Facility Mapping:
A Tool for Effective Planning

Background

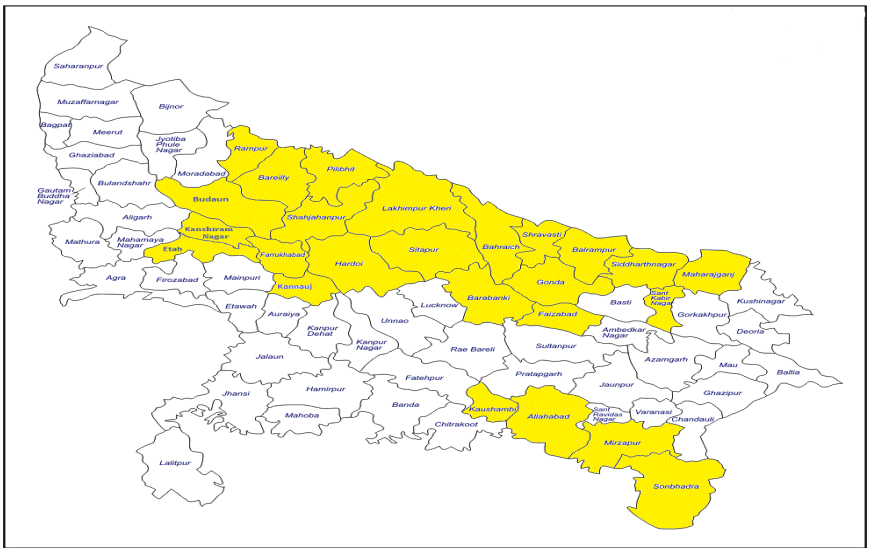
The National Rural Health Mission (NRHM) in Uttar Pradesh (UP) is being implemented to tackle the high burden of maternal, neonatal and child morbidity and mortality in its rural populations, by improving the availability of and access to quality health care for the people, especially those residing in the rural areas. In order to achieve these goals, the state needed to first map all the public and private health care facilities according to the populations and geographies that they cover, documenting the infrastructure, human resource, drugs, equipment and supplies. Mapping helps to identify and plan for minimizing the gaps that exist in the availability and accessibility of critical reproductive, maternal, newborn and child health services. In this context, the University of Manitoba and the Karnataka Health Promotion Trust carried out a mapping of all health facilities in the 25 high priority districts[1] of UP, with financial support from the Bill & Melinda Gates Foundation.

These 25 HPDs have a total population of 59 million, 29% being rural, organized into 294 Blocks. During June 24 to October 9 2013, over 8,200 health facilities were mapped – 6,358 Sub-Centers (SCs), 856 Primary Health Centers (PHCs), 324 Block Primary Health Centers or Community Health Centers (BPHCs/CHCs), 24 District Hospitals (DHs), and 731 private facilities.

Methodology

Facilities were identified through lists provided by state and district officials. As these lists were not complete, snowballing was conducted to identify unlisted public and private facilities. Private facilities were defined as all private hospitals, nursing homes or clinics providing delivery services. The mapping tools (specific to facility types) were developed largely in accordance with appropriate service guidelines and were finalized in consultation with a team of experts from the UP-NRHM, and BMGF. The tools were designed to capture details of: population/ villages covered physical infrastructure, staff, drugs, equipment, supplies, services (antenatal care, delivery, postpartum, postnatal, abortion, new born and child), certain service statistics, and use of facilities' untied funds.

Figure 1: Twenty-five high priority districts of Uttar Pradesh



[1] Include 19 high focus districts according to the Government of India's classification and 6 low performing districts as per Government of UP's own classification.

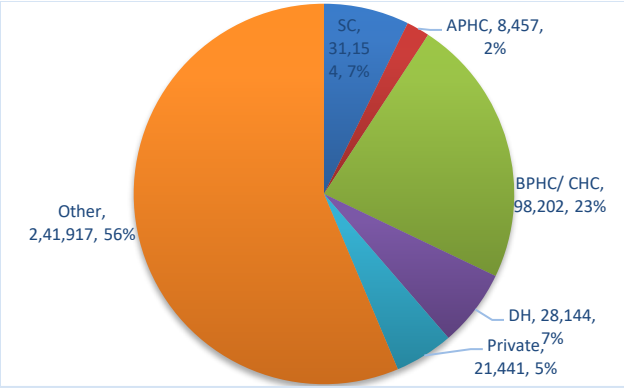
The facility mapping team consisted of 125 field researchers and 25 data quality supervisors, grouped into 25 teams of 5 field researchers and 1 data quality supervisor, each. Five such teams were deployed in each of the 5 zones, each zone consisting of about 5 districts. The field researchers were largely the individuals local to the zone who had completed – or were pursuing – Master in Public Health degrees in local medical colleges/institutions, or Post-Graduate degree in social sciences. The auxiliary nurse midwives (ANMs) at the SCs, medical officers' in-charge (MOIC) at the PHCs and CHCs and the chief medical superintendents (CMSs) at the DH, were the primary respondents.

Findings

The available delivery points are grossly inadequate in relation to the need.

The public facilities in the 25 HPDs of UP conducted only 39% of the expected number of deliveries in the quarter ending May 2013 (Figure 2). A total of 429,315 deliveries are expected in these districts based on their population as per 2011 census and the 2011-12 CBR as per the AHS. A total of 187,398 deliveries were reported for the quarter ending May 2013, as per the documents maintained at the facilities. The "missing" deliveries are most likely to occur at homes, at private facilities that are missed by the mapping and at facilities that did not maintain records for the deliveries conducted.

Figure 2: Distribution of expected number of deliveries according to place of delivery



The low proportion of institutional deliveries, which is one of the major reasons for high mortality among mothers and newborns, is largely due to the fact that ***most facilities that are mandated to provide delivery services are not providing these services***. Over 80% of the 856 PHCs do not provide delivery services. Similarly, only about 2% of the 4000 SCs conduct deliveries. Although over 50% of the PHCs have labour rooms, a large majority of them do not have the sanctioned positions of staff nurses, the key personnel for conducting safe deliveries.

More importantly, ***there are far fewer health facilities per population in these HPDs than it is nationally recommended*.** For instance, the population covered by a sub-center in the 25 HPDs is about 8,000 on average, compared to the national recommendation of one sub-center per 5,000 rural population. Thus, there is a 40% shortage of the required 11,809 sub-centers. Similarly, there are only 856 PHCs in these HPDs against the recommended 1,968 PHCs, at the rate of one PHC per 30,000 rural population. On average, a PHC in these HPDs covers a population of 69,000, and these districts have only about 44% of the required number of PHCs. The average population per CHC is about 182,000 and 168 additional CHCs are required if we consider the national recommendation of one CHC for every 120,000 population.

Within the public sector health facilities, the BPHCs/CHCs contribute over half of the reported deliveries from institutions, and have the highest delivery load (an average of 115 deliveries a month) next only to the DHs. The contribution of SCs is unexpectedly higher than that of the DH (17% versus 15%). However, the DHs are fewer in number and have very high delivery loads (390 a month, on average) compared to the SCs. The SCs that conducted deliveries had an average of 12 deliveries a month, with 63% conducting <10

deliveries a month and 10% reporting 30+ deliveries a month. The generally low delivery volumes pose a challenge in maintaining the skills of the ANMs. At the same time, inadequate infrastructure in the few SCs with higher delivery loads is a challenge in ensuring quality of delivery services in SCs.

The contribution of private sector in providing the delivery services seems to an under-estimate, as not all private facilities providing delivery services were mapped, and not all of the private facilities mapped divulged the data on the number of deliveries conducted there. However, it is important to note here that in most Blocks/districts, the even the private facilities providing delivery services are very few and far between. The PHCs accounted for only 5% of the total institutional deliveries in these 25 HPDs.

Not all the 294 Blocks in HPDs have equal availability of delivery points, resulting in a disproportionately low percentage of institutional deliveries. There are not enough public health facilities that are conducting deliveries to meet the delivery needs in most of the Blocks. For instance, in 40 (14%) Blocks, the existing delivery points conducted only 10% or fewer of the total expected deliveries in that Block. In 42% of the Blocks, the existing delivery points in the block could conduct only 25% or less of the total expected deliveries in that block.

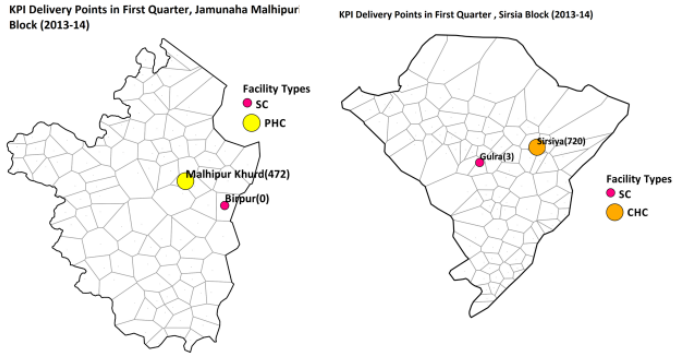
Table 1: Distribution of 294 Blocks in the 25 HPDs of Uttar Pradesh, according to the reported percentage of deliveries in public health facilities

% of reported deliveries in public health facilities	# of Blocks	% of blocks
<10%	40	14
<25%	122	42
<50%	256	87
<75%	287	98

Figure 3 provides examples of two Blocks of district Shrawasti with inadequate delivery services. A total of 1600-1700 deliveries are expected in these two blocks per quarter, and the two delivery points in each Block cater to less than half of the expected deliveries. It would be a challenge to increase the proportion of institutional deliveries without activating additional delivery points in these Blocks as the existing delivery points are already overloaded (each of the BPHC/CHCs conduct over 100 deliveries a month).

Thus, the non-availability of adequate number and distribution of health facilities in general and of delivery points in particular, seems to a critical gap in these HPDs of Uttar Pradesh.

Figure 3: Examples of Blocks with inadequate delivery points



The facility mapping in 25 HPDs also highlighted the gaps in the availability of CEmOC facilities. Based on the GoI's recommendation of 2 CEmOC facilities per million population, the 25 HPDs will require about 186 CEmOC facilities. However, currently, only 16 public health facilities are providing all the 9 signal functions of a CEmOC facility. ***The average distance from a CHC to a C-section facility (incl. private) is 32 km***[2], 34 km to Blood Bank, and intensive new born care unit is 33km. About 12% of the deliveries in District Hospitals and less than 1% of the deliveries in BPHCs/CHCs were reported to be Caesarian.

In sum, the supply of delivery points does not meet the need for delivery services per population or geography.

[2] If the facility itself allows for deliveries, distance is taken as 0 km.

The public health facilities are grossly inadequate in terms of infrastructure, human resource, the availability of essential services, equipment, drugs and supplies (EDS)

General infrastructure

The general infrastructure in the 328 CHCs in the 25 HPDs is quite good (Table 2). However, almost one in 10 SCs in these districts do not have a building and 67% of the ANMs do not stay in the SC headquarters. **Availability of safe and clean water in the SCs and PHCs is poor**, as only 7% and 27%, respectively, have access to tap water. Only 45% of the SCs and 54% of the PHCs have separate labour rooms. About one-third of the SCs and a quarter of PHCs do not have a boundary wall. Only 22% of the SCs and 65% of the PHCs have an electricity connection. Even in the CHCs, only 55% has a functional telephone connection, though 81% have an internet connection.

Human resources

The availability of HR in the 25 HPDs of Uttar Pradesh with regard to the ANMs in SCs is quite good; almost all the SCs have at least one ANM (Table 3). Conversely, **PHCs do not have adequate staff to provide most of the maternal, newborn and child health services because the staff in these facilities consist largely of only Medical Officers, Pharmacists, Lab Technicians, Ward boys and Group D employees**. Alarming still, only 70% of the sanctioned Medical Officer positions in PHCs are currently filled. The PHCs do not have sufficient numbers of ANMs or SNs to provide delivery or other related maternal and newborn services.

Table 2: General infrastructure at public health facilities in 25 HPDs of Uttar Pradesh

	SC (N=6358)	PHC (N=856)	CHC (N=320)
Is the building owned by the Govt?			
Yes	73.0		
No, rented	18.5		
No building	8.5		
Source of water[3]			
Tap water	6.6	27.0	76.3
Hand pump	68.9	67.8	91.9
Other	24.5	20.2	12.5
Waste disposal mechanism[3]			
Burn in pit	20.2	40.4	48.1
Bury in pit	35.2	43.2	63.1
Thrown in common/ open garbage	23.0	16.9	10.9
Outsourced	3.8	4.1	31.3
Thrown in premises	10.9	15.2	17.2
Other	6.9	4.8	4.7
Boundary wall	64.8	76.1	85.0
Proper approach road	84.3	89.6	99.1
Electricity connection	21.8	65.4	97.8
Separate labour room	44.6	54.4	96.6
Separate laboratory		47.3	92.8
(functional) Telephone connection		0.6	55.0
Functional computer		0.5	85.6
Internet connection			81.3
Does the ANM stay in SC HQ?			
Yes, in residential Quarters	14.2		
Yes, in rented house in HQ	18.9		
No	66.8		
# of available beds			
None		12.0	2.2
1-3		40.1	3.4
4-5		33.4	15.7
6+		14.5	78.7

The BPHCs/CHCs are relatively better positioned to provide basic maternal, newborn and child health services, but lack specialists to provide emergency obstetric and newborn care services. The BPHCs/CHCs have an average of 34 positions sanctioned, of which 80% are in position. The current staff availability in CHCs include an average of 5 Medical Officers, 3 Staff Nurses, and about 9 "other staff" including data

Table 3: Availability of human resources at public health facilities in the 25 HPDs of Uttar Pradesh

Designation	SC (N=6358)		PHC (N=856)					CHC (N=320)					DH (N=24)		
			Sanctioned		In position		% in position	Sanctioned		In position		% in position	Sanctioned	In position	% in position
	Total	Mean	Total	Mean	Total	Mean		Total	Mean	Total	Mean				
ANM	7016	1.1	368	0.4	276	0.3	75.0	210	0.7	194	0.6	92.4	16	16	100.0
MO			1318	1.5	917	1.1	69.6	1977	6.2	1608	5.0	81.3	241	155	64.3
OBG								36	0.1	21	0.1	58.3	51	47	92.2
Surgeon								62	0.2	50	0.2	80.6	35	33	94.3
Anaesthetist								22	0.1	12	0.0	54.5	17	14	82.4
Paediatrician								33	0.1	27	0.1	81.8	28	27	96.4
SN			83	0.1	33	0.04	39.8	1010	3.2	844	2.6	83.6	430	327	76.0
LHV			95	0.1	78	0.1	82.1	587	1.8	464	1.5	79.0	9	9	100.0
LT/LA			618	0.7	467	0.5	75.6	544	1.7	472	1.5	86.8	85	63	74.1
Pharmacist			856	1.0	762	0.9	89.0	710	2.2	650	2.0	91.5	120	109	90.8
BHW			96	0.1	81	0.1	84.4	438	1.4	205	0.6	46.8			
HS			86	0.1	71	0.1	82.6	533	1.7	370	1.2	69.4			
Group D			546	0.6	368	0.4	67.4	757	2.4	536	1.7	70.8	396	306	77.3
Ward boy			722	0.8	619	0.7	85.7	589	1.8	513	1.6	87.1	84	54	64.3
Other			626	0.7	484	0.6	77.3	3378	10.6	2758	8.6	81.6	422	334	79.1
TOTAL	**7016**	**1.1**	**5414**	**6.3**	**4156**	**4.9**	**76.8**	**10886**	**34.0**	**8724**	**27.3**	**80.1**	**1934**	**1494**	**77.2**

entry operators, BPMs, etc. The availability of specialists including OBG/Gynecologists, surgeons, anaesthetists, and paediatrician in public health facilities in these districts is poor, largely because the required number of positions are not sanctioned. For instance, only 36 OBG positions are sanctioned for these 320 BPHCs/CHCs and 58% of these positions are currently available. The District Hospitals have almost all the sanctioned positions filled, although the number of sanctioned anaesthetists' positions remains low and there is no surgeon's position sanctioned in PHCs.

Training

It is an SBA (Safe birth attendance) -trained staff who is in the best position and most capable of delivering integrated intervention during the critical period of during and after delivery, for both the mother and the newborn. The staff are required to be able to skilfully deliver a set of critical services during this period and they need to be supported with systems and supplies appropriately. It is proven that SBA alone, without modern obstetric techniques that often require surgery, can save lives and treat complications. In the HPDs though, **only 20% of the ANMs and 7% of the MOs are trained in SBA** (Table 4).

Table 4: ANMs, MOs, and SNs trained in SBA

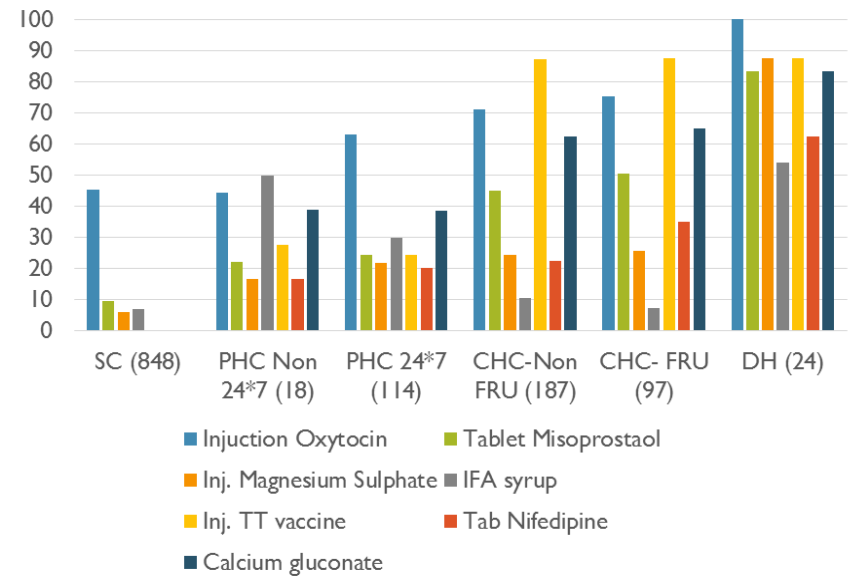
Staff	SC% (N)	PHC % (N)	CHC % (N)	Total % (N)
ANM	20.3 (7016)	21.4 (276)	21.6 (194)	20.3 (7486)
MO		6.5 (917)	7.2 (1608)	6.9 (2525)
SN		15.2 (33)	20.3 (844)	20.1 (877)

However, among the SCs that reported delivery in the quarter ending May 2013, very few of the ANMs were trained in SBA. If drastic reduction in maternal and newborn mortality is to be achieved, great priority needs to be given to training relevant staff in SBA.

Availability of equipment, drugs and supplies for delivery

A critical element of service provision are the equipment, drugs, and supplies offered at a delivery point. Though shortfalls of critical requirements (Figure 4) such as equipment, drugs, and supplies (EDS) do not entirely account for the partiality of service provision, they do undermine the ability of providers to offer comprehensive and quality care. Hence,

Figure 4: Percentage of facilities with essential delivery drugs



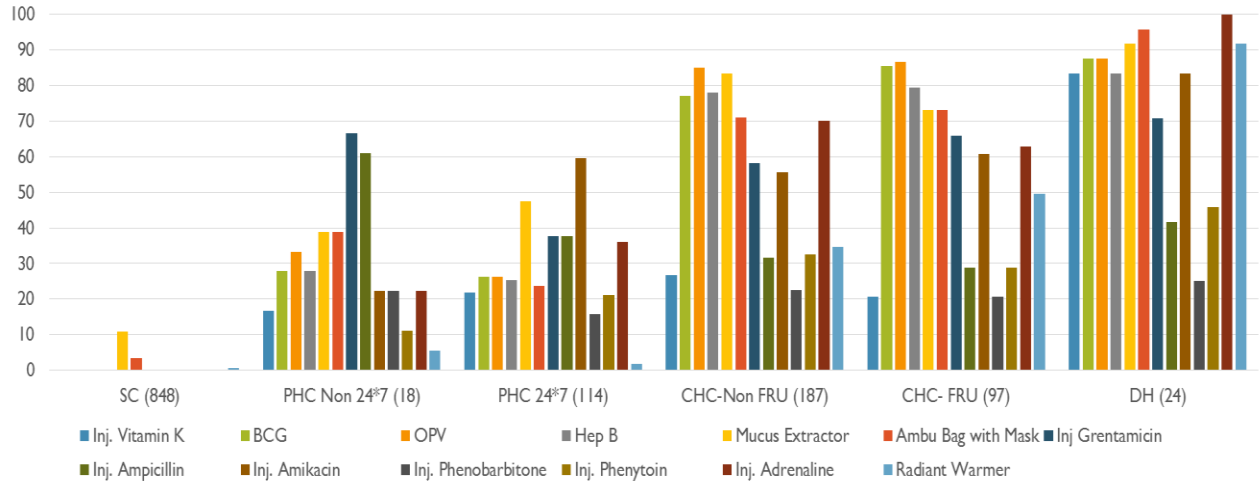
drugs, equipment and supplies are needed for the provision of care through the continuum of care should be available as per the approved drugs and supplies list, without interruption, in each public health facility. Compared to the PHCs and SCs that conduct deliveries, the CHCs conducting deliveries in the district are relatively better equipped to provide quality delivery services.

Even among the CHCs, however, only 42% has reported a current stock of Nifedipine tablets, which is a critical drug recommended to treat pre/eclampsia – one of the most common causes of maternal death. Uterotonics (Including Inj Syntocinon/Pitocin, Inj Methergine/ Methylergometrine, T Methyl-ergometrine, and T Misoprostol), a critically recommended drug to prevent and treat postpartum haemorrhage, another major cause of maternal deaths, was available in only about 65% of the CHCs in the district.

Other important EDS gaps at CHCs are found in the availability of fetoscope, gloves, neonatal bag and mask, and disposable delivery kits. There is a need to strengthen the supply of almost all the equipment, drugs, and supplies across facilities. None of the PHCs are currently equipped to conduct deliveries, although about 55% of them have separate labour rooms and neonatal corners.

The availability of drugs and equipment necessary for delivering essential new born care in SC and PHC facilities are especially poor (Figure 5). The key equipment not available in SCs and PHCs include: radiant warmers (1%, 5%),

Figure 5: Percentage of facilities that have essential newborn commodities in public health facilities



mucous extractor (11%, 40%), and ambu bag and mask (4%, 40%). The lack of critical drugs and at vaccines at PHCs is particularly concerning. Some of these drugs – ampicillin, gentamicin – are not adequately available even in CHCs.

From analysis to planning

Facility mapping situation analysis: the cornerstone for effective planning

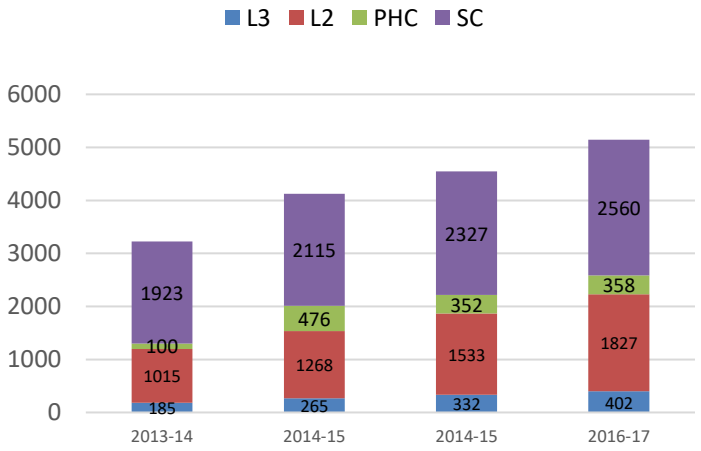
The information gathered during the mapping directly influenced the NRHM's planning process through its program implementation plan (PIP). Facility mapping provided the government with an accurate and to-date situation analysis of the current condition of maternal, newborn, child health, along with a sense of status of key components such as HR, procurement, training, infrastructure etc. Most notably, the mapping revealed a wide disparity between UPs planned delivery load and the actual delivery need in the state.

The situation analysis allowed program managers to assess all delivery points and focus on those that required greater support in two ways: by **strengthening** current delivery points; and by **activating** facilities not currently conducting facilities as delivery points.

The purpose of strengthening facilities was to ensure that none of the delivery points suffer from quality related gaps. The mapping provided **(i) a situation analysis, (ii) a gap analysis**, and this helped the district officials in planning for the phasing-in of 'strengthening' of facilities. Keeping delivery services at the fulcrum of planning, related services such as child health, family planning, adolescent health were planned only in delivery points, such that the continuum of care in the life-cycle of an individual is accessibility in the same facility. **Once a facility is chosen for strengthening or activation based on delivery needs of the district, all resources such as child health, family planning, human resource, training, construction etc. were planned in the same facility.**

Based on the gap analysis in 25 HPDs and the emerging pointers to the planning process, the UP NRHM, in its state PIP for the years 2014-17, has proposed a 60% increase in the delivery points to meet at least 70-75% of the delivery needs of its population (Figure 6).

Figure 6: Proposed increase in delivery points in Uttar Pradesh, state PIP, 2014-17



Facility mapping and rapid gap analysis helped UP: understand it current – maternal, newborn, and child health – situation; isolate and analyze gaps from the state, district, block, facility, and community levels; and, plan timelines for facility strengthening and activating.