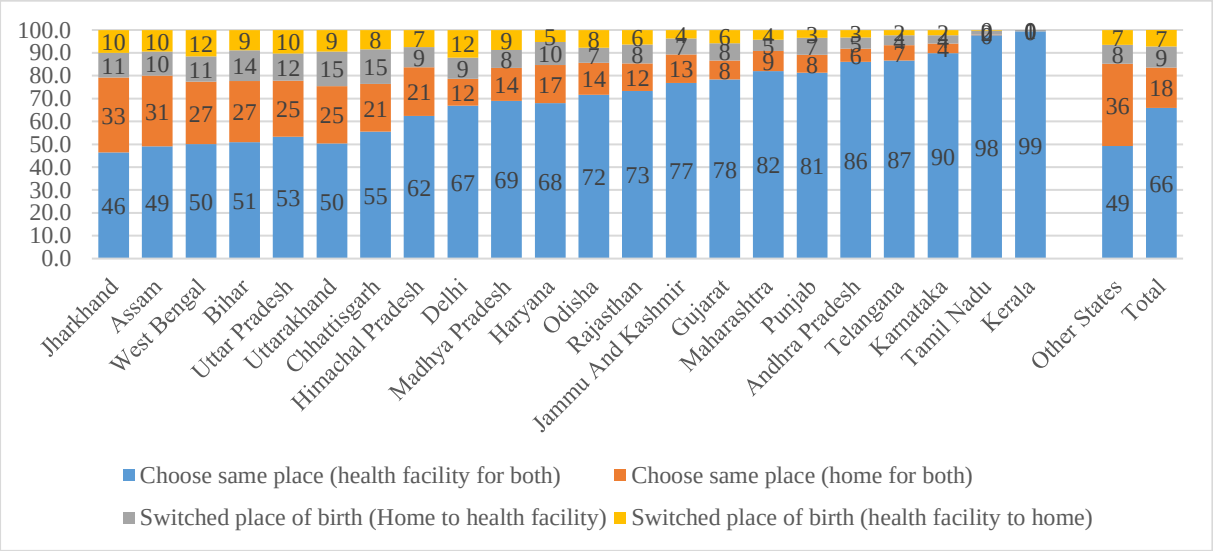


Table-1: Choice of childbirth place for the last two successive births in the five years preceding survey.

	Public to			Private to			Home to			
States	**Public**	**Private**	**Home**	**Public**	**Private**	**Home**	**Public**	**Private**	**Home**	**N**
Andhra Pradesh	29.4	10.5	3.9	4.1	42.0	1.0	1.3	2.0	5.8	770
Assam	42.6	1.3	9.8	2.0	3.3	0.7	9.0	0.5	30.9	1,583
Bihar	36.5	3.5	11.6	2.7	8.2	1.9	7.2	1.7	26.7	7,310
Chhattisgarh	43.5	3.8	14.1	1.5	6.6	1.1	7.7	0.7	20.9	2,198
Delhi	50.4	3.4	6.4	2.5	10.6	2.8	3.8	8.3	11.8	288
Gujarat	27.3	7.5	4.8	5.4	38.2	2.7	3.6	2.2	8.3	1,654
Haryana	42.9	5.2	8.2	4.2	15.7	1.8	3.8	1.5	16.6	1,854
Himachal Pradesh	47.6	3.2	7.2	3.9	7.6	1.6	6.4	1.1	21.4	563
Jammu And Kashmir	69.1	2.6	6.9	2.8	2.3	0.1	3.7	0.0	12.5	1,758
Jharkhand	29.8	3.4	9.0	2.3	10.9	1.8	8.4	1.6	32.8	2,897
Karnataka	58.1	6.1	2.9	4.8	20.8	0.6	2.1	0.3	4.3	1,722
Kerala	28.5	11.1	0.6	3.5	56.3	0.0	0.0	0.0	0.0	300
Madhya Pradesh	60.0	2.4	7.6	1.9	4.8	0.3	8.4	0.3	14.4	6,198
Maharashtra	42.3	9.3	3.5	4.3	26.1	1.4	3.2	1.2	8.7	2,027
Odisha	65.0	1.9	6.1	2.7	2.1	0.4	7.5	0.2	14.0	1,862
Punjab	45.9	7.5	5.1	4.1	23.8	2.4	2.2	1.2	7.9	968
Rajasthan	54.1	5.1	6.7	3.7	10.4	1.5	5.3	1.0	12.1	4,171
Tamil Nadu	65.7	7.4	1.4	4.5	20.1	0.3	0.3	0.0	0.3	1,594
Telangana	23.2	7.0	2.2	4.8	51.7	2.2	1.4	0.8	6.6	580
Uttar Pradesh	33.0	4.0	8.9	3.6	12.6	2.9	7.6	2.8	24.6	10,962
Uttarakhand	30.6	4.2	11.3	2.7	12.9	3.8	7.0	2.5	25.1	1,317
West Bengal	40.5	2.5	9.9	2.9	4.2	1.1	10.2	1.3	27.4	788
Other States	36.6	2.9	7.3	2.1	7.6	1.0	5.5	1.0	36.1	6,265
Total	41.9	5.0	7.5	3.4	15.7	1.7	5.8	1.5	17.6	59,629

Net shift in childbirth place in favour of health facility

The net shift in childbirth place in favour of health facility is computed by taking the difference of percentage switched childbirth place from home to health facility and switched childbirth place from health facility to home. **Figure 3a** and **3b** presents the spatial pattern in % switched in childbirth place and net shift in childbirth place in favour of health facility among states of India respectively. Switching of childbirth place varies largely across states of India from 0.6% in Kerala to 24.5% in Uttarakhand. All the states had observed switching in childbirth place by more than 5% except Kerala (0.6%) and Tamil Nadu (2.0%). 4 states switched childbirth place by 5-10%, 5 states by 10-15%, 4 states by 15-20% and 7 states by more than 20%. Figure 3 clearly shows that all the shifting in childbirth place is not translated to shifting in favour of health facility as only 55.7% of the total shifting were in favour of health facility and 44.3% were in favour of home, which indicating a substantial proportion of births showed movement away from health facility towards home. However, there are large variation across the states with 43.4% in Delhi to 100% in Kerala. There are states where shifting in favour of home is equal or more compared to shifting in favour of health facility.

The institutional delivery has increased by 1.9% among last two births from 73.2% to 75.1%. There is evidence of shifting of birth place in favour of health facility across the states of India except Delhi, Odisha, Madhya Pradesh and West Bengal where the shifting was in favour of home. Among the bigger states of India, Chhattisgarh observed maximum in favour of health facility with 6.8% points increase in institutional delivery from 63.9% to 70.7% for the last birth followed by Uttarakhand (5.7% points), Haryana (4.8% points), Bihar (4.7% points) and Punjab (4.0% points).

Figure 3a. % shifted childbirth place among states of India

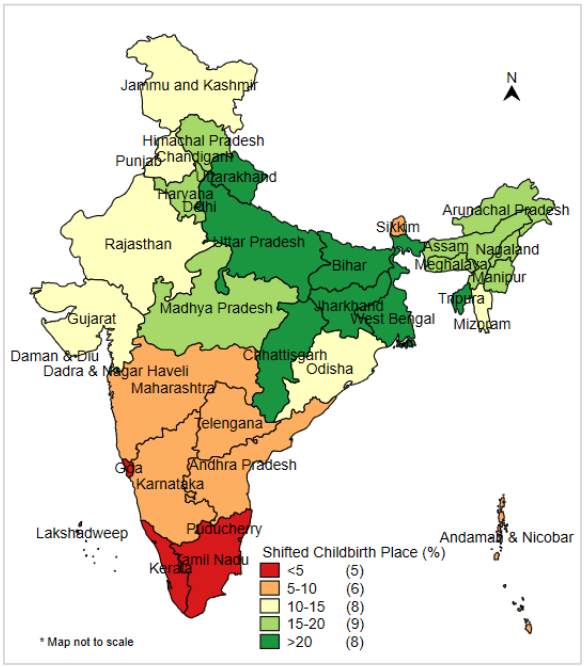


Figure 3b. Net shift in childbirth place in favour of health facility among states of India

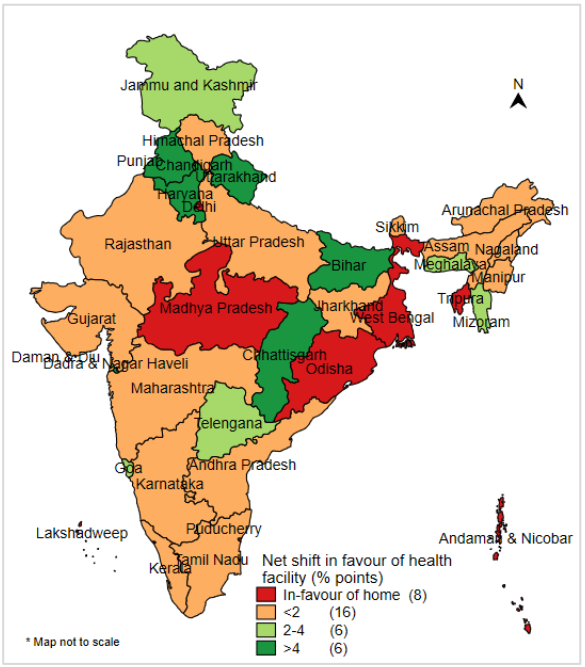


Figure 3c. % shifted childbirth place among regions of India

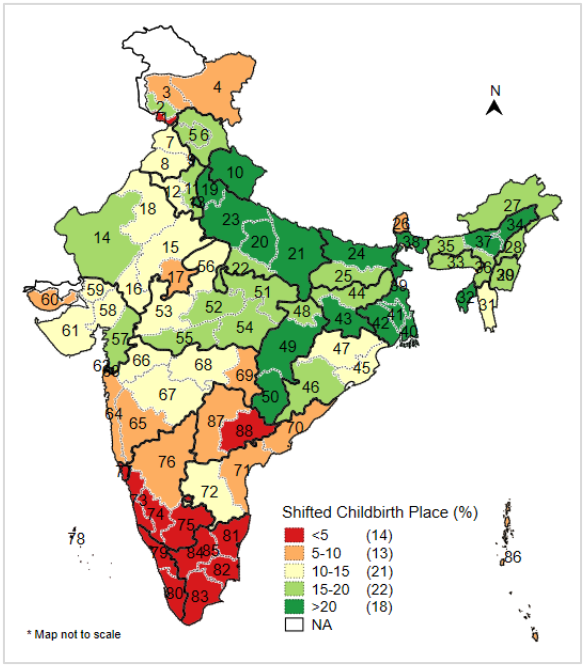
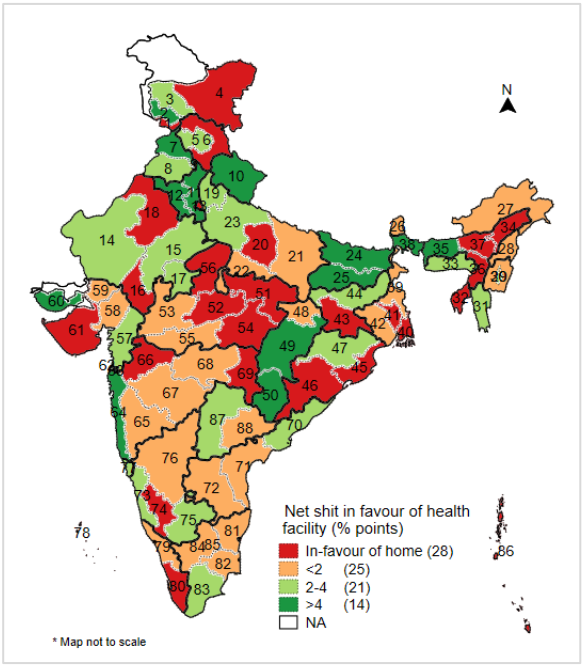


Figure 3d. Net shift in childbirth place in favour of health facility among regions of India



Regions of India			
1.Mountainous_JK	23.Southern Upper GangaPlains_UP	45.Coastal_OR	67.Inland Central_MH
2.Outer Hills_JK	24.Northern_BIR	46.Southern_OR	68.Inland Eastern_MH
3.Jhelam Valley_JK	25.Central_BIR	47.Northern_OR	69.Eastern_MH
4.Ladakh_JK	26.Sikkim	48.Northern Chhattisgarh_CHS	70.Coastal Northern_AP
5.Cental_HP	27.Arunachal Pradesh	49.Mahanadi Basin_CHS	71.Coastal southern_AP
6.Trans Himalayan & Southern_HP	28.Nagaland	50.Southern Chhattisgarh_CHS	72.Inland Southern_AP
7.Northern_PNJ	29.Plains_MN	51.Vindhya_MP	73.Coastal & Ghats_KTK
8.Southern_PNJ	30.Hills _MN	52.Central_MP	74.Inland Eastern_KTK
9.Chandigarh	31.Mizoram	53.Malwa_MP	75.Inland Southern_KTK
10.Uttarakhand	32.Tripura	54.South_MP	76.Inland Northern_KTK
11.Eastern Haryana_HAR	33.Meghalaya	55.South Western_MP	77.Goa
12.Western Haryana_HAR	34.Plains Eastern_ASM	56.Northern_MP	78.Lakhsadweep
13.New Delhi	35.Plains Western_ASM	57.South Eastern_Guj	79.Northern_KER
14.Western_RAJ	36.Cachar Plain_ASM	58.Plains Northern_GUJ	80.Southern Kerala_KER
15.North-Eastern_RAJ	37.Central Brahamputra Plains_ASM	59.Dry areas_GUJ	81.Coastal Northern_TN
16.Southern_RAJ	38.Himalayan_WB	60.Kachchh	82.Coastal_TN
17.South-Eastern_RAJ	39.Eastern Plains_WB	61.Saurashtra	83.Southern_TN
18.Northern_RAJ	40.Southern Plains	62.Daman & Diu	84.Inland_TM
19.Northern Upper Ganga Plains_UP	41.Central Plains	63.Dadra & Nagar Haveli	85.Puducherry
20.Central_UP	42.Western Plains_WB	64.Coastal_MH	86.Andaman & Nicobar Islands
21.Eastern_UP	43.Ranchi Plateau_JKH	65.Inland Western_MH	87.Inland North Western_AP
22.Southern_UP	44.Hazaribagh Plateau_JKH	66.Inland Northern_MH	88.Inland North Eastern_AP

Associated factors of shifting in childbirth place

Table 2: Odds ratios [95% Cis] for switching birth place

	Switching birth place vs didn't switch		Switching birth place from home to health vs didn't	
Background characteristics	Odds Ratio	[95% Conf.]	Odds Ratio	[95% Conf.]
Age				
35+ ©				
<25	1.22***	[1.09 - 1.36]	0.93	[0.8 - 1.09]
25-29	1.10*	[1.00 - 1.22]	1.03	[0.9 - 1.18]
30-34	1.05	[0.95 - 1.17]	1.15	[1 - 1.32]
Education				
No education ©				
Primary	1.05	[0.98 - 1.12]	1.26***	[1.14 - 1.39]
Secondary	0.83***	[0.78 - 0.88]	1.51***	[1.38 - 1.66]
Higher	0.56***	[0.48 - 0.66]	1.85***	[1.38 - 2.46]
Caste				
SC/ST ©				
OBC	0.89***	[0.84 - 0.94]	1.07	[0.98 - 1.16]
None	0.82***	[0.76 - 0.88]	0.99	[0.88 - 1.11]
Religion				

Hindu ©				
Muslim	1.17***	[1.09 - 1.25]	0.70***	[0.64 - 0.77]
Others	0.81***	[0.7 - 0.93]	0.52***	[0.42 - 0.65]
Place of residence				
Rural ©				
Urban	0.91***	[0.85 - 0.98]	0.86***	[0.77 - 0.96]
Birth order				
2 ©				
3	1.24***	[1.17 - 1.31]	1.12**	[1.02 - 1.23]
4+	1.24***	[1.15 - 1.33]	0.96	[0.86 - 1.07]
Birth interval				
<24 months ©				
24-35	0.99	[0.94 - 1.04]	1.10**	[1.02 - 1.19]
36+	1.09***	[1.02 - 1.17]	1.40***	[1.28 - 1.55]
Wealth quintile				
Poorest ©				
Poorer	0.97	[0.91 - 1.03]	1.25***	[1.15 - 1.37]
Middle	0.92**	[0.85 - 0.99]	1.53***	[1.36 - 1.72]
Richer	0.79***	[0.72 - 0.86]	1.77***	[1.52 - 2.05]
Richest	0.49***	[0.43 - 0.56]	1.42***	[1.14 - 1.77]
Ever had a terminated pregnancy				
No ©				
Yes	1.05	[0.98 - 1.12]	1.13**	[1.02 - 1.25]
Received 4+ ANC				
No ©				
Yes	0.80***	[0.76 - 0.85]	1.63***	[1.5 - 1.78]
Region				
North ©				
Central	1.23***	[1.13 - 1.32]	0.85***	[0.75 - 0.95]
East	1.18***	[1.08 - 1.28]	0.90	[0.79 - 1.02]
North East	1.02	[0.86 - 1.21]	0.51***	[0.4 - 0.67]
West	0.71***	[0.64 - 0.79]	0.90	[0.76 - 1.07]
South	0.36***	[0.32 - 0.41]	1.06	[0.87 - 1.28]

© Reference category; *** p<0.01, ** p<0.05, * p<0.1