



Institutional Delivery Trend in Assam- Metadata Analysis of Large Scale Health Surveys in India

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ABSTRACT

Background: Although widespread progress has been made in recent decades, women, children and adolescents still face numerous health challenges, with many factors often affecting each other. This study conducted to analyze trend of institutional delivery in districts of Assam based on large demographic survey and to assess the relationship with ANC check up and MMR.

Methods: Secondary data related to Annual health survey (AHS)-baseline, AHS-2nd updation, National Family Health Survey (NFHS), Health Management information system (HMIS)-2016-17, DLHS-III. Analysed using appropriate software package and expressed in terms of proportion, mean, regression etc.

Observations: As per AHS 2nd updation, NFHS 4 and HMIS (16-17) overall Assam institutional delivery rate is 65.9%, 70.6% and 86.55% respectively. Comparing between AHS baseline and 2nd updation, a decreasing trend observed in 10 district of Assam; 10.1% increase in deliveries occurring in govt. institution and Caesarean section in govt institution ranges 5.1%- 18.4% (Assam-10.6%). Significant relationship in Antenatal check up, decline in maternal mortality ratio (MMR) with institutional delivery.

Conclusion: The present analysis observed inter-district variation which is evident from antenatal visit coverage and institutional delivery rates and significant.

Keywords: Institutional delivery, Assam, Annual Health Survey, NFHS

INTRODUCTION

Globally, the maternal mortality ratio nearly halved between 1990 and 2015. However, progress was patchy, with only nine countries with an initial maternal mortality ratio greater than 100 achieving the Millennium Development Goal (MDG) 5 target of 75% reduction, twenty six countries made no progress, and in twelve countries including the USA where maternal mortality ratios increased.¹ Three-quarters of women now deliver with a skilled birth attendant and two-thirds receive at least four antenatal care visits worldwide.^{2,3}

The annual death toll remains unacceptably high: 289,000 maternal deaths, 2.6 million stillbirths, 5.9 million deaths in children under the age of five—including 2.7 million newborn deaths—and 1.3

million adolescent deaths.⁴⁻⁶ Although widespread progress has been made in recent decades, women, children and adolescents still face numerous health challenges, with many factors often affecting each other.⁷

South-East Asia and sub-Saharan Africa contribute to 90% of the maternal mortality in the world and less than 5% of all people in these regions have access to emergency services such as the caesarean section. The South-East Asia (SEA) Region accounts for more than 174 000 maternal and 1.3 million neonatal deaths every year, which is approximately a third of the global burden.⁸

In India, Reproductive Child Health (RCH)-II is the main vehicle for the delivery of maternal and child health(MCH) by the health system. The aim is to

create a core of facilities so that women can deliver safely, and sick infants can get adequate care at the right time.⁸ In 2005 the Government of India launched Janani Suraksha Yojana (JSY), an integral component of National Rural Health Mission (since 2013 the program has been called the National Health Mission [NHM]), to promote institutional delivery.⁹ According to NFHS 4(2015-16), the institutional birth India is 78.9%. However, it is evident from [Fig-A1.1] that there is interstate variation within states. The present metadata analysis of major health surveys conducted in India with special reference to Assam is aimed to analyze the trend of institutional delivery rates in districts of Assam; to assess the relationship of antenatal check up with institutional delivery rate and to assess changes in MMR with increase in institutional delivery rate.

METHODS

Study area: Assam is one of the Nine Empowered action group (EAG) states with 2.58% of the total population of India, constitute 2.7% of total births, 3.5% of infant deaths, 3.5% of Under five Deaths in bigger States, 4.5% of Maternal Deaths in bigger States; the urban population in India is 31.2% whereas in Assam it is 14.10%. Sex ratio for Assam is 958 whereas for India is 943. [Source: statistical hand book Assam].

For looking at institutional delivery trend in the present article, Annual health survey (AHS)-baseline, AHS-2nd updation, National Family Health Survey (NFHS), Health Management information system (HMIS)-2016-17, DLHS-III is included because of availability of district level data for the period.

Annual Health Survey: The baseline Survey and the first updation survey in all the nine AHS States was carried out during July 2010 to March 2011 and October 2011 to April 2012 respectively. Reference period (i.e. 01.01.2007 to 31.12.2009 for baseline and 01.01.2010 to 31.12.2010 for first updation survey and for the 2nd round updation is 1st Jan to 31st December 2011).

It is the largest sample survey in the world covering more than 40 lakh households and 20 million

persons residing in 20,000 sampling units spread across 284 districts in 9 States of the country has indeed been a challenging task. 9 states are Bihar, Jharkhand, Odisha, Rajasthan, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttarakhand & Assam.¹⁰

NFHS: The first NFHS was conducted in 1992-93, and the second (NFHS-2) was conducted in 1998-99. All three NFHS surveys were conducted under the stewardship of the Ministry of Health and Family Welfare (MOHFW), Government of India. The MOHFW designated the International Institute for Population Sciences (IIPS), Mumbai, as the nodal agency for the surveys.¹¹ NFHS-4 is a national sample survey designed to provide information on various demographic parameters and other family welfare and health indicators by background characteristics at the national and state level and for the first time at the district level as well. Given the need to report demographic and health indicators at the district level, the NFHS-4 sample size has been increased to approximately 571,660 households, as compared with 109,041 households in NFHS-3.¹² the reference period for data collection for NFHS1-4 is given in **Table-1**.

DLHS III: The District Level Household and Facility Survey (DLHS-3) on Reproductive and Child Health (RCH) carried out during 2007-08 was designed to collect data at the district level on various aspects of health care utilisation for RCH and accessibility of health facilities, assess the effectiveness of ASHA and JSY in promoting RCH care, to assess the health facility capacity and preparedness in term of infrastructure. DLHS -3 is the third in the series of district survey, preceded by DLHS-1 in 1998-99 and DLHS-2 in 2002-04.¹³

Sources of secondary data are Government of India websites namely <http://www.rchiips.org/nfhs>; <https://nrhm-mis.nic.in>; and <http://censusindia.gov.in>. All data sources were thoroughly searched and compiled relevant to the study objectives and analyses using percentage, proportion, correlation, regression and represented in tables and graphs.

Permission obtained from data dissemination unit (DDU), Registrar General of India, Census for use of AHS and SRS data for metanalysis.

Table-1 Reference period for 4 NFHS

Survey	Reference period of women aged 15-49 year
NFHS-1(1992-93)	Mothers of all children born since 1 January 1988 where NFHS initiated in 1992; 1 January 1989 where it was carried out in 1993.
NFHS-2(1998-99)	Women age 15-49 who gave birth since 1 January 1996.
NFHS -3(2005-06)	Women who gave birth in the five years preceding the survey. The fieldwork in Assam was conducted by TNS India Private Limited between December 2005 and April 2006
NFHS-4(2015-16)	All births since January 1, 2010.

RESULTS

For results it is divided into subsection, a) Comparative findings from AHS,NFHS- 4 and HMIS (2016-17); b) Comparison AHS-Baseline (10-11) & 2nd Updation (12-13); c) Institutional Delivery (%) in Govt & Pvt institution in Districts of Assam[Fig-2]; and 4) Caesarean section(%)in Govt & Pvt institution in Districts of Assam [Fig-3]

Trend institutional delivery rate between AHS Baseline 2nd update & AHS 2nd update NFHS-4

Comparative findings from AHS,NFHS- 4 and HMIS(2016-17)

According to AHS 2nd updation, NFHS 4 and HMIS (16-17) overall Assam institutional delivery rate is 65.9% [Range- Karimganj 38.2% to Nalbari 87.4%], 70.6% [Range- Dhubri 43.6% to Jorhat 95.9%] and 86.55% [Range- Dhubri 53.15% to Dibrugarh 99.67%] respectively.

A decreasing trend in change of institutional delivery rate has been observed in 10 district of Assam between AHS-2nd updation and NFHS 4 [Fig-1], the districts in decreasing order are Marigaon, Dar-

rang, Dhubri, Tinsukia, Sivasagar , Kamrup rural , Lakhimpur, Nalbari, Karbi Anglong and Dima Hasao.

Barpeta and Dhemaji which showed similar lower trend of below State value. 11 districts which showed similar increasing trend in between AHS baseline & 2nd Updation & between AHS-2nd & NFHS 4,the names are Cachar, Dibrugarh, Kokrajhar, Nagaon, Karimganj, Bongaigaon, Hailakandi, Jorhat, Golaghat, Goalpara, Sonitpur respectively in increasing order.

Sonitpur HMIS data almost correspond to NFHS 4 (difference 0.73%). Dima Hasao HMIS data shows similar decrease rate as seen in AHS & NFHS 4. Karbi Anglong reported 86.11% as compared to 59.5% and 50.2% in AHS & NFHS 4 respectively. There is difference in HMIS data with that of NFHS 4,14 districts have more than State average(15.95 percent point) namely Hailakandi, Karimganj, Chirang, Darrang, Tinsukia, Udalguri, Bongaigaon, Goalpara, Cachar, Barpeta, Dhemaji, Nagaon, Kokrajhar, Karbi Anglong in increasing order.

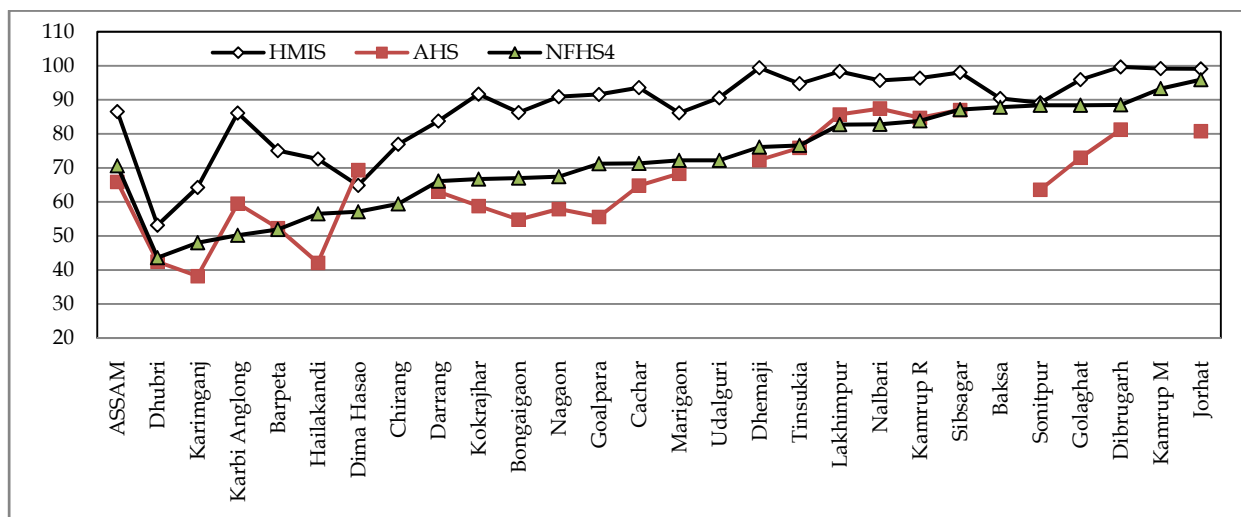


Fig-1: Institutional delivery rate as per HMIS, NFHS4, AHS(2nd Updation)

Comparison AHS-Baseline (10-11) & 2nd Updation (12-13)

Institutional Delivery (%) in Govt & Pvt institution in Districts of Assam: Overall state increase in percent of deliveries occurring in Govt institution is 10.1% between AHS baseline and 2nd updation. Delivery rate at Govt health institution has increased in all districts corresponding to the increase in total institutional deliveries. However, there were 11 districts where the delivery rate at Govt institution was less than overall state performance the names of districts in increasing order are Sibsagar, Tinsukia, Barpeta, Dhemaji, Kamrup, Nalbari, Karimganj, Dibrugarh, Dhubri, Golaghat and Kokrajhar. 3 districts namely Karimganj, Di-

brugarh and Kokrajhar however showed increasing trend in total institutional deliveries between AHS-2nd and NFHS 4.

For deliveries occurring in private institution there is overall a decreasing trend observed. More than 1% increase in deliveries at private institution is seen in Sonitpur, Nalbari, Nagaon, Dibrugarh, Kamrup, Sibsagar, Tinsukia districts respectively in increasing order. In districts Sibsagar, Tinsukia, Kamrup, Nalbari, Dibrugarh where delivery at Govt institution less but more than 1% increase in delivery occurred at private institution. There was no change recorded in Cachar district between AHS Baseline and 2nd updation.

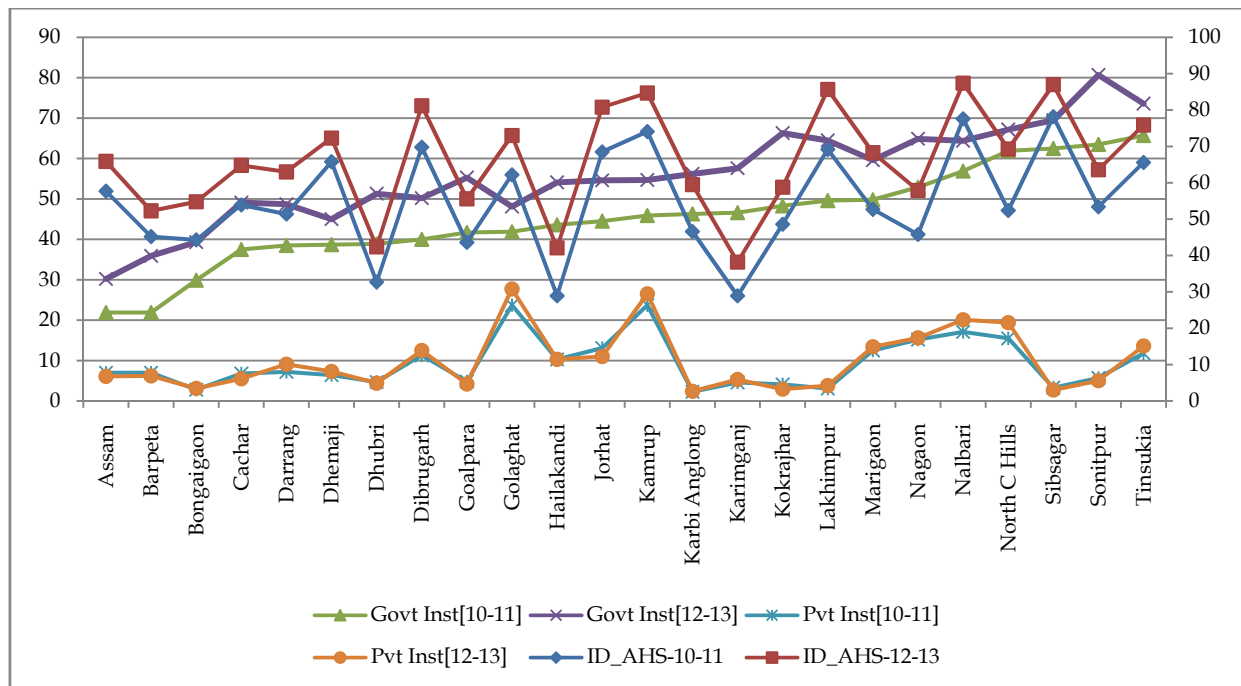


Fig-2 Institutional delivery (ID)%, Delivery conducted in Govt % & Pvt Institution % in Districts, Assam (AHS- Baseline & 2nd updation)

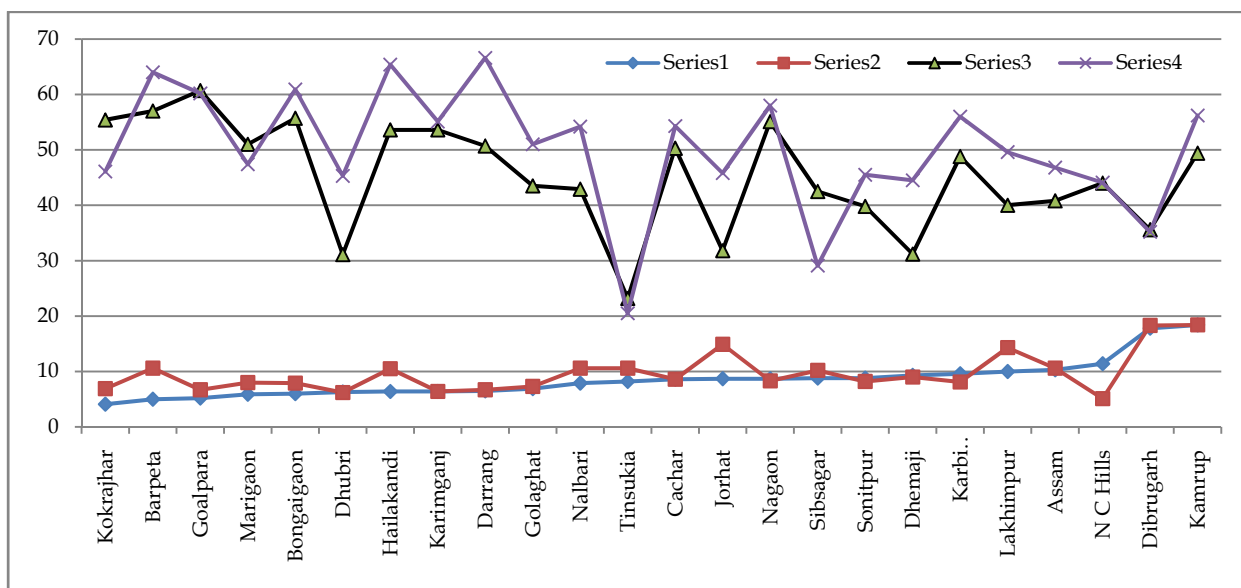


Fig-3: % C-S in Govt and Pvt institutions during AHS-B & AHS-2nd

Caesarean section (%) in Govt & Pvt institution in Districts of Assam [Fig-3]

Caesarean section taking place in govt institution, out of total delivery, ranges from minimum 5.1% in NC Hills and maximum 18.4% in Kamrup (Assam-10.6). Comparing to baseline data increase in Caesarean section in Govt institution was observed in Sibsagar, Goalpara, Bongaigaon, Marigaon, Tinsukia, Nalbari, Kokrajhar, Hailakandi, Lakhimpur, Barpeta, Jorhat district.

Highest increase observed in Jorhat (6.2%), followed respectively by Barpeta (5.6%), Lakhimpur

(4.3%), Hailakandi (4.1%). Decrease rate is observed in North Cachar Hills, Karbi Anglong, Sonitpur, Nagaon, Dhemajji, Dhubri.

Rate of Caesarean section in pvt institution, out of total delivery, ranges from 20.5% in Tinsukia to 66.6% in Darrang [Assam-46.8%].

Kokrajhar, Tinsukia, Marigaon, Goalpara, Sibsagar (13.4%), Dibrugarh district show decrease in CS in private institution. Highest decrease rate observed in Sibsagar (13.4%) followed by Kokrajhar (9.3%) and for rest other districts there was marginal decrease.

Trend institutional delivery rate between AHS Baseline -2nd update & AHS 2nd update - NFHS-4

Between AHS baseline and 2nd Updation, the overall state increase in Institutional delivery rate is 8.2%. Dhemaji & Barpeta recorded 6.5% and 7.1% increase respectively which is less than state performance, rest in all 21 districts showed increased rate, highest has been observed in Dima Hasao (16.9%) followed respectively by Lakhimpur (16.5%), Marigaon (15.6%), Hailakandi (13.2%), Karbi Anglong (12.9%), Jorhat (12.3%), Nagaon (12.1%), Goalpara (12%), Darrang (11.6%), Dibrugarh (11.4%), Cachar (10.9%), Golaghat (10.8%), Kamrup (10.6%), Bongaigaon (10.5), Tinsukia (10.3%), Sonitpur (10.2%), Kokrajhar (10.2%), Nalbari (9.8%), Dhubri (9.7%), Karimganj (9.3%) and Sibsagar (8.8%).

11 districts which showed similar increasing trend in between AHS baseline & 2nd Updation & between AHS-2nd & NFHS 4, the names are Cachar (6.5%), Dibrugarh (7.3%), Kokrajhar (7.9%), Nagaon (9.5%), Karimganj (9.8%), Bongaigaon (12.2%), Hailakandi (14.4%), Jorhat (15.1%), Golaghat (15.4%), Goalpara (15.6%), Sonitpur (24.8%).

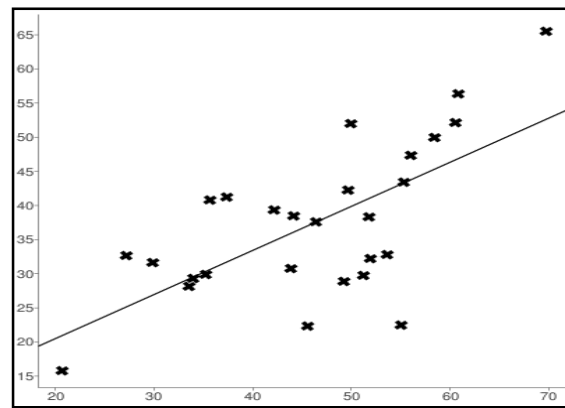
A negative change or less than the State of 4.7% difference in institutional delivery rate between AHS-2nd updation and NFHS 4 has been reported in 10 district of Assam in decreasing order are Marigaon (3.9%), Darrang (3.1%), Dhubri (1.2%), Tinsukia (0.7%), Sivasagar (0.1%), Kamrup rural (-0.9%), Lakhimpur (-3%), Nalbari (-4.6%), Karbi Anglong (-9.3%) and Dima Hasao (-12.2%).

14 districts have difference of more than state HMIS value (15.95%) namely Hailakandi (16.09%), Karimganj (16.25%), Chirang (17.53%), Darrang (17.64%), Tinsukia (18.14%), Udalguri (18.39%), Bongaigaon (19.27%), Goalpara (20.38%), Cachar (22.26%), Barpeta (23.17%), Dhemaji (23.30%), Nagaon (23.52%), Kokrajhar (24.96%), Karbi Anglong (35.91%) in increasing order.

However, there were 11 districts where the delivery rate at Govt institution was less than overall state performance the names of districts in increasing order are Sibsagar (5.3%), Tinsukia (6.2%), Barpeta (6.3%), Dhemaji (7%), Kamrup (7.5%), Nalbari (7.9%), Karimganj (8.3%), Dibrugarh (8.8%), Dhubri (9.4%), Golaghat (9.8%) and Kokrajhar (9.9%).

As regards to deliveries occurring in private institution there is decreasing trend observed in overall state which is -2.1%. more than 1% increase is seen in districts such as Sonitpur (1.2%), Nalbari (1.8%), Nagaon (1.9%), Dibrugarh (2.8%), Kamrup (3%), Sibsagar (3.9%), Tinsukia (4%) respectively.

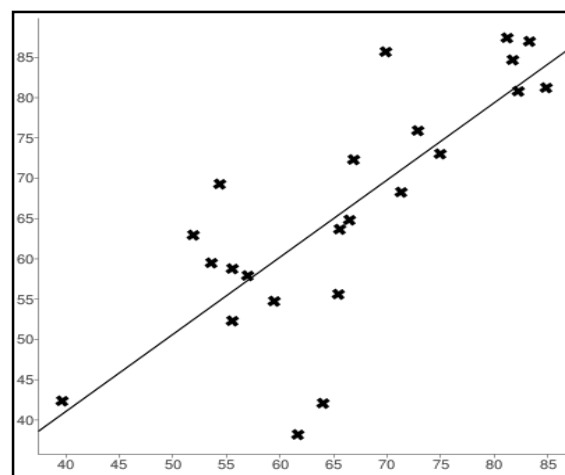
Relation of Antenatal visits with institutional delivery [Annex-1, Table-A.1]



Regression line equation: $y=7.5992188687498+0.645413202997x$; Correlation coefficient(r):0.66036489702366,df=26,two tailed p-value equal 0.0001

Figure 4a: Regression Scatter plot-DLHS III

AHS (Updation)



Regression line equation: $y=2.7313983554912+0.95793764415589x$; Correlation coefficient(r):0.77218242248977, df=22,two tailed p-value 0.0001

Figure 4b Regression Scatter plot-AHS-Updation

MMR Decline with increase in Institutional delivery rate [Fig-5]

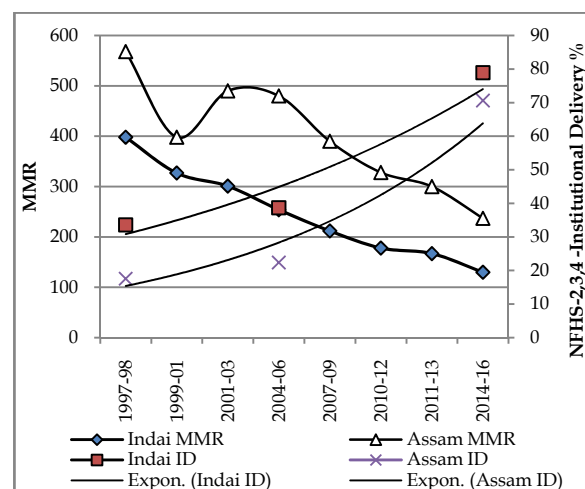


Fig-5 MMR Decline with increase in Institutional delivery rate

DISCUSSION

Population-based surveys are an invaluable source of health information.¹⁴ As national health surveys are resource-intensive, it would be wise to maximize the knowledge gained from them that could be used to improve population health in India.¹⁵ In India, there has been 68.7% change in MMR between 1990 and 2015 from 556 to 174.⁵ Similar to the present finding utilization of antenatal care and skilled delivery service has significantly and negatively associated with MMR.¹⁶ The present observation of difference in performance in districts of Assam corroborate findings from a study on efficiency of health care system at sub-state level (i.e., district level) in India using Assam state and its district level data where it has been found that the low performing districts have been not able to utilize existing medical institutions and beds capacity due to the constraint of inadequate medical manpower, higher population density, higher rural populations, lower literacy levels and lack of comparable roads development relative to efficient districts in the state.¹⁷

CONCLUSION

Providing maternity care in a given setting is, in part, a function of available resources and existing infrastructure—including the private sector, human resources, financing, and factors such as geography, population density, facility density and capability, and distance between peripheral and referral centres.¹⁸ The present analysis also observed similar factors responsible for inter-district variation which is evident from antenatal visit coverage and institutional delivery rates finally contributed to higher maternal mortality rate in Assam compared to other states. The present RMNCH+A approach and special focus to high priority districts (HPDs) will appreciably bring equity within health system by addressing the local factors and barriers in accessing and providing service delivery to the vulnerable groups.

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Annexure 1

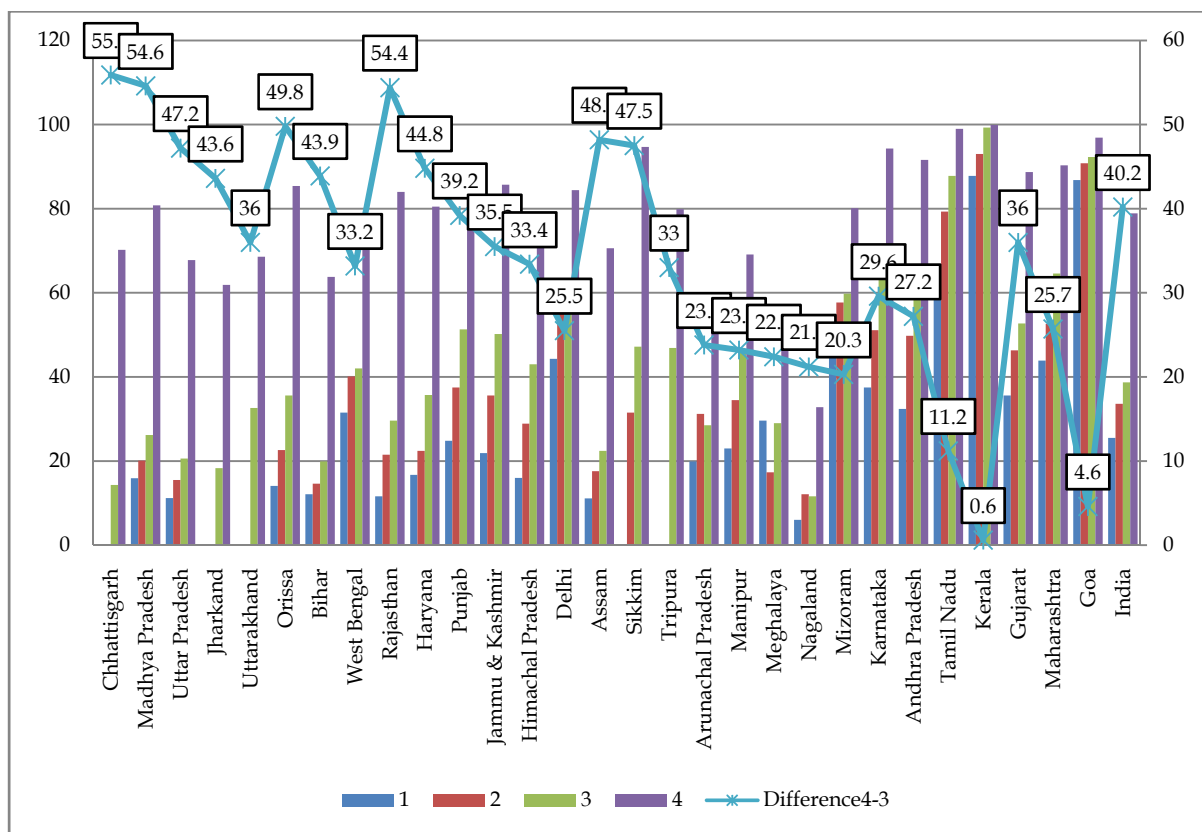


Fig-A 1.1 Institutional delivery (%) in 29 states of India according to NFHS-1,2,3&4

Table-A1.2

Sr No	District	DLHS III		AHS-Updation		NFHS 4	
		Inst Del	3 ANC	Inst Del	3 ANC	Inst Del	4 ANC
1	Assam	35.1	45	65.9	66.2	70.6	46.5
2	Dhubri	15.8	20.7	42.4	39.7	43.6	26
3	Kokrajhar	32.6	27.2	58.8	55.6	66.7	39.1
4	Dhemaji	31.6	29.9	72.3	66.9	76.1	49.1
5	Goalpara	28.2	33.5	55.6	65.4	71.2	42.1
6	Chirang*	29.3	33.9			59.4	41.2
7	Bongaigaon	29.9	35.2	54.8	59.5	67	24.2
8	North Cachar Hills	40.8	35.7	69.3	54.4	57.1	35.1
9	Lakhimpur	41.3	37.3	85.7	69.9	82.7	59
10	Golaghat	39.4	42.2	73	75	88.4	62.5
11	Marigaon	30.7	43.9	68.3	71.3	72.2	43.1
12	Darrang	38.4	44.2	63	51.9	66.1	39.9
13	Karimganj	22.4	45.6	38.2	61.6	48	37.1
14	Karbi Anglong	37.6	46.4	59.5	53.6	50.2	38.1
15	Barpeta	28.8	49.3	52.3	55.6	51.9	47.5
16	Sonitpur	42.2	49.7	63.6	65.6	88.4	42
17	Nalbari	52	49.9	87.4	81.2	82.8	49.2
18	Nagaon	29.8	51.2	57.9	57	67.4	46.2
19	Baska*	38.3	51.8			87.8	49.8
20	Cachar	32.2	51.9	64.8	66.5	71.3	51.3
21	Udalguri*	32.8	53.6			72.2	37
22	Hailakandi	22.5	55.1	42.1	64	56.5	34.5
23	Tinsukia	43.4	55.3	75.9	72.9	76.6	56.1
24	Jorhat	47.4	56	80.8	82.3	95.9	75.8
25	Dibrugarh	49.9	58.4	81.2	84.8	88.5	67.6
26	Sibsagar	52.2	60.6	87	83.3	87.1	70.8
27	Kamrup(Metro)*	56.3	60.8			93.3	56.9
	Kamrup	65.5	69.7	84.7	81.7	83.8	40.4

Note:* AHS was not conducted in these districts.