



**IOCH**  
**Immunization and Other Child Health Project**

**Vaccination Coverage Survey in  
the Tea Gardens Owned by the  
National/Local Companies**

**February 2002**

**Survey Report No. 59**

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## 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 Program on Immunization
FWC	Family Welfare Center
IOCH	Immunization and Other Child Health
Mahallah	Smaller localities (smaller than a village)
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 1<sup>st</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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*.

## SUMMARY RESULTS

### Background

There are about 158 tea gardens in Bangladesh, and most of them are located in Maulavibagar and Habiganj districts. Some of them are owned by the foreign companies (British registered companies), and the rest by the national/local companies (i.e., National Tea Company (NTC), Bangladesh Limited Company and Bangladeshi private companies). A large number of labors (called tea garden labors) work in these tea gardens. The tea garden labors usually reside in the colonies/slums inside the tea gardens. However, in some places, tea garden labors also reside in nearby slums. The GOB health workers are responsible for providing routine EPI services to the tea garden labors. Some tea gardens, particularly the large tea gardens, have their own health care facilities that provide primary health care including EPI to their labors. The GOB health workers, in collaboration with the tea garden authorities, are responsible for conducting national immunization campaigns in the tea garden areas. However, in the absence of an effective health management information system and reliable service statistics of the GOB health department at upazila level, it is often difficult to assess the level of immunization coverage of the tea garden labors. So far, no independent coverage evaluation survey has been conducted in the tea garden areas to assess the coverage levels of routine EPI as well as coverage of NIDs among the tea garden labors. In view of this situation, the IOCH decided to conduct two coverage evaluation surveys in the tea gardens of Maulavibazar and Hobiganj districts- one for the tea gardens owned by the foreign companies and the other for those owned by the national/local companies. Accordingly, this survey was conducted in the tea gardens owned by the national/local companies in Maulavibazar and Habiganj districts in February 2002.

### Objectives

The overall objective of the survey was to assess the level of immunization coverage of the tea garden labors working in the tea gardens owned by the national/local companies. 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 women of 15-49 years of age, irrespective of their marital status, and find out the reasons for non-immunization and partial immunization; and
- c) assess the coverage levels of OPV and Vitamin A administered during the 1<sup>st</sup> Round of the 10<sup>th</sup> NID Campaign.

### Methodology

The survey employed the WHO recommended 30-cluster survey methodology that has been widely used in many developing countries to assess immunization coverage (the survey methodology and its limitations are presented in Annex A). In all, 30 clusters were randomly selected from the tea gardens owned by the national/local companies in Maulavibazar and Habiganj districts following PPS sampling procedures. A list of the selected clusters is provided in Annex- B and their locations are shown on the maps in page 8. From each

cluster, 7 children 12 – 23 months and 7 women of reproductive age (15 – 49 years) irrespective of their marital status were selected following

30 cluster survey methodology to ascertain their routine immunization coverage. Also, 7 children < 5 years (0 – 59 months) were selected to assess the immunization coverage of the 1<sup>st</sup> Round of the 10<sup>th</sup> National Immunization Campaign.

The WHO standard questionnaires were used for documenting the routine immunization status of the children and women. Also, separate questionnaires were used to collect data on NID and reasons for non-immunization and dropouts. The data were collected by the experienced Field Investigators of the Survey Team of the IOCH. Data processing and analysis were done by the Monitoring & Evaluation Unit of the IOCH using COSAS 4.41<sup>1</sup> and EpiInfo.

### **Coverage levels for the routine immunization of children**

*Access:* Based on crude data (card plus history), 93% children received at least one dose of antigen (DPT 1<sup>st</sup> dose in this case) from routine immunization sessions. Only 5% of the children did not receive a dose of any antigen.

*Crude coverage between 12-23 months:* 94% children received BCG, 78% children received three doses of OPV, 78% received three doses of DPT and 67% received measles vaccine. 67% children were fully immunized.

*Valid coverage between 12-23 months:* 94% children received BCG, 65% children received three doses of OPV, 65% received three doses of DPT and 65% received measles vaccine. 54% children were fully immunized.

*Valid coverage by 12 months:* 94% children received BCG, 63% children received three doses of OPV, 63% received three doses of DPT and 53% received measles vaccine. 42% children were fully immunized.

*Source of immunization and distance of immunization center:* Childhood immunization in this area was provided solely by the GOB EPI outreach centers (100%). All the women could reach to the EPI outreach centers (from their homes) within 20 minutes.

*Reasons for non-immunization and partial immunization or dropout of children:* The primary reasons for non-immunization of children cited by parents were lack of awareness of need and importance of immunization (27%), sickness of the children (10%), mother was busy with other work (27%), and health worker's behavior was not good (18%). As regards reasons for partial immunization or dropout, the primary reasons mentioned by the parents included lack of awareness of need of second or subsequent doses (12%), did not know the importance of measles vaccine (10%), family problem/mother's sickness (22%), child's sickness (12%), and child was away from home (10%)

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<sup>1</sup> COSAS (Coverage Survey Analysis System) is a dedicated software for analyzing coverage evaluation survey data.

*Problems detected:* Although access to immunization was quite high (93%), there were 16% dropouts from DPT1 to DPT3 and 28% from DPT1 to Measles vaccine. Also, there were a number of invalid doses due to early immunization or inadequate interval between the doses (9% for DPT1, 4% for DPT2, 3% for DPT3 and 4% for measles). Prevalence of uncorrected missed opportunity for different antigens was very low, except for measles (2%). Child immunization cards (EPI Cards) were ever given to 89% of the children; but they were available at the time of interview in 45% of the cases only. EPI Card retention rate was 51%, which means that 49% of the EPI Cards were lost. Only 15% of the parents could mention correctly the number of times (i.e. 4 times) their children needed to visit the immunization centers to get fully immunized.

### **Coverage levels for the routine TT immunization of women**

The survey of coverage levels for immunization against tetanus toxoid showed that about 83% of women of reproductive age (15-49 years) received a first dose of TT; 79% received two doses; and 31% received 5 doses of the TT vaccine. About 17% women never received any TT vaccine.

*Dropout rate for TT immunization:* The dropout rate for TT immunization among the women of reproductive age was quite high. The dropout rate for TT1 to TT2 was 5%, TT2 to TT3 was 25%, and TT1 to TT5 was 63%. It implies that 63% of the women who received TT1 dose did not get fully immunized for life-long protection against tetanus.

*Sources of TT immunization:* Most of the women received TT vaccine from GOB EPI outreach centers (96%), followed by the teagarden's clinics (4%).

*Reasons for non-immunization and partial immunization of women:* The primary reason for non-immunization of TT cited by majority of the women was lack of awareness of need and importance of TT immunization (69%); while one-fifth of the women reported that TT was not introduced in the program when they had their pregnancies. The primary reasons for partial immunization or dropout were that the health workers did not specify the date of next/subsequent doses (41%), the women were not aware of the need for subsequent doses to get fully immunized against tetanus (26%), or they were told by the health workers that 2 or 3 doses were enough for them for their pregnancies, and they were not advised (by health worker) for full immunization (22%)

### **Coverage levels for the 1<sup>st</sup> Round of the 10<sup>th</sup> NID Campaign**

During the 1<sup>st</sup> Round of the 10<sup>th</sup> NIDs, 95% of the children <5 years received OPV. Vitamin A capsules were given to 92% of the eligible children during the same round.

The primary reasons for not receiving OPV during the 1<sup>st</sup> Round of the 10<sup>th</sup> NIDs were that the parents were not aware of NID campaign, and that they were busy with other work on the day of NID, and the child was sick or away from home.

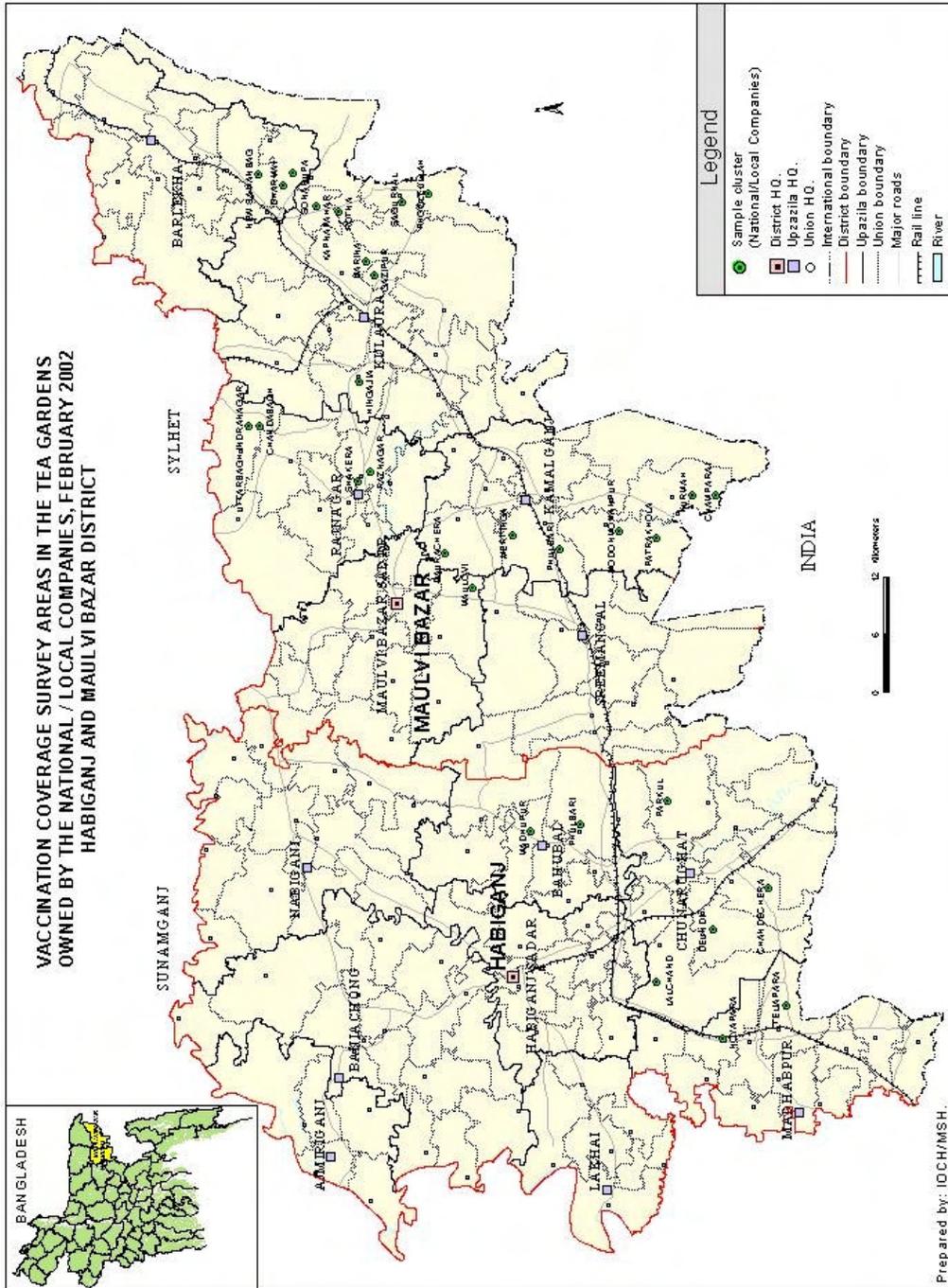
Majority of the parents learned about the 1st Round of the 10th NID Campaign from Line Chawkidars (security guards) of the tea gardens (84%), followed by miking (12%); while

another 12% came to know about the NID from relatives and neighbors. IPC by health worker as a source of information was mentioned by only 7% of the parents.

### **Suggested solutions**

The survey indicates the need for appropriate BCC activities and counseling to make the parents/caretakers understand the importance of full immunization of their children. The information must stress that each child, irrespective of sex, must be fully immunized before 12 months of age, and how to achieve full immunization (the time and place of the immunization sessions and the number of doses required). All women of childbearing age must be informed about how to prevent tetanus with 5 doses of TT vaccination to protect herself and her newborn child.

The quality of services as reflected by the number of invalid doses (9% for DPT1, 4% for DPT2, and 4% for measles) and high dropout rates (16% for DPT1 to DPT3 and 28% for DPT1 to measles) could be further improved by proper screening of eligibility of clients for antigen at the time of vaccination, and by adequate counseling of mothers at the time of vaccination and during home visit. There is also a need to further train the service providers to help them keep up with EPI policies and guidelines and increase their capacity for counseling parents and women of reproductive age about EPI.

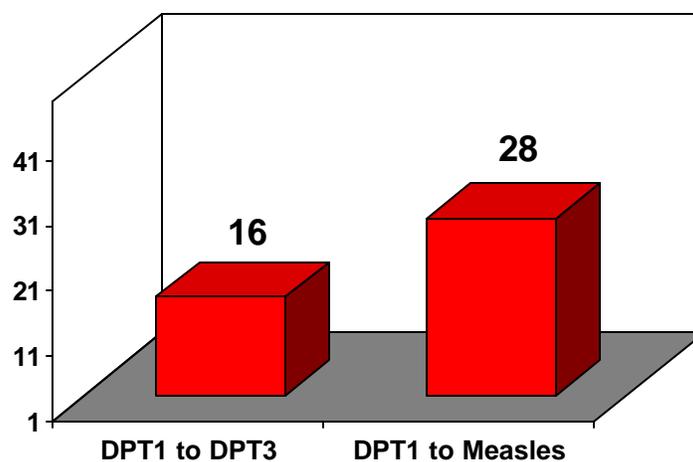


## TABLES AND CHARTS

**Table 1: Routine immunization coverage levels of the children**

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	94
OPV1	94	85	84
OPV2	86	74	72
OPV3	78	65	63
DPT1	93	85	84
DPT2	86	74	72
DPT3	78	65	63
Measles	67	65	53
Fully immunized	67	54	42
Zero Dose	5	-	-

**Chart 1: Drop-out rate for childhood immunization**



**Table 2: Invalid doses of immunization provided to the children**

Antigens	Percentage
DPT1	9
DPT2	4
DPT3	3
Measles	4

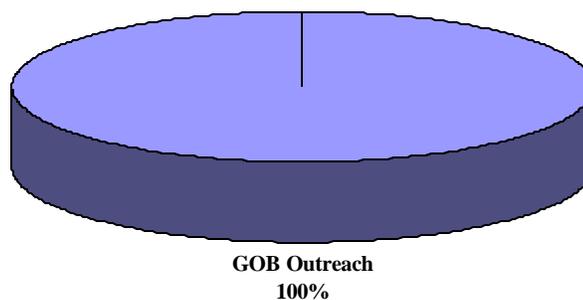
**Table 3: Missed opportunities by antigens**

Name of the vaccine	Uncorrected		Corrected	
	Number	Percent	Number	Percent
BCG	0	0.0	0	0.0
DPT1	1	0.5	1	0.5
DTP2	0	0.0	1	0.5
DPT3	1	0.5	0	0.0
OPV1	1	0.5	1	0.5
OPV2	0	0.0	1	0.5
OPV3	1	0.5	0	0.0
Measles	4	2	2	1

**Table 4: EPI card availability and retention**

Card Status	Number	Percentage
EPI card available	94	45
EPI card ever given	186	89
EPI card retention	94	51

**Chart 2: Sources of childhood immunization services**



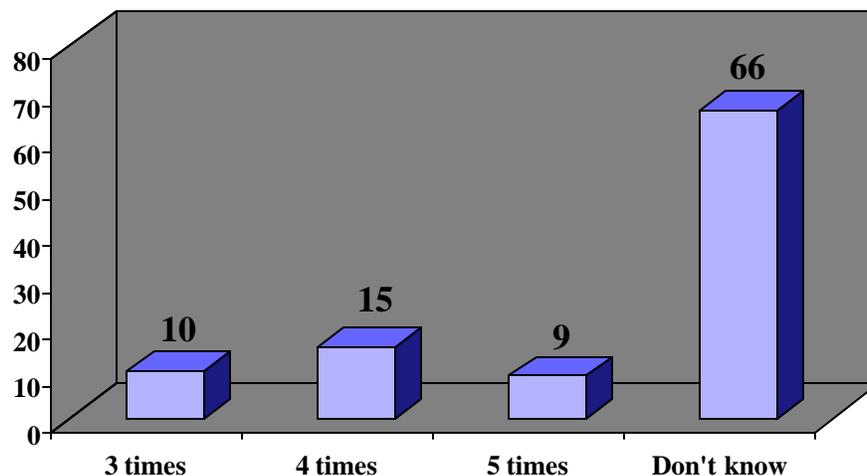
**Table 5: Distance between the child's home and the vaccination site**

Time (Minutes)	Number	Percentage
1-5 Min.	104	50
6-10 Min.	80	38
11-20 Min.	26	12

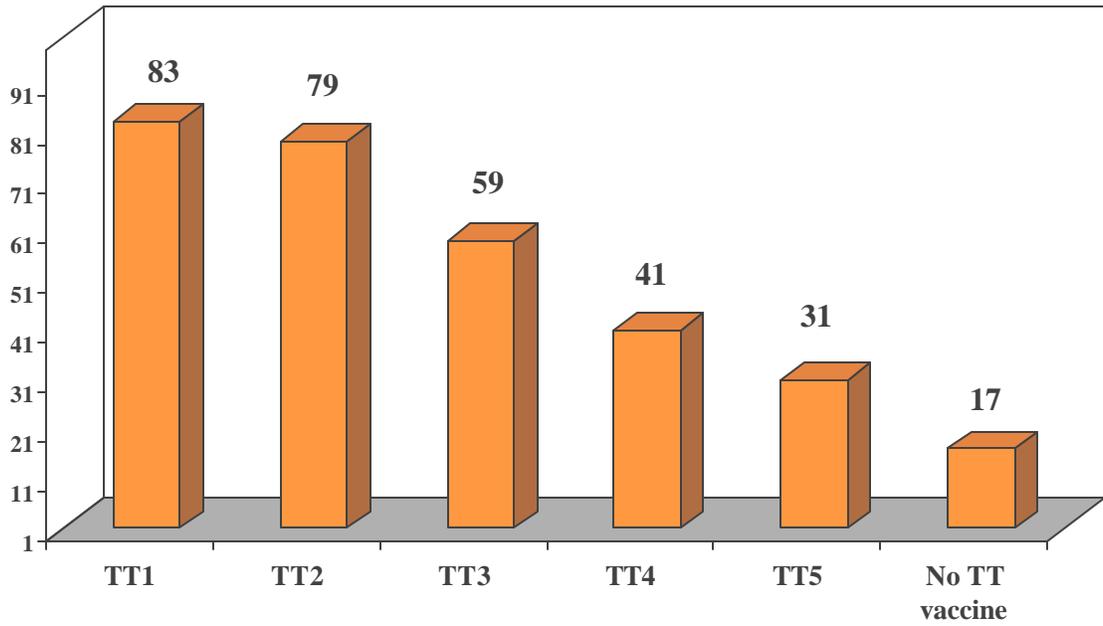
**Table 6: Reasons for non-immunization and partial immunization of the children**

Reasons	Non-immunized (%) (N=11)	Partially immunized (%) (N=58)
Did not know about need of immunization	27	-
Did not know about need of second dose	-	12
Did not know when to return for 2 <sup>nd</sup> /3 <sup>rd</sup> dose.	-	9
Did not know about importance of measles vaccine	-	10
Did not know about place and time of immunization	9	3
Did not know when to return for Measles.	-	2
Family problem/mother sick	-	22
Child sick, was not taken to vaccination site	10	12
Mother busy	27	5
Future plan to vaccination to the children	-	2
Vaccination time was inconvenient	9	-
Health worker not available at the site	-	3
Health worker's behavior was not good	18	3
Vaccine was not available at the site	-	2
Child was away from home	-	10
Others	-	5

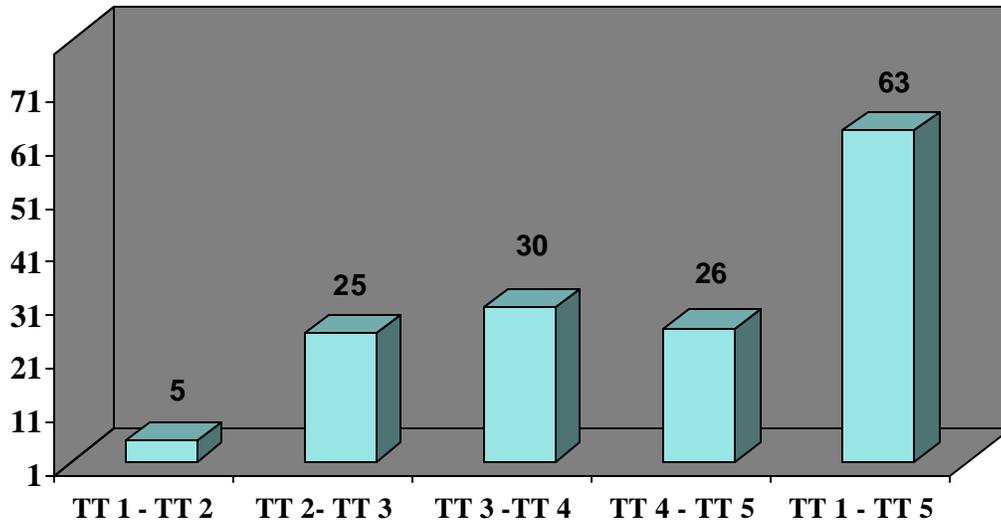
**Chart 3: Respondents' knowledge about required visits to immunization centers**



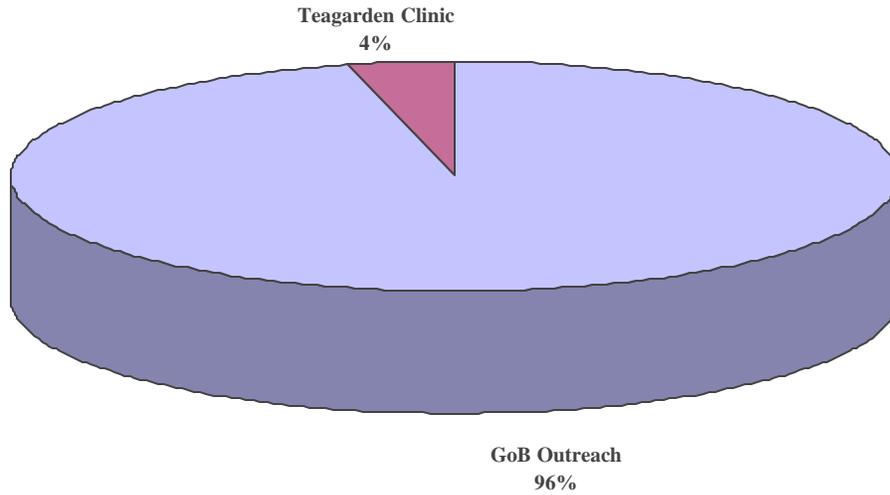
**Chart 4: Routine immunization coverage levels for TT of women (15-49 years)**



**Chart 5: TT Immunization drop-out rate among women 15-49 years**



**Chart 6: Providers of TT immunization**



**Table 7: Reasons for non-immunization and partial immunization for TT of the women**

Reasons	Non-immunization (%) (N=36)	Partially immunization (%) (N=110)
Next dose is not yet due	-	4
Don't feel need for immunization	69	-
Health worker did not specify the next dose	-	41
As per HW advice 2/3 TT is enough during the pregnancy	-	22
Unaware of need of next dose	-	26
In our times TT immunization was not in practice	19	-
Fear of injection	3	-
Busy with house holds works	6	6
Family problem	3	1

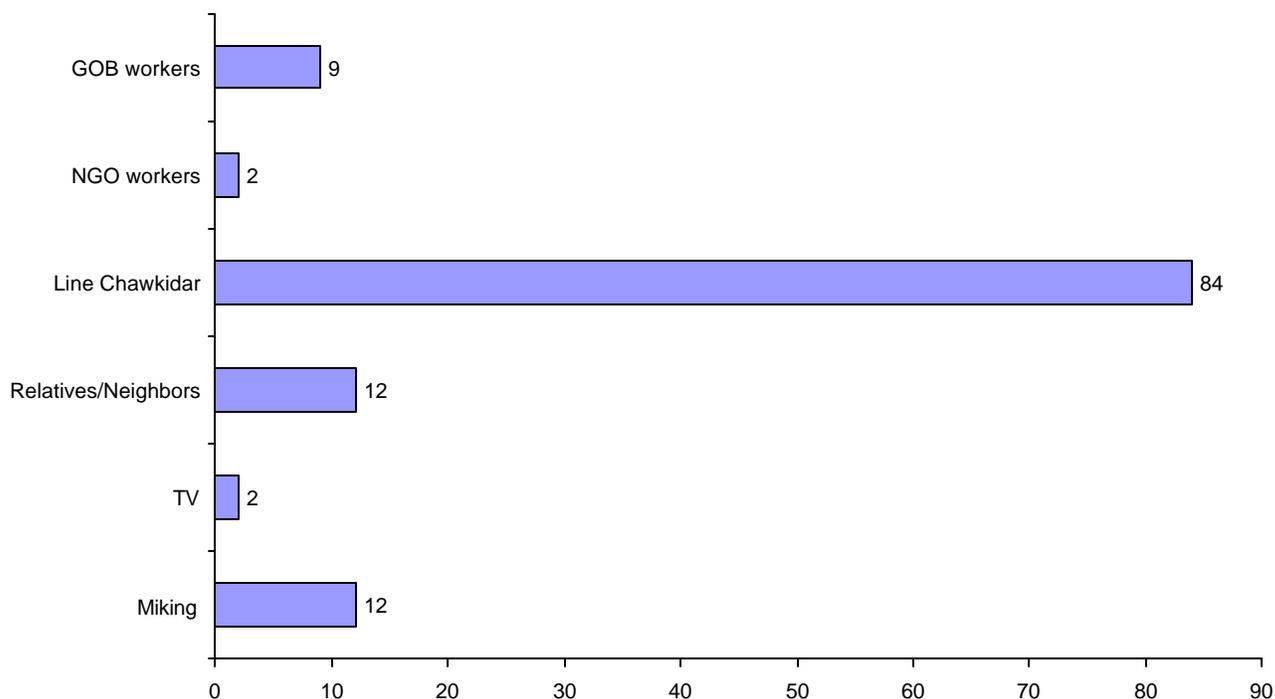
**Table 8: Coverage of the 1<sup>st</sup> Round of the 10<sup>th</sup> NID Campaign**

Round	OPV (%)	Vit A (%)
1 <sup>st</sup> round	95	92

**Table 9: Reasons for non-immunization of OPV during the 1<sup>st</sup> Round of the 10<sup>th</sup> NID campaign**

Reasons	Number	Percent
Did not know about NID	7	46
Child sick, not given	1	7
Too busy	1	7
Child/mother sick, not taken	1	7
Religious/ social barrier	2	13
Child away from home	1	7
Others	2	13

**Chart 7: Source of information about the 1<sup>st</sup> Round of the 10<sup>th</sup> NID campaign**



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 (*ppes*). 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**

<b>District</b>	<b>Company</b>	<b>Name</b>	<b>Pop.</b>	<b>Cluster</b>
Moulavibazar	The New Sylhet Tea Estates Ltd.	Phooltullah	4236	1
	Deundi Tea Co. Ltd.	Mertinga	4050	2
		Champarai	3390	3
		Kurmah	4639	4
		Modonmohanpur	1514	5
		Patrakhola	5215	6
	National Tea Co.	Daurachera	2720	7
		New Samanbag	5828	8
		Chandabagh	1638	9
		Dharmai	3750	10
		Gazipur	2951	11
		Kapnapahar	3152	12
		Maulovi	1776	13
		Phulbari	1884	14
		Sagurnal	3650	15
		Sonarupa	4095	16
		Dildarpur	850	17
		Hingajia	1647	18
		Marina	1900	19
		Uttarbagh Indranagar	3708	20
		Raznagar	3383	21
		Rotna	2545	22
		Shakera	2021	23
Habigonj	Deundi Tea Company Limited	Deundi	4338	24
		Lalchand	4731	25
		Noyapara	3248	26
		Chandechera	3500	27
		Parkul	2405	28
		Teliapara	5525	29

*Annex C*

**List of never vaccinated children identified by clusters**

<b>District</b>	<b>Company</b>	<b>Name</b>	<b>Pop.</b>	<b>Cluster</b>	<b>Never Vaccinated Children</b>
Moulavibazar	The New Sylhet Tea Estates Ltd.	Phooltullah	4236	1	2
	Deundi Tea Co. Ltd.	Mertinga	4050	2	2
		Champarai	3390	3	
		Kurmah	4639	4	
		Modonmohanpur	1514	5	
		Patrakhola	5215	6	
	National Tea Co.	Daurachera	2720	7	
		New Samanbag	5828	8	
		Chandabagh	1638	9	2
		Dharmai	3750	10	
		Gazipur	2951	11	
		Kapnapahar	3152	12	
		Maulovi	1776	13	
		Phulbari	1884	14	
		Sagurnal	3650	15	
		Sonarupa	4095	16	
		Dildarpur	850	17	
		Hingajia	1647	18	
		Marina	1900	19	
		Uttarbagh Indranagar	3708	20	1
		Raznagar	3383	21	
		Rotna	2545	22	
		Shakera	2021	23	1
Habigonj	Deundi Tea Company Limited	Deundi	4338	24	
		Lalchand	4731	25	
		Noyapara	3248	26	
		Chandechera	3500	27	
		Parkul	2405	28	
		Teliapara	5525	29	3
		Madhumur	1013	30	

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**Survey coordination:**

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