Original Article

ASSESSMENT OF VACCINE COVERAGE BY 30 CLUSTER SAMPLING TECHNIQUE IN RURAL GANDHINAGAR, GUJARAT

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ABSTRACT

Objectives: To assess the immunization status of children of Gandhinagar (Rural) district and to compare it with the NFHS3/DLHS3 coverage results.

Materials & Methods: A Multi-Indicator Cluster Survey (MICS) was planned and community-based cross-sectional survey was conducted in April 2008. The Study was conducted using 30 cluster technique. Proforma designed by UNICEF, modified by experts and approved for uniform use by department of health & family welfare, Government of Gujarat was used as a study tool.

Statistical analysis used: Simple proportions and Chi-square test.

Results: Coverage for BCG, OPV3, DPT3 & Measles were 92.04%, 85.23%, 83.71% & 82.20% respectively. BCG scar was seen in 83.95% of children out of those who received BCG. The proportions of fully immunized children were 79.55%. Unimmunized children were 4.16%. Dropout rate was 9.05% for BCG-DPT_3, 10.69% for BCG-Measles & 7.53% for DPT_1-DPT_3. Compared to NFHS3 (2005-06) as well as DLHS3 (Gandhinagar district, 2007-08) the current survey shows higher coverage for all vaccines except measles which was higher in DLHS3 (87.3%). Gender wise difference in the coverage of different vaccines or various dropout rates was not statistically significant.

Conclusions: Although the vaccination coverage shows higher coverage than previous studies, it is still below the minimum targets set as national goal.

Key-words: MICS, children 12-23 months, vaccination status, coverage evaluation survey

INTRODUCTION

Childhood immunization is one the most significant, cost effective preventive public health strategy. In 1985, the Universal Immunization Programme (UIP) was started in India with the aim of achieving at least 85% coverage of primary immunization of infants, i.e. with three doses of DPT and OPV, one dose of BCG and one dose of measles by the year 1990.[1]

National Family Health Survey 3 (NFHS3) carried out in 2005-06 has shown that although the immunization coverage has slightly increased but with only 44% of children fully immunized, the average levels remain far less than desired goal of achieving 85% coverage.[2] For Gujarat the situation is even worse with percentage of fully immunized children going down from 53% (NFHS2) to 45% (NFHS3). With the launch of National Rural Health Mission (NRHM) & declining trend in vaccination shown by NFHS3, improving vaccination coverage is one of the topmost agenda for the department of health & family welfare, government of Gujarat.[3] The present study was formulated against this background with an objective of assessing the vaccination coverage in Gandhinagar (Rural) district.

SUBJECTS AND METHODS

Gandhinagar is an administrative district in the central part of Gujarat with its headquarters in Gandhinagar city, the state capital. It covers an area of 2163 square kilometers with a total population of 13,34,731 according to 2001 census. The district has a population density of 617 persons per sq.km. and sex ratio of 911 females per 1000 males. The district includes four taluks with about 35% population living in urban area.[4]

Department of Health & Family Welfare, Government of Gujarat planned to carry out Multi-Indicator Cluster Survey (MICS) in various districts. Preventive & Social Medicine (P&SM) departments of various medical colleges who already had good liaison with the health department were given the responsibility for conducting the MICS in one district each. As per the allocation of district, MICS was planned & carried out in rural component of Gandhinagar district from 1st April to 17th April 2008 by P&SM department of this institute. A total of five teams, each comprising of four members (1 faculty member, 1 resident from P&SM department and 2 interns) carried out the survey. All the 5 teams surveyed 6 clusters each, completing the survey of 30 clusters.

A structured, pre-tested questionnaire designed by UNICEF was used after necessary modifications and approval by the health officials of government of Gujarat. To minimize errors and uniform reporting, the survey team members received training and extensively discussed the likely problems in filling the format. To reduce data-entry errors, programming was done using EPI-Info software and survey team members were assigned the duties to enter their own collected data. The MICS technique with 30 clusters proposed by the World Health Organization (WHO) is a standard method for rapid assessment of coverage evaluation[5] Measuring and evaluating vaccination coverage not only gives the true picture of the vaccination status of the target population but also indicates trends in the vaccination at the earliest to take appropriate and timely action. A rapid assessment of vaccination coverage is best achieved by the Coverage Evaluation Survey (CES). Since the CES is conducted among children between 12 - 23 months old for their vaccination during infancy, it actually reflects the vaccination performance of the preceding year. Selection of study clusters: Urban areas were excluded from the list of district population of 2007and a total of 292 villages/towns with 10,34,032 total population were selected. Cluster interval was 34,468. The first cluster was selected using the random number which was 00092. Subsequent clusters were selected using the sampling interval. Thus, 30 clusters were selected on the basis of systematic random sampling from the probability of the cluster selection based on the population size of the cluster.

Details of sampling within a cluster: The 30 cluster technique was used in MICS. The cluster survey methodology has been criticized by survey statisticians due to the manner in which the households are selected within a cluster.[6] Documented techniques to improve the accuracy of cluster survey method including, segmenting sample clusters (selecting subsamples of equal probability from within a cluster) was also considered.[7] To satisfy the objective of studying multiple indicators, various criteria were considered for the completion of study in one cluster. Among

these, study of households in four different quadrants of the village with at least two children aged 12-23 months in each quadrant making a total of minimum 8 children was also considered. Data thus gathered was entered and analyzed using the EPI-INFO software package. Simple proportions were calculated and chi-square test applied wherever applicable, to find out the statistical significance. For calculation of coverage, vaccines provided under the UIP (BCG, OPV, DPT and measles) were considered. Children between 12-23 months exactly on the day of survey were selected. When documentation was not available, parent's information regarding child's age was relied upon. The present article deals with findings of one of the major objectives of MICS i.e. vaccination coverage survey undertaken during April 2008 which actually reflects the vaccination of the preceding year i.e. 2006-07. NFHS3 (2005-06) & District Level Household and Facility Survey 3 (DLHS3, 2007-08) were used for comparison.

RESULTS

A total of 1,218 families with 6,366 subjects with an average family size of 5.22 were studied from 30 clusters. Larger sample of children in the target age group (264) than minimum desired (240) were selected due to the multiple criteria applied for completing a cluster to satisfy the need of studying multiple indicators. A total of 133(50.4%) boys & 131(49.6%) girls were covered under the survey.

Although 205(77.7%) of the respondents reported having a card, survey team could verify mamta card(47, 17.8%) or vaccination card(102, 38.63%) in only 149(56.44%) out of 264 study subjects as a record or documentation of vaccination. Vaccination status was not known in 11(4.2%) cases, while in remaining 104(39.4%) cases recall history by the parents was considered for the purpose of obtaining details of vaccination.

Table 1: vaccine coverage and dropout rates among study subjects

Vaccination status	Considering vaccination card as well as history		Considering vaccination card or mamta card*	
	n=264 (%)	95% CI	n=149 (%)	95% CI
BCG	243 (92.04)	88.15-94.74	147 (98.66)	95.24-99.63
BCG scar	204 (83.95)	71.85-81.92	131 (87.92)	81.71-92.22
DPT1	239 (90.53)	86.39-93.50	145 (97.31)	93.30-98.95
DPT2	227 (85.98)	81.28-89.66	136 (91.27)	85.65-94.83
DPT3	221 (83.71)	78.78-87.68	134 (89.93)	84.03-93.80
OPV1	241 (91.29)	87.27-94.12	145 (97.31)	93.30-98.95
OPV2	230 (87.12)	82.54-90.64	137 (91.94)	86.45-95.33
OPV3	225 (85.23)	80.44-89.00	135 (90.60)	84.85-94.32
Measles	217 (82.20)	77.13-86.34	135 (90.60)	84.85-94.32
Fully immunized	210 (79.55)	74.27-83.97	131 (87.92)	81.71-92.22
Unimmunized	11 (4.16)	2.34-7.31	2 (1.34)	0.37-04.76
Dropout rates				
Dropout BCG-DPT3	9.05	6.05-13.33	8.84	5.24-14.54
Dropout BCG-Measles	10.69	7.41-15.22	8.16	4.73-13.73
Dropout DPT1-DPT3	7.53	4.82-11.59	7.59	4.29-13.07
Dropout OPV1-OPV3	6.63	4.13-10.51	6.90	3.79-12.23

*Cross checked during the survey

Considering vaccination card as well as history by parents as an evidence for vaccination [Table 1], the coverage was highest for BCG and lowest for measles. BCG scar was seen in 204(83.95%) children out of those who have history of BCG vaccination. Coverage for primary doses of OPV was almost similar but slightly higher than primary doses of DPT. A total of 210(79.55%) were fully immunized and 11(4.16%) were not immunized at all. The remaining 43(16.29%) were partially immunized. The dropout rate was highest for BCG-Measles (>10%) while other dropout rates were below 10%.

When available card is crosschecked, the coverage is higher. When the card is preserved

carefully it indirectly indicates better concern by the parents regarding the child's vaccination status. It not only helps tracking of vaccination status but also helps in verification and confirmation of the vaccination status. Information given by the health worker is also an important determinant for good coverage.[9] So, asking parents to preserve the card carefully should be an integral part of health education during the session.

A Study in Bangladesh showed significant gender difference in vaccination.[10] However, in our study just as another study in Alwar, Rajasthan, India; gender difference in vaccination was not found to be statistically significant.[11] This reflects improved situation without a gender bias for immunization of girl child. When preventive services like vaccination does not show gender difference, it indirectly suggest a balanced gender consideration for various health issues.

Table 2: Gender wise vaccination coverage and dropout rates among study subjects

Vaccination coverage	Boys	Girls	Total	x^2	P value
	n=133 (%)	n=131 (%)	n=264 (%)		
BCG	121 (91.0)	122 (93.1)	243 (92.04)	0.42	0.517
DPT1	120 (90.2)	119 (90.8)	239 (90.53)	0.03	0.862
DPT2	116 (87.2)	111 (84.7)	227 (85.98)	0.34	0.560
DPT3	112 (84.2)	109 (83.2)	221 (83.71	0.05	0.823
OPV1	121 (91.0)	120 (91.6)	241 (91.29)	0.03	0.862
OPV2	117 (88.0)	113 (86.3	230 (87.12)	0.17	0.680
OPV3	113 (85.0)	112 (85.5)	225 (85.23)	0.01	0.920
Measles	111 (83.5)	106 (80.9)	217 (82.19)	0.29	0.590
Fully immunized	108 (81.2)	102 (77.9)	210 (79.55)	0.45	0.502
Unimmunized	8 (6.0)	3 (2.3)	11 (4.16)	2.33	0.127
Dropout rates					
Dropout BCG-DPT3	7.44	10.65	9.05	0.76	0.383
Dropout BCG-Measles	8.26	13.11	10.69	1.50	0.220
Dropout DPT1-DPT3	6.66	8.40	7.53	0.26	0.610
Dropout OPV1-OPV3	6.61	6.66	6.63	0.00	0.998

Gender wise comparision of the vaccine coverage [Table 2] shows that the proportion of fully immunized children was higher in males(81.2%) than in females(77.9%), however the difference was statistically not significant ($x^2 = 0.28$, $P > 0.597$). Coverage for DPT_2, DPT_3, OPV_2 and measles were slightly higher in males whereas coverage for BCG, DPT_1, OPV_1, OPV_3 were slightly higher in females. However, all these differences were also statistically not significant. All the calculated dropout rates were higher among females than in males. However the differences were statistically not significant.

DISCUSSION

Mamta card is a multi-utility card incorporating not only vaccination details but also multiple maternal as well as child health components. As mamta card was recently introduced in 2006, many children in the target age group had vaccination card rather than mamta card. Although history of card availability is in 77.7% study subjects, but the retention rate was 56.4%. This shows poor retention rate as compared to 84% retention during a survey in Dhaka.[8] The sex-ratio for 12-23 months agegroup is 985 which is better than the 911 as per 2001 census.

The present survey was carried out after DLHS3. Higher proportion of most vaccine coverage shows result of governmental efforts to improve vaccine coverage. Accessibility is significant determinant for good coverage.[9] Considering history by parents, all vaccines show coverage above 80%, this shows that the "Access" is good. However, still the proportion of children fully immunized is slightly below 80% target. Most dropout rates are below 10% suggesting that the "Utilization" is also good. The dropout rate is minimum for OPV_1-OPV_3, increases further for DPT_1-DPT_3, BCG-DPT_3 & highest for BCG-Measles, indicating that the dropout rate increases with time duration between doses or increase in the number of vaccines. The only exception is BCG-DPT_3 dropout rate which is higher than BCG-Measles

dropout rate when consideration is given only to the card verification. Possible reasons for this include poor tracking, late vaccinations, refusal by parents for further doses of DPT due to fever/local reactions, ignorance by workers to check for DPT doses when infant is brought for measles at 9 months or not updating the card while the vaccination is carried out.

Table 3: Comparison of vaccine coverage among study subjects with NFHS3 & DLHS3

Vaccination status	MICS April 2008 present study Gandhinagar (Rural)	DLHS3 (2007-08)		NFHS3 (2005-06)	
		Gandhinagar (Rural)	Gujarat (Rural)	Gujarat (Rural)	Gujarat
Fully immunized	79.55	62.6	49.1	40.1	45.2
BCG	92.04	91.9	86.7	84.7	86.4
DPT-3 doses	83.71	67.6	58.0	58.4	61.4
OPV-3 doses	85.23	73.3	68.6	61.9	65.3
Measles	82.20	87.3	73.3	61.4	65.7
Unimmunized	4.16		6.7	6.9	4.5

Various evaluation and studies have shown a wide variation between reported and evaluated coverage. The reported coverage for the BCG, 3 doses of DPT & Measles for the year 2006-07 were 98.2%, 94.5% & 91.3% respectively and fully immunized children 89.5% for the state of Gujarat.[3] The same were 94.64%, 97.10% and 95.25% respectively for Gandhinagar District.[12] The current study reflects the evaluation result from the field for the same period showing wider gap between reported and evaluated coverage. This strengthens the evidence that reported data should not be taken for actual coverage and evaluation studies are more likely to reveal the actual field situation for coverage of vaccination.

We have tried to compare the findings of the current study with NFHS3 of Gujarat state & DLHS3 findings of Gandhinagar (Rural) district [Table 3]. The comparison with NFHS3 findings of Gujarat state shows that overall the coverage has improved for all the vaccines with lesser number of unimmunized children. The comparison with DLHS3 findings of Gandhinagar (Rural) district also shows that the coverage has improved for all vaccines except measles which is higher in DLHS3.

Reasons for non-vaccination are valuable pointers/indicators.[13] Although being a Multi Indicator Cluster Survey, the study of reasons for non-vaccination was beyond the scope of the study, but these reasons for non-vaccination should not only be identified but appropriately addressed through effective IEC activities.[2]

CONCLUSION

Although, the coverage evaluation as a part of MICS shows higher coverage than previous studies, it is still below the minimum targets set as national goal. This indicates need to address the vaccine coverage and dropout in Gandhinagar (Rural) district.

RECOMMENDATIONS

As the verification of card for vaccination is an important determinant during the survey, health functionaries must act proactively to deliver the 4 key messages to every mother/caretaker during the vaccination session.[14] This includes 1) information regarding the vaccine and the disease it prevents 2) information regarding the next visit 3) dealing with minor side-effects of the given vaccine & 4) keeping the vaccine card safely & to bring it during the next visit. These simple key messages not only address the parent's concern but also address important issues like preserving the vaccination card.

Innovative approaches integrating birth registration and follow-up may also be considered to ensure full immunization.[15]

Coverage surveys should also be done on a periodic basis to check the effectiveness of measures undertaken to improve the coverage and to reduce the dropout.[16]

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