



IOCH
Immunization and Other Child Health Project

**Vaccination Coverage Survey in the
Slums of Khulna and Rajshahi City
Corporation**

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Survey Report No. 64

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Acronyms

BCC	Behavior Change Communication
BCG	Bacillus of Calmette and Guerin
BINP	Bangladesh Integrated Nutrition Project
CES	Coverage Evaluation Survey
COSAS	Coverage Survey Analysis System
DPT	Diphtheria, Pertussis and Tetanus
EPI	Expanded Programme on Immunization
FIC	Fully Immunized Children
FWC	Family Welfare Center
IOCH	Immunization and Other Child Health
MNT	Measles, Neonatal and Tetanus
Mahallah	Smaller localities (smaller than a village, the urban equivalent of a para)
MOHFW	Ministry of Health and Family Welfare
Mouza	Smallest administrative locality in an Upazila
MSH	Management Sciences for Health
NGO	Non Governmental Organization
NID	National Immunization Day
OPV	Oral Polio Vaccine
TT	Tetanus Toxoid
TTBA	Trained Traditional Birth Attendant
UTBA	Untrained Traditional Birth Attendant
WHO	World Health Organization

Terminology

This provides the meaning of some of the more technical terms used in this report and a brief explanation of their use.

By card: An immunization given to a child is termed as by card if the date of the dose is entered on an immunization card. Only doses recorded by card are treated as valid data in this survey.

By history: Immunization history collected from a parent's recall is termed as by history. Often no date will be mentioned. This information is only included in crude data.

Crude coverage rate is calculated from the doses recorded by card and/or by history. It is not ascertained whether the doses were given at the correct age and/or following the correct interval (where applicable). Crude data however, helps us to understand how much additional coverage could be achieved if all vaccines were given at the optimum age for the child and following the optimum interval. It also provides useful information on access to the EPI program and on the operational aspects of the provision of health services.

Valid coverage rate is calculated from the vaccinations recorded by card plus history. In the calculation process, first the rate of validity is calculated based on cards only, then this rate is applied to history cases too. Valid data includes only the doses of vaccines that were given after the minimum date of eligibility and/or after the minimum interval necessary to be effective and to protect the child. There is no maximum interval for a dose and therefore a dose administered after 52 weeks is still regarded as valid. By comparing crude coverage with valid coverage data of any particular antigen, one can determine how much coverage was lost due to the inability to give vaccine at the appropriate time.

Invalid doses are those administered at the wrong age and/or at the wrong interval. Doses administered before the minimum age in the case of DPT/Polio 1st doses and Measles vaccine or with less than four weeks interval in the case of DPT or Polio vaccines are classified as "invalid" doses.

The **criteria for a valid dose** used in this survey is the criteria recognized by the Bangladesh EPI program: minimum age for DPT/Polio 1st dose - 6 weeks old; minimum DPT/Polio interval - 4 weeks; minimum age for Measles vaccine - 38 weeks old.

Dropout cases refer to the children/women who have initially received at least one dose of any antigen and then failed to receive the subsequent doses to get fully immunized. Dropout rate implies the inability of the EPI to follow-up and protect the cohort of children initially reached out.

Program access is measured by the percentage of children surveyed who received DPT 1st dose (crude data – by card and history) in the routine immunization session.

Fully immunized means the child has received all the doses it requires (BCG, OPV 1-3, DPT 1-3 and measles).

Missed opportunity refers to a visit of a child to a vaccination center for a dose that he received. However at that time he was also eligible for another dose of antigen that he did not receive. If the missed dose was provided at a later date, it is a *corrected missed opportunity*. If not, it is an *uncorrected missed opportunity*.

Executive Summary

Background

To improve routine EPI and polio eradication activities, the Expanded Program on Immunization (EPI), Directorate General of Health Services (DGHS), Government of Bangladesh, decided to conduct district and city corporation wise coverage evaluation surveys (CES) in early 2002. UNICEF supported this initiative by contracting out 75 coverage evaluation surveys- one for each of the 64 districts, one for each of the 4 city corporations and 7 surveys for the Bangladesh Integrated Nutrition Project (BINP) upazilas, to two local consulting firms. To supplement these surveys, the Government and the partners requested IOCH to conduct additional 7 coverage evaluation surveys in urban areas. Accordingly, IOCH conducted a coverage evaluation survey in the slums of Khulna and Rajshahi City Corporations in April 2002.

Objectives

The overall objective of the survey was to assess the level of immunization coverage in the slums of Khulna and Rahshahi City Corporations. The specific objectives were to:

- a) assess the level of routine immunization coverage of the children (12-23 months) and find out the reasons for non-immunization and partial immunization;
- b) assess the level of TT immunization coverage among mothers who had live births in the previous year, and find out the reasons for non-immunization and partial immunization;
- c) assess the coverage levels of OPV and Vitamin A administered during the 10th NID campaign;
- d) investigate antenatal and delivery practices, and decision making process for immunization; and
- e) understand importance of education on selected health care practices.

Coverage levels for the routine immunization of children

Access: Based on crude data (card plus history), 94% of the children 12-23 months received at least one dose of antigen (DPT 1st dose in this case) from routine immunization sessions. 6% children did not receive a dose of any antigen.

Crude coverage between 12-23 months: 94% of the children received BCG, 81% received three doses of OPV, 81% received three doses of DPT and 78% received measles vaccine. 76% children were fully immunized.

Valid coverage between 12-23 months: 94% children received BCG, 76% received three doses of OPV, 76% received three doses of DPT and 76% received measles vaccine. 70% children were fully immunized.

Valid coverage by 12 months: 93% children received BCG, 73% received three doses of OPV, 73% received three doses of DPT and 69% received measles vaccine. 62% were fully immunized.

Dropout rates: Although access to child immunization was high (94% for DPT1), the dropout rates for different antigens were high too. There was 14% dropout from DPT1 to DPT2 and 18% from DPT1 to measles.

Invalid doses: There were a number of invalid doses due to early immunization and/or inadequate interval between the doses. About 4% of the DPT1 doses were administered before 6 weeks, and 2% measles doses before 38 weeks of age of the children. In addition, 1% of the DPT2/OPV2 doses and 2% of the DPT3/OPV3 doses were invalid as they were given before the 4 weeks interval between the doses.

Missed opportunities: Total missed opportunities (uncorrected plus corrected) for different antigens ranged from 4 to 10 cases (out of 210). However, the prevalence of uncorrected missed opportunities for different antigens was low, ranging from 0.5% to 2%. The composite index for missed opportunities was as high as 45, reflecting poor quality of screening during vaccination sessions.

Immunization coverage by sex: Male children had more access to immunization than the female. Boys' access to immunization as measured by coverage of DPT1 was 5 percentage points higher than that of the girls. A similar trend was also observed with regard to crude full immunization. 80% of the male children were fully immunized; while the corresponding figure for the female children was 73% only. However, the proportion of invalid doses for the male children was higher than that of for the female children, leading to lower valid FIC (fully immunized children) for male children (69% vs. 71%)

EPI Card retention: 94% of the children interviewed were ever given EPI cards; however, EPI cards were available in 64% of the cases at the time of interview. EPI card retention rate was 69% only, which means that 31% of the EPI cards were lost.

Sources of immunization services: Child immunization services in this area were mostly provided by the GOB/CC outreach centers (64%), followed by NGO clinics (28%) and GBO hospitals (6%). Private clinics provided immunization to 2% of the cases only.

Reasons for non-immunization and partial immunization of the children: The primary reasons for non-immunization of the children included: lack of faith in immunization (50%), sickness of the children (17%), and fear of adverse reaction (17%). The primary reasons for partial immunization or dropouts were: sickness of the children (42%), lack of faith in immunization (24%) and mothers did not know when to return for 2nd and 3rd dose of DPT/OPV or measles (8%).

Coverage levels for the routine TT immunization of mothers

TT coverage: Access to TT immunization for the mothers who had live births in the last year was fairly high. About 95% of the mothers received TT1. The corresponding figures for TT2, TT3 and TT4 were 92%, 67% and 47% respectively. Only 31% of the mothers received TT5, which provide lifelong protection against tetanus. About 5% of the mothers never received any TT vaccine.

TT immunization dropout rates: TT immunization dropout rates were high. The dropout rate for TT2 to TT3 was 25%. The corresponding rates for TT3 to TT4 and TT4 to TT5 were 32% and 34% respectively. The dropout rate for TT1 to TT5 was as high as 68%, indicating that 68% of the mothers who received first dose of TT did not complete 5 doses TT immunization schedule.

Invalid TT doses: A considerable proportion of TT doses were invalid as they were administered before the minimum required interval between the doses. 27% of the TT3 doses were given before 6 months interval between TT2 and TT3, and as such were invalid. One-third of the TT4 doses (34%) were invalid, since they were given before one year interval between TT3 and TT4; similarly 33% of the TT5 doses were invalid for the same reason.

TT card retention: 93% of the mothers (who had live births in the last year) were ever given TT cards; however, TT cards were available in 47% of the cases at the time of interview. TT card retention rate was 51% only, which means that 49% of the TT cards were lost.

Protection against tetanus at birth: Of the mothers who had live births in the previous year, 87% of newborn babies were found protected against tetanus, indicating that 13% of the newborn babies were still not protected against tetanus at birth.

Sources of TT immunization services: Half of the TT immunization services were provided by the GOB outreach centers (50%), followed by NGO clinics (27%) and GOB hospitals (19%). Private clinics provided immunization to 4% of the cases only.

Coverage levels for the 10th National Immunization Campaign

OPV and Vitamin A coverage: During the 10th NIDs, 97% of the children < 5 years received OPV in both the rounds; while 98% received in each of the rounds. Vitamin A capsules were given to 94% of the eligible children (12 – 59 months old). Besides, Vitamin A capsules were administered wrongly to 2 ineligible children (out of 210) who were <1 year of age.

Sources of OPV during the 10th NIDs: Most of the children received OPV from NID sites during both the rounds of the 10th NIDs. It was found that more children received OPV during child-to-child search of the 2nd round compared to that of the 1st round (2% in 1st round vs. 4% in 2nd round).

Reasons for not receiving vaccines from the NID sites of the 10th NIDs: The most important reasons for not receiving OPV from the NID sites of the 10th NIDs were: parents were too busy to take their children to NID sites (37% for 1st round and 33% for 2nd round), lack of information of NID campaign (13% for 1st round and 17% for 2nd round), and religious and social barriers (12% for 1st round and 17% for 2nd round).

Sources of information of the 10th NID campaign: The major sources of information of the 10th NID campaign were the GOB/City Corporation health workers (65%), followed by television (41%) and mosque miking (40%). The other sources of information included relatives/neighbors (35%), mobile miking (27%) and NGO workers (20%).

Antenatal checkup: 40% of the mothers did not receive any antenatal check-up during their last pregnancies. Mother's education seems to have positive association with antenatal checkup. About half of the uneducated mothers (48%) never received antenatal checkup during their last pregnancies; while the corresponding figures of the mothers with education of class VI or higher ranged from 20% to 28%

Delivery Practices: Most of the deliveries (70%) were attended by untrained traditional birth attendants (UTBA) or neighbors and relatives. Only 17% of the deliveries were attended by graduate doctors or midwives/nurses; while another 13% were attended by trained traditional birth attendants (TTBA). Uneducated women were less likely to have their deliveries attended by qualified doctors or midwives and nurses. In most of the cases (97%), new blades or sterilized blades/scissors were used in cutting the umbilical cords of the newborn babies. About 41% of the mothers did not apply anything at the cut of umbilical cord of their newborn babies. However, 25% of the mothers applied antibiotic powder/ ointment/cream. Unhygienic practices, i.e. using ash, soil/soil with oil or oil at the cut of the umbilical cord were reported by 26% mothers. It was found that uneducated women were less likely to use antibiotic powder/ointment/cream to treat the cut of the umbilical cord of newborn babies. Deliveries attended by qualified doctors or midwives/nurses were apparently less likely to use ash, soil/soil with oil or oil at the cut of umbilical cord than those delivered by TBAs, neighbors and relatives. However, these data should be interpreted cautiously, since many other confounding variables, such as economic condition, husband's education, family's health care practices, etc. may effect this particular health care practice. (Because of absence of data, we could not control these variables for this analysis)

Decision making process for child immunization: For half of the cases, mothers alone took decision regarding immunization of their children; while father and mother jointly took decision in one-third of the cases. However, grant parents and other relatives played an important role in this matter accounting for 13% of the cases. It was found that the women with education of SSC and higher were more likely to take decision either themselves alone or jointly with their husbands regarding immunization of their children, compared to uneducated ones

Immunization status and mother's education: It was found that the uneducated mothers were less likely to get their children fully immunized. 67% of the children of the uneducated mothers were fully immunized (crude data); while the corresponding figure for the mothers with education of SSC or higher was 100%.

Problems detected

Access to child immunization in the slums of Khulna and Rajshahi City Corporations was good (94% for DPT1); but this high access dropped to 76% for fully immunized children because of high dropout rates of different antigens. (Dropout rate for DPT1 to DPT3 was 14% and DPT1 to measles was 18%). There were also a number of invalid doses (4% for DPT1 and 2% for measles), which further reduced the crude full immunization coverage of 76% to 70% when validity of doses was taken into account. Total missed opportunities for different antigens were also considerably high (5 for BCG, 6 for DPT1 and 10 for measles). These high rates of dropouts, invalid doses and missed opportunities reflect poor quality of immunization services.

Male children had more access to immunization than the female children. Boys' access to immunization as measured by coverage of DPT1 was 5 percentage points higher than that of the girls. Although 94% of the children were ever given EPI, the retention rate of EPI cards was 69% only. Such a low retention rate of EPI cards plays a negative role in the quality of EPI services provided by the health workers. Level of knowledge of the mothers with regard to full immunization was poor. Two-third of the mothers (65%) could not mention how many times their children were required to be taken to EPI center to get fully immunized.

Lack of faith in immunization and fear of adverse reaction were the major reasons for non-immunization, which indicate that the wrong perception about immunization still persists in the community. While sickness of the children, lack of awareness of benefits of immunization and lack of knowledge as to when to return for subsequent doses resulted in high drop out rate and consequently contributed to low full immunization coverage.

Of the women who had live births in the previous year, 5% did not receive any dose of TT (although each of the women was supposed to receive at least two doses of TT prior to her last delivery). 13% of the newborn babies were found unprotected against tetanus at birth. The dropout rate for TT was also high (68% for TT1 to TT5), resulting in very low coverage of TT5 (31%), which provides lifelong protection against tetanus. A very high proportion of TT doses were invalid (27% for TT3, 34% for TT4 and 33% for TT5). Mother's knowledge about full TT immunization was found to be very low. 78% mothers did not know that a woman is required to receive 5 doses of TT for lifelong protection against tetanus. The rate of retention of TT cards was also very low (51%).

3% of the children < 5 years did not receive OPV in both the rounds of the 10th NID campaign. In spite of intensive communication activities during NIDs, lack of information of NID campaign as a reason for not receiving OPV from NID site was still reported by 13% parents in 1st round and 17% in 2nd round.

6% of the children of 12 – 59 months did not receive Vitamin A during the 10th NIDs. Besides, Vitamin A capsules were also administered wrongly to 2 ineligible children (out of 210) who were <1 year of age.

Suggested solutions

1. Programmatic strategies must be undertaken to reduce the existing high dropout rates in both child immunization and TT immunization. The program should focus on quality of counseling of mothers/women (on immunization) by the service providers. The service providers at the first contact must counsel the mothers/women properly to motivate her to return and to get herself and/or her child fully immunized.
2. Program managers and field supervisors should ensure that EPI sessions are held as per plan, and at a regular and adequate interval (more than 28 days).
3. The service providers should be given refresher training to improve their technical skills on counseling of mother/women on immunization.
4. In order to reduce existing high rate of invalid doses and missed opportunities, emphasis should be given on screening of clients for both child and TT immunization.

- The service providers should be given refresher training to improve their technical skills on screening of clients for immunization
5. The pregnant mothers should be motivated (by the service providers and/or by the BCC activities through mass media) to receive the required number of TT doses necessary to protect their newborn babies.
 6. Mothers should be explained (by the service providers) the benefits and importance of EPI cards/ TT cards for immunization of themselves and their children.
 7. Mothers should be asked to preserve the EPI card safely until their children are 5 years old, and to bring the cards with them whenever they come to the clinic/ EPI center for immunization of their children. They should also be asked to carefully preserve their TT cards, and to bring the cards with them whenever they come to clinic/ EPI center for TT immunization.
 8. In the case of loss of EPI card/TT card, it should be provided over and over, and the history of the earlier vaccinations accurately recorded again and again, if necessary.
 9. During IPC between the mothers and the service providers and/or at the first contact, the mothers should be clearly explained the importance of full immunization of children and women, and of the immunization schedule for full immunization for both children and women.
 10. The program should strengthen BCC activities to inform the community of importance of immunization in general, and to motivate the mothers to get themselves and their children fully immunized. Very selective and focused mass media campaign may also be conducted to achieve this end.
 11. Appropriate BCC activities need to be undertaken at the community and household levels to get rid of existing sex preference (preference to male child) in immunization.
 12. Area specific innovative strategies suitable to local situation have to be undertaken during the next NIDs to reach to the left out children.
 13. More attention should be given to high risk areas and traveling population during next NIDs.
 14. Communication activities need to be strengthened through mass media, such as television, as well as through IPC by the health workers, to inform the communities of the next NID campaign.
 15. Parents should be encouraged to attend the fixed NID sites/centers and discouraged to wait for home visits by the service providers during child-to-child search.
 16. For distribution of Vitamin A capsules during NID, special attention should be given to the exact age group to limit shortage (through better screening for age) and no Vitamin A capsule should be given to the parents to administer them to their children either at NID site or in their homes.

Introduction

To improve routine EPI and polio eradication activities, the Expanded Program on Immunization (EPI), Directorate General of Health Services (DGHS), Government of Bangladesh, decided to conduct district and city corporation wise coverage evaluation surveys (CES) in early 2002. UNICEF supported this initiative by contracting out 75 coverage evaluation surveys- one for each of the 64 districts, one for each of the 4 city corporations and 7 surveys for the Bangladesh Integrated Nutrition Project (BINP) upazilas, to two local consulting firms. To supplement these surveys, the Government and the partners requested IOCH to conduct additional 7 coverage evaluation surveys in urban areas as follows:

- i) one coverage evaluation survey for the slums of Dhaka City Corporation;
- ii) one coverage evaluation survey for homeless and street children of Dhaka City Corporation;
- iii) one coverage evaluation survey for the slums of Chittagong City Corporation;
- iv) one coverage evaluation survey for the slums of Khulna and Rajshahi City Corporations;
- v) one coverage evaluation survey for the major municipalities (IOCH supported 91 municipalities); and
- vi) two coverage evaluation surveys for the peri-urban areas (Tejgaon Circle) of Dhaka City Corporation.

Accordingly, IOCH conducted a coverage evaluation survey in the slums of Khulna and Rajshahi City Corporations in April 2002.

Objectives

The overall objective of the survey was to assess the level of immunization coverage in the slums of Khulna and Rajshahi City Corporations. The specific objectives were to:

- a) assess the level of routine immunization coverage of the children (12-23 months) and find out the reasons for non-immunization and partial immunization;
- b) assess the level of TT immunization coverage among mothers who had live births in the previous year, and find out the reasons for non-immunization and partial immunization;
- c) assess the coverage levels of OPV and Vitamin A administered during the 10th NID campaign;
- d) investigate antenatal and delivery practices, and decision making process for immunization; and
- e) understand importance of education on selected health care practices.

Methodology

The survey employed the WHO recommended 30-cluster survey method¹, which has been widely used in many developing countries to assess immunization coverage. It is relatively simple and can be done at low cost¹. Briefly, the immunization information is collected on a randomly selected group of 210 children/women from 30 clusters (seven children/women per

cluster) in a given community. It gives an estimate of immunization coverage to within +/- 10 percentage points of the true population proportion with 95% statistical confidence, assuming a design effect of 2. Based upon prior experience with immunization coverage surveys, 30 clusters are generally thought to be necessary to yield sufficiently reliable estimate.

In this survey, seven children between 12-23 months born between March 23, 2000 and March 23, 2001 were selected from each cluster to ascertain their routine vaccination status. The 10th NID campaign was conducted on 27 January 2002 (first round) and 10 March, 2002 (second round) throughout the country, including the urban areas. Seven children born between 15 March 1997 and 26 January 2002 were selected from each cluster for collecting information on NIDs. Also, seven women who had live births between 23 March 2001 and 23 March 2002 were selected from each cluster to ascertain their tetanus toxoid vaccination status for routine immunization. In addition to the information on immunization and NIDs, information on several social, antenatal and delivery indicators was collected from the mothers interviewed.

Thirty clusters (mahallahs/blocks/sub-blocks) were chosen randomly from a list of the slum populations in Khulna and Rahshahi City Corporations. The list of the selected clusters is given in **Annex A** and their location is shown on the following map. The WHO recommended standard coverage evaluation questionnaires were used in this survey for documenting the routine immunization status of children and women. Separate questionnaires were used for collecting the data on the NID campaign, as well as social and health care indicators.

The data for the survey were collected by the experienced Field Investigators of the Survey Team and selected Polio Eradication Facilitators of the IOCH. All the surveyors were trained and were adequately supervised in the field during data collection to ensure quality and completeness of the data. The data were collected over a week, between March 27, 2002 and March 31, 2002. Data processing and analysis were done by the Monitoring and Evaluation Unit of the IOCH using COSAS 4.41² and EpiInfo. The final report was produced by the Monitoring and Evaluation Unit of the IOCH/MSH.

Limitations

Limitations of the 30-cluster survey method

Although the 30-cluster survey method is relatively simple, it has several limitations² that can be grouped into two types:

Linked to the sampling method:

- As an inherent bias in the sampling technique in 30 clusters, bigger mouzas are more likely to be selected as a cluster. The survey leaves out scattered small mouzas with poor access to services. It also does not reflect the lack of uniformity in service availability or the behavior of particular populations.

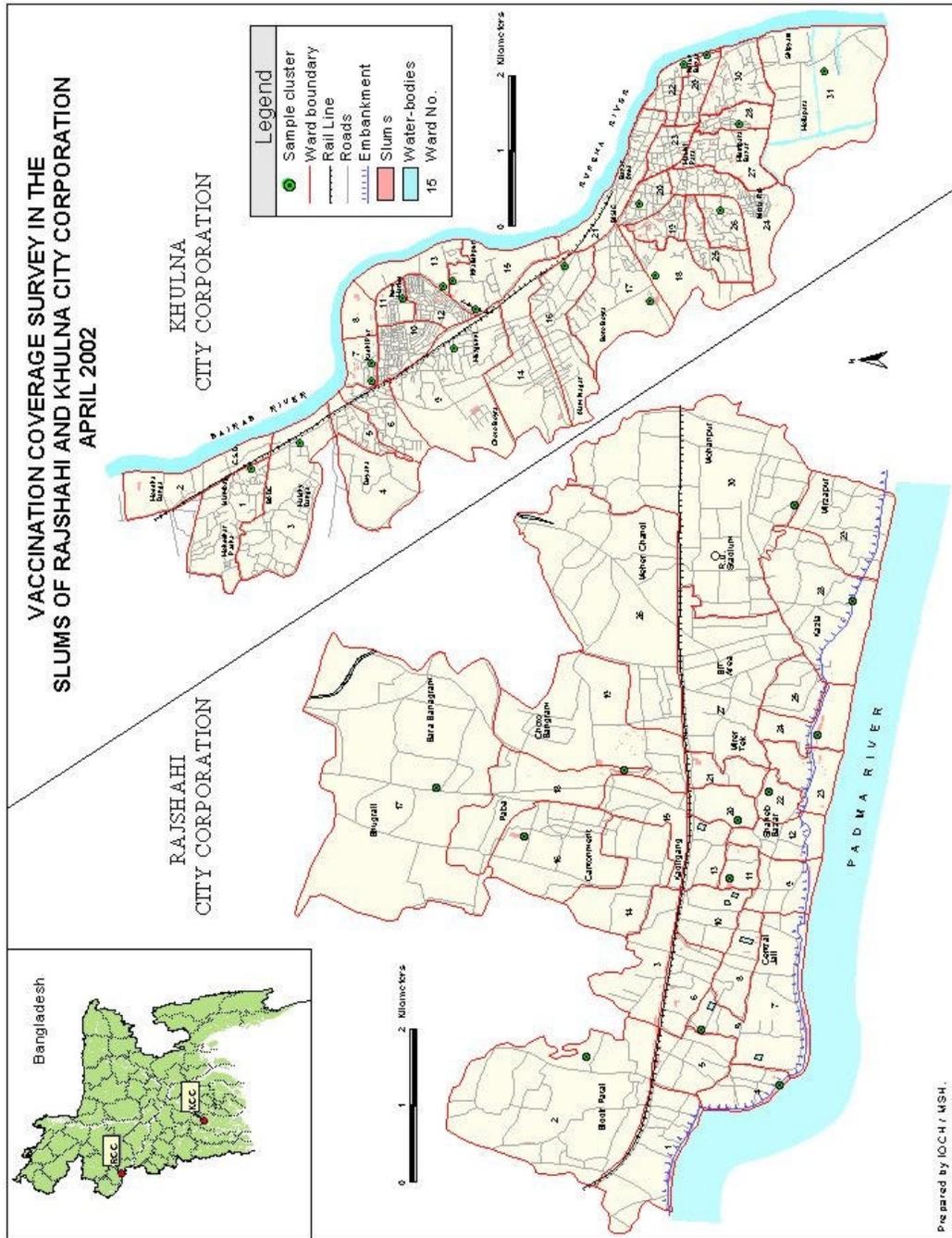
² COSAS (Coverage Survey Analysis System) is a dedicated software for analyzing coverage evaluation survey data

- There is a wide confidence interval (+/- 10%). It means that if the result shows 56% of children received a valid dose of measles before 12 months of age, then the “true” figure of measles immunization of children could be anywhere between $(56-10) = 46\%$ and $(56+10) = 66\%$. This type of survey is useful when the coverage is low but is less relevant to assess higher coverage or to compare surveys – unless there is a big difference between two surveys.
- To be relevant, the analysis of valid data must apply to a relatively high percentage of available cards.

Linked to the implementation:

- The selection of the index house is key. Too often, the proper method is not followed because the surveyors do not make the effort to number all the houses from their location to the end of the mouzas along the direction indicated by the bottle or by the pencil.
- If a household includes an eligible child who is not at home for a few hours, the surveyor often does not return later on but skips the house and substitutes another child. This is, of course, an incorrect procedure that introduces a bias.

It is also important to remember that this survey coverage data gives little information about the current program as it documents the activities of a year earlier.



Results

Routine immunization coverage levels for children

Table 1 shows the coverage levels of children between 12-23 months of age and their vaccination status at 12 months of age. The crude data figures for the 12-23 month age group indicate that 94% of the children had access to immunization services. The crude coverage for BCG, OPV3, DPT3 and Measles were estimated at 94%, 81%, 81% and 78% respectively. The corresponding valid coverages for these antigens were 94%, 76%, 76% and 76%. Valid coverage by 12 months for BCG, OPV3, DPT3 and Measles were 93%, 73%, 73% and 69% respectively.

Table 1: Routine immunization coverage levels

Name of the Vaccine	Coverage (%) Immunization of 12-23 months age group		Coverage (%) Immunized by 12 months of age
	Crude data (Access)	Valid data	Valid data
BCG	94	94	93
OPV1	94	91	90
OPV2	89	84	84
OPV3	81	76	73
DPT1	94	91	90
DPT2	88	83	83
DPT3	81	76	73
Measles	78	76	69
Fully immunized	76	70	62
Zero Dose	6		

Crude coverage of full immunization of 12-23 months age group was 76%. The coverage for the same age group for valid data was 70%. When considered for 12 months, the coverage went further down to 62%. The relatively lower valid coverage of full immunization (compared to crude full immunization coverage) might be explained by the prevalence of invalid doses and missed opportunities (which have been discussed in the following pages). 6% of the children never received any dose of vaccine.

The crude data figures for 12-23 months age group show that the valid coverage for different antigens were relatively lower than those of the crude coverage (76% vs. 81% for OPV3 and 70% vs. 76% for full immunization) reflecting a number of invalid doses, indicating poor quality of services.

Immunization coverage levels by gender

Routine immunization coverage levels for different antigens by gender are shown in Table 2. It indicates that the male children had more access to immunization than the female. Male children's access to immunization as measured by coverage of DPT1 was 5 percentage points higher than that of the female children. A similar trend was also observed with regard to

crude full immunization. 80% of the male children were fully immunized; while the corresponding figure for the female children was 73% only. However, the proportion of invalid doses for the male children was higher than that of for the female children, leading to lower valid FIC (fully immunized children) for male children (69% vs. 71%).

Table 2: Routine immunization coverage levels by gender

Name of the vaccine	Coverage % Immunization of 12-23 months age group				Coverage % Immunized by 12 months	
	Crude data (Access)		Valid data		Valid data	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
BCG	97	91	97	91	96	91
OPV1	97	92	93	89	91	89
OPV2	90	88	82	85	82	85
OPV3	80	83	70	81	67	78
DPT1	97	92	93	89	91	89
DPT2	89	88	81	85	81	85
DPT3	80	83	70	81	67	78
Measles	81	75	78	75	73	66
Fully immunized	80	73	69	71	64	61
Zero dose	3	8				

Invalid doses and missed opportunities

Table 3 shows that there were a number of invalid doses due to early immunization and/or inadequate interval between the doses. About 4% of the DPT1 doses were administered before 6 weeks, and 2% measles doses before 38 weeks of age of the children. In addition, 1% of the DPT2 doses and 2% of the DPT3 doses were invalid as they were given before the 4 weeks interval between the doses.

Table 3: Invalid doses of immunization provided to the children

Antigens	Percentage
DPT1	4
DPT2	1
DPT3	2
Measles	2

Table 4 shows missed opportunities for different antigens. Total missed opportunities (both corrected and uncorrected) for different antigens were quite high, ranging from 4 to 10 cases out of 210. Prevalence of uncorrected missed opportunities for different antigens ranged from 0.5% to 2%. The composite index for total missed opportunities was as high as 45, reflecting poor quality of screening during vaccination sessions.

Table 4: Missed opportunities by antigens

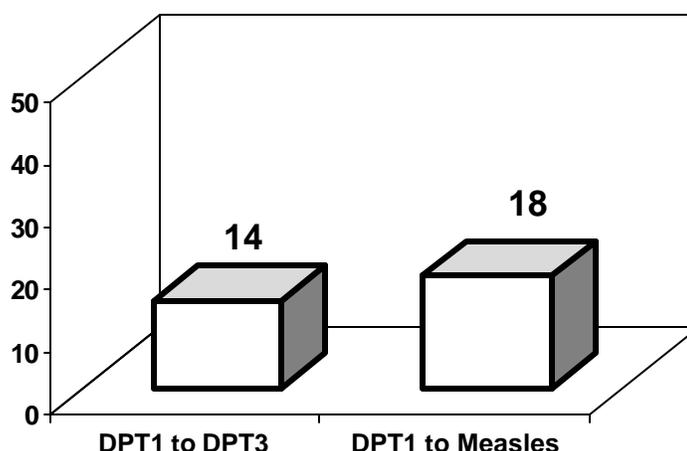
Name of the vaccine	Uncorrected		Corrected		Total
	#	%	#	%	#
BCG	1	0.5	4	2	5
DPT1	1	0.5	5	2	6
DTP2	1	0.5	3	1	4
DPT3	3	1	2	1	5
OPV1	1	0.5	5	2	6
OPV2	1	0.5	3	1	4
OPV3	3	1	2	1	5
Measles	4	2	6	3	10
Index					45

** The idea is to propose one composite index reflecting the quality of screening during vaccination sessions.*

Dropouts of child immunization

Figure 1 shows that the dropout rates for different antigens were considerably high. The dropout rate for DPT1 to DPT3 was 14% and DPT1 to measles was 18%. These high dropout rates reflect inadequate counseling of parents by the service providers on completion of immunization schedule.

Figure 1: Drop-out rates for child immunization



EPI card retention

Table 5 shows that 94% of the children interviewed were ever given EPI cards; however, EPI cards were available in 64% of the cases at the time of interview. EPI card retention rate was 69% only, which means that 31% of the EPI cards were lost.

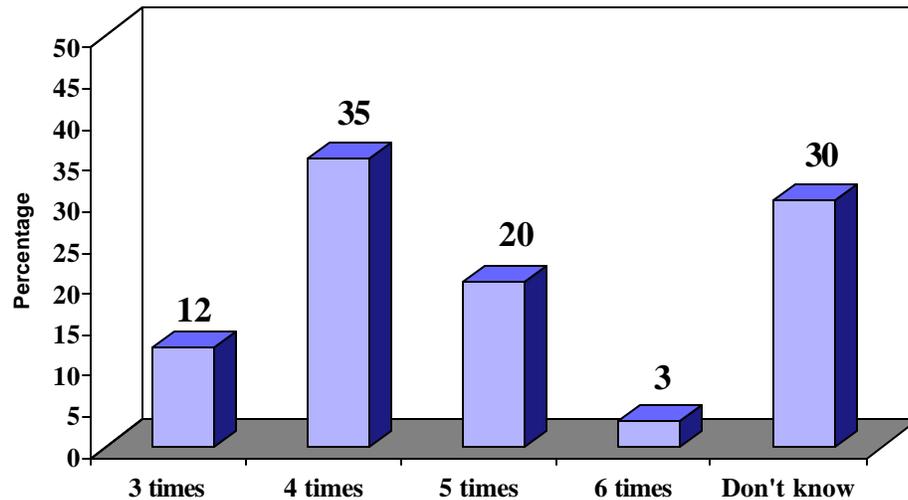
Table 5: EPI Card availability and retention

Card Status	Number	Percentage
EPI card available	135	64
EPI card ever given	197	94
EPI card retention	135	69

Knowledge about required visit to immunization center for full immunization

Figure 2 shows mothers' knowledge about required visits to immunization center for getting a child fully immunized. It shows that only 35% of the mothers could mention correctly the number of times (i.e. 4 times) a child is required to visit immunization center to get fully immunized.

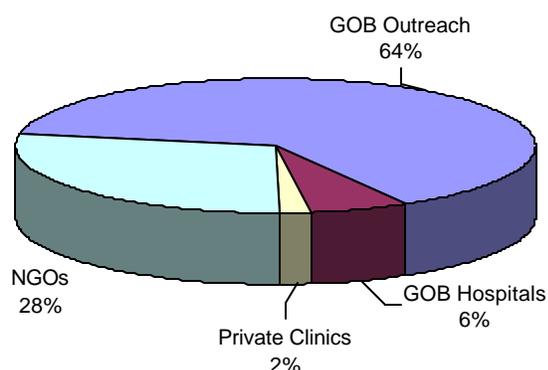
Figure 2: Knowledge about required visits to immunization centers for full immunization



Sources of immunization services

Child immunization services in this area were mostly provided by the GOB/CC outreach centers (64%), followed by NGO clinics (28%) and GBO hospitals (6%). Private clinics provided immunization to 2% of the cases only (Figure 3).

Figure 3: Sources of child immunization services



Reasons for non-immunization and partial immunization of the children

Table 6 presents reasons for non-immunization and partial immunization (dropouts) of children. The primary reasons for non-immunization of the children, as reported by the parents, included: lack of faith in immunization (50%), sickness of the children (17%), and fear of adverse reaction (17%). The primary reasons for partial immunization or dropouts were: sickness of the children (42%), lack of faith in immunization (24%) and mothers did not know when to return for 2nd and 3rd dose of DPT/OPV or measles (8%).

Table 6: Reasons for non-immunization and partial immunization of the children

Reasons for non-immunization or partial immunization	Non-immunized (%) (N=12)	Partially immunized (%) (N=38)
Did not know when to return for 2 nd /3 rd dose.	-	8
Did not know about importance of measles vaccine	-	5
Did not know about place and time of immunization	-	3
Child was sick, and not taken to immunization center	17	34
Child was sick, and was taken to immunization center but not given by vaccinator	-	8
Fear of adverse reaction	17	3
Future plan to vaccinate the child	17	3
No faith in immunization	50	24
Vaccinator was not available at the site	-	3
Vaccine was not available at the site	8	-
Long distance of EPI center	-	3
Painful for the children	-	3
Others	8	3

Routine TT immunization coverage levels for the mothers

Figure 4 shows routine TT immunization coverage levels for the mothers who had live births in the previous year. It shows a considerably high access to TT (95% for TT1), but very low full immunization coverage (31% for TT5). About 90% of the mothers interviewed received first dose of TT1; while 92%, 67% and 47% of the mothers received TT2, TT3 and TT4 respectively. Only 31% of mothers received TT5, which provides lifelong protection against tetanus. Of the mothers interviewed, 5% never received any TT vaccine.

Figure 4: Routine TT immunization coverage levels for the mothers

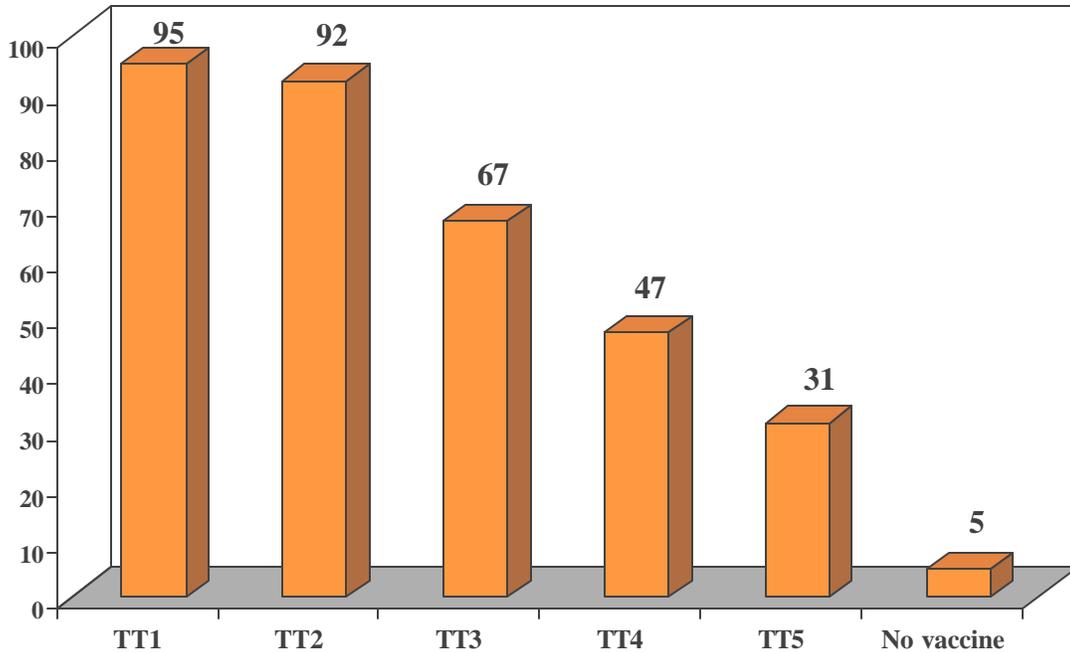
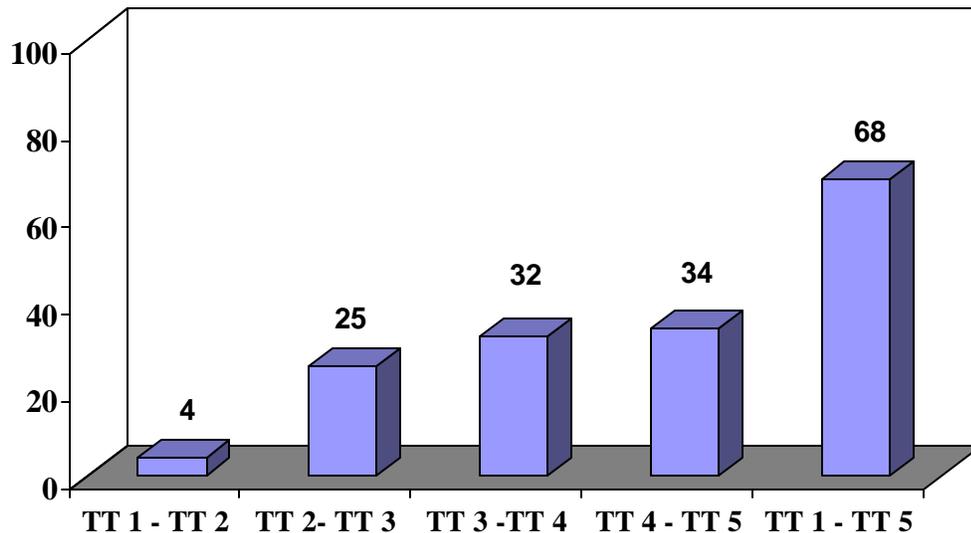


Figure 5: TT Immunization drop-out rates of the mothers



TT immunization dropout rate

Figure 5 shows a very high TT immunization dropout rate. The dropout rate from TT2 to TT3 was 25 percent. The corresponding rates for TT3 to TT4, and TT4 to TT5 were 32% and 34% respectively. The dropout rate for TT1 to TT5 was as high as 68%, indicating that 68% of the mothers who received first dose of TT did not complete 5 doses TT immunization schedule.

Invalid TT doses

Table 7 shows that a very high proportion of TT doses were invalid as they were administered before the minimum required interval between the doses. 27% of the TT3 doses were given before 6 months interval between TT2 and TT3, and as such were invalid. One third of the TT4 doses (34%) were invalid, since they were given before one year interval between TT3 and TT4; similarly, one-third of the TT5 doses (33%) were invalid too for the same reason.

Table 7: Interval between TT1 and TT2, TT2 and TT3, TT3 and TT4, and TT4 and TT5 dose

Interval between dose	<1 months		1 months+		<6 months		6 months+		<1 year		1 year +		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
TT1-TT2	14	8	166	92	-	-	-	-	-	-	-	-	180	100
TT2-TT3	-	-	-	-	35	27	95	73	-	-	-	-	130	100
TT3-TT4	-	-	-	-	-	-	-	-	31	34	59	66	90	100
TT4-TT5	-	-	-	-	-	-	-	-	20	33	40	67	60	100

Age distribution of mothers never receiving TT

About 95% of mothers had received first dose of TT indicating good access to TT immunization. However, 5% of mothers never received any TT vaccine. Table 8 shows age distribution of the mothers who had never received any dose of TT. It shows that all the mothers who were over 30 years of age received at least one dose of TT; while 12% of the mothers < 20 years never received any dose of TT.

Table 8: Age distribution of mothers who never received any dose of TT

Age group	Received		Never received		Total	
	#	%	#	%	#	%
15-19	35	88	5	12	40	100
20-25	91	97	3	3	94	100
26-30	49	96	2	4	51	100
31-35	14	100	-	-	14	100
36-45	11	100	-	-	11	100
Total	200	95	10	5	210	100

Protection against tetanus at birth

Mothers interviewed were asked about the TT vaccination status during the last pregnancy. The newborn was considered protected against neo-natal tetanus if the mother had received required number of valid doses of TT vaccine before the delivery of last child for protection against neo-natal tetanus. Of the mothers interviewed, 87% of newborn were found protected against tetanus. It indicates that a large number of newborn babies (13%) were still not protected against tetanus at birth (Table 9).

Table 9: Children born protected against tetanus

Status of children born protected	Number	Percentage
Protected	183	87
Not Protected	27	13

Knowledge about full TT immunization

Over two-third of the mothers (71%) did not have any idea about the number of TT doses required for a woman to get fully immunized; while 7% had wrong idea about the number of TT doses required for full immunization. However, 22% mothers could correctly mention that a woman was required to receive 5 doses of TT vaccine for full immunization for lifelong protection against tetanus (Table 10).

Table 10: Knowledge about number of TT doses required for full immunization

Number of TT doses	Number	Percentage
<5 doses	12	6
5 doses	47	22
>5 doses	2	1
Don't know/ no idea	149	71

TT card retention

Table 11 shows that 93% of the mothers (who had a live birth during last one year) were ever given TT cards; however, TT cards were available in 47% of the cases at the time of interview. TT card retention rate was 51% only, which means that 49% of the TT cards were lost.

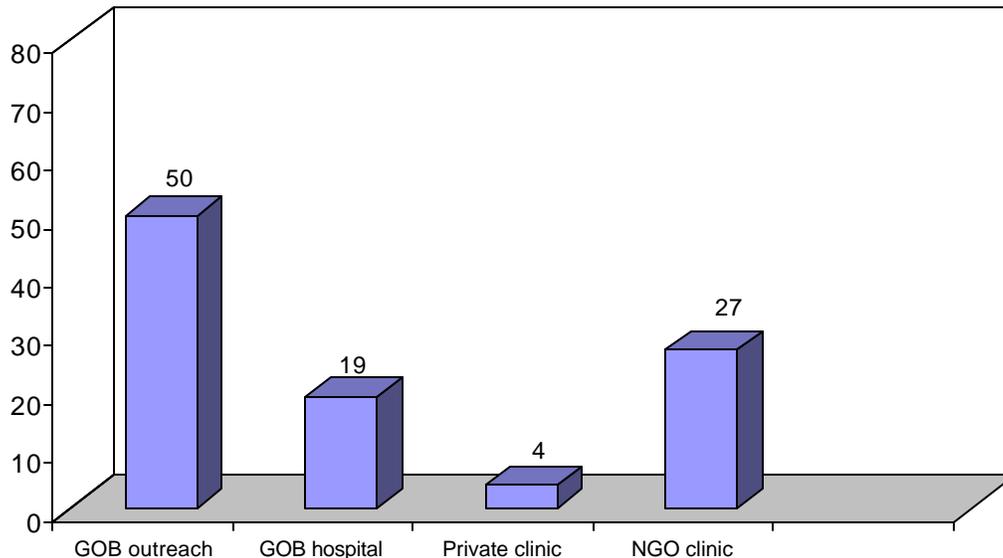
Table 11: TT card availability and retention

Card Status	Number	Percentage
TT card available	99	47
TT card ever given	195	93
TT card retention	99	51

Sources of TT immunization services

Half of the TT immunization services were provided by GOB/CC outreach centers (50%), followed by the NGO clinics (27%) and GOB hospitals (19%). Private clinics provided immunization service to 4% of the cases only.

Figure 6: Sources of TT immunization services



Coverage levels of the 10th National Immunization Campaign-2002

During the 10th NIDs, 97% of the children < 5 years received OPV in both the rounds; while 98% received in each of the rounds. Vitamin A capsules were given to 94% of the eligible children (12 – 59 months old) during the 10th NIDs (Table 12). Besides, Vitamin A capsules were administered wrongly to 2 ineligible children (out of 210) who were <1 year of age.

Table 12: Coverage levels of the 10th NID Campaign

Round	OPV (%)	Vit "A" (%)
1 st round	98	94
2 nd round	98	-
Both rounds	97	-
Any round	100	-

Sources of OPV during the NIDs

Table 13 shows that most of the children received OPV from NID sites during both the rounds of the 10th NIDs. It was found that more children received OPV during child-to-child search of the 2nd round compared to that of the 1st round (2% in 1st round vs. 4% in 2nd round).

Table 13: Sources of OPV during the 10th NIDs

Sources of OPV	1 st Round		2 nd Round	
	#	%	#	%
NID site	202	98	198	96
Child-to-child search	4	2	8	4
Total	206	100	206	100

Reasons for not receiving vaccines from the NID sites of the 10th NIDs

The most important reasons for not receiving OPV from the NID sites of the 10th NIDs were: parents were too busy to take their children to NID sites (37% for 1st round and 33% for 2nd round), lack of information about NID campaign (13% for 1st round and 17% for 2nd round), and religious and social barriers (12% for 1st round and 17% for 2nd round). (Table 14).

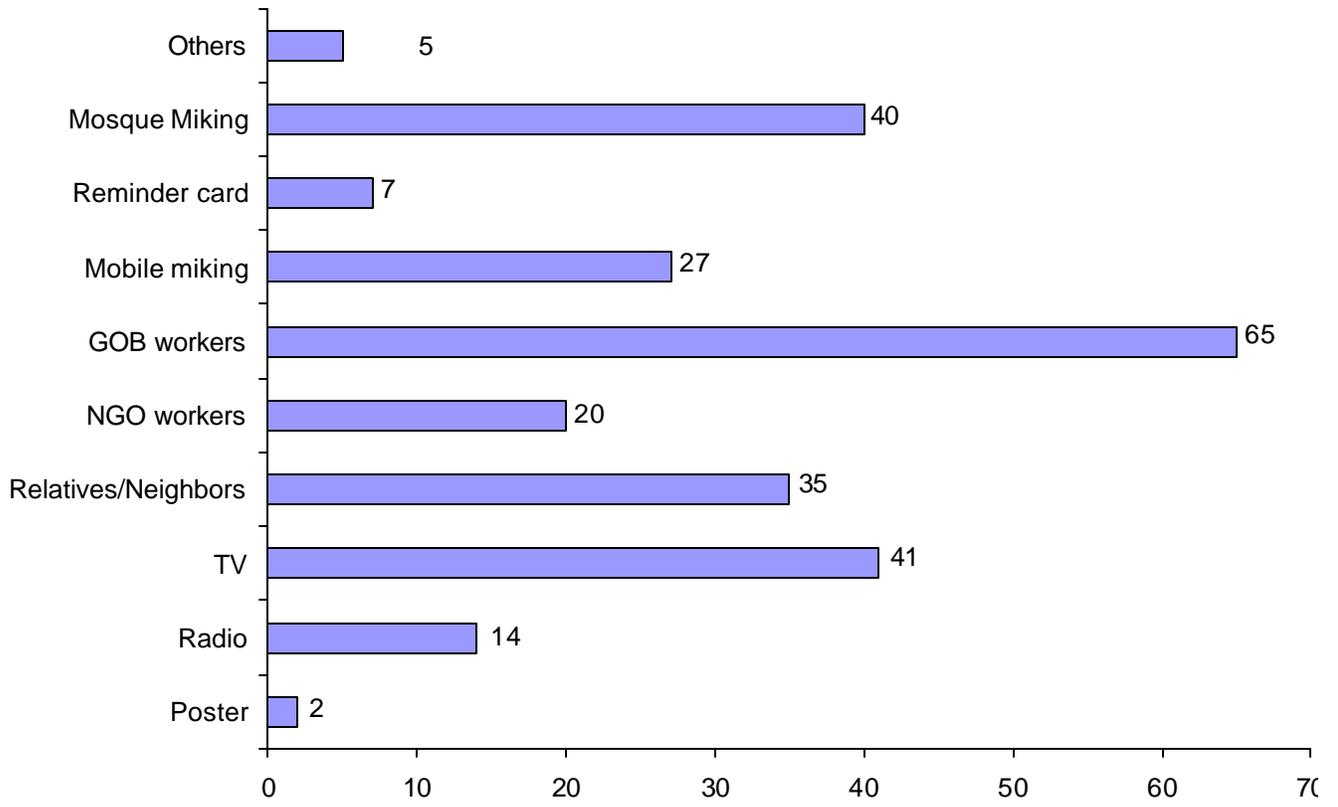
Table 14: Reasons for non-immunization of OPV during the 10th NIDs

Reasons	1 st Round (%) (N=8)	2 nd Round (%) (N=12)
Did not know about NID	13	17
Parents were too busy	37	33
Vaccinator was not available	13	-
Child was away from home	-	8
Place of NID site was too far	13	-
Religious/social barrier	12	17
Others	12	25

Sources of information of the 10th NID Campaign

The major sources of information of the 10th NID campaign were the GOB/City Corporation health workers (65%), followed by television (41%) and mosque miking (40%). The other sources of information included relatives/neighbors (35%), mobile miking (27%) and NGO workers (20%).

Figure 7: Sources of information about the 10th NID campaign



Mothers' profile, antenatal and delivery practices

Mothers' age and education

73% of the mothers were <30 years of age, and 61% were in the age-group of 20 – 29 years. About half of the mothers (47%) were uneducated; only 2% of the mothers had education of SSC level or higher (Table 15).

Table 15: Mothers' characteristics, antenatal and delivery practices

Variable	Percent	Variable	Percent
Mother's Age:		Instruments used for cutting umbilical cord:	
<20 years	12	New blade	75
20-24 years	30	Sterilized blade/scissor	22
25- 29years	31	Old blade	1
30-34 years	16	Others	2
35 years+	11	Total	100
Total	100		
Mother's education:		Medicine/powder applied at the cut of umbilical cord:	
No education	47	Antibiotic powder	18
I-V	32	Ointment/cream	7
VI-X	19	Soil/Soil with oil	12
S.S.C+	2	Ash	1
Total	100	Oil	13
		Others	8
At least one antenatal check up received during the last pregnancy:		Nothing used	41
Received	60	Total	100
Not received	40		
Total	100	Decision to immunize the child was taken by:	
Delivery attended by:		Father-Mother jointly	36
MBBS Doctor	7	Mother	48
Mid wife/Nurse	10	Father	2
Trained TBA	13	Grand parents	10
Untrained UTBA	37	Others	4
Relative/Friends/Neighbor	33	Total	100
Total	100		

Antenatal Checkup

60% of the mothers received at least one antenatal check-up during their last pregnancies. Mother's education seems to have positive association with antenatal checkup. About half of the uneducated mothers (48%) never received antenatal checkup during their last pregnancies; while the corresponding figures of the mothers with education of class VI or higher ranged from 20% to 28% (Table 15 & 16).

Table 16: Mothers never receiving antenatal checkup by education

Mother's education	Never received ANC checkup	
	#	%
No education	47	48
I-V	26	38
VI-X	11	28
S.S.C+	1	20
Total	85	40

Delivery practices

Most of the deliveries (70%) were attended by untrained traditional birth attendants (UTBA) or neighbors and relatives. Only 17% of the deliveries were attended by graduate doctors or midwives/nurses; while another 13% of the deliveries were attended by trained traditional birth attendants (TTBA). Uneducated women were less likely to have their delivery attended by qualified doctors or midwives and nurses. Among the uneducated women, only 7% deliveries were attended by qualified doctors and/or midwives and nurses; while the corresponding figure was 33% for the women with education of class VI - X and 60% for the women with education of HSC and higher (Table 16 & 17).

Table 17: Type of persons who attended deliveries by mothers' Education

Mother's education	MBBS Doctor		Mid wife /Nurse		TTBA		UTBA		Relative/Friends /Neighbor		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
No education	3	3	4	4	18	18	37	38	36	37	98	100
I-V	3	4	8	12	4	6	27	40	26	38	68	100
VI-X	6	15	7	18	5	13	13	33	8	21	39	100
S.S.C.+	2	40	1	20	1	20	0	0	1	20	5	100
Total	14	7	20	10	28	13	77	37	71	33	210	100

In most of the cases (97%), new blades or sterilized blades/scissors were used in cutting the umbilical cords of the newborn babies. Non-sterilized old blades or other instruments were used (for cutting umbilical cords) for 3% cases only (Table 15). It seemed that there was no specific pattern of relationship between the instrument used to cut the umbilical cord and the type of persons who attended the delivery or mothers' education (Table 18 & 19).

Table 18: Instruments used for cutting the umbilical cords of newborn babies by type of persons who attended deliveries

Type	MBBS Doctor		Midwife/ Nurse		TTBA		UTBA		Relative/Friend /Neighbor		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
New blade	1	8	8	50	19	68	73	95	55	77	155	75
Sterilized blade/ scissor	9	75	7	44	9	32	3	4	16	23	44	22
Old blade	0	0	0	0	0	0	1	1	0	0	1	1
Others	2	17	1	6	0	0	0	0	0	0	3	2
Total	12	100	16	100	28	100	77	100	71	100	203	100

Table 19: Instruments used for cutting the umbilical cord of newborn babies by mothers' education

Type	No education		I-V		VI-X		S.S.C+		Total	
	#	%	#	%	#	%	#	%	#	%
New blade	80	82	49	74	23	64	3	75	155	75
Sterilized blade/scissor	17	18	15	22	12	33	0	0	44	22
Old blade	0	0	1	2	0	0	0	0	1	1
Others	0	0	1	2	1	3	1	25	3	2
Total	97	100	66	100	36	100	4	100	203	100

About 41% of the mothers did not apply anything at the cut of umbilical cord of their newborn babies. However, 25% of the mothers applied antibiotic powder/ ointment/cream. Unhygienic practices, i.e. using ash, soil/soil with oil or oil at the cut of the umbilical cord were reported by 26% mothers (Table 15). Table 20 shows that uneducated women were less likely to use antibiotic powder/ointment/cream to treat the cut of the umbilical cord of newborn babies.

Table 20: Medicine/powder applied at the cut of umbilical cord of newborn babies by mothers' education

Type	No education		I-V		VI-X		S.S.C+		Total	
	#	%	#	%	#	%	#	%	#	%
Antibiotic powder	9	10	17	25	11	29	1	20	38	18
Ointment/cream	7	7	2	3	4	10	1	20	14	7
Soil/Soil with oil	14	14	7	10	4	10	0	0	25	12
Ash	2	2	0	0	0	0	0	0	2	1
Oil	13	13	12	18	2	5	1	20	28	13
Others	11	11	3	4	2	5	0	0	16	8
Nothing used	42	43	27	40	16	41	2	40	87	41
Total	98	100	68	100	39	100	5	100	210	100

Table 21 shows that the deliveries attended by qualified doctors or midwives/nurses were apparently less likely to use ash, soil/soil with oil or oil at the cut of umbilical cord than those delivered by TBAs, neighbors and relatives. However, these data should be interpreted cautiously, since many other confounding variables, such as economic condition, husband's education, family's health care practices, etc. may effect this particular health care practice. (Because of absence of data, we could not control these variables for this analysis)

Table 21: Medicine/powder applied at the cut of umbilical cord of new- born babies by type of persons who attended deliveries

Type	MBBS Doctor		Midwife/ Nurse		TBA		UTBA		Relative/Friends /Neighbor		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
Antibiotic powder	4	27	6	30	4	14	6	8	18	25	38	18
Ointment /cream	1	7	1	5	4	14	4	5	4	6	14	7
Soil/Soil with oil	0	0	0	0	5	18	11	14	9	13	25	12
Ash	0	0	0	0	0	0	2	3	0	0	2	1
Oil	0	0	2	10	6	21	12	16	8	11	28	13
Others	0	0	0	0	6	22	4	5	6	8	16	8
Nothing used	10	66	11	55	3	11	38	49	26	37	87	41
Total	15	100	20	100	28	100	77	100	71	100	210	100

Decision making process for child immunization

For half of the cases, mothers alone took decision regarding immunization of their children; while father and mother jointly took decision in one-third of the cases. Father was reported to be a sole decision maker in 2% cases only. However, grand parents and other relatives played an important role in this matter accounting for 13% of the cases (Table 15). Table 22 indicates that women with education of SSC and higher were more likely to take decision either themselves alone or jointly with their husbands regarding immunization of their children, compared to uneducated ones.

Table 22: Decision making for immunization of children by mothers' education

Mother's education	Father-mother jointly		Mother		Father		Grand parents		Others		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
No education	28	32	44	50	2	2	6	7	8	9	88	100
I-V	27	40	32	48	1	1	7	10	0	0	67	100
VI-X	15	39	17	45	0	0	6	16	0	0	38	100
S.S.C.+	2	40	3	60	0	0	0	0	0	0	5	100
Total	72	36	96	49	3	2	19	9	8	4	198	100

Knowledge about required visit to EPI center for full immunization

Two-third of the mothers (65%) did not know how many times their children were required to be taken to EPI center to get fully immunized. Only 35% of the mothers could correctly mention that a child was required to be taken to the EPI center 4 times for full immunization. The table 23 shows that the uneducated women were less likely to know how many times a child was required to be taken to EPI center to get fully immunized.

Table 23: Knowledge about required visits to immunization center for full immunization of children by mothers' education

Mother's education	3 times		4 times (Correct answer)		5 times		6 times		Don't know		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
No education	11	11	32	33	20	20	3	3	32	33	98	100
I-V	9	13	24	35	13	19	2	3	20	29	68	100
VI-X	4	10	14	36	8	21	1	3	12	30	39	100
S.S.C.+	0	0	3	60	1	20	1	20	0	0	5	100
Total	24	11	73	35	42	20	7	3	64	31	210	100

Vaccination status of the children and their mothers' education

Three-fourth of the children (76%) were fully immunized (as per crude data). Table 24 shows that the uneducated mothers were less likely to get their children fully immunized. 67% of the children of the uneducated mothers were fully immunized (crude data); while the corresponding figure for the mothers with education of SSC or higher was 100%.

Table 24: Vaccination status of the children by mothers' education

Mother's education	Total children	All doses received (crude FIC)	
		#	%
No education	98	66	67
I-V	68	56	82
VI-X	39	33	85
S.S.C+	5	5	100
Total	210	160	76

Discussions

Access to child immunization in the slums of Khulna and Rajshahi City Corporations was good (94% for DPT1); but this high access dropped to 76% for fully immunized children because of high dropout rates of different antigens. (Dropout rate for DPT1 to DPT3 was 14% and DPT1 to measles was 18%). This crude coverage reduced to 70% when validity of doses was taken into account. It further reduced to 62% when valid coverage by 12 months was estimated. This large difference between crude coverage and valid coverage could be well explained by high invalid doses. A large number of invalid doses were provided before the minimum required age or before required interval between the doses. 4% of the DPT1 doses and 2% of measles doses were provided before the required minimum age. Missed opportunities for different antigens were also considerably high. (Total missed opportunity for BCG and measles were 5 and 10 cases respectively with a composite total index of 45) These high rates of dropouts, invalid doses and missed opportunities reflect on the quality of services negatively.

Male children had more access to immunization than the female children. Boy's access to immunization as measured by coverage of DPT1 was 5 percentage points higher than that of the girls. A similar trend was also observed with regard to crude full immunization. However, the proportion of invalid doses for the male children was higher than that of for the female children, leading to lower valid FIC (fully immunized children) for male children (69% vs. 71%).

Although 94% of the children were ever given EPI, the retention rate of EPI cards (child immunization cards) was 69% only. Similarly, TT card retention rate was 51% only. Such a low retention rate of EPI cards/TT cards negatively affect the quality of EPI services provided by the health workers. Level of knowledge of the mothers with regard to full immunization was poor. Two-third of the mothers (65%) could not mention how many times their children were required to be taken to EPI center to get fully immunized; while 78% mothers did not know how many times a woman was required to receive TT vaccine for lifelong protection against tetanus.

Lack of faith in immunization and fear of adverse reaction were the major reasons for non-immunization (12% of the total children), which indicate that the wrong perception about immunization still persists in the community. While sickness of the children, lack of awareness of benefits of immunization and lack of knowledge as to when to return for subsequent doses resulted in high drop out rate and consequently contributed to low full immunization coverage.

Access to TT immunization for the mothers who had live births in the previous year was high (95% of the mothers interviewed received TT1); but TT dropout rate was also high, resulting in very low coverage of TT5 (31%), which provides lifelong protection against tetanus. The dropout rate TT1 to TT5 was as high as 68%, indicating that 68% of the mothers who received first dose of TT did not complete 5 doses TT immunization schedule.

A considerable proportion of TT doses were invalid as they were administered before the minimum required interval between the doses. Over one-fourth of TT3 doses (27%) were given before 6 months interval between TT2 and TT3, and as such were invalid. One-third of the TT4 doses (34%) were invalid, since they were given before one year interval between TT3 and TT4; similarly 33% of the TT5 doses were also invalid for the same reason.

Of the mothers who had live births in the previous year, 87% of newborn babies were found protected against tetanus, indicating that a large number of the newborn babies were not protected against tetanus at birth.

During the 10th NIDs, 97% of the children < 5 years received OPV in both the rounds; while 98% received in each of the rounds. Vitamin A capsules were given to 94% of the eligible children (12 – 59 months old). Besides, Vitamin A capsules were administered wrongly to 2 ineligible children (out of 210) who were <1 year of age.

Most of the children received OPV from NID sites during both the rounds of the 10th NIDs. It was found that more children received OPV during child-to-child search of the 2nd round compared to that of the 1st round (2% in 1st round vs. 4% in 2nd round).

The most important reasons for not receiving OPV from the NID sites of the 10th NIDs were: parents were too busy to take their children to NID sites (37% for 1st round and 33% for 2nd round), lack of information about NID campaign (13% for 1st round and 17% for 2nd round), and religious and social barriers (12% for 1st round and 17% for 2nd round).

The major sources of information of the 10th NID campaign were the GOB/City Corporation health workers (65%), followed by television (41%) and mosque miking (40%). The other sources of information included relatives/neighbors (35%), mobile miking (27%) and NGO workers (20%).

40% of the mothers did not receive any antenatal check-up during their last pregnancies. Mother's education seems to have positive association with antenatal checkup. About half of the uneducated mothers (48%) never received antenatal checkup during their last pregnancies; while the corresponding figures of the mothers with education of class VI or higher ranged from 20% to 28%

Most of the deliveries (70%) were attended by untrained traditional birth attendants (UTBA) or neighbors and relatives. Only 17% of the deliveries were attended by graduate doctors or midwives/nurses; while another 13% of the deliveries were attended by trained traditional birth attendants (TTBA). Uneducated women were less likely to have their delivery attended by qualified doctors or midwives and nurses.

In most of the cases (97%), new blades or sterilized blades/scissors were used in cutting the umbilical cords of the newborn babies. About 41% of the mothers did not apply anything at the cut of umbilical cord of their newborn babies. However, 25% of the mothers applied

antibiotic powder/ ointment/cream. Unhygienic practices, i.e. using ash, soil/soil with oil or oil at the cut of the umbilical cord were reported by 26% mothers. It was found that uneducated women were less likely to use antibiotic powder/ointment/cream to treat the cut of the umbilical cord of newborn babies.

Deliveries attended by qualified doctors or midwives/nurses were apparently less likely to use ash, soil/soil with oil or oil at the cut of umbilical cord than those delivered by TBAs, neighbors and relatives. However, these data should be interpreted cautiously, since many other confounding variables, such as economic condition, husband's education, family's health care practices, etc. may effect this particular health care practice. (Because of absence of data, we could not control these variables for this analysis)

For half of the cases, mothers alone took decision regarding immunization of their children; while father and mother jointly took decision in one-third of the cases. However, grand parents and other relatives played an important role in this matter accounting for 13% of the cases. It was found that the women with education of SSC and higher were more likely to take decision either themselves alone or jointly with their husbands regarding immunization of their children, compared to uneducated ones.

Mother's education was found to be associated with immunization status of their children. The uneducated mothers were less likely to get their children fully immunized. 67% of the children of the uneducated mothers were fully immunized (crude data); while the corresponding figure for the mothers with education of SSC or higher was 100%.

Conclusions and Recommendations

Access to child immunization in the slums of Khulna and Rajshahi City Corporations was good (94% for DPT1); but this high access dropped to 76% for fully immunized children because of high dropout rates of different antigens. (Dropout rate for DPT1 to DPT3 was 14% and DPT1 to measles was 18%). Such high dropout rates imply inability of the EPI program to follow-up and protect the cohort of children initially reached out.

Similarly, access to TT immunization for the mothers who had live births in the past year was high, since 87% of the newborn children were protected at birth. 95% of the mothers interviewed received the first dose of TT; but TT dropout rate was very high (68% for TT1 to TT5), resulting in very low coverage of TT5 (31%), which provides lifelong protection against tetanus.

- *Programmatic strategies must be undertaken to reduce the existing high dropout rates in both child immunization and TT immunization. The program should focus on quality of counseling of mothers/women (on immunization) by the health workers. The health workers at the first contact must counsel the mother/women properly to motivate her to return and to get herself and/or her child fully immunized. He/she must:*
 - *explain to mother the importance of full immunization, and concept of 8 doses and 4 visits required for full immunization of a child;*
 - *tell women of reproductive age the benefit and importance of full TT immunization and the concept of 5 dose TT schedule for lifelong protection against tetanus;*
 - *issue an EPI card/TT card dully filled out and explain the mother/women the importance of keeping the EPI card/TT card in safe and bringing it on the next due date;*
 - *tell the mother/women clearly when she should come back for next doses, and inform her that the date is written in the EPI card/ TT card so that she can check it if forgets the date;*
 - *inform mothers/women of possible side effects of injection and how it should be handled;*
 - *pay attention to the hospitality at the clinic/EPI center, and to supportive environment.*
- *Program managers and field supervisors should ensure that EPI sessions are held as per plan, and at a regular and adequate interval*
- *The service providers should be given refresher training to improve their technical skills on counseling of mothers/women on immunization*

There were also too many invalid doses in child immunization (4% for DPT1 and 2% for measles), which further reduced the crude full immunization coverage of 76% to 70% when validity of doses was taken into account. Total missed opportunities for different antigens were also high (5 for BCG and 10 for measles). These high rates of invalid doses and missed opportunities reflect service providers' inability to screen the clients properly.

Like child immunization, a very high proportion of TT doses were invalid (27% for TT3, 34% for TT4 and 33% for TT5). A sizable proportion of newborn babies (13%) were found unprotected against tetanus at birth.

- ***Emphasis should be given on screening of clients for immunization to avoid or reduce invalid doses and missed opportunities. The service providers must:***
 - *screen properly each and every child/ woman to decide his/her eligibility for a specific dose of specific antigen;*
 - *check EPI card/ EPI register/ TT card or any other record to decide on the eligibility of a particular dose of specific antigen(s);*
 - *if a child/woman is found not eligible for a dose today, ask him/her to return at a specified date; and explain the reason to her/ mother clearly and patiently.*
 - *check if there is any missed opportunity for other antigen.*
- ***The service providers should be given refresher training to improve their technical skills on screening of clients for immunization.***
- ***The pregnant mothers should be motivated to receive the required number of TT doses necessary to protect their newborn babies.***

EPI card (child immunization card) and TT card play an important role in ensuring good quality of immunization services. It helps the mothers to adhere to immunization schedule, as well as assists the service providers to screen the children for specific doses of specific antigens. Unfortunately, the retention rates of both the EPI card and TT card were very low, 69% and 51% respectively.

- ***Mothers should be explained the benefits and importance of EPI cards/ TT cards for immunization of themselves and their children.***
- ***Mothers should be asked to preserve the EPI card safely until the child is 5 years old, and to bring the card with them whenever they come to the clinic/ EPI center for immunization.***
- ***Mothers should also be asked to carefully preserve their TT cards, and to bring their TT cards with them whenever they come to clinic/ EPI center for TT immunization.***
- ***In the case of loss of EPI card/TT card, it should be provided over and over, and the history of the earlier vaccinations accurately recorded again and again, if necessary.***

Mothers have a poor understanding of full immunization. Two-third of the mothers could not mention how many times their children were required to be taken to EPI center to get fully immunized. Similarly, 78% mothers (who had live births in the past year) did not know how many TT doses were required for a woman for lifelong protection against tetanus.

- ***During IPC between the mothers and the service providers and/or at the first contact, the mothers should be clearly explained the importance of full immunization of children and women, and of the immunization schedule of full immunization for both children and women.***

Lack of faith in immunization and fear of adverse reaction were the major reasons for non-immunization, which indicate that the wrong perception about immunization still persists in the community. While sickness of the children, lack of awareness of benefits of immunization and lack of knowledge as to when to return for subsequent doses resulted in high drop out rate and consequently contributed to low full immunization coverage.

- ***The program should strengthen BCC activities to inform the community of importance and benefits of immunization in general, and to motivate the mothers to get their children fully immunized in particular. Very selective and focused mass media campaign, in addition to IPC by health workers, may also be conducted to achieve this end.***

Sex preference (preference to male child) with regard to immunization services at household level still exists. Male children's access to immunization services was 5 percentage points higher than that of the female children.

- ***Appropriate BCC activities need to be undertaken at the community and household levels to get rid of the existing sex preference (preference to male child) in immunization.***

3% of the children < 5 years did not receive OPV in both the rounds of the 10th NID campaign. In spite of intensive communication activities during NIDs, lack of information of NID campaign as a reason for not receiving OPV from NID site was still reported by 13% in the 1st round and 17% in the 2nd round.

- ***Area specific innovative strategies suitable to local situation have to be undertaken during the next NIDs to reach to the left out children.***
- ***More attention should be given to high risk areas and traveling population***
- ***Communication activities need to be strengthened through mass media, such as television, as well as through IPC by the health workers and volunteers during next NIDs.***
- ***Parents should be encouraged to attend the fixed NID sites/center and discouraged to wait for home visits (by the health workers) during child-to-child search.***

6% of the children of 12 – 59 months did not receive Vitamin A during the 10th NIDs. Besides, Vitamin A capsules were also administered wrongly to 2 ineligible children (out of 210) who were <1 year of age.

- ***Appropriate BCC activities, suitable to local situations, need to be carried out to educate the community of the benefits of Vitamin A capsules during the next NIDs.***
- ***Special attention should be given to:***
 - ***the exact age group to limit shortage (better screening for age); and***
 - ***no Vitamin A capsules should be given to the parents to administer them to their children either at NID site or in their homes.***

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*Annex-A***List of Selected Clusters for the Survey**

Name of CC	Ward No.	Name of the Slum	Total Population	Cluster No.
RCC	2	Mollapara Ashrayan prokalpa	895	1
	4	Keshobpur Nodirdhar	1155	2
	7	Chandipur	1025	3
	11	Barakuthipara (camp)	822	4
	16	Sujanagar	804	5
	17	Asham coloni	4507	6
	18	Hazrapukur	3281	7
	20	Bawa coloni	2163	8
	22	Shekerchack	2847	9
	24	Ramchandrapur	1289	10
	27	Dharompur Nadirdhar	2603	11
	28	Khozapur Nadirdhar	2880	12
KCC	1	Shahebpara Manik Tola Bastee	418	13
	3	Kuli Bagan Bastee	1276	14
	7	Tofazzal Miah-er Bari	94	15
		Abdul Wadud o Others-er Bari	160	16
	9	Karim Shiheb O Sabur Msater-er Bari	116	17
	11	T& T Bastee (Rastar Pasha)	143	18
	13	Minu Shaheb-er Bari	138	19
	15	Alom-nagar Bastee-2	1166	20
		Rail Line Bastee-1	1496	21
	16	Ekram-er Bari	5500	22
	17	Sonadanga Powrasava Bastee	2145	23
	18	Sanu Banjir Bari+Anowar-er Bari	66	24
	20	Chiristan Society Bastee	303	25
	22	Nutun Bazar Char Bazar	7700	26
		Malek Shaheb Shaheb-er Bari Basrul Shahbe-er Bari	165	27
	26	Majumder-er Bari	66	28
	28	Motlob Morol O Nasu Morol and Syed Bastee	99	29
	31	Maalek Hazi	248	30

Annex- B

List of Never Vaccinated Children Identified by Clusters

Name of CC	Ward No.	Name of the Slum	Total Population	Cluster No.	# of Never Vaccinated Children
RCC	2	Mollapara Ashrayan prokalpa	895	1	1
	17	Asham coloni	4507	6	1
KCC	1	Shahebpara Manik Tola Bastee	418	13	1
	18	Sanu Banjir Bari+Anowar-er Bari	66	24	2
	20	Chiristan Society Bastee	303	25	1
	22	Nutun Bazar Char Bazar	7700	26	1
		Malek Shaheb Shaheb-er Bari Basrul Shahbe-er Bari	165	27	3
	26	Majumder-er Bari	66	28	1
	28	Motlob Morol O Nasu Morol and Syed Bastee	99	29	1

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