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**A COMMUNITY BASED CROSS SECTIONAL RAPID SURVEY IN FIVE DISTRICTS IN BIHAR INDIA
TO ASSESS ROUTINE IMMUNIZATION STATUS AND REASONS FOR DROP-OUTS**

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A COMMUNITY BASED CROSS SECTIONAL RAPID SURVEY IN FIVE DISTRICTS IN BIHAR INDIA TO ASSESS ROUTINE IMMUNIZATION STATUS AND REASONS FOR DROP-OUTS**GHANASHYAM SETHY*[^], SATISH KUMAR GUPTA**[,] RAVEESHA MUGALI**[,] SUNITA SETHY***[,]**

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^Corresponding Author: gsethy@unicef.org**ABSTRACT:**

The aim of the study was to assess the status of routine immunization status and reasons for drop-outs in five districts in Bihar India. A community based cross sectional rapid survey in five districts in Bihar was undertaken from 11th January to 5th February 2013. Of the 38 districts in Bihar, 5 districts prioritized by the state government for intensive routine immunization support were selected purposively for the rapid assessment. Samples of primary health centres, Health sub centres, villages were chosen for the study using geographic and performance criteria. Twenty households having babies 0 to 36 months old from each village were randomly selected. A total of 7,500 households were taken from the 5 study districts. Apart from household survey, cold chain points where vaccines are stored and vaccination session sites were also assessed for service delivery and community participation. The assessment findings revealed high access resulted in good coverage of the initial vaccination such as BCG and DPT1, while low utilization due to drop out of children from DPT1 to DPT3 (15%) and BCG –measles dropout (27%). The coverage was inequitable, with 12% difference in full immunization among children below poverty line and scheduled caste and tribe children. The reasons for low vaccination coverage were both related to demand and supply side. Lack of awareness on immunization, lack of correct information about the place and time of immunization, illness of the child at the time of immunization session, irregular session timing and fear of adverse effects were found to be the major causes for almost 60% of households. The health staff ascribed it mainly to erratic supply of vaccines and logistics, poor planning, insignificant role of media or past experience of Adverse Effect Following Immunization (AEFI) as major causes. Based on the assessment of cold chain and vaccination session facility and key informant interviews, it was recommended that special emphasis should be given to due list preparation and tracking of beneficiaries using local volunteers, self-help groups and mobilizers especially in hard to reach areas. In addition, to ensure regular vaccine and logistic availability, Microplanning to include disadvantaged communities like Scheduled Caste (SC)/Scheduled Tribe (ST) & Below Poverty Line (BPL) households and intensive monitoring using both internal and external supervisors for regular monitoring of the routine immunization activities

Keywords: Vaccination left out, drop outs, inequity, immunization

INTRODUCTION:

India's attainment of the Millennium Development Goal (MDG) 4 in 2015 reducing the Under Five Mortality Rate (U5-MR) of children critically depends on large and the performance of poor states like Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan. These States have large share un-immunized children that have negative impact in the country as a whole. The state of Bihar has total population of 100.83 million (Census 2011) and has a U5-MR of 64 per 1000 live births which is higher than national rate of 59/1000 live births [1]. Many initiatives were undertaken to improve the child survival in the state including newborn care, integrated management of childhood illnesses, under nutrition and Routine Immunization (RI). The full immunization coverage in the state increased from 10.7% in 1992 to 64.5% in 2010, still a third of children are not getting the protection from the life saving vaccines [2 – 5]. A study with focus on drop-outs from RI was undertaken to focus on drop-outs in the on-going RI programme in the State.

METHODOLOGY:

The procedure used was to conduct a cross-sectional community survey to find out the coverage and reasons behind the drop out of children, then monitoring of RI sessions to identify the service delivery bottlenecks and also to conduct key informant interviews to

triangulate the findings of coverage, service delivery and reasons behind drop-outs from the RI programme.

Study area and population:

There are a total of 38 districts in Bihar (total population 103,804,637million as per Census 2011) out of which 5 districts prioritized by the state government for intensive routine immunization support were selected purposively for the rapid assessment. From each district, 5 primary health centres (PHCs) were identified (best performing-2 and poor performing-3), from each PHC, 5 Health sub centres (HSCs) (2 HSCs near from the block head quarter and 3 from remote location) were chosen for the rapid assessment. Similarly, 3 villages from each HSC were identified randomly for household survey and a total of 20 households having babies 0 to 36 months old from each village were randomly selected. A total 1500 Households (HHs) were covered from each district (1D x 5 PHCs x 5 HSCs x 3 Villages x 20 HHs). Thus a total of 7500 HHs were covered from the 5 districts. The village centre was identified first and the bottle/pen was turned to identify the direction of the first house, diagonally walk taken till the edge of the village in the same direction. Later the currency note taken to find the last digit in the note to identify the row of first house. Once the first house was identified the next house selection was done on the basis nearest next door till

reaching the sample size. A total of 7500 children aged 0-35 month were taken based on sample size of 367 for a district with 100,000 cohort size, assuming Full Immunization coverage (FIC) of 60 percent and acceptance of 5% standard error

Apart from the household survey, cold chain points where vaccines are stored in Ice Lined Refrigerator (ILR) points of each selected blocks was assessed and all session sites commencing during the time of visit amongst the 5 identified HSCs per block were also assessed for service delivery and community participation. Average population per district in Bihar is 2.73 million, whereas all districts selected for the survey were in the range of 3.03 to 4.37 million (11% to 60% more than the average population). Gaya (29.6%) and Vaishali (20.7%) districts have more than state average (15.7%) of SC (Scheduled Cast) population. Similarly ST (Scheduled Tribe) population is higher in Purnea (4.4%) and Bhagalpur (2.3%) than state average (0.9%) and is negligible in the other 3 districts. Except Gaya and Purnea, sex ratio is very low in the other three districts as compared with the state average. Female literacy is lower in Purnea (43.19%) and Darbhanga (46.88%) than state average of 53.3% (Table 1).

Data collection and analysis:

The study was undertaken from 11th January to 5th February 2013. Data entry was done at district level whereas analysis was done at

UNICEF Field Office. During the preparatory phase finalization of study protocol along with the survey instruments using monitoring formats used by Government of India i.e. Household, Session site and ILR point monitoring formats were used.

UNICEF Routine Immunization coordinators were involved during the process of data collection. There were 3 teams formed for each district comprising of 2 coordinators in each team and for each team 25 villages allotted for data collection. Before going to the field, meeting cum orientation of district team members along with district officials (Civil Surgeon, District Program Manager and District Immunization Officer) were arranged and the processes and methodology were discussed.

In the selected households, children below 3 years of age and their mothers were included as study subjects after getting their informed consent being explained regarding purpose and nature of the study. In case the selected household declined, the immediate neighbor, nearest to doorstep of the present house was given the chance to be included. The help of Accredited Social Health Activist (ASHA) and Anganwadi workers (AWW) was taken to build a good rapport for the interview. The various study variables used for data collection were Age, Sex, Religion, Caste, Immunization status, Literacy status of parent, Occupation status of parent, Place of delivery.

The data was analyzed using Epi Info™ 7 (7.1.2) software. The following process and

output indicators were considered with an attempt to interpret an approximate picture of the situation on RI situation in the five districts and generalize the same situation all across the state: Coverage; Status of Full Immunization; Antigen wise coverage; Community Awareness and Mobilization; Due list preparation; Involvement of ASHA and AWW; Availability of vaccines and logistics.

RESULTS:

The profile of the respondents (Table 2) revealed that majority of the study populations were from Hindu (84.2%) community followed by Muslim (15.8%). Caste wise Other Backward Caste (OBC) accounts for the highest (40.8%) followed by SC (34.0%), General (21.7%) and ST (2.2%). The children in the 0 to 11 months, 12 to 23 month and 24 to 35 month age groups accounts for 34.9%, 33.3% and 31.8% respectively. Gender wise most of the children up to 3yrs of age were male (52.8%) and majority of the households assessed belongs to Below Poverty Line (BPL) category (60.9%).

Inequity in coverage:

Overall BCG coverage was highest in the general caste category, which was 100% followed by OBC (98%) and SC/ST (96%). Similarly, Antigen wise individual vaccine

coverage was also more in the general category followed by OBC then SC/ST. Overall fully immunization coverage was highest among the general category, which was 69% followed by OBC category (63%) and lowest seen in the SC/ST category (58%) population. Fully immunization coverage and antigen wise individual vaccine coverage was assessed amongst the study subjects of 12 months to 23 months old children. Gap in fully immunization coverage between General and SC/ST category was as high as 11%. Religion wise, individual vaccine coverage was more in the Hindu community than the Muslim community and the overall fully immunization coverage was 64% for Hindu and 63% for Muslim community. Individual vaccine coverage between APL and BPL was found more in the APL category than the BPL category. Overall fully immunization status for APL family was 70% and BPL family was 58% (Table 4)

Dropout rates: The difference in immunization coverage between the first and the last dose of the same vaccine (e.g., between DTP-1 and DTP-3) was above 10 percent except in Purnea where it was found to be 7%. The drop out between BCG and Measles (the first and last dose of the schedule under one year) was above 20% with highest of 34% in Dharbhanga district (Table 5).

Table 1: Profiles of the districts under study

| | Bihar | Gaya | Bhagalpur | Vaishali | Darbhanga | Purnia |
|--|-------|------|-----------|----------|-----------|--------|
| 1 Total population (Census 2011) (in millions) | 103.8 | 4.37 | 3.03 | 3.49 | 3.92 | 3.27 |
| 2 % to total population of the state | 100.0 | 4.22 | 2.92 | 3.37 | 5.78 | 3.15 |
| 3 Rural population (%) | 89.5 | 86.3 | 81.3 | 93.1 | 91.9 | 91.3 |
| 4 Schedule Caste population (%) | 15.7 | 29.6 | 10.5 | 20.7 | 15.5 | 12.3 |
| 5 Schedule Tribe population (%) | 0.9 | 0.1 | 2.3 | 0.1 | 0 | 4.4 |
| 6 Minority (%) | 16.6 | 11.6 | 17.5 | 17.4 | 22.7 | 10.1 |
| 7 Sex ratio (no. of females per 1000 males) | 916 | 932 | 879 | 892 | 910 | 930 |
| 8 Female literacy rate (%) | 53.33 | 55.9 | 56.49 | 59.1 | 46.88 | 43.19 |

Table 2: Characteristics of the studied sample (n = 7500)

| | Number (%) |
|--|--------------|
| Religion – HINDU | 6314 (84.2%) |
| Religion – MUSLIM | 1184 (15.8%) |
| Religion – OTHER | 2 (0.03%) |
| Total | 7500 |
| Scheduled Caste (SC) | 2550 (34.0%) |
| Scheduled Tribe (ST) | 164 (2.2%) |
| Other Backward Caste (OBC) | 3057 (40.8%) |
| General Caste (GEN) | 1729 (23.0%) |
| Total | 7500 |
| Age of the child- 0 to 11 month | 2617 (34.9%) |
| Age of the child- 12 to 23 month | 2498 (33.3%) |
| Age of the child- 24 to 35 month | 2385 (31.8%) |
| Total | 7500 |
| Sex of the selected Child – Male | 3957 (52.8%) |
| Sex of the selected Child – Female | 3543 (47.2%) |
| Total | 7500 |
| Socio economic status – Above Poverty Line (APL) | 2930 (39.1%) |
| Socio economic status – Below Poverty Line (BPL) | 4570 (60.9%) |

Table 3: Antigen wise coverage and Full Immunization Coverage (FIC) of the five districts among children 12 months to 24 months (all values are in percentages)

| | BCG | OPV 0 | DPT 1 | DPT 2 | DPT 3 | OPV 1 | OPV 2 | OPV 3 | HEPB 1 | HEPB 2 | HEPB 3 | Measles | FIC |
|-----------|-----|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|---------|------|
| Gaya | 97 | 53 | 95 | 89 | 80 | 89 | 81 | 75 | 72 | 62 | 56 | 71 | 59.3 |
| Vaishali | 97 | 58 | 96 | 92 | 86 | 81 | 76 | 68 | 60 | 54 | 48 | 76 | 52 |
| Dharbanga | 97 | 52 | 93 | 86 | 78 | 83 | 74 | 69 | 36 | 40 | 30 | 63 | 62 |
| Bhagalpur | 98 | 64 | 96 | 93 | 89 | 89 | 86 | 56 | 68 | 52 | 45 | 76 | 63.5 |
| Purnia | 98 | 70 | 96 | 93 | 84 | 91 | 86 | 79 | 71 | 65 | 59 | 73 | 68 |

*FIC: BCG OPV1 2 3 DPT1 2 3 Measles

Table 4: Equity in coverage

| Percentage of children immunized among children of different Socio-Economic Status (SES), Caste and Religion | | | | | | | | | |
|--|-----|-----|--|-------|-------|-----|--|----------|--------|
| | SES | | | Caste | | | | Religion | |
| | APL | BPL | | OBC | SC&ST | GEN | | Hindu | Muslim |
| BCG | 99 | 96 | | 99 | 96 | 100 | | 98 | 97 |
| DPT3 | 86 | 81 | | 86 | 81 | 87 | | 85 | 82 |
| OPV3 | 76 | 66 | | 76 | 66 | 77 | | 73 | 69 |
| Measles | 77 | 68 | | 77 | 68 | 77 | | 74 | 70 |
| FIC | 70 | 58 | | 70 | 58 | 69 | | 64 | 63 |

Table 5: Percentage of Dropout rates

| Dropout rate | Vaishali | Bhagalpur | Purnea | Gaya | Dharbhanga |
|--------------|----------|-----------|--------|------|------------|
| DPT1-DPT3 | 10 | 7 | 12 | 15 | 15 |
| BCG-MEASLES | 21 | 22 | 25 | 26 | 34 |

Antigen wise coverage:

Figure 1 shows the immunization coverage of all the individual vaccines and fully immunization coverage of Bihar amongst 12 to 23 month old children indicated by various standard surveys and the present rapid assessment survey. As far as antigen wise

coverage is concerned, BCG was found to have the highest coverage (97.4%) as against the lowest coverage of OPV3, which was 70.8%. Between the findings of AHS-2011 and the present study, the difference in individual vaccine coverage is statistically insignificant ($p > 0.5$ for each individual vaccine). Coverage

of BCG and DPT3 was found to be higher than the findings of the present study whereas coverage of OPV3 and Measles was less in the present study. Fully immunization coverage is 63.6% in the present study which is 0.9% less than that of the AHS-2011 report (64.5%) for Bihar (Figure 1).

Antigen wise coverage of five districts among the children aged between 12 to 36 months is shown in table 2. BCG coverage is above 90% in all the five districts, DPT3 coverage above 80% except the Dharbhanga district which is 78%. Measles coverage is 60% to 70%; OPV Zero dose coverage is 50% to 60% except in Purnia where it is 70%. HepB 3 coverage less than 60%. The full immunization coverage (BCG, DPT1 2 3 and measles) is 59.3%, 52%, 62%, 63.5% and 68% in Districts Gaya, Vaishali, Dharbhanga, Bhagalpur and Purnia districts respectively (Table 3)

Reasons for partial or no immunization:

There were 3341 children out of 7500 children surveyed who were unimmunized or partially immunized, their parents were asked questions to find the reasons for not getting the children vaccinated. The reasons categorized either due to supply side issues or in demand side. The results are presented in Figure 2. The major reasons as described by the parents for non-immunization were unaware about immunization (24%), did not know when to get vaccination (19%) and child was sick (11%), unavailability of vaccine was also figured out in

10% of responses. Inconvenient timing and location of session and fear of side effects were found to be common causes for both partial and un-immunizations.

BCG mark present in left deltoid area:

BCG scar mark over the left deltoid area was present during examination in an average of 89.2% children across all five districts against 97.4% of total BCG coverage. The reason for absence of scar mark in 7.2% babies aged less than 12 weeks was because the scar mark was not yet developed in them. However in the rest of the cases (1%) among babies above 12 weeks of age with no scar mark the reason was either due to faulty technique or inadequate immunological response. The highest BCG rate was found among children of Bhagalpur district (93%) followed by Purnea (90%), Gaya (89%) and Vaishali (85%) and Darbhanga (85%).

Retention of RI / Mother and Child Protection (MCP) card:

Retention of RI card by the parents during the time of field visit was better in Bhagalpur and Vaishali (87% each) and Purnea (83%), but poor in Darbhanga (71%) and lowest in Gaya 59%. The major reasons of non-retention of RI cards in Gaya were either the cards were not provided by the Auxillary Nurse-cum-Midwife (ANM) (19%), or the card was lost (16%) and in 4% of cases, the card was under lock and key and the head of the household was not present during the time of visit. Similarly, major reason

for non-availability of RI card in all districts (except Gaya), was due to loss of card followed by card being not provided by ANM.

Vaccine availability at the session site:

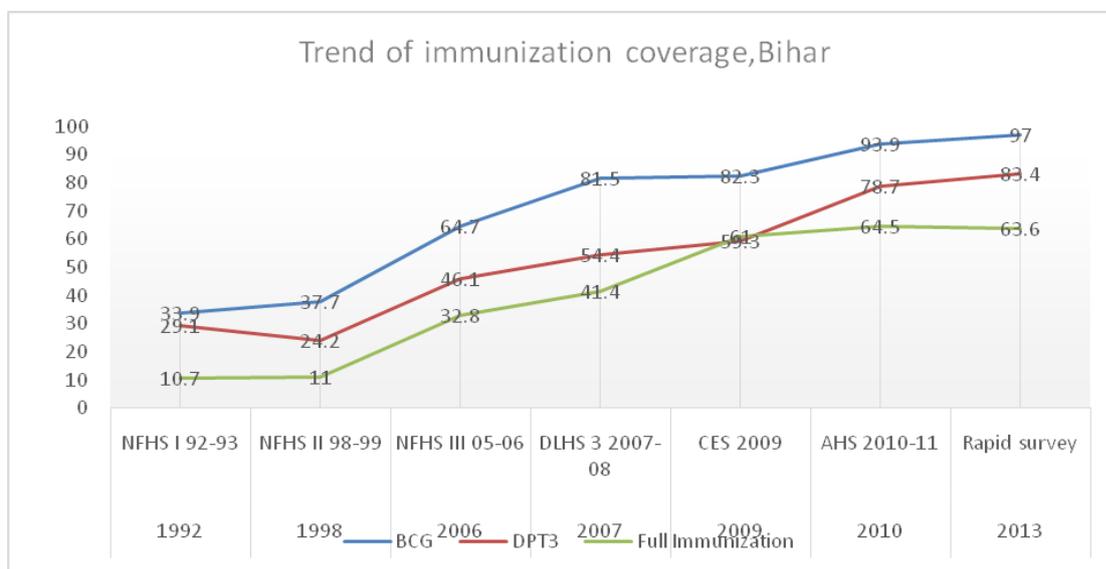
Availability of BCG, t-OPV, and Hepatitis B vaccines were inadequate in all the districts during the time of visit to session sites. Subsequently the ILR points and District Vaccine Stores were crosschecked for the stock position of vaccines but adequate storage of vaccines for the next four weeks was not observed in any of the five districts reviewed

under the rapid survey. Hepatitis B was out of stock for the last one month in Gaya district.

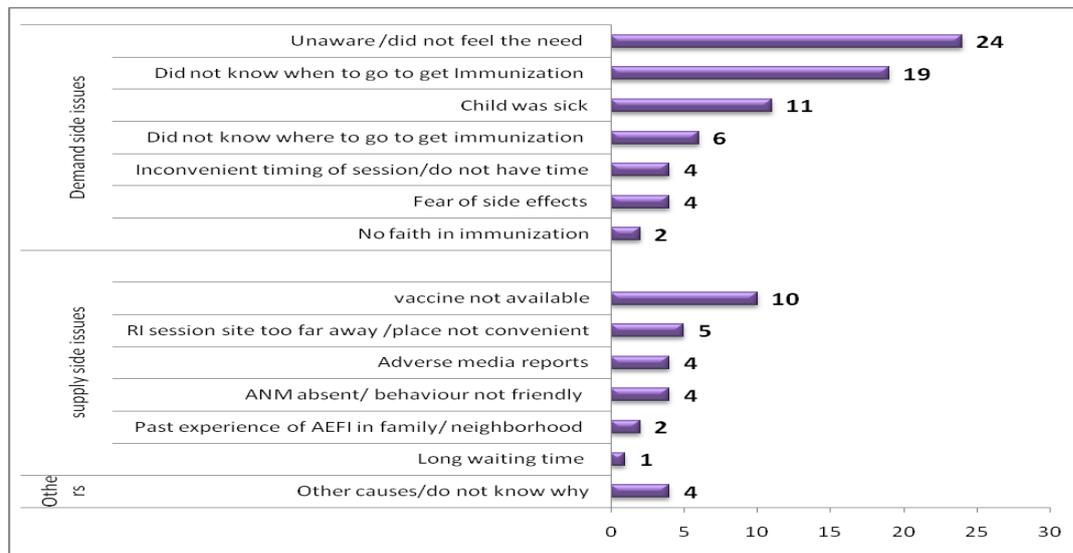
Due lists availability:

Out of all the session sites visited, the due list was found in only 27% of the districts in form of a freshly written list prepared by the ANM in consultation with ASHA /AWW. In 56% of the sessions, markings in the Mother and Child Health (MCH) register were done for mobilization of beneficiaries. But the area of concern was that in 17% of the session sites the due list was totally absent.

Figure 1: Immunization coverage trend Bihar state



Refs: 1992 National Family Health Survey (NFHS) 1992-1993; 1998 NFHS: 1998-1999; 2006 NFHS: 2005-2006; 2007: District Level Household Survey (DLHS) 2007-2008; 2009 Coverage Evaluation Survey (CES) 2009; 2010- Annual Health Survey (AHS) 2010-2011

Figure 2: Reasons for partial or no immunization (N 3341) in percentage**DISCUSSION:**

High initial utilization: BCG coverage of 97% and DPT1 coverage of 93% with evidence of BCG scar were present in 89.2% of the total children surveyed. Similarly AHS 2012-13 report for Bihar also depicts BCG coverage of 94.7% [9]. Early utilization of vaccination has shown good improvement in the vaccination programme in the state [6].

High Drop outs: DPT1-DPT3 dropout of 15% and BCG –measles dropout of more than 27% are the consistent findings in all the five districts; this is one of the main reasons for partial immunization and incomplete protection of children in these districts. Though the dropout proportion has been showing improvement as compared to the CES-2009 report for Bihar in which the dropout rate mentioned was quite high (DPT1-DPT3 dropout

was 23.9% and BCG –measles dropout more than 29.3%) [2], yet the programmatic direction should now focus on reducing drop outs.

Inequity in coverage: Children in families BPL and families of as scheduled castes and tribes are more prone to missing the vaccination (Fully Immunized Children difference of 12%). Hence programmatic direction again needs to be focused on these demographic profiled families [7, 8].

Reasons for the partial and no vaccination: The reasons for left out and drop out, as ascertained by the parents, can be ascribing to various issues related to both demand and supply side. Lack of awareness on immunization, lack of correct information about the place and time of immunization, illness of the child at the time of immunization session, irregular session timing and fear of adverse

effects were found to be the major causes for almost 60% of the people. On the contrary, the health staff ascribed it mainly to erratic supply of vaccines and logistics, poor planning, insignificant role of media or past experience of AEFI as major causes for poor immunization coverage. The major causes for partial and non-immunization due to the demand and supply side issues identified in our study remained more or less the same or similar when compared to the findings of CES-2009 and AHS 2012-13 [2, 9].

Continuous supply and availability of vaccines at the session sites: The issues on vaccine forecasting at each level and maintaining minimum stock level, buffer stock and reorder level need to be practiced at the state and district and PHC levels. Poor stock management practices are contributing to drop outs and missing the age appropriate dosages of vaccines for the children.

However, adequate supply of vaccines was not up to mark in any of the districts studied, which was validated through the observations during the visit to session sites. BCG, t-OPV, Hepatitis B vaccines were found inadequate in most of the session sites in all districts and more importantly in the district of Gaya where none of the vaccines was adequately available for 2 months and there was no stock of Hepatitis B.

Coordination among ASHA, AWW and ANM were key front line workers in creating awareness on immunization whereas Panchayat Raj Institutes (PRI), Self Help Group

(SHG) and others have least role in bringing awareness among the mothers. Proportion of community awareness on immunization was found to be encouraging. Approximately 91% of the people interviewed were found to be aware of immunization in all these five districts with highest proportions in the district of Vaishali and the least in Gaya.

Use of duelist was found to be a grey area in almost all districts. Out of 52 session sites visited during the data collection, an average of only 20% ANMs and 22% mobilizers were found to have used duelists. In none of the session site in the district of Bhagalpur district was the duelist utilized either by the ANM or by the mobilizer. Similarly, no ANM in Darbhanga was found using duelist. Another important observation was that 65.6% of immunization sessions were held at the VHND sessions. In Purnea district 90% of the session sites were synchronized with VHND, whereas Gaya was found having the least (36%) session sites being synchronized with VHND.

RECOMMENDATIONS:

The assessment was carried out in five districts of Bihar, identified as program priority by the state government. Based on the findings of household survey, cold chain and session site facility assessment and key informant interviews, it is recommended that:

1. Special emphasis is needed for reducing Dropout rate through social mobilization by involving the Self Help Groups apart from the regular mobilizer, due list preparation

- and utilization, tracking of beneficiaries, coverage of hard to reach areas and developing immediate plan for the missed sessions.
2. Ensuring uninterrupted and adequate vaccine and logistic availability at the ILR points and session sites with orientation to the vaccinators on effective vaccine management.
 3. Emphasis has to be given on equitable immunization coverage. To bridge the gap, the disadvantaged communities like (SC/ST & BPL households) need special focus initially by accommodating them in the micro-plan and providing special outreach and hard-to-reach services.
 4. Increasing the awareness in the community about the importance of immunization by extensively involving the VHSC, teachers, SHGs, religious leaders and also the media.
 5. Building capacity of the vaccinators on preparation of micro-plan (with focus on hard to reach, missed session and disadvantage groups), tracking of beneficiaries by preparing due list, Effective Vaccine Management, Injection safety, proper biomedical disposal of waste, record keeping and identification of adverse events following immunization.
 6. Involvement of both internal and external supervisors and managers for regular monitoring and supervision of the routine immunization activities

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