



IOCH

Immunization and Other Child Health Project

Vaccination Coverage Survey of Routine EPI and August 2001 MNT Campaign in the slums of Chittagong, Khulna and Rahshahi City Corporations

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Survey Report No. 2

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Table of Contents

	Page No.
List of Tables and Figures	3
Acronyms	4
Terminology	5
Executive Summary	6
Introduction	9
Objectives	10
Methodology	10
Limitations of the Study	12
Map showing the locations of the selected clusters	13
Results	
Routine immunization coverage of children	14
Routine TT immunization coverage of women	17
Coverage of MNT campaign 2001	20
Discussion	23
Conclusions and Recommendations	24
References	25
Annexures	
Annex A: EPI Cluster Survey design (extracts from an article written by Anthony G Turner, Robert J Magnani and Muhammed Shuaib)	26
Annex B: List of selected clusters for the survey	27
Annex C: List of never vaccinated children by clusters	28
Acknowledgements	29
List of IOCH reports	30

List of Tables

Table 1. Routine immunization coverage of children

Table 2: Invalid doses of childhood immunization

Table 3. Reasons for partial immunization of children

Table 4. Knowledge of EPI among women

Table 5. Reasons for not receiving vaccines during MNT campaign

List of Figures

Figure 1: Access and FIC by 12 months by sex

Figure 2: Providers of childhood immunization

Figure 3: Dropout rates for childhood immunization

Figure 4: TT coverage of women of 15-49 years

Figure 5: Dropout rates for TT immunization

Figure 6: Sources of correct knowledge about the number of EPI Center visits required for full immunization

Figure 7: Coverage of MNT Campaign - 2001

Figure 8: Sources of information about MNT Campaign

Acronyms

BCC	Behavior Change Communication
BCG	Bacillus of Calmette and Guerin
CES	Coverage Evaluation Survey
COSAS	Coverage Survey Analysis System
DPT	Diphtheria, Pertussis and Tetanus
EPI	Expanded Programme on Immunization
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
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.

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

The last round of a three year (1999-2001) Measles Neonatal Tetanus (MNT) campaign in selected high-risk urban and rural areas of Bangladesh was conducted between August 26 and September 4, 2001 by the national EPI Program in collaboration with various development partners and organizations. The children aged 9-35 months were given measles vaccination if they had not received one in the previous 30 days and women of child-bearing age (15-49 years) were targeted for TT immunization. In addition Oral Polio Vaccine (OPV) was given to children 0-59 months. The areas were selected on the basis of low EPI coverage, cases of neonatal deaths reported in the last two years, geographically inaccessible and with hard to reach populations like migrants and floating populations. In order to evaluate the coverage of MNT campaign three surveys were conducted in urban areas and four were in rural areas. Standard WHO EPI 30 cluster survey methodology was followed to collect information. The surveys were conducted by the IOCH/MSH in collaboration with UNICEF, WHO and Save the Children, USA in September 2001. In addition to coverage, information related to knowledge, source and reasons for not receiving vaccines both for routine EPI and MNT campaign were collected. This report provides findings of the coverage evaluation survey in the slums of Chittagong, Khulna and Rajshahi City Corporations of Bangladesh. The objectives of the survey were as follows:

- a) To assess the level of coverage of routine childhood and TT immunization of women including program performance.
- b) To assess the level of coverage of OPV, TT and Measles during the 2001 MNT campaign.
- c) To find the level of knowledge about immunization, reasons for not being immunized (both routine and during the campaign) and sources of information about immunization and the MNT campaign

Coverage levels for the Routine Immunization of Children

Access: Based on crude data (card plus history), 96% of the children between 12-23 months received at least one dose of antigen (DPT 1st dose in this case) from routine immunization sessions. Only 2% children did not receive a dose of any antigen.

Crude coverage between 12-23 months: 96% of the children received BCG, 74% received three doses of OPV, 74% received three doses of DPT and 70% received measles vaccine. 66% children were fully immunized.

Valid coverage between 12-23 months: 96% children received BCG, 66% received three doses of OPV and DPT and 69% received measles vaccine. 56% children were fully immunized.

Valid coverage by 12 months: 96% children received BCG, 66% received three doses of OPV, 66% received three doses of DPT and 61% received measles vaccine. 53% were fully immunized.

Dropout rate and invalid doses: Crude data for antigens received by 12-23 months of age is used for calculating the drop out rate. In the survey the DPT1 to DPT3 dropout was 22 percent and DPT1 to measles dropout rate was 27 percent

Five percent of children received an invalid dose for DPT1, 1% an invalid dose of DPT2 and 7 percent children received invalid DPT3 dose. For measles the rate was 2 percent

Source of immunization: 55% of the immunization services were from the government/city corporation EPI outreach centers, 23% from GOB hospital/clinics and 22% from NGO EPI facilities

Reasons for non-immunization and partial immunization

2% of the surveyed children were not immunized at all; while 32% had partial immunization. Main reasons for non-immunization was lack of knowledge about the importance of immunization. Most important reasons mentioned by the respondents for partial immunization were: lack of knowledge about the need of second dose, when to return for subsequent dose, fear of adverse reaction and child sickness.

Coverage levels for the Routine TT Immunization of Women

27 percent of women interviewed had all five doses of TT. Eighty six percent women had first dose of TT while 80 and 63 percent of women had second and third dose of TT respectively. The rate for fourth dose of TT was 44 percent. Fourteen percent women had no dose of TT. 86 percent of women had received first dose of TT indicating good access to TT immunization. 23 percent of women had TT card at the time of interview. TT card retention rate was 30%. The drop out rate of first dose of TT vaccine to second dose was 7 percent. The corresponding rates for TT1 to TT3 and TT1 to TT5 were 27 and 69 percent respectively. Of the women interviewed 76% of newborn were protected against tetanus.

Knowledge about EPI: 8 percent of the respondents knew that by 12 months a child has to complete the immunization schedule and 27 percent knew that a child has to go four times to the center to complete the EPI schedule. 10% of the respondent knew that 5 doses are required for life- time protection against tetanus. The sources of correct knowledge about number of times required to go to EPI center for full immunization were: NGO worker (73%), government health worker (20%) and Family/friend (7%).

Coverage levels for the 2001 MNT Campaign

79 percent of children (0-59 months) had OPV during the campaign, 42 percent of children aged between 9-35 months received measles shot (except those who received measles vaccination during the last one month) and 29 percent women of child bearing age (15-49 years) had TT vaccination.

Comparison with last year (August 2000) OPV+NNT campaign: There was a significant improvement in TT coverage compared to last year (August 2000 OPV+NNT) campaign (29% vs. 11%) in the slums of three city corporations. However, there was no such improvement in OPV coverage (79% vs. 72%).

Information and motivation activity during the MNT campaign: 58 percent of the respondent mentioned that health worker visited their household before the MNT campaign. 1% of the

household interviewed had a referral slip for OPV provided by the health worker when visited before the campaign. 19% percent of the women got TT card during household visit before the interview. The government/city corporation health workers were the main source of information about the campaign at the household level (57%) followed by relative/friend (26%), NGO worker (14%), and miking (3%). 22 percent of the respondent mentioned that someone came to the household to inquire about receiving vaccination during the campaign period.

Reasons for not receiving vaccines during the MNT campaign: The most important reasons for not receiving OPV during the campaign were: lack of information about MNT campaign, mother was too busy, vaccine/vaccinator not available and child not at home. For measles different reasons given by the respondents were: lack of information about the campaign, fear of side effect, mothers too busy, child had measles vaccination earlier and child not at home. Not knowing about the campaign, too busy at home, not given at the center and mothers' away from home were the most important reasons for not receiving TT during the campaign.

Problems detected

The quality of the program was affected with drop out (22% for DPT-DPT3 and 27% for DPT3-Measles) and invalid doses. Poor level of knowledge about EPI was observed in the surveyed population (8% of the respondents knew that by 12 months a child has to complete the immunization schedule, 27% knew that a child has to go four times to go to the center to complete the EPI schedule and 10% knew that 5 doses are required for life- time protection against tetanus). TT5 coverage of 27% was low and 24% newborns were not protected against tetanus. Lack of information about the campaign was the most important limiting factors for low coverage of all three antigens.

Suggested solutions

Program is required to continue its effort to sustain and improve the coverage in high-risk slum areas of three city corporations. In order to reduce drop out rate actions are needed to improve counseling of mothers about the importance of all vaccines and the correct timing of different vaccines. At the same time slum dwellers should be mobilized to raise awareness for routine immunization through various communication channels and social mobilization activities with special emphasis on measles vaccination and the need to return on time for various doses. Service providers and community outreach workers should register all pregnant women in their area and follow up to ensure TT doses to protect their newborns. Behavior Change Communication (BCC) activities on community awareness on the benefits of TT should be further developed and implemented. Mop-up campaign for TT and Measles should be conducted periodically to improve coverage in selected high- risk slum areas. Motivational activities before and during the campaign should be well organized and followed up.

Introduction

The Ministry of Health and Family Welfare of the Government of Bangladesh in collaboration with various development partners and organizations have been conducting a three years Measles Neonatal Tetanus campaign popularly known as "MNT Campaign" since 1999 in selected areas. The objective of the MNT campaign is to reduce morbidity and mortality from tetanus and measles. In the campaign oral polio vaccine (OPV) was included to facilitate the ongoing polio eradication activities. During the first two years vaccines against tetanus and polio were included while in last round measles vaccine was added. The third round of the campaign was conducted between August 26, 2001 and September 4, 2001 in urban and rural areas of Bangladesh.

The MNT campaign is an additional immunization activity on top of the routine immunization program specially targeted to reach women and children in high-risk areas who would otherwise remain unreached and unprotected. The target areas for MNT campaign were slums in four city corporations (Dhaka, Chittagong, Khulna and Rajshahi), twenty-seven municipalities and high-risk rural areas (554 unions in 1818 upzillas). The high-risk rural areas were determined by low coverage of immunization, geographically inaccessible areas, cases of neonatal deaths reported in last two years and hard to reach populations like migrants and floating populations. Targeting these areas will increase overall vaccination coverage and reduce transmission of poliovirus.

The MNT campaign targeted 0-59 months old children for OPV, 9-35 months for Measles (except those who received measles in the last one month) and 15-49 years women for Tetanus Toxoid (TT). The campaign lasted for eight consecutive days from 8 am until 4 pm. In urban areas this was extended as per local need and the sessions were continued in the evening for working women. Planning meetings of key stakeholders, training of trainers and volunteers, Interpersonal communication through household visits, miking and registration of target groups, supervision and reporting were the major activities in the implementation of campaign. In all cases autodestruct syringes were used to ensure safety.

In order to evaluate the coverage of the MNT campaign of August 2001, a number of coverage evaluation survey was conducted following WHO EPI standard 30 cluster survey. The surveys were conducted in collaboration with Unicef, WHO and Save the Children, USA in urban and rural areas. In total 3 urban and four rural cluster surveys were conducted. These included one 30 cluster survey for slums of Dhaka City Corporation, one 30 cluster survey for slums of Chittagong, Khulna and Rajshahi City Corporations, one 30 cluster survey for twenty seven selected municipalities, one 30 cluster survey for the MNT unions of Brahmanbaria district, one 30 cluster survey for the MNT unions of Kishorganj district and two 30 cluster surveys for all other rural MNT unions. The rural areas were divided into south and north depending on the geographical locations of the selected unions. The survey also collected data on routine EPI coverage and information related to knowledge, source and reasons for not receiving vaccines. This report describes the findings of the survey conducted in the slums of Chittagong, Khulna and Rajshahi City Corporations of Bangladesh.

Objectives

- a) To assess the level of coverage of routine childhood and TT immunization of women including program performance.
- b) To assess the level of coverage of OPV, TT and Measles during the 2001 MNT campaign.
- c) To find the level of knowledge about immunization, reasons for not being immunized (both routine and during the campaign) and sources of information about immunization and the MNT campaign

Methodology

Standard WHO EPI 30 cluster survey method was used to collect information. The immunization information were collected on a randomly selected group of 210 children /women from 30 clusters (7 children/women per cluster) in a given community. It gives an estimate of immunization coverage to within +- 10 percentage points of the true population with 95% statistical confidence, assuming a design effect 2 (The survey methodology and its limitations are presented in Annex A).

From the list of slums of three city corporations (Chittagong, Khulna and Rahshahi) where MNT campaign was conducted, 30 clusters were selected. The list of selected clusters is shown in Annex B and their locations are shown in the following map.

In the survey seven children between 12-23 months (children born between September 12, 1999 and September 11, 2000) were selected from each cluster to ascertain their routine vaccination status. Seven women between 15-49 years of age, irrespective of their marital status were selected for TT status.

In case of MNT children born between September 5, 1996 and August 25, 2001 were included for OPV coverage while children born between September 5, 1998 and November 25, 2000 were considered for measles vaccination. Another seven women of childbearing age (15-49 years) were interviewed for TT immunization during MNT campaign.

For routine immunization information about program coverage (childhood and women TT), program access, continuity, quality, reasons for non-immunization/partial immunization and knowledge about EPI was collected using standard 30 cluster survey questionnaire.

For MNT following information were collected about OPV, Measles and Tetanus:

- a) OPV: OPV received during the campaign, site of OPV vaccination, reason for not receiving OPV, household visited before MNT campaign and referral slip provided and household visited to inquire about receiving vaccine during the MNT campaign.

- b) Measles: measles vaccine received during the campaign, site of measles vaccination, reasons for not receiving measles vaccination, source of information about the MNT campaign, household visited during the MNT campaign
- c) TT: TT vaccine received during the campaign, reason for not receiving TT during the MNT campaign, source of information about MNT campaign, household visited before the MNT campaign to give information about the MNT campaign and gave card and household visited during the MNT campaign to inquire about receiving TT vaccination.

All questionnaires were translated into Bangla and pre-tested before the final survey.

IOCH survey team collected field data. Interviewers were trained and the data were collected over a week time between September 22, 2001 and September 29, 2001. The teams were supervised in the field to ensure quality and completeness of data. Data entry and analysis was done by IOCH using COSAS 4.41¹, EPIInfo and SPSS. Simple tables and graphs were produced to summarize results. The final report was produced by the Monitoring and Evaluation Unit of IOCH/MSH.

¹ COSAS (Coverage Survey Analysis System) is a dedicated software for analyzing coverage evaluation survey data

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:

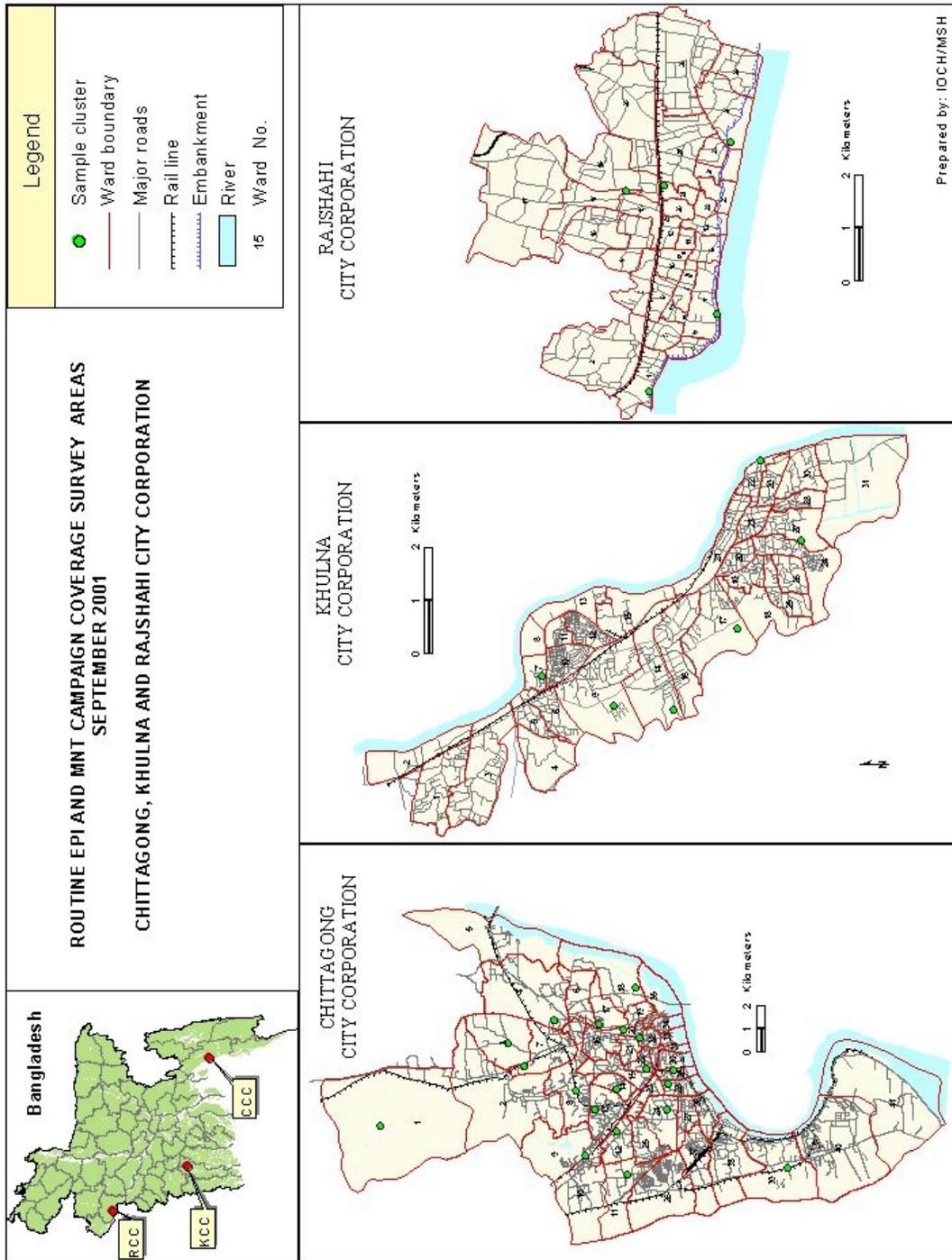
Linked to the sampling method:

- 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.
- 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 of Children

Table 1 shows childhood immunization coverage achieved by the routine EPI in the slums of 3 city corporations of Bangladesh (CCC,KCC,RCC). The crude data shows coverage for BCG, OPV3, DPT3 and Measles at 96, 74, 74 and 70 percent respectively. The corresponding valid data for these antigens are 96, 66, 66 and 69 percent. Valid coverage by 12 months for BCG, OPV3, DPT3 and Measles were 96, 66, 66and 61 percent respectively.

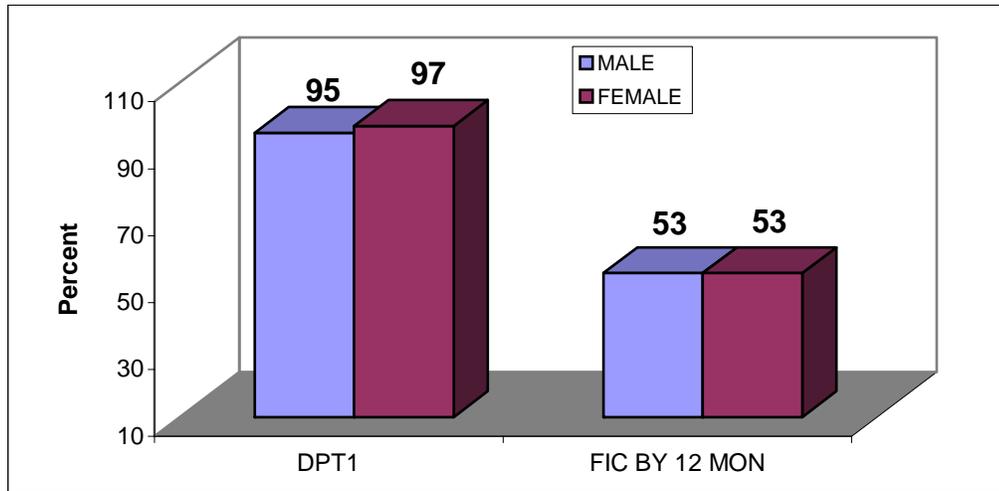
Table 1. Routine immunization coverage of children

Name of vaccine	Coverage (12-23 months)		Coverage by 12 months of age
	Crude (%)	Valid (%)	Valid (%)
BCG	96	96	96
OPV1	97	93	91
OPV2	84	79	78
OPV3	74	66	66
DPT1	96	91	90
DPT2	83	78	77
DPT3	74	66	66
Measles	70	69	61
Fully immunized	66	56	53
Zero dose	2	-	-

Crude coverage of full immunization of 12-23 months age group was 66 percent. The coverage for the same age group for valid data was 56 percent. When considered for 12 months the coverage went further down to 53 percent.

Table 1 shows significant difference between crude coverage and valid coverage for some antigens (74% vs. 66% for DPT3 and OPV3) and (66% vs. 56% for full immunization) reflecting low quality of services.

Figure 1: Access and FIC by 12 months by sex

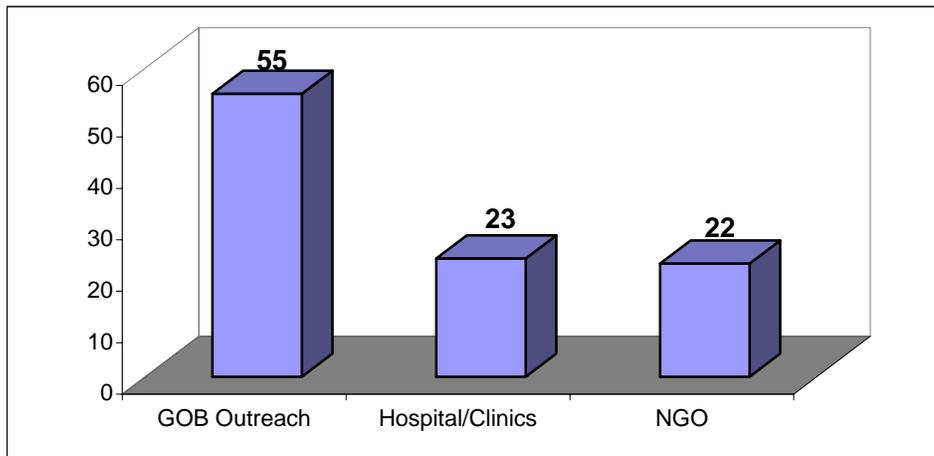


DPT1 (access) and Full Immunization Coverage (FIC) by 12 months by sex are shown in *figure 1*. No sex preference was observed either in accessing immunization service or overall coverage in the surveyed population.

Program access

96 percent of the children surveyed received DPT1. 55% of the immunization services were from the government/city corporation EPI outreach centers, 23% from GOB hospital/clinics and 22% from NGO EPI facilities (*figure 2*).

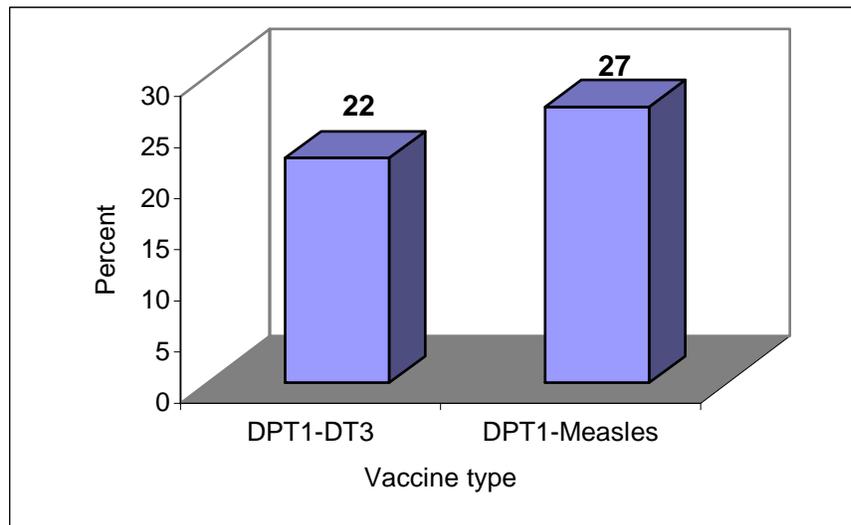
Figure 2: Providers of childhood immunization



Program continuity (drop out rate)

Crude data for antigens received by 12-23 months of age is used for calculating the drop out rate. In the survey the DPT1 to DPT3 dropout was 22 percent and DPT to measles dropout rate was 27 percent (*figure 3*).

Figure 3: Dropout rates for childhood immunization



Program Quality

Five percent of children received an invalid dose for DPT1 while 7 percent children received invalid DPT3 dose. For measles the rate was 2 percent (**table 2**).

Table 2: Invalid doses of childhood immunization

Antigens	Percent
DPT 1	5
DPT2	1
DPT 3	7
Measles	2

96 percent of children received BCG dose. Of them 86 percent children had scar in their arm. 42 percent of households had EPI card at the time of interview. Card retention rate was 44%.

Reasons for non-immunization and partial immunization of the children

2% of the surveyed children were not immunized at all; while 32% had partial immunization. Main reasons for non-immunization was lack of knowledge about the importance of immunization.

In **table 3** reasons for partial immunization of children in the survey area given. Most important reasons mentioned by the respondents for partial immunization were: lack of knowledge about the need of second dose, when to return for 2nd and 3rd dose of DPT/OPV, fear of adverse reaction and child sickness.

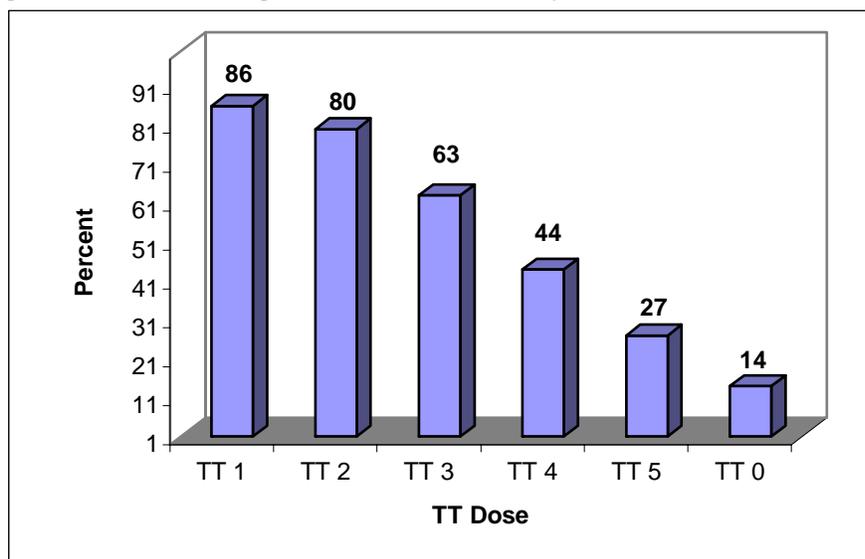
Table 3. Reasons for partial immunization

Reasons	Percent
Did not know where to go for vaccination	3
Did not know about the need of second dose	36
Did not know when to return for 2 nd , 3 rd dose and measles	21
Fear of adverse reaction	8
Injection was too painful for child	6
Abscess after previous vaccination	2
Too busy	3
Child/Mother sick	16
Others	5

Routine TT immunization coverage of women (15-49 years)

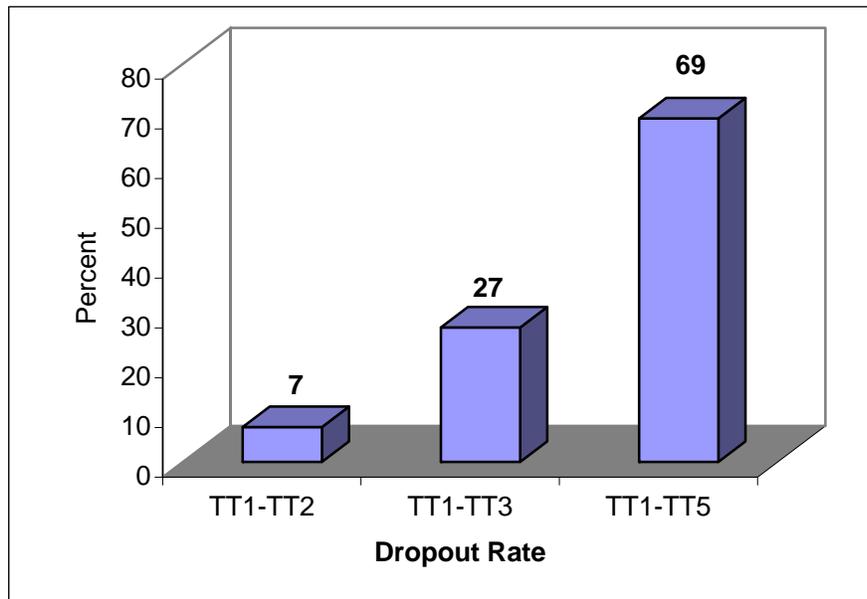
27 percent of women interviewed had all five doses of TT. Eighty six percent women had first dose of TT while 80 and 63 percent of women had second and third dose of TT respectively. The rate for fourth dose of TT was 44 percent. Fourteen percent women had no dose of TT (*figure 4*).

Figure 4: TT coverage of women of 15-49 years



86 percent of women had received first dose of TT indicating good access to TT immunization. 23 percent of women had TT card at the time of interview. TT card retention rate was 30%. The drop out rate of first dose of TT vaccine to second dose was 7 percent. The corresponding rates for TT1 to TT3 and TT1 to TT5 were 27 and 69 percent respectively (*figure 5*).

Figure 5: Dropout rates for TT immunization



Protection against tetanus at birth

Mothers interviewed were asked about the TT vaccination status during the last pregnancy. The new born 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 women interviewed 76% of newborn were found protected against tetanus.

Knowledge of EPI (child immunization and TT)

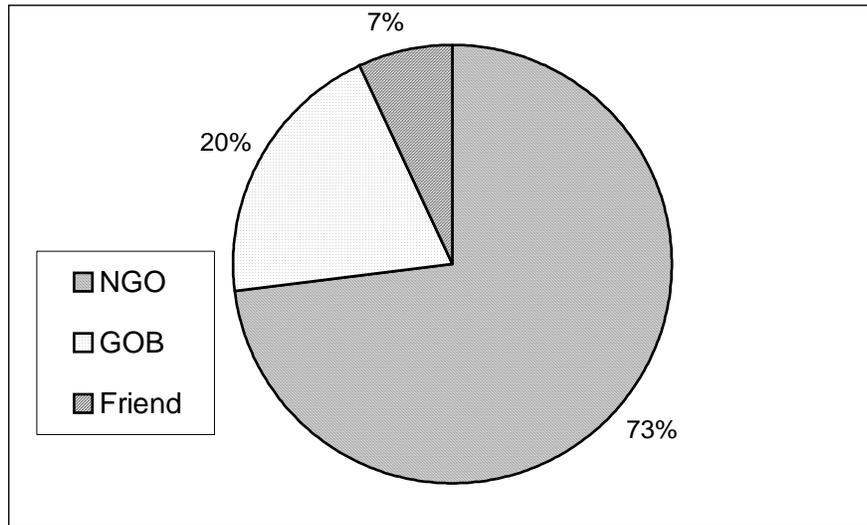
Table 4 shows the knowledge of EPI of the respondents in the survey area. 8 percent of the respondents knew that by 12 months a child had to complete the immunization schedule and 27 percent knew that a child had to go four times to the center to complete the EPI schedule. 10% of the respondent knew that 5 doses were required for life- time protection.

Table 4. Knowledge of EPI among women

Variable	Correct Knowledge (%)	Incorrect Knowledge (%)	Don't Know (%)
Age of full immunization	8	57	35
Number of times child required to go to EPI center for full immunization	27	37	36
Number of TT doses required for life time protection	10	4	86

The sources of correct knowledge about number of times required to go to EPI center for full immunization were: government health worker (20%), Family/friend (7%), NGO worker (73%)(figure 6).

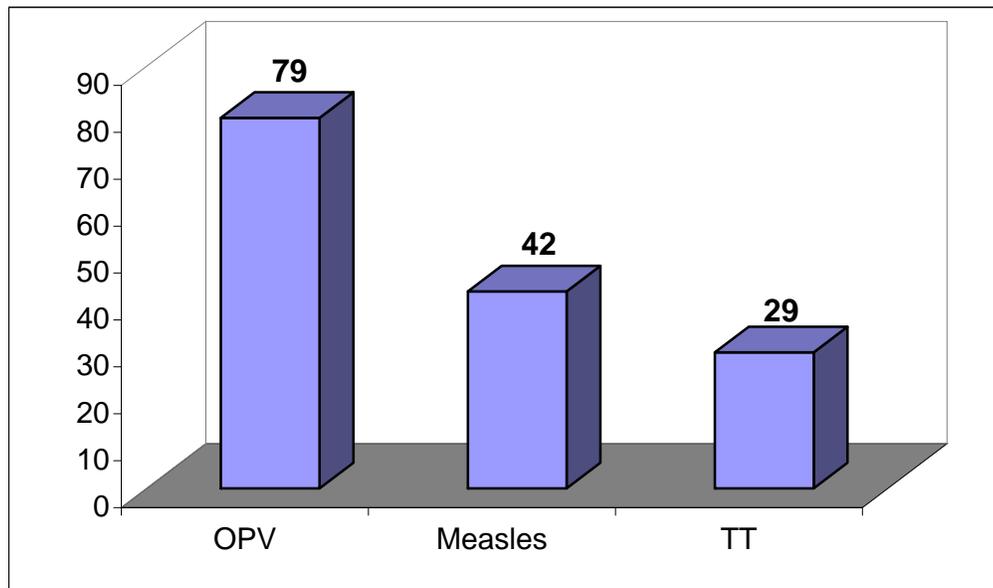
Figure 6: Sources of correct knowledge about number of time required to go to EPI center for full immunization



Coverage of MNT Campaign 2001

79 percent of children (0-59 months) had OPV during the campaign, 42 percent of children aged between 9-35 months received measles shot (except those who received during 30 days prior to the campaign) and 29 percent women of child bearing age (15-49 years) had TT vaccination (*figure 7*).

Figure 7: Coverage of MNT Campaign - 2001



Comparison with last year (August 2000) OPV+NNT campaign: There was a significant improvement in TT coverage compared to last year (August 2000 OPV+NNT) campaign (29% vs. 11%) in the slums of three city corporations. However, there was no such improvement in OPV coverage (79% vs. 72%).

Reasons for not receiving vaccines during the MNT campaign

The most important reasons for not receiving OPV during the campaign were: lack of information about MNT campaign, mothers' too busy, vaccine/vaccinator not available and child not at home. For measles different reasons given by the respondents were: lack of information about the campaign, fear of side effect, mothers too busy, child had measles vaccination earlier and child not at home. Not knowing about the campaign, too busy at home, not given at the center and mothers' away from home were the most important reasons for not receiving TT during the campaign (**table 5**).

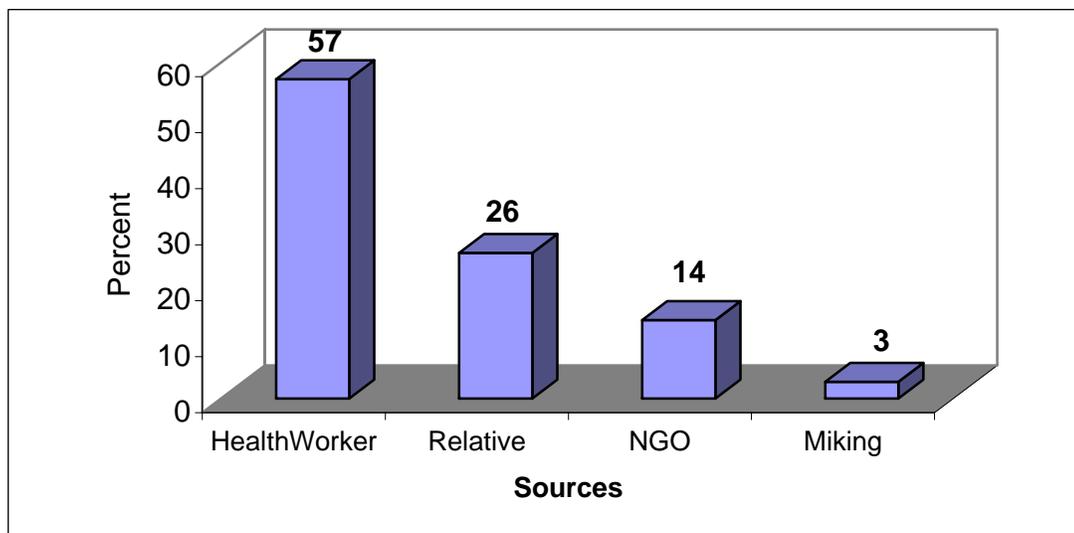
Table 5. Reasons for not receiving OPV, Measles and TT during MNT Campaign

Reasons	OPV (%)	Measles (%)	TT (%)
Did not know about MNT	69	35	42
Vaccine/vaccinator was not available at the site	6	2	1
Too busy	7	5	14
Long queue	-	1	-
Not taken- Child/mother sick	-	2	2
Does not believe in vaccine	-	1	5
Fear of injection	-	-	5
Fear of side effect	-	7	2
Believed she is fully immunized	-	-	4
Received TT/Measles one month prior to MNT		3	6
Not given- child/mother sick	2	2	-
Already vaccinated	2	21	-
Child/mother was not at home	11	8	11
Taken to the center but not given	-	5	7
Others	3	7	1

Sources of information and household visit during the MNT campaign

The government/city corporation health workers were the main source of information about the campaign at the household level (57%) followed by relative/friend (26%), NGO worker (14%), and mikimg (3%) (figure 8).

Figure 8: Sources of information about MNT Campaign



58 percent of the respondent mentioned that health worker visited their household before the MNT campaign. Only 1% of the household interviewed had a referral slip for OPV provided

by the health worker when visited before the campaign. 19% percent of the women got TT card from the health workers during their household visit before the MNT campaign. 22 percent of the respondent mentioned that someone came to the household to inquire about receiving vaccination during the campaign period.

Discussion

The survey found 66% crude coverage of immunization against six EPI diseases among children aged between 12-23 months with good access (96 percent) to immunization in the slums of Chittagong, Khulna and Rajshahi City Corporations of Bangladesh. The coverage is lower than the national average (75%).⁴ The coverage drops to 56 percent when valid doses are considered and further down to 53% when considered by 12 months of age. The program had very good access but the continuity of the program was not good as reflected in drop out rate for DPT1 to Measles at 22 percent. In case of TT among child bearing aged women (15-49 years) the access rate was high with 86 percent women having first dose of TT. However, 26% of newborn are still unprotected from neonatal tetanus in high-risk slum areas.

Knowledge base of the respondents about EPI was very poor. Only 8 percent of the respondent knew the correct age of full immunization and only 10% of the women knew that 5 doses are required for lifetime protection. The poor knowledge level about EPI was also reflected in the reasons for non-immunization/partial immunization. Present communication materials and strategies need to be reexamined and find barriers for such poor knowledge level. NGOs can play supplementary role in this area.

Main reasons for non-immunization was lack of knowledge about the importance of immunization. Most important reasons mentioned by the respondents for partial immunization were: lack of knowledge about the need of second dose, when to return for 2nd and 3rd dose of DPT/OPV, fear of adverse reaction and child sickness. Proper counseling at every contact for subsequent dose, reminding the EPI schedule and time to return for subsequent dose by the health workers can decrease drop out rate and improve compliance for full immunization by the end of one year age of the child. These reasons indicate wrong perception about immunization by the slum dwellers, inadequate information about immunization and lack of motivation by the service providers.

The coverage of OPV (79% vs. 72%) and TT (29% vs. 11%) were higher during the 2001 MNT campaign compared to last year NNT (OPV+TT) campaign⁶ Lack of information and motivation were the major reasons for not receiving vaccines during the campaign. This reflects inadequate social mobilization and communication activities in slums. Families and communities should be adequately informed about the objective of the campaign and thus the importance of these vaccines during a campaign. More careful planning and strategies are required for such campaigns in future in slum areas. Mop up campaign for measles and TT should be conducted periodically in high-risk slum areas to improve routine EPI coverage and awareness about immunization.

Conclusions and Recommendations

Childhood immunization

The program performed reasonably well in reaching children in slums of three city corporations. However, the quality of the program was affected due to drop out and invalid doses. Poor level of knowledge about EPI was also observed in the surveyed population.

Recommendations

- Program is required to continue its effort to sustain and improve the coverage in high-risk slum areas. Slum dwellers should be targeted to raise awareness for routine immunization through various communication channels and social mobilization activities with special emphasis on measles vaccination and the need to return on time for various doses.

TT immunization of women (15-49 years)

TT1 and TT2 coverage were high (86% and 80% respectively) in slums of three city corporations. However, 24% newborns were not protected against tetanus. Knowledge of 5 doses of TT was also poor (18%).

Recommendations

- Service providers and community outreach workers should register all pregnant women in their area and follow up to ensure TT doses to protect their newborns
- Behavior Change Communication (BCC) activities on community awareness on the benefits of 5 doses TT schedule should be further developed and implemented.

MNT Campaign

MNT campaign can improve routine TT and Measles coverage. Lack of information about the campaign was the most important limiting factors for not receiving vaccines during the campaign.

Recommendations

- Mop-up campaign for TT and Measles should be conducted periodically to improve coverage in selected high-risk slum areas.
- Emphasis should be given on BCC activities in future campaigns.

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Annex- A

The following are extracts from **Anthony G Turner, Robert J Magnani and Muhammad Shuaib's** article entitled "**A not quick as quick but much cleaner alternative to the Expanded Programme on Immunization (EPI) cluster survey design**" published in the *International Journal of Epidemiology* in 1996, volume 25, Issue No. 1, pages 198-203.

The standard EPI Cluster Survey Design

"The sample design for the EPI Cluster Survey is a two-stage design involving the selection of 30 primary sampling units or 'clusters' (usually village or other area units), from which 210 children with a target age range (usually 12-23 months) are chosen, seven children per cluster. The sample size of 210 children (per domain or stratum) is mandated by the desire to estimate the level of immunization coverage to within +/- 10 percentage points of the true population proportion with 95% statistical confidence, assuming a design effect (i.e. *deff*) of 2.0. Based upon prior experience with immunization coverage surveys (primarily in the US), 30 clusters are generally thought to be necessary to yield sufficiently reliable estimate."

"In the standard design, clusters are chosen from a list of primary sampling units (i.e. villages, urban communities, census enumeration areas etc.) through systematic random sampling with probability proportional to estimated size (*ppe*s). The latest estimates of cluster population sizes, which are assumed to be proportional to the number of children in the target age group in each cluster, are typically used as measures of size. The 30 clusters so chosen are then visited by survey field staff who carry out the second stage of sample selection and conduct the household interviews. "

"The original EPI design called for sample children to be chosen randomly from a list of all eligible children in each sample cluster. However, because the creation of lists of households and children tends to be time-consuming, costly, and unfeasible in some settings, this procedure is only infrequently used in actual practice. Instead, one of several simplified second stage sampling procedures is commonly used. In one variant, children are selected by first choosing a random direction from a central location in a village or community (e.g. by spinning a bottle). The number of households in that direction to the edge of the community is then counted, and one household is randomly chosen to be the first sample household. Subsequent households are chosen by visiting the nearest neighboring households until information has been gathered on seven children. In a yet simpler variant, a direction from a central starting point is randomly chosen as described above and households are contacted as the interviewer moves in the chosen direction until the required information has been gathered for seven children."

"The second stage sampling methods described above are 'quota sampling procedures' and some of the problems resulting from the use of this approach have been noted over the years."

"First, quota sampling does not ensure that every eligible member of the target population has a known, non-zero chance of being selected. Hence, the standard EPI design, as it is usually applied, is not a true probability sample design."

"A second problem concern sampling weights. However, since measures of size in sampling frames are often inaccurate due to census errors and changes in population since the census was taken, application of the standard EPI Cluster Survey method does not automatically result in a self weighting sample. The survey data must be weighed in order to yield unbiased estimates. However, since selection probabilities are not known in most EPI Cluster Survey applications, sampling weights can not be calculated."

"Thirdly, a computer simulation study demonstrates that the EPI Cluster Survey based upon quota sampling at the second stage of sample selection is considerably more prone to sampling bias than conventional cluster sampling, particularly where immunized children are 'pocketed' within clusters. "

"Finally, there is the issue of how second stage sample selection should proceed in surveys with multiple measurement objectives."

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

CC Name	Ward No	Slum Name	Total Population	Cluster No
RCC	1	SARGACHA	347	1
	7	VATAPARA UDC AREA	862	2
	18	ASHAM COLONI	4507	3
	21	BASTUHARAPARA	830	4
	28	CHARKAZLA BADURTOLA	3805	5
CCC	24	Jafor Colony	500	6
	28	Baraquater slum	1450	7
	22	Railway Hospital Colony	1304	8
	29	Olapukur Basti	546	9
	32	Amanat Sha Basti	208	10
	1	Labubagan Chatina(behind)	1500	11
	3	Shahetnagar	3500	12
	7	Roufabad	4500	13
	39	Railline	1500	14
	9	Golpahar & katapahar basti	2100	15
	11	Monjur Collony	900	16
	12	Farid Colony	240	17
	13	Diesel Colony	600	18
	14	Moti Jharna (North)	5000	19
	17	Kalam Colony	1500	20
	18	Mahbub & Sukkur Colony	1400	21
	20	C&B Raja Colony	800	22
	4	Barisal Colony	2000	23
8	Railway Station Sholoshahar	5000	24	
KCC	22	Nutun Bazar Char Baste	7658	25
	7	Jan Mohamamd+Delowar+Johur-er Baste	257	26
	14	Morhum Rustom ALi-er Baste	131	27
	27	Belayet Hazir Bari	49	28
	17	Sonadanga Powrasava Baste	2133	29
	9	Bastohara Colony	6564	30

Annex-C

List of Never Vaccinated Children Identified by Clusters

CC Name	Ward No	Slum Name	Total Population	Cluster No	Never Vaccinated Children
RCC	1	SARGACHA	347	1	-
	7	VATAPARA UDC AREA	862	2	-
	18	ASHAM COLONI	4507	3	-
	21	BASTUHARAPARA	830	4	-
	28	CHARKAZLA BADURTOLA	3805	5	-
CCC	24	Jafor Colony	500	6	-
	28	Baraquater slum	1450	7	-
	22	Railway Hospital Colony	1304	8	-
	29	Olapukur Basti	546	9	-
	32	Amanat Sha Basti	208	10	-
	1	Labubagan Chatina(behind)	1500	11	-
	3	Shahetnagar	3500	12	-
	7	Roufabad	4500	13	-
	39	Railline	1500	14	1
	9	Golpahar & katapahar basti	2100	15	-
	11	Monjur Collony	900	16	1
	12	Farid Colony	240	17	-
	13	Diesel Colony	600	18	-
	14	Moti Jharna (North)	5000	19	-
	17	Kalam Colony	1500	20	-
	18	Mahbub & Sukkur Colony	1400	21	-
	20	C&B Raja Colony	800	22	1
	4	Barisal Colony	2000	23	1
8	Railway Station Sholoshahar	5000	24	1	
KCC	22	Nutun Bazar Char Baste	7658	25	-
	7	Jan Mohamamd+Delowar+Johur-er Baste	257	26	-
	14	Morhum Rustom ALi-er Batee	131	27	-
	27	Belayet Hazir Bari	49	28	-
	17	Sonadanga Powrasava Baste	2133	29	-
	9	Bastohara Colony	6564	30	-

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