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Information for Action Using Data to Improve EPI Imact

BASICS is an USAID-funded project administered by the Partnership for Child Health Care, Inc.

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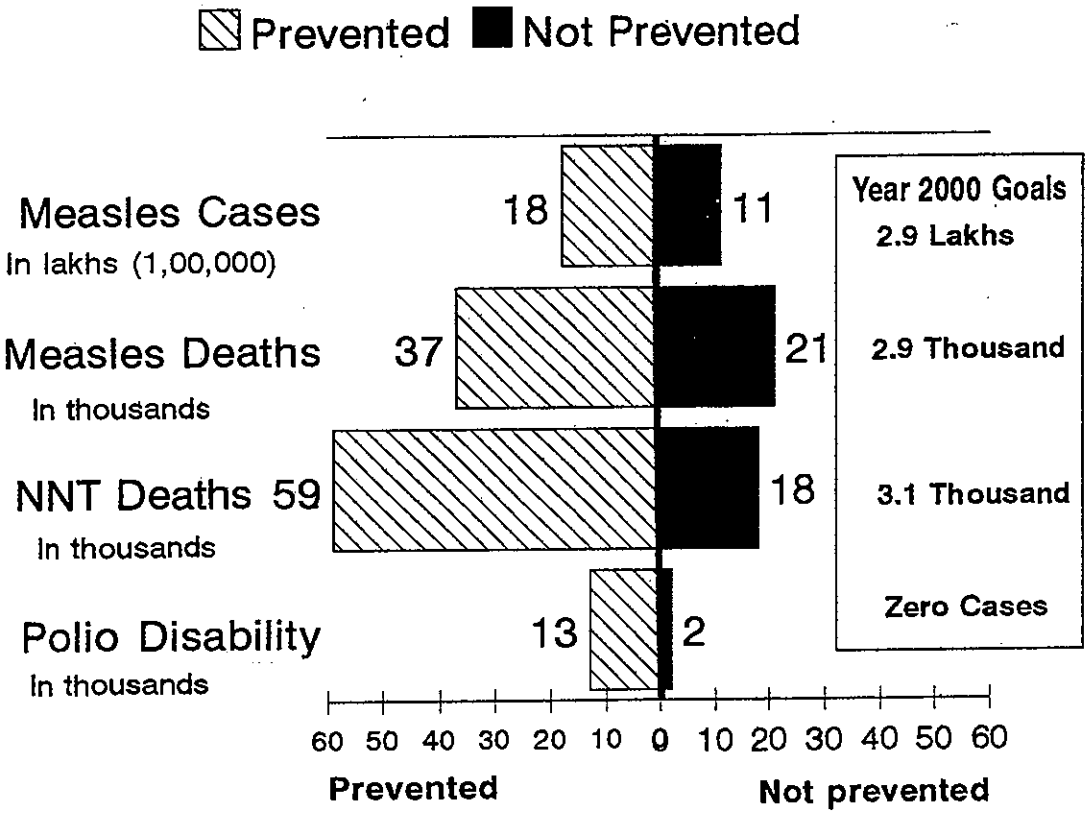
INFORMATION FOR ACTION
USING DATA TO IMPROVE EPI IMPACT

Bangladesh Progress Toward Year 2000 EPI Goals



GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
EXPANDED PROGRAMME ON IMMUNIZATION
ASSESSMENT OF EPI SURVEILLANCE
JANUARY 12-FEBRUARY 8, 1996

B

Using EPI Information to Improve Health and Survival in Bangladesh

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EXECUTIVE SUMMARY - CONCLUSIONS

- The Bangladesh Expanded Programme on Immunization (EPI), established in 1979, became fully operational in 1985. Over the last 10 years, EPI has achieved sustained incremental increases in coverage of its target populations. In 1995, an estimated 2.2 million infants (70%) and 2.1 million pregnant women (60%) were immunized.
- Bangladesh has committed itself to the achievement of several EPI goals by the year 2000. Progress toward four of these goals is summarized on the cover graph. Assumptions used in determining the estimates are provided on page 5.
- In 1995, EPI prevented an estimated 2 million cases of disease and 100,000 deaths. Bangladesh and its many partners can be very proud of their achievements. One million cases and 36,000 deaths were not prevented.
- The challenges for the Bangladesh EPI are two: 1) sustaining the current levels of coverage, and 2) closing the gap between the current levels of morbidity and mortality and the Year 2000 Disease Reduction Goals (cover graph).
- Achieving these goals will require expanding the program's vision beyond coverage to disease reduction. Achieving targeted levels of coverage will not automatically achieve the desired reductions in morbidity and mortality for two reasons: 1) aggregating coverage at thana, district and national levels masks pockets of low coverage, and 2) individuals and communities with low coverage are frequently at high risk (poverty, undernutrition. lack of access to quality care) for morbidity, disability, and death. Thus, achieved reductions in disease burden are less than predicted by levels of coverage.
- Achieving the disease reduction goals will require targeting resources at areas of high risk. This requires collection and use of information for two main actions: 1) identification of foci of disease for investigation and control, and 2) identification of high risk individuals and communities for vaccination. The most important locus for this information for action is at the community level.
- This review of EPI surveillance in Bangladesh describes systems reporting numbers on vaccinations and detected cases of EPI from the field to the center. Use of data for action, except for coverage at the Thana level, is very limited.
- Current systems report 2-10% of cases of the three target EPI diseases estimated to be occurring in the population by sampling methodologies. Predictive value positivity was highest for neonatal tetanus reported through the sentinel system and lowest for polio.
- Achievement of the Year 2000 EPI Goals will require improved understanding of the reasons for and use of data for making decisions and taking action. Three principles underlie the changes needed to ensure the effective use of health information: 1) each level (community, union, thana, district, division, and central) has its own unique needs for data; 2) cost-effective methods to provide information for action differ by question being asked and by level, 3) maximum impact is achieved when data are used at the level of collection.
- Improving EPI effectiveness, through better use of information, will not require a new reporting system. It will require, however, a new vision of information for action in which information are collected to meet level specific (community, thana, district, national) needs for information for policy, planning, implementation, monitoring, and evaluation.
- On the next page are three priorities to improve surveillance that merit consideration by those responsible for the health of the Bangladeshi people.
- No single reporting methodology can provide the answers needed for decision making. Strengthening surveillance, a recognized EPI priority, needs to shift from identifying systems to provide information to identifying the most cost effective methods to provide answers to key EPI questions. Page 4 of this report provides an illustrative matrix on the different methodologies for providing answers to 6 key questions for each of the 3 priority EPI diseases.

EXECUTIVE SUMMARY - THREE PRIORITY SURVEILLANCE ACTIONS

Priority 1

Issue Most collections of EPI data are carried out as a condition of service with little understanding of use. Important data, e.g., pockets of uncovered high risk populations and cases of EPI disease, are suppressed in fear of supervisory retribution

Facts The most important locus for use of EPI coverage and disease data is at the community, union, bastee, and ward levels. At this level, information can be used to identify and solve problems, e.g., cases/outbreaks of disease for investigation and control, and high risk populations for vaccination.

Action Identify the union and ward levels as the focal points for use of data: 1) monitoring the coverage of children under 23 months of age and fertile aged/pregnant women, 2) identification and vaccination of uncovered high risk populations, and 3) identification and investigation of disease occurrence for taking appropriate action. Detection of cases of an EPI disease should be looked on as a program achievement and an opportunity to learn on how to do better in the future.

Priority 2

Issue City Corporations and District Level Municipalities lack the basic emergency disease reporting systems needed for identification and control of health emergencies.

Fact Urban areas, with their compact populations, are at high risk for infectious, toxic, and environmental emergencies. Municipalities have multiple untapped resources (hospitals, NGOs, private practitioners) who have data needed for improved urban health.

Action Request DG Health to designate an Emergency Response Focal Point in each municipality. In municipalities with Health Officers, focal point would be established with HO. In district level municipalities without a HO, focal point would be located in the office of the CS with responsibility assigned to the MOCS. In non-district level municipalities - Emergency Response should be delegated to the adjacent THFPO.

- Emergency Response Focal Points need to be in place by the end of NID2, April 1996.
- Emergency Response Officers will require training in surveillance and response.
- Each focal point needs to be equipped with a direct phone line. Conditions requiring immediate emergency notification need to be publicized along with Emergency Response Address and Phone through a poster with distribution to hospitals, NGOs, and private practitioners.
- Each district level municipality needs to establish its own sentinel surveillance system consisting of major hospitals seeing target diseases and NGOs. Reporting needs to be weekly (positive or negative) to the designated Emergency Response Focal Point.
- All health emergencies need investigation, response, reporting, and feedback.

Priority 3

Issue EPI is inundated with large amounts of data which are of insufficient quality to meet needs for policy, planning, and implementation. Effective use and feedback is limited.

Fact Most information needed by EPI to manage the program is available in greater quality at lower cost through non-routine sample methods (sentinel, surveys).

Action At each level, identify the minimal information needed to make the critical decisions for EPI planing, implementation, monitoring and evaluation. Assess options for getting required data with quality at minimal cost.

- Focus surveillance on selective use of data at level of collection.
- Convene task force to address issues of urban surveillance
- Initiate a monthly feedback bulletin to the Thana and Zonal levels on how surveillance data is being used and monthly meeting lesson plans on effective use of data.

EXECUTIVE SUMMARY-DISEASE SPECIFIC RECOMMENDATIONS

Tetanus Recommendations

- Recognize and affirm the progress being made in the battle to control NNT.
- Through advocacy and training, focus efforts on the identification of and achievement of high TT coverage among high risk individuals and populations.
- Place priority on monitoring coverage at the HA/Union/Ward levels
- Assess the feasibility of using neonatal deaths identified and recorded by FWAs as a mechanism of identifying areas at high risk of NNT for vaccination
- Utilize tetanus admissions (neonatal, child and women) to the largest sentinel sites as cases to further define current tetanus epidemiology and vaccine efficacy
- Consider including Tetanus Serology in the Multiple-Indicator Survey.
- Assess adequacy of current policies and strategies (target population and methods of assessment) to meet disease reduction goals.

AFP/Polio Recommendations

- Recovery of the investment in routine and NID polio immunization requires an effective reporting system for AFP meeting WHO standards.
- Reexamine 207 polio cases reported in 1995 to assess predictive value positive (% of cases that are AFP) of current reporting
- Immediate reporting of AFP cases cannot be achieved by health system passive surveillance. Active partnership of the public in the immediate reporting of AFP will be required. Consideration should be given to the early institution of a reward for reporting and full investigation. Rotarians should be asked to consider establishing by the end of 1996 NID2, May 1996, an incentive for families reporting cases of confirmed polio such as: 1) providing a job to a family member, and/or 2) assistance in rehabilitation. Such a commitment would be a major contribution to ensuring the effective surveillance needed for a Bangladesh free of polio.
- As the areas most likely to main wild poliovirus foci, the municipalities, are those with the poorest surveillance, municipal recommendations merit immediate implementation.
- Effective AFP surveillance requires timely analysis and feedback of stool data.. Identified obstacles to ensure rapid laboratory examination and feedback of results need to be addressed immediately.

Measles Recommendations

- The cost of measles in terms morbidity, disability, mortality, human, and economic cost, and its importance to child health and child survival must be publicized.
- In rural areas, there needs to be a shift in monitoring priority from HA vaccinations performed and Thana coverage, to monitoring of coverage at the union level, and identification and vaccination of low coverage areas.
- Coverage is lowest in the groups at the highest risk for mortality. Annual pre-epidemic season (September to November) assessment of coverage and catch-up measles vaccination for 9-23 or 9-35 month children should be institutionalized at the bastee, ward, and union levels.
- Although overall measles incidence will remain low, EPI needs to be prepared for outbreaks with increasing proportions of cases among vaccinees. Prompt investigation of these outbreaks to assess their epidemiology and vaccine efficacy will be required to maintain public trust and confidence.
- The routine reporting systems are providing useable data on measles trends: one but not two systems merit continuation.

SURVEILLANCE MATRIX

Overview

During visits to the field in four districts, health workers all levels understood surveillance as the need to identify every case. While immediate reporting of every case of AFP is absolutely essential for polio eradication, less complete collections of quality data will provide the information for action required for the elimination of neonatal tetanus and the control of measles. The table below is illustrative of the variety of strategic approaches that are available to provide needed information for EPI. Selecting the most appropriate surveillance methods is not unlike the decision making process involved in selecting local transportation (walk, rickshaw, motor rickshaw, baby taxi, bus, train, or private vehicle). It involves a choice involving destination (question being asked), the distance to be traveled (the amount of data required), the quality of the ride (the sensitivity and predictive value positive of the data), and cost (cost required to provide valid data).

Surveillance Methods for Providing Essential EPI Information for Action* **			
Question to be Answered	Neonatal Tetanus	AFP/Poliomyelitis	Measles
What is the cost in morbidity, disability, and mortality?	*Survey for Neonatal Deaths and Cases compatible with NNT*	*Lameness Survey for Polio Compatible Residual Paralysis*	*Prospective Community Surveillance (ICDDRB)*
What factors contribute to risk of morbidity, mortality, and disability?	*Survey with case control study.* **Sentinel site cases with case control study**		*Prospective Community Surveillance (ICDDRB)*
Who are the appropriate targets for immunization?	***Case reporting(FWAs and facilities) to identify Mothers of TT cases for vaccination and communities for coverage assessment and catch up vaccination. *Use of administrative estimates of coverage to identify high risk communities for special vaccination .**	***Administrative estimates of low NID coverage unions/wards for revaccination**	***House to house identification and referral for vaccination of 9-23 month or 9-35 children by HA catchment area (rural) and bastees (urban) *Administrative estimates of coverage at district level. Survey estimates of coverage data**
What % of at-risk population has received vaccination?	***Administrative estimate at union level? *NGO Records or LQAS at ward level.**		***Administrative estimate at union level? *NGO Records or LQAS at ward level.**
Are disease reduction targets being achieved?	***Sentinel surveillance for NNT *AHI/HA Investigation of 5-14 day NND detected by FWA**	***AFP cases investigated and confirmed as polio? *%achievement of WHO Surveillance Criteria**	***Vaccine efficacy at thana /ward level by chart[1]. *Coverage times vaccine efficacy estimated by outbreak investigation at national level.**

***Bold indicates current priority needs for information needed for action**

*** Italics indicate areas where current data are sufficient to provide necessary data for action*

[1] Orenstein et al. Field Evaluation of Vaccine Efficacy. Bull WHO 1985, 63:1055-1068.

SCOPE OF WORK

At the request of the Bangladesh Expanded Programme on Immunization (EPI), USAID, through its BASICS Urban EPI Partnership, provided the services of Stanley O. Foster, Visiting Professor of International Health of Emory University for the following tasks:

- In conjunction with the MOH, Municipal Health, and BASICS staffs, review/examine the overall plan for disease surveillance in Bangladesh with particular attention to the urban surveillance system. The review should include assessment of the sensitivity, predictive value positive, timeliness, and completeness of current surveillance of the 6 EPI diseases, plus pneumonia, diarrhea, and dysentery.
- Document in writing the existing urban disease surveillance system (focusing on EPI diseases) including case detection, case reporting, case investigation, and containment actions.
- Work with BASICS country staff and counterparts to develop recommendations and a realistic action plan to address the deficiencies and improve the functioning of the urban disease surveillance system. Aim for the development of a system which provides data that is understood and used to improve health of urban residents.
- Identify the needs for surveillance for planning, implementation, disease control, and monitoring - particularly in urban settings.
- Increase skills in data collection and use through conducting a workshop for selected counterparts and BASICS staff.

The consultancy was carried out from January 8-February 8, 1996. Information was provided by EPI, IPH, IEDCR, UNICEF, WHO, ICDDRB, and NGOs including World Vision, Concern, and Helen Keller. Field visits were carried out in 4 municipalities (Chittagong, Comilla, Dhaka, and Mymensingh). A 4 day workshop on EPI surveillance was held at BARD Comilla with participation by EPI, IEDCR, IPH, WHO (5 Divisional Surveillance Officers), NGOs, BASICS, and 7 Municipal Health Officers (See Appendix IA for a Summary of Proceedings and Appendix 1B for Self-Generated Surveillance Targets to be achieved over the next three months).

For the consultant whose first visit to Bangladesh occurred post-independence in the spring of 1972 at a time that the health system had been destroyed by the war for liberation, the development of the health infrastructure and especially its EPI has been spectacular. EPI development has been incremental and sustained. Public confidence and trust has been established. Systems of cold chain, vaccine distribution, training and monitoring have been established. The many individuals and partners who have contributed to this development have my respect and admiration.

EPI MORBIDITY, DISABILITY AND MORTALITY PREVENTED AND NOT PREVENTED 1995

EPI is, however, understood primarily as a coverage program with well deserved pride for the levels achieved and a growing awareness of the challenges involved in maintaining high coverage. However, the full potential of EPI lies not in providing vaccinations but in preventing morbidity, disability, and mortality. Improved surveillance is essential to ensure the achievement of the disease reduction targets set for the year 2000. For this reason, it is important to continually assess the EPI regarding its effectiveness in preventing morbidity, mortality, and disability. Using Bangladesh data and assumptions, as detailed below and in the body of the report, the current status of EPI diseases is estimated in the following table, Table 1.

Estimated Impact of Bangladesh EPI on Morbidity, Disability, and Mortality - December 1995				
Disease	If No EPI	Currently Prevented	Currently Not Prevented	% Prevented
Neonatal Tetanus Deaths	76,800	58,560	18,240	76
Polio Lameness	15,200	12,400	2,800 (94)	82
Measles Morbidity	2,880,000	1,830,000	1,050,000	64
Measles Mortality	57,600	36,600	21,000	64

Assumptions

- Population 1995 = 115 million, Births= 3.2 million, Surviving Infants 2.88 million, Children <5 20 Million
- NNT: Mortality with no immunization: Incidence 24/1000 live births[2]; Current Incidence from 1994 NND Survey = 5.7 (18,400); Alternatively, coverage from 1996 Progotir Pathey Survey (assuming one dose was booster and protective) (77.6% X 95% Efficacy = 56,600 Cases Prevented); Using 2 doses in pregnancy as protective (59.4 % X 95% Efficacy = 43,300 Cases Prevented);
- Polio: Pre-EPI Polio EPI Lameness Survey Estimate 0.76/1000 <5, 1994 incidence 0.14/1000 <5; Current AFP surveillance not adequate to assess post NID polio incidence
- Measles: Measles Attack Rate 100% of 2.8 million children surviving to age of infection (2.88 million x 1996 Progotir Pathey Survey Coverage of 79.4% X Vaccine Efficacy 80% = 1.83 million Cases Prevented)
- Measles Mortality: Morbidity X CFR of 2%,

Further decreases in morbidity, disability, and mortality will require broadening the EPI mandate from coverage to coverage and surveillance (the collection of data for action). Disease surveillance can be likened to the keeping the score at a football match: successes - goals for, and failures - goals against. Without knowledge of successes and failures, it will not be possible to assess needs for policy and strategy revision and for targeting resources at the high risk populations, both prerequisites for achievement of disease reduction targets.

Surveillance is not reporting, the transmission of information from the field to Dhaka, but the selective collection and use of data to answer specific epidemiologic questions for decision making and action. These questions are detailed in Appendix IV. For EPI surveillance, the following questions are critical:

- What is the cost in morbidity, disability, and mortality?
- What factors (demographic, socio-economic, environmental, behavioral) contribute to risk? (Risk Factors)
- Who are the appropriate targets for immunization? (Target Population)
- What percentage of the at risk population have received vaccination? (Coverage)
- How effective is the vaccine? (Vaccine Efficacy)
- Are disease reduction targets being achieved? (Impact) If not, Why?

Strengthening EPI surveillance requires, as a first step, an understanding of the sources of data available for EPI decision making: 1) Routine Reporting, 2) Surveys, and 3) Research carried out by ICDDRB.

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2 Rahman M et al. Use of Tetanus Toxoid for prevention of neonatal tetanus. 1. Reduction of neonatal mortality by immunization of pregnant and non-pregnant women. Bull WHO 1982, 60:261-267.

ROUTINE SYSTEMS

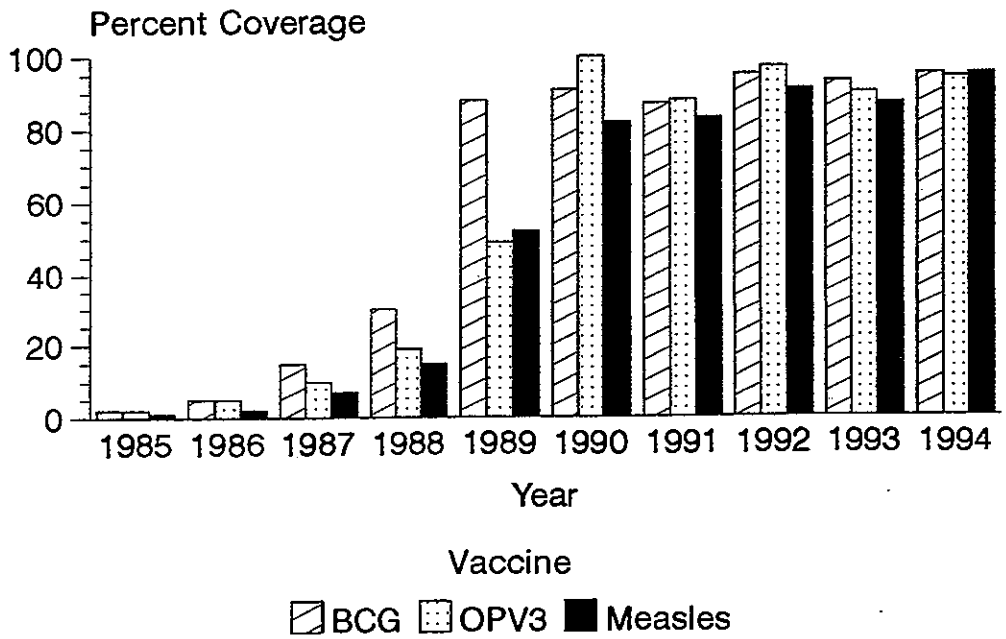
EPI Vaccinations

Vaccinations carried out in the field and at fixed and outreach sites are reported to the Thana level. Monthly, a report of vaccinations performed by antigen and age group are submitted through the Civil Surgeon's Office to EPI for collation and reporting. In some Thanas, the number of vaccinations performed are compared monthly to that required to achieve the 80% target. In Municipalities, where vaccinations are performed by a variety of public and private (NGO and profit) providers, submission and collation of data is less systematic.

EPI Coverage

EPI Coverage involves the comparison of vaccinations performed with that of the estimated target population. This administrative method provides an estimate of coverage, its reliability dependent on the accuracy of the numerator, the number of vaccinations provided to children in the first year of life, and the denominator, the population under one. The estimated coverage levels have been useful at thana, district, and national levels to document the incremental and sustained increases in coverage, Figure 1.

Administrative Estimates of Vaccine Coverage
BCG, OPV3 and Measles; 1985-1994
Bangladesh, 1985-1994



Source: MOH EPI Information System

EPI Six Disease Report

Health Assistants encountering EPI diseases in their assigned areas are required to report weekly to the Assistant Health Inspector (AHI) at the Union Level. These reports are collated monthly with the monthly Disease Profile (a report of patients seen at facilities) and submitted on a monthly basis to EPI through the Civil Surgeon. Completeness of reporting is assessed at the District level. At the national level, these data are combined with the reports from sentinel sites, described below, tabulated and plotted. No evidence of other use of these data is apparent. Data reported for the years 1987-1995 (November) are recorded below, Table 2.

Reports of EPI Diseases, Bangladesh 1987-1995 (Total includes Sentinel)									
Year	NNT			Measles			Polio		
	Total	Sentinel	IEDCR	Total	Sentinel	IEDCR	Total	Sentinel	IEDCR
1987				13,631			102		
1988	1029			11,471			540		
1989	1105			27,327			449		
1990	740			1,705			374		
1991	602			9,292			287		
1992	534			5,479			243		
1993	720	368		5,443	431		233	138	442
1994	834	358	466	9,571	94	11,715	289	89	
1995	685	268		4,288	234		207	79	

For the two diseases for which independent assessments of incidence are available (NNT & polio), the sensitivity (percent of actual cases reported) of the existing routine surveillance system can be estimated, Table 3.

Sensitivity of EPI Surveillance Systems Disease Reported in 1994 and Survey Data from 1994 National Disease Incidence Survey[3]					
Disease	Incidence by Survey	Population	Estimated Cases	Reported Cases	% Reported
Neonatal Tetanus	5.96/1000 Births	3.2 million	19,072	476	2.5
Polio	0.14/1000 Children <5	15.0 million	2100	194	9.2

[3] National Disease Incidence Survey, September 1994: Assessment of Neonatal Tetanus Deaths and Poliomyelitis. EPI, DGHS, Mohakali, Dhaka

Several factors contribute to the low levels of reporting: 1) lack of understanding of the reasons for and importance of reporting, 2) limited direct contact with households in catchment area, 3) lack of questioning regarding disease occurrence during household visits (other tasks such as promotion of EPI and ORT have priority), 4) non-reporting because of fear of supervisory retribution for not having prevented the case, and 5) non-submission of reports. Based on current levels of measles coverage, measles reporting is estimated at 7%. Little data are available to assess the predictive value positive, the percentage of reported cases that are, in fact, true cases. Of the diseases reported to EPI, measles appears to have value as an indicator of trend. The data show the expected seasonality of measles, the dampening of the seasonal peaks expected with increasing rates of coverage, and the lengthening of the inter-epidemic period from 2 to 3 years.

IEDCR Weekly Report

The IEDCR system was started in 1994. HA weekly reports on 3 EPI Diseases (NNT, Polio, and Measles) along with three non-EPI diseases (ARI, Diarrhea, and Dysentery) are collated at the Thana level and sent monthly directly to IEDCR. All reports received at IEDCR by the 20th of the following month are collated by number of Thanas and HAs reporting, disease, age group and week of report. Reports received late are not included in the tally. For 1994, 63% of the expected 21,620 Thana reports were received by the due date and tabulated. Of the 1,092,000 HA weekly reports, 49.2% (537,000) were received. For the first 11 months of 1995, the percent of HA reports received ranged from a high of 63% in January to lows of 37% in March and October. Data are collated monthly and annually and results are circulated to senior ministry officials (40 copies). Due to a loss of critical data processing staff, the 1995 annual data have not been analyzed; the system risks collapse. Although the primary source of the EPI data is the same as the EPI reporting system (HA reports minus the disease profile) , the IEDCR system reports more measles cases than the EPI systems (IEDCR 1994-11,715 cases vs EPI 1994-9,571 cases. Use of data appears limited to reports at central level. No regular feedback to those providing the data takes place. IEDCR has the advantages of monitoring completeness of reporting from primary providers (HAs). Its value for EPI rests primarily with AFP and measles.

EPI Sentinel Surveillance

EPI has 24 sites which report monthly on one or more diseases. Chittagong Medical College's Department of Pediatrics exemplifies a sentinel site providing useful and useable data, Table 4.

Sentinel Surveillance Data, Chittagong Medical College, Pediatric Admissions 1990-95

Year	Polio	NNT	Other Tetanus	Measles	Diphtheria	Pertussis	TB <5 Y
1990	5	62	23	14	10	1	40
1991	3	37	38	16	17	1	43
1992	1	25	26	13	12	2	36
1993	2	11	21	12	13	0	30
1994	1	8	20	18	5	0	38
1995	1	8	18	5	2	0	n/a

Among the 7 conditions, neonatal tetanus, other tetanus and TB <5 appear to have enough cases to be useful for analysis. The value is most striking for NNT where the 1994-1995 average shows a 84% decrease compared to the average for 1990-1991. This is slightly higher than that expected by the reported 70% TT coverage for the Chittagong metropolitan area.

Data are, however, not being made available to Chittagong City Health Authorities, those most likely to find a use for the data. The absence of a decrease in childhood tetanus and childhood TB raises questions of program efficacy which merit investigation. Were the child tetanus cases unvaccinated, or do they represent declining immunity following 3 doses in infancy? What is the BCG status of the TB cases?

Quality of data at other sentinel sites varied from excellent (Dhaka IDH-Appendix 3) to confused (Shishu Hospital Dhaka which was including old polio cases in the sentinel report but not AFP cases on which stools had been collected). Several of the current sites are inappropriate because of the type of cases being seen (RIHD Dhaka - a rehabilitation unit for old polio), the small number of cases being seen, or the irregularity of reporting. The current summation of sentinel site reporting and their addition to routine reporting is of little value.

Well selected sentinel sites have considerable epidemiologic value because of the high quality of the data (high predictive value positive), the ability to track changes over time (trend analysis), and their potential use for detailed investigations. For example, the mother of a NNT case is a high risk person meriting TT vaccination. Her community may be a low coverage high risk area requiring special efforts to increase TT coverage. For institutions seeing large numbers of cases, like Dhaka, case control studies can be carried out to assess risk factors and vaccine efficacy.

The sentinel surveillance system needs to be upgraded to provide information needed for action at the local level, and policy formulation and strategy assessment at the national level. Four suggestions are offered: 1) sentinel sites should be asked to provide their data to their municipalities as a source of information for action; 2) tabulation of sentinel data from 24 sites with varying levels of quality of diagnosis and completeness of reporting and their addition to routine reporting should be discontinued; 3) NNT data from selected quality sites reporting consistently should be used to assess NNT trend and impact, and 4) standard protocols should be developed to study neonatal, child, and adult tetanus at the 3-5 sentinel sites that see the largest number of cases to better define the current epidemiology of tetanus and to identify improved strategies for prevention.

Current and potential sentinel sites need to be revisited to assess their current value in meeting the following criteria for sentinel sites. An example of such a visit is provided in Appendix 3.

- Sees any cases of AFP including Guillan Barre or =>20 cases of tetanus per year. Because most measles admissions are for complications, sentinel measles data are of little value. Because of the difficulties in diagnosing pertussis, the data are of little use.
- Has clinical capacity in diagnosis using standard case definitions
- Has system which enables retrieval of name, age, sex, address, diagnosis, and outcome
- Has retrievable records from past years to provide baseline data for monitoring of trends
- Has an individual (doctor, nurse, statistician) who is, or can be enthused in, the importance of serving as a sentinel site

Community Based Disease Surveillance (CBDS)

As health activities in municipalities are under the Ministry of Local Government rather than the Ministry of Health, municipalities lack the basic infrastructure and resources which provide services and information in rural areas. Where present, health service are provided by limited municipal health staff (vaccinators), health assistants deputed by the Civil Surgeon to municipalities, NGOs (predominantly family planning), and private providers. Many of these NGOs also provide MCH services including immunization of mothers and children. With assistance from BASICS, a number of NGOs are replicating the rural pattern of surveillance where cases of EPI diseases encountered on their rounds (each couple is visited every 2 months) are recorded and reported. As this sequencing will not provide the required rapid detection and immediate reporting of AFP cases within 7 days, role of NGOs in EPI surveillance needs to expand beyond the role of case detection to advocacy for community reporting.

Some NGO's, e.g., World Vision, maintain ongoing surveillance of infant and child deaths. Verbal autopsy analysis of identified deaths assist the NGOs themselves and their urban community members in identifying health problems for action. The value of such data is illustrated by the following table, Table 5.

Verbal Autopsy Results of Deaths Reported by Community, TBAs, and Field Staff Dhaka Urban Integrated Child Survival Project - October 1994-September 1995									
Age	Prematurity	Difficult Labor	Birth Trauma	Asphyxia	ARI	Diarrhea	Malnutrition	Other	Total
0-28 Days	9	1	1	5	6	3	1	9	35
1-11 Months	2	0	0	0	10	18	5	2	37
12-23 Months	0	0	0	0	3	2	2	2	9
24-59 Months	0	0	0	1	2	3	2	2	10
Total	11	1	1	6	21	26	10	15	91

Other includes bloody dysentery, jaundice, intestinal obstruction, and accident.

Such data provide useful information as to age groups at risk (0-23 months) and major causes of preventable mortality (ARI, Diarrhea). Prime use of such data is at the level of collection.

Family Planning

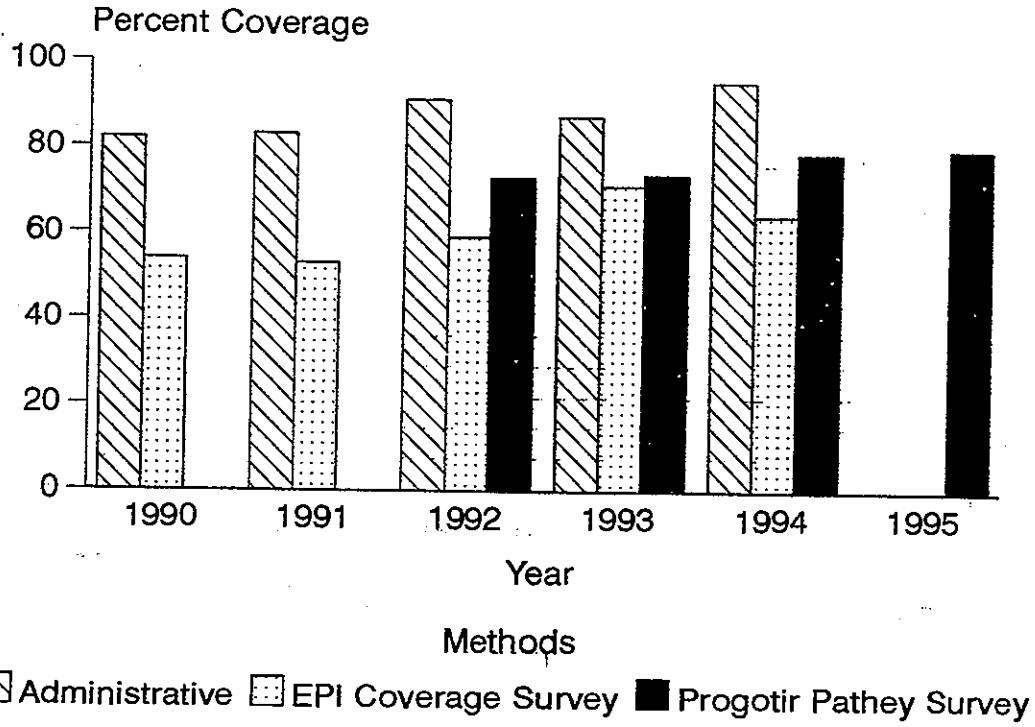
The Family Planning reporting system is extensive and beyond the scope of this consultancy. One aspect of that system has great potential benefit to EPI, the identification and recording of neonatal deaths. According to Family Planning senior staff, these data are not currently used. If this data could be shared with health staff at the union level, especially if the day of death is known, health staff would acquire a sensitive tool to identify NNT deaths and NNT prone high risk individuals, the mother of the NNT case, and communities.

SURVEY METHODS

EPI Coverage Surveys

The standard WHO EPI Coverage Survey, carried out annually, provides independent estimates of national, divisional, and sometimes district level coverage. These figures are derived from 30 cluster surveys of seven 12-23 month target age children per cluster. The figure below compares measles vaccine coverage as estimated by three methods: 1) administrative, 2) 30 Cluster, and 3) Progotir Pathey, Figure 2. As the latter two methods measure coverage in 12-23 month children, the appropriate administrative estimate for comparison is that of the previous year.

Estimated Measles Coverage: Three Methods Bangladesh, 1990-1995



As can be seen from the above figure, administrative estimates overestimate coverage. The reasons for these high estimates are not clear. Possibilities include a problem of high numerators (vaccination outside the target age group) or false reporting, or of falsely low estimates of target population. Quality of administrative estimates can be increased by shifting the locus of coverage analysis from the thana to the union and involving the community as active partners in the monitoring process.

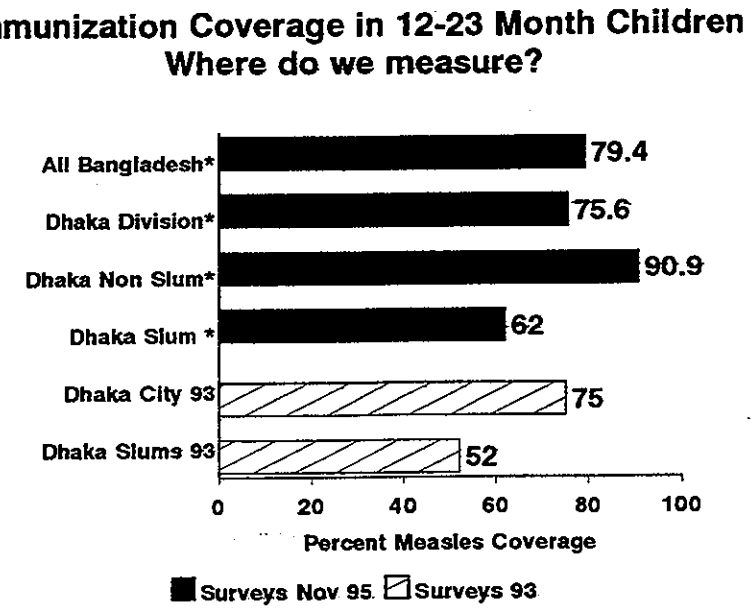
Progotir Pathey Surveys

As part of monitoring progress toward the Year 2000 Child Health Goals, the Bangladesh Bureau of Statistics, with assistance from UNICEF, is carrying out annual surveys measuring 27 indicators critical to child health (demographic, socio-economic, education, sanitation, health, health services, and disease). Three relate to EPI: DPT/Polio and Measles in children and TT in pregnant women. Although the sampling methodology at the district level is of questionable validity, the aggregation of data provide important data useful in documenting the heterogeneity of coverage among different population groups, e.g., the low coverage in urban slums, Table 6.

EPI Coverage in % as Determined by March 1995 Progotir Pathey Survey (<70%in Bold)

Antigen	Metro Slum		Metro Non-Slum		Other Municip	All Urban	All Rural	All
	Ctg	Dhaka	Ctg	Dhaka				
DPT/Polio 3	**61.6**	**63.5**	75.4	72.1	83.3	80.0	76.0	76.4
Measles 12-23 Mo	**58.9**	**56.8**	84.2	**65.1**	85.8	80.4	78.2	78.4
TT 2+	**54.3**	**41.6**	78.2	**57.2**	72.6	**67.0**	**58.5**	**59.4**

Aggregating coverage figures at thana, district, divisional, and national levels, however, frequently provides a false sense of confidence as to current coverage. This is well demonstrated in the following figure which provide measles coverage at different levels of disaggregation. Restricting one's analysis to the national data provides a sense of confidence that the coverage target has been achieved and all is well. However, further analysis identifies low coverage in urban bastees (slums) which are at very high risk of disability and mortality, Figure 3.



Lot Quality Assurance Sampling (LQAS)

With the assistance of the BASICS project, three city corporations, the largest of the municipalities, have utilized Lot Quality Assurance Sampling (LQAS) surveys to identify low coverage wards for intensive vaccination. In this methodology, households (usually 13) are selected systematically using the best available sampling frame (usually family planning registers). Wards with results below the cut off level, 9 for a sample of 13, are identified as low coverage and are targeted for catch-up vaccination, Table 7.

Lot Quality Assurance Sampling in 41 Wards of Chittagong City 1995			
Coverage	Number of Wards	Number of Wards with Low Coverage	% Wards with Low Coverage
Children with Cards	41	18	44
BCG	41	0	0
DPT-1	41	0	0
DPT-3	41	5	12
Measles	41	5	12
TT2	41	2	5

Disease Incidence and Prevalence Surveys

As indicated in the sections below on neonatal tetanus and poliomyelitis, EPI has carried out a series of surveys to determine the incidence of neonatal tetanus and the prevalence of polio compatible lameness. These surveys were valuable in documenting the magnitude of the disease problem and in justifying allocation of scarce resources for their prevention. As incidence rates have fallen, however, sample sizes required to show a significant differences are increasing. These surveys are no longer a priority for the EPI program.

MUNICIPAL SURVEILLANCE

Responsibility for health in urban areas rests with the Municipalities themselves under the Ministry of Local Government, not the Ministry of Health. Only 9 of the 64 district level municipalities have a Health Officer. Health Officers, where they do exist, are often kept busy responding to requests by the Mayor or CEO about mosquitos, water, and sanitation. Because of the absence of a health infrastructure, municipalities lack the basic reporting systems present in rural areas. The most commonly found data at the municipality level were the collections by the Sanitary Inspector of vaccinations performed by municipal vaccinators, NGOs, and, where existent, dispensaries. Disease data were notable by their complete absence. In those municipalities without a health officer, there is a lack of understanding as to whom disease data should be reported and by whom action should be taken: the Municipality Sanitary Inspector ("not qualified"), the Sadar Thana THFPO ("its not my responsibility"), or the Civil Surgeon's Office ("its the responsibility of the THFPO").

Visits to major urban health facilities (Medical Colleges, Departments of Pediatrics, IDHs), identified a number of "sonar koni" (gold mines) of data which lay unused except for forwarding up the system to EPI (sentinel sites) or to the HIS Unit in the Office of the Director General of Health. Visits to this latter office failed to uncover any systematic monitoring or collation of disease data. With the exceptions of the relatively recent CBDS described above, municipalities lack any system of reporting. Disease surveillance, in terms of information for action, is non-existent.

Since urban areas contain the highest risk populations (low coverage urban slums), strengthening of urban surveillance is essential for basic public health including the eradication of poliomyelitis. Based on visits to 4 cities, and workshop discussions with 7 Urban Health Officers, EPI and BASICS staffs, the following actions are proposed for consideration.

- Establish by Ministerial Order, an Emergency Response Focus in every municipality. In municipalities with a Health Officer, the HO would be responsible for receiving and responding to reports of health emergencies. In municipalities where there is no Health Officer, Emergency Response Focus would be located in the Civil Surgeon's Office with responsibility designated to the MOCS (Medical Officer Civil Surgeon).
- Each Emergency Response Focus would acquire a direct phone line. In the 4 city corporations, an answering machine is recommended.
- Designated Emergency Response Focus will require training in surveillance and response and a small amount of start up funds.
- Each municipality should prepare a list of facilities, organizations, and individuals likely to see cases of the target diseases
- Each municipality should prepare a Health Emergency Poster indicating the phone number and address of the Emergency Response Focus and the conditions for which immediate reporting is required, i.e., AFP <5, Guillan Barre, or clusters of unexplained morbidity or mortality. Poster should be distributed to surveillance contacts identified above.

- Using the criteria listed above under sentinel surveillance, each municipality should establish its own sentinel surveillance system (pediatric departments, NGOs). These institutions should be trained and provided forms so as to provide written weekly positive or negative reporting.
- Municipal focal point should establish a wall chart listing sentinel sites and weeks and record data of receipt of report. Reports delinquent for 7 days should be followed up by phone or in person.
- Monthly, the Emergency Response Focus should provide oral or written feedback to each reporting site indicating the contact on the wall chart.
- Emergency Response Focus will ensure the immediate investigation and action for reported emergencies.

EPI DATA FROM ICDDRB POPULATION STUDIES

Bangladesh is privileged to have access to some of the finest EPI research in the developing world. These data have been important in the formulation of global EPI strategies. Unfortunately, the importance and the programmatic relevance of these data have not always been recognized by either ICDDRB or the EPI program. With the expansion of ICDDRB studies in the high risk urban areas, efforts need to be undertaken to share relevant research findings in programmatic terms with the EPI program and municipal authorities. Studies identified as important are listed below in the individual sections on Neonatal Tetanus, AFP, and Measles.

IMPROVING THE QUALITY OF DATA

At the present time, data flow unread and unused from the field to Dhaka. Filling of a report is frequently considered a condition of continued employment. As reports of disease occasionally result in reprimand or extra work, there is a disincentive to report cases. Programs need to work hard to avoid the historic reporting trap described by Josiah Stamps for the UK in the 18th Century: "The government is very keen on amassing statistics, add them, raise them to the nth power, take the cube root and prepare wonderful diagrams, But what you must never forget is that every one of the figures comes in the first instance from the village watchman, who just puts down what he damn pleases."

The Bangladesh EPI is recognized for its development of a nationwide vaccine delivery system. Achievement of disease reduction objectives will require, in addition, improved selective use of information to better target high risk groups and identify and resolve disease control problems. Several principles need to be understood and utilized, Table 8.

Principles for Effective Surveillance
Each level in the health system (community, union, thana, municipality, district, division, nation) has its own unique needs for data.
Need for and use of data should be understood by those involved in collection, transmission, and collation.
Data should have some use at level of collection.
No report does not mean no cases; negative reporting does.
Use of data should justify the work involved in its collection.
Transmission of data should be limited to that needed, justified, used, and responded to.
Regular feedback to reporting sites is essential to ensure continued reporting.

Least well understood is the fact that the need for data and action are different for each level in the health system. Summarized below are some of the EPI needs by level starting appropriately at the level of collection.

Health Area (HA, NGO), Union, Ward

- The monitoring of coverage, identification and vaccination of low coverage areas.
- The identification of a case for investigation, reporting and control
- The use of information for advocacy and feedback in the community

Thana/Municipality Levels

- Identification of outbreaks of communicable disease for investigation and control (measles, diphtheria)
- The identification and investigation of cases (AFP) for the purposes of identifying improved methods of prevention and control
- Monitoring progress of implementation toward achievement of coverage targets
- Identification of low coverage and high risk areas for special vaccination

District Level

- Reading of monthly reports with written feedback
- Monitoring the validity, completeness of disease surveillance at subunit level
- Identification of disease control problems that need district level assistance
- Assessing effectiveness of planning, implementing, and monitoring of disease prevention/control strategies
- Identifying the need for district level support or training

National Level

Planning :

- for describing the magnitude of a health problem
- for allocating priority to a health problem for utilization of limited health resources
- for developing disease control targets
- for developing, reviewing, and revising national strategies and guidelines

Monitoring

- Measuring progress toward targets
- Identifying areas of good work for commendation
- Identifying areas needing support (support-a-vision)
- Monitoring program impact
- Using data to assess cost effectiveness of alternative policies and strategies
- Identifying and solving unexpected problems of strategy or implementation

Advocacy

- To provide decision makers data on program progress and challenges
- To provide feedback and continuing education to those involved in implementation
- To provide affirmation and recognition of partner inputs

In reviewing and upgrading surveillance systems, several attributes of effective surveillance systems, described by Vernon, should be considered, Table 9.

Attributes of Effective Surveillance Systems[4]	
Usefulness	Capacity to contribute to the prevention and control of adverse health events, including an improved understanding of the public health implications
Simplicity	Refers to structure and ease of operations: considers flow of information and lines of response
Flexibility	Ability to adapt changing information needs or operating conditions with little additional time, cost, staff
Acceptability	Reflects willingness of individuals and institutions to participate.
Sensitivity	Proportion of cases detected, and ability to detect epidemics
Pred. Value Pos	Proportion of persons identified as cases who actually do have the condition under surveillance
Representa-tiveness	Ability to accurately describe the occurrence of a health event over time and its distribution in the population, and thus the ability to generalize findings from surveillance data
Timeliness	Reflects the speed or delay between steps in the surveillance system

EPI INFORMATION FOR ACTION

Most EPI information systems start out as traditional reporting systems in which data collected in the field are forwarded from the field to the central ministry. As programs mature, there is a need to identify the needs for data at each level and to customize the system so as to provide the information needed for action. This will involve a paradigm shift in which the strategy for collection of information shifts from reporting systems to identification of mechanisms to meet specific needs for data, i.e., that is what information is **essential for action at the local level, monitoring and "support-a-vision" at intermediate levels, and policy, planning, and evaluation at program levels.** A framework outlining this information for action approach is provided in Appendix 4.

Such a reorientation of EPI surveillance requires four steps:

1. a disease specific approach to what is the minimum amount of data needed for effective implementation of coverage and disease reduction strategies,
2. a careful assessment of what is already known about the disease
3. the identification of "sonar koni" (gold mines) of information that exist within the current information systems
4. The identification of feasible affordable strategies to obtain information essential to program planning, implementation, problem identification and resolution, monitoring, and evaluation.

Note: The section below on the 3 EPI diseases with disease reduction targets summarize answers to the above questions resulting from discussions with EPI HQ staff, visits for four municipalities, and the Surveillance Workshop. The findings are not meant to be definitive but to provide options for consideration by program staff responsible for EPI in Bangladesh.

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4 Vernon A. The ACSI-CCCD Experience with Routine Epidemiologic Surveillance. USAID and CDC, PHS, DHHS. Atlanta GA CDC Publication 099-4039.

Neonatal Tetanus

What is the cost in morbidity, disability mortality?

The magnitude of the neonatal tetanus problem has been documented through use of three methods: 1) sample surveys, 2) cohort studies, and 3) intervention studies, Table. 10.

Neonatal Tetanus Incidence in Bangladesh				
Year	Location	Method	Sample	Result
1974[5]	Matlab	DT as Placebo in Cholera Vaccine Trial	1,652	23.8 / 1000 less 4-14 Day Deaths
1977[6]	Matlab	Cohort Study		1174 (37.4 NNT/1000)
1978	National Survey (EPI)	Survey for NND &NNT	2,432	27 (11.1 NNT /1000)
1979[7]	Matlab	Phased Program Introduction		23.1-23.8/1000 less 4-14 Day Deaths
1986	Four Districts from Each Division (EPI)	Survey for NND and NNT	2,077	82 (41 NNT/1000)
1989	Four Thanas, one from Each Division (EPI)	Survey for NND and NNT	2,024	24 (12 NNT/1000)
1989	Four Thanas, One from Each District with TT Program	Survey for NND and NNT	1,017	(7 NNT Deaths/1000)
1990[8]	Rajshahi Division	Survey for NND and NNT	6,148	112 (18.2 NNT /1000)
1990	Chittagong Division	Survey for NND and NNT		(13 NNT Deaths/1000)
1991	Khulna Division	Survey for NND and NNT		(10 NNT /1000)
1992[9]	Dhaka Wards 12, 13, 14, 51	Survey for NND & NNT	1,693	3 (1.8 NNT/1000)
1993	4 Thanas	Survey for NND and NNT	6,356	18 (2.8 NNT /1000)
1994	5 Divisional Surveys	Survey for NND and NNT	30,039	5.7 NNT /1000

5 Black RE et al. Reduction of neonatal tetanus by mass immunization of non-pregnant women: duration of protection provided by one or two doses of aluminum absorbed tetanus toxoid. Bull WHO 1980, 58:927-930

6 Chen LC et al. Epidemiology and Causes of Death among Children in a Rural Area of Bangladesh. IJE 1990, 9:25-33.

7 Rahman M. Use of Tetanus Toxoid for prevention of neonatal tetanus. 1. Reduction of neonatal mortality by immunization of pregnant and non-pregnant women. Bull WHO 1982, 60:261-267.

8 Hlady WG et al. Neonatal Tetanus in Rural Bangladesh: Risk Factors and Toxoid Efficacy. AJPH 1992, 82:1365-1369.

9 Neonatal Death Survey Report in Ward Nos 12, 13,14, &51 of Dhaka City Corporation. DUICSP, World Vision Dhaka

Less well known is the cost of tetanus to maternal health. Data from Matlab attributed 3 (7.3%) of 41 maternal deaths to tetanus. Including tetanus related abortion deaths, the tetanus attributable maternal mortality rate is 56 per 100,000 births.[10] The report from the Dhaka IDH that 80% of adult tetanus admissions are post abortion (personal communication) merits documentation and investigation. If correct, such a finding has major policy implications regarding the target for TT, pregnant versus fertile aged women.

What factors contribute to risk?

The risk factors for maternal and neonatal tetanus are well known:

- poor women
- un-immunized or inadequately immunized with TT
- abortion (self induced)
- baby delivered with unwashed hands
- cutting of the cord with an unsterile instrument

Specific risk factors are best determined through case-control studies of cases identified through sentinel surveillance or surveys. Such data are available from the 1990 study in Rajshahi Division, Table 11.

Factors Increasing or Decreasing Neonatal Tetanus Risk in Rajshahi Survey 1990[11]				
Factor	Cases	Control	Odds Ratio Logistic Regression	CI and Significance
Previous NNT Case	14.3	4.3	3.63 (not included in final model - see ref)	1.30-10.14 P=0.01
Person Delivering child Washed Hands	40.2	54.2	0.76	0.30-0.81 P=.005
Cutting Tool cleaned	49.1	68.8	0.40	0.24-0.66 p<0.001
Coconut oil applied to vagina	8.0	3.6	3.16	1.13-8.86 P=0.03
Multiple Ties Used	36.6	26.5	2.00	1.16-3.43 P=0.01
History of TT2	29.5	36.3	0.76	0.45-1.29 NS

This study identified three factors increasing neonatal tetanus risk: 1) previous death from neonatal tetanus, 2) application of coconut oil to the vagina, and 3) multiple ties to the umbilical cord. Two factors were identified as protective: 1) hand washing by the person delivering the baby, and 2) cleaning of the cutting tool. The unexpected lack of protection by TT identified a problem in TT production which has since been corrected. Less clear is the epidemiology of non-vaccination in current NNT case mothers. Is this a problem of lack of access to prenatal care? prenatal care without TT, or other missed opportunities. Sufficient cases of neonatal, child, and maternal tetanus are available at 5 sentinel sites to answer these question through detailed case investigation and a case control study using community controls. A protocol including serologic testing is being developed.[12]

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10 Chen LC et Maternal Mortality in Rural Bangladesh. Studies in Family Planning. 1974, 5:534-541.

11 Hlady WG et al. Neonatal Tetanus in Rural Bangladesh: Risk Factors and Toxoid Efficacy. AJPH 1992, 82:1365-1369.

12 Deming MS. Determining the Threshold Tetanus Antibody Level Among Mothers in Developing countries that Reliably Prevents Neonatal Tetanus and Using Hospitalized Neonatal Tetanus Cases as Sentinel Events for Public Health Action. IHPO, CDC. Atlanta GA USA.

Who are the appropriate targets for immunization?

The current EPI target for immunization is pregnant women. If the desired 80% coverage is, however, achieved through 100% vaccination of 80% low risk women and 0% in the 20% high risk women, the disease impact will be minimal. **The priority for prevention of NNT is the achievement of high coverage in the high risk population.** From the field visits, it is not clear that there is a clear understanding of high risk populations. For example, the groups at highest risk, mothers of neonatal tetanus cases, are not receiving immunization while attending their children in the hospital. The key challenge is to operationalize the high risk approach. Three, not mutually exclusive, approaches need to be explored:

Epidemiologic

In the spirit of Willie Sutton, the famous American bank robber, whose reply to a question as to why he robbed banks? "That is where the money is", first priority needs to be given to areas where neonatal tetanus is occurring. In urban areas, available IDH data need to be used to identify at risk areas. Mapping of NNT and maternal tetanus admissions will help identify probable high risk areas. Mothers of neonatal tetanus cases need to be immunized and their communities checked for TT coverage through convenience or LQAS. Areas identified as having coverage less than 80% coverage should receive catch-up immunization.

In rural areas, the best potential source for information is the identification of neonatal deaths by family planning workers. All deaths occurring at 5-14 days should be considered NNT till proved otherwise. Channels need to be established at the union level, where identified 5-14 day NND are made known to health staff, investigated for both cause (NNT compatible) and coverage. If coverage in the mauza is <80%, catch up-vaccinations should be carried out.

Programmatic

High risk populations are identifiable: poor, low TT coverage, and high percentage of deliveries by untrained attendants. The 1995 Progotir Pathey data clearly show that most Bangladesh women are at high risk for NNT, Table 12.[14]

TT2 and Attended Delivery by Geographic Area			
Area	% TT2 Coverage	% Antenatal Care	% Delivery by Trained Person
All Bangladesh	59.4	22.7	13.7
Rural	58.4	20.5	10.4
All Urban	68.5	42.9	43.8
Other Municipality	80.0	43.9	41.0
Metro Non-Slum	50.4-71.8	49.4-74.8	45.0-79.6
Metro Slum	53.2-54.0	17.7-18.3	13.7-29.6

[14] BBS & UNICEF. Progotir Pathey. 1995

Strategic

Current policy prioritizes immunization of pregnant women. Cost effective options of alternative strategies for ensuring TT documentation (permanent TT card or necklace) need to be explored. The lack of cards limits the ability to estimate actual protection by survey. Micro-serologic methods are available to assess seroprotection.[14] A protocol has been developed for including serology in Multiple-Indicator Survey.[15]

What % of the at-risk population has received vaccination?

The TT2 data cited above show that less than 60% of pregnant women received 2 doses of TT during the last pregnancy. Even this figure may not be representative of the women at highest risk for a NNT birth. Aggregation of low risk and high risk coverage at thana, district, and national levels masks the key coverage figure, coverage of high risk women. This emphasizes the importance of analysis and use of data at the level of collection. From an operational perspective, the union and ward levels are the most appropriate to assess coverage for high risk populations. The Thana monthly meeting provides a superb opportunity to share the concept of risk area with health staff, asking them to identify one risk area in their catchment areas, to investigate and take appropriate action, and report back at the next monthly meeting. Once successful in one small area, additional areas can be addressed

In urban areas, the data are equally clear. The Progotir Pathey data clearly document urban slums as NNT prone: low TT coverage, low prenatal care, and high rates of delivery by untrained personnel. Strategies such as that used by BASICS to assess coverage by ward or bastee area are useful to identify areas of low coverage. However, one must always balance the cost benefit of assessment versus campaign vaccination.

How Effective is the Vaccine?

As demonstrated by the Hlady study, TT vaccine efficacy cannot be assumed. New laboratory quality assurance procedures assure potency at source. While TT is the most stable of the EPI vaccines, mishandling through freezing is always a matter of concern. Identification of NNT cases in children of adequately vaccinated mothers, if and when identified, need to be investigated. The priority at all levels needs to be high coverage of high risk populations.

Are the disease reduction targets being achieved?

Six different types of information are available on NNT: 1) the routine EPI system, 2) the IEDCR system, 3) the cumulative total of all NNT cases reported from 24 sentinel sites, 4) the cumulative data from the five sentinel sites reporting regularly for the years 1990-1995, and 5) the incidence rate estimated by NNT lameness survey, Table 13.

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14 Deming MS et al. Tetanus Toxin seroprevalence and Measures of Tetanus Toxoid Coverage in Women at Term in Burundi (in press).(Available with Sniadack & BASICS)

15 Deming MS. Protocol for including Tetanus Serologic Testing in the Multiple-Indicator Survey. Draft January 2, 1996. (Available with Sniadack & BASICS)

Estimating Neonatal Tetanus Incidence in Bangladesh						
Year	EPI	IEDCR	Sentinel		Survey	
			All Sites	5 Sites	Rate/1000 Pop Million	NNT Deaths
1979					23x1.7	39,000
1988	1029					
1989	1105					
1990	740			388	15x2.7	40,500
1991	602			372	10x2.8	28,000
1992	534			258		
1993	720		368	234		
1994	834	252	358	277	5.7x3.1	18,000
1995	685		268	200		

The EPI numbers which includes HA reports, monthly disease profile, and sentinel data shows no clear cut trend. If these data were the only source of information on NNT, they would raise questions of program effectiveness. IEDCR is clearly less sensitive identifying NNT than EPI, possibly because of the contributions of the monthly disease profiles. As data are only available since 1994, it is not possible to carry out trend analysis. The aggregate 24 site sentinel data is complicated by the addition of sentinel sites over the last 5 years and the irregularity of reporting from certain sites. Analysis of data from the sites for which 5 years of complete data are available shows a clear decrease in reported cases by 37%, from an average of 380 cases in 1990-1991 to and average of 238 cases in 1994-1995. During this same period the incidence of neonatal tetanus as estimated by NND surveys, has decreased from 13.7 in 1990-1991 to 5.7 in 1994, a decrease of 48%. The above data emphasize the superior value of valid data collection methods, the 5 sentinel sites and the NND surveys. They both clearly document program effectiveness.

Tetanus Recommendations

- Recognize and affirm the progress being made in the battle to control NNT.
- Through advocacy and training, focus efforts on the identification of and achievement of high TT coverage among high risk individuals and populations.
- Place priority on monitoring coverage at the HA/Union/Ward levels
- Assess the feasibility of using neonatal deaths identified and recorded by FWAs as a mechanism of identifying areas at high risk of NNT for vaccination
- Utilize tetanus admissions (neonatal, child and women) to the largest sentinel sites as cases to further define current tetanus epidemiology and vaccine efficacy
- Consider including Tetanus Serology in the Multiple-Indicator Survey.
- Assess adequacy of current policies and strategies (target population and methods of assessment) to meet disease reduction goals.

ACUTE FLACCID PARALYSIS

What is the cost in morbidity, disability, and mortality?

For many decades, poliomyelitis was not considered a major problem in developing countries. The development of lameness surveys by WHO has provided a methodology for countries to assess the magnitude of disability due to poliomyelitis.[16] Less well documented is the human and economic costs of desperate parental attempts to address the acute onset of paralysis, the long term cost of disability and dependency, and the increased mortality among disabled children. The problem of poliomyelitis in Bangladesh has been well documented through a series of lameness surveys for acute flaccid paralysis, three of which are detailed below, Table 14.

Estimates of Poliomyelitis in Bangladesh by Lameness Surveys			
	1983	1993	1994
Age Group Surveyed	5-9 Years	0-4 years	0-4 years
Number Children Examined	34,980	138,620	134,810
Children with Leg Lameness	227	194	168
Children with Polio Lameness	80	64	58
Annual incidence/1000 children	0.76	.15	.14
Population of Bangladesh	81 million	108 million	112 million
% Population <5	18%	16.5%	16.5%
Estimated Polio Cases/year	11,080 (79-83)	2,744 (88-92)	2,550 (90-94)
Polio 3 Coverage	<1%	56%(88)-76%(92)	65%(90)-93%(94)
Incidence Reduction from 1984		80%	81%
Reduction in Cases from 1984		75%	77%
Mean Reported Cases	124 (79-83)	379 (88-92)	285 (90-94)
Percent Cases Reported	1.1%	13.8%	11.2%

What factors contribute to risk?

The three polio viruses (Types I, II, III) are enteric viruses that are transmitted predominantly through the fecal-oral route. In the developing world, almost all children, unprotected by immunization, are infected with all 3 types of poliovirus by age 5. Approximately 1 in 200 will develop acute flaccid paralysis. The single risk factor of importance regarding risk of infection and disease is the lack of immunity from immunization. Immunization with 3 doses of OPV is on average is 80% protective.

16 LaForce FM et al. Clinical survey techniques to measure prevalence and annual incidence of poliomyelitis in developing countries. Bull WHO 1980,58:609-620.

Who are the appropriate targets for immunization?

Prior to 1994, the target for immunization was the provision of 3 or 4 doses of OPV (if OPV given at birth) to all children in the first year of life. With Bangladesh's commitment to the global program to eliminate poliomyelitis by the year 2000, the target for immunization has been expanded to include National Immunization Days for the years 1995, 1996, and 1997. In these NIDs, all children under 5 are provided two doses of OPV one month apart regardless of previous vaccine status. This strategy is based on the successful elimination of poliomyelitis from the western hemisphere, and the global decision to achieve eradication through progressive regional expansions of polio free zones. Thus the targets for OPV in Bangladesh are two: 3-4 doses of OPV in the first year of life and 2 doses of OPV to all children under 5 in 1995, 1996, and 1997.

What percentage of the at risk population has received vaccination?

As well shown in the figures of administrative and survey estimates of coverage (Figures 1 and 2), Bangladesh has achieved moderate levels of coverage. There are significant differences among regions for coverage for routine OPV coverage as measured by the Progotir Pathey Surveys, Table 15.

OPV3 Coverage by Division; Urban and Rural - March 1995; Rates Below 70 are in Bold

Division	Metro Slum*	Metro Non-Slum*	Metro City*	Other Municipal*	Rural*	NID1 95 **	NID2 95 **
Chittagong	**46.7**	81.8		**54.8**	**53.3**	88.1	99.9
Dhaka	**58.8**	**63.6**		82.4	**59.4**	78.9	89.5
Khulna			82.1	**68.2**	85.7	75.5	78.8
Barisal				97.4	73.1	84.9	87.6
Rajshahi			82.9	76.4	84.6	89.5	95.8
Total			**69.1**	75.0	**68.1**	83.9	92.3

* Progotir Pathey Survey March 1993; ** Administrative Coverage March April 1995

The heterogeneity of the above figures illustrate the importance of looking at coverage by geographic and demographic subunits. This low coverage in urban slums, a potential reservoir of wild polio virus, is also illustrated by the following data from Dhaka, Table 16.

OPV3 Coverage in Dhaka City by Survey; Bastees versus Total City, 1993

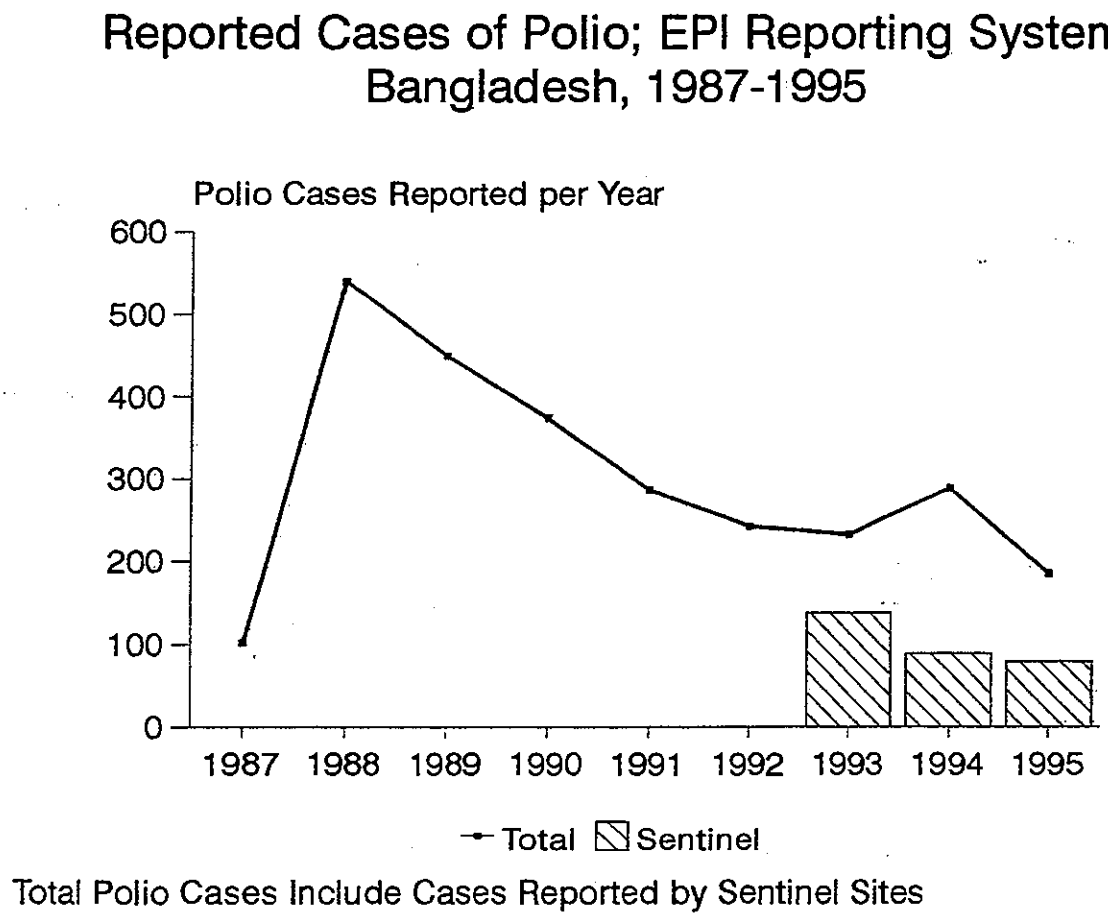
Area	Age at 12 months	Age 12-23 Months
Dhaka City	75	81
Dhaka Bastees	52	63
% Difference	23	18

How Effective is the Vaccine?

Due to the high percentage of asymptomatic infections, estimation of vaccine efficacy for OPV is extremely difficult. Serologic studies and outbreak investigations show that routine immunization is usually 70-85% effective in tropical areas. This relates in part to interference from other enteroviruses. In the absence of an epidemic among vaccinees, allocation or resources to assess vaccine efficacy is not warranted.

Are the disease reduction targets being achieved?

Reports of polio reported through the EPI reporting systems are shown in the following graph, Figure 4.



Although the downward trend in polio incidence is in the expected direction, analysis of the data shows that the reported cases represent a mixture of old cases and AFP. 225 (32%) of the 707 EPI polio cases reported over the last 3 years (1993-1995) come from a sentinel site, RIHD (a rehabilitation unit in Dhaka), and are predominantly old polio. There are no data to assess the predictive value positive of cases reported through the routine system. Of equal concern were the field findings of non-inclusion in the reporting system of 3 cases of investigated AFP from Shishu Hospital, Dhaka, and 5 cases of Guillan Barre from the 250 bed hospital in Comilla. The 207 cases reported in 1995 need follow-up to assess predictive value positive levels of current reporting.

None of the 3 routine systems (EPI, IEDCR, or Sentinel) will meet the needs for the immediate reporting of AFP. Active surveillance involving health providers (private and public) and the community will be required. Prior to the initiation of the NIDs, the lameness surveys listed above estimated a decrease in the incidence of residual paralysis from 0.76/1000 per year (1979-1983) to 0.14 (1990-1994). This estimates a decrease from 11,080 cases (1979-1983 average) to 2550 cases (1990-1994 average), a decrease of 81%. The supplementation with NIDs has, in all probability, reduced the incidence to very low levels. With Bangladesh a key partner in the global program to eradicate poliomyelitis, the targets have changed from coverage and disease control to that of polio eradication. As well outlined in the *Field Guide for Supplementary Activities Aimed at Achieving Polio Eradication*,[17] success requires high vaccine coverage (discussed above), NIDS (see evaluation of 1995 NIDs)[18], and effective surveillance for Acute Flaccid Paralysis (AFP). This surveillance component involving the detection and investigation of all cases of AFP is essential for eradication. As illustrated in the table below, the level of AFP surveillance is far below that required to achieve eradication, Table 17.

Progress in AFP Surveillance - Bangladesh 1994-1995				
Performance Indicator	WHO Standard	1994	1995	%
#1 AFP Reported	=>1/100,000 <5	289	207	
#2 Completeness of Monthly Reporting in %	=>90%		30-60	
#3 Timeliness of Monthly Reporting	=>80%		30-60	
AFP Investigated		154	71 (57 with stools)	
#4 AFP Cases Investigated within 48 Hours of Report	80%	38	45	63
Number of Stools Collected		122	81	
#5 % AFP Cases with 2 stools per case within 14 days	=>80%	36	19 of 38, others NA	
#6 & Living AFP cases followed-up at 60 days	=>80%		18*	25
#7 % stools arriving at lab within 3 days	0.8	65	37 of 52	71
#8 % stools arriving in good condition	=>80%		NA	
#9 % lab report dispatched within 28 days	=>80%		40/73	55
#10% specimen isolating non- polio enterovirus	=>10%		0	
Stools Positive for Polio		13	4 (all Type 1)	

17 *Field Guide for Supplementary Activities Aimed at Achieving Polio Eradication.* WHO Geneva 1995.
18 Evaluation of Bangladesh National Immunization Days, GOB/USAID/BASICS June 1995

AFP/Polio Recommendations

- Recovery of the investment in routine and NID polio immunization requires an effective reporting system for AFP meeting WHO standards.
- Reexamine 207 polio cases reported in 1995 to assess predictive value positive (% of cases that are polio) of current reporting
- Immediate reporting of AFP cases cannot be achieved by health system passive surveillance. Active partnership of the public in the immediate reporting of AFP will be required. Consideration should be given to the early institution of a reward for reporting and full investigation. Rotarians should be asked to consider establishing by the end of 1996 NID2 an incentive for families reporting cases of confirmed polio such as 1) providing a job to a family member, and/or 2) assistance in rehabilitation. Such a commitment would be a major contribution to ensuring the effective surveillance needed for a Bangladesh free of polio.
- As the areas most likely to main wild poliovirus foci, the municipalities, are those with the poorest surveillance, municipal recommendations need to be instituted immediately.
- Effective AFP surveillance requires timely analysis and feedback of stool data. Identified obstacles to ensure rapid laboratory examination and feedback of results need to be addressed immediately.

MEASLES

What is the cost in morbidity, disability, and mortality?

All children surviving to the point of exposure to measles and unprotected by immunization will develop clinical measles. A significant proportion will develop acute complications of pneumonia and diarrhea. Long term complications include blindness, deafness, and malnutrition. Approximately 2% will die. In the absence of immunization, 3 million cases and 60,000 deaths would occur annually. Five ICDDRB studies are important to the full understanding of the disease burden of measles and the effectiveness of measles vaccine on disease prevention and child survival, Table 18.

Five Key ICDDRB Measles Studies						
Year	Population	Method	Measles Cases	Measles Deaths	CFR	Survival Impact of
1975-6 [19]	5775 1mo-10yr	Prospective	896	33	3.68	NA
1975-7 [20]	42,000 <5	Prospective		21.1/1000		
1980 [21]	28,660<5	Prospective	3458	61	1.76	NA
1984 [22]	9-60 months	536 Deaths 1072 Controls	NA	NA	NA	36% dec mortality in vac CI (21%-48%)
1985 [23]	8135 Matched Pairs	Life Table Analysis	NA	NA	NA	RR death vac child 0.54 CI(0.45-0.65)

19 Koster FT et al. Synergistic impact of measles and diarrhoea on nutrition and mortality in Bangladesh. Bull WHO 1981, 59,901-908.

20 Chen LC et al. Epidemiology and Causes of Death among Children in a Rural Area of Bangladesh. IJE 1980, 9:25-33.

21 Bhuiya A et al. Measle Case Fatality among Under-Fives: A Multi variate Analysis of Risk Factors in a Rural Area of Bangladesh. Soc. Sci Med 1987, 24, 439-443.

22 Clemens JD et al. Measles vaccination and childhood mortality in Bangladesh. A J Epid 1988, 128:1330-1339.

23 Koenig MA et al. Impact of measles vaccination on childhood mortality in rural Bangladesh. Bull WHO 1990,68:441-447.

The above studies illustrate the significant mortality cost of measles in Bangladesh (Case Fatality 1.78-3.68%) and the equally important point that measles vaccine not only prevents mortality but increases child survival. The last two studies were critical in refuting the argument - if children were saved by vaccine, they will die of other causes. With the possible exception of birth spacing, prevention of measles is the single most important intervention to ensure child health and survival.

What factors contribute to risk?

All children surviving to age of exposure to measles virus and unprotected by antibody (passive transfer of maternal antibody or acquisition of immunity from measles vaccination) will be infected with measles. Thus key issues relating to measles risk relate to risk of severe morbidity, disability, and death (acute (within 30 days) and delayed (after 30 days)) Understanding of risk factors for measles mortality is essential to ensuring high coverage in groups at greatest risk of disability and death. This question has been expertly addressed by Bhuiya, Table 19.

Risk Factors for Measles Mortality - Matlab Bangladesh [24]						
Factor	Measles Case Fatality Rates				Logistic Regression	
	Cases	CFR	Odds Ratio	95% CI	Odds Ratio	95%CI
<12 months	956	1.26	0.76	0.34-1.64	.80	0.39-1.66
12-35 months	1354	2.22	1.35	0.73-2.50	1.28	0.71-2.31
36-59	1148	1.66	RC			
Acquired in Home	630	2.70	1.83	0.99-3.38	1.87	1.04-3.37*
Primary in Home	2551	1.49	RC			
No Diarrhea	491	1.83	RC			
Diarrhoea	2336	1.50	0.81	0.37-1.83		
Dysentery	631	2.69	1.48	0.62-4.14		
Male	1830	0.98	RC			
Female	1628	2.64	2.73	1.52-4.94	2.73	1.54-4.76*
Mothers No Ed	2250	2.18	2.11	1.06-4.19	1.83	0.94-3.60
Mothers Some Ed	1053	1.04	RC			
Articles None	801	3.12	2.25	1.15-4.45	2.18	1.27-3.77*
Articles 1-3	1523	1.31	0.96	0.46-1.89		
Articles =>4	1134	1.41	RC			

RC = Reference Category; Articles Owned: quilt, hurricane lamp, push bike, watch, radio
* Significant (95% CI not overlapping 1)

The significant factors increasing risk (CI >1) were female sex, poverty, and acquisition of the disease in the home. Girls infected with measles were 2.73 times more likely to die than males infected with measles. While not significant in this study, the high mortality in 12-35 month children

[24] Bhuiya A et al. Measles case fatality among under-fives: a Multi variate analysis of risk factors in a rural area of Bangladesh. Soc Sci Med 1987, 24:439-443.

and the increased risk of diarrhea and dysentery deserve mention. Post-measles immuno-suppression, prolonged diarrhea, weight loss, and malnutrition are common sequelae of severe measles; such conditions are associated with increased mortality risk after the 45 days utilized in this study.

Who are the appropriate targets for immunization?

On the recommendation of the WHO EPI program, the target age for measles vaccine in Bangladesh was established at 9-12 months. This age is a trade off between declining maternal antibody, which may prevent effective immunization, and the risk of infection. As coverage has increased, the median age of infection is rising providing a larger window of opportunity for measles vaccination. In Bangladesh where Case Fatality rates for children 12-35 months are high (=>2%), widening the target age for immunization in the pre-epidemic season (September-November) to 9-36 months merits consideration. While it is not politically feasible to give preference to the highest risk populations, e.g., poor girls, the above data underline the importance of achieving high coverage in all populations especially those a highest risk for severe morbidity, disability, and death.

What percent of the at-risk populations have received vaccination?

As discussed and illustrated in the section on coverage, national levels of coverage by both the administrative and survey methods have increased, and with the possible exception of 1995, were sustained. However, as discussed above, key issues of coverage relate to those populations at highest risk of severe morbidity, disability, and mortality. While national coverage is at the targeted 80% level (79.4%), coverage in certain high risk areas is significantly lower as shown in the following table, Table 20.

Measles Coverage in 12-23 Month Children by Division and Area Type
1995 Progotir Pathey Survey

Division	Metro Slum	Metro Non Slum	Metro Cities	Other Municipalities	All Urban	Rural	All
Chittagong	**61.0**	93.2		83.9		**69.7**	
Dhaka	**62.0**	90.9		97.1		75.6	
Khulna			84.2	86.0		88.7	
Barisal				**34.9**		79.6	
Rajshahi			91.4	85.5		85.4	
National			86.1	85.6	87.9	78.4	79.4

Again we note areas with reported coverage levels below 70%, slums of Dhaka and Chittagong, rural Chittagong, and urban Barisal.

Because of problems of sample size and cost, it is not possible to efficiently identify and target high risk areas by surveys. Monitoring of measles coverage by HA areas and union provides a cost effective approach to identifying low coverage areas for catch-up vaccination. This will, however, require a shift in priority from district and thana coverage to monitoring of coverage at the level of data collection, the HA catchment area. AHIs will need training to facilitate their identification of high risk areas, the management of resources, "support-a-vision", and monitoring. In the city corporations, intensive vaccination of high risk slum areas will be required annually during the pre-epidemic September-November period.

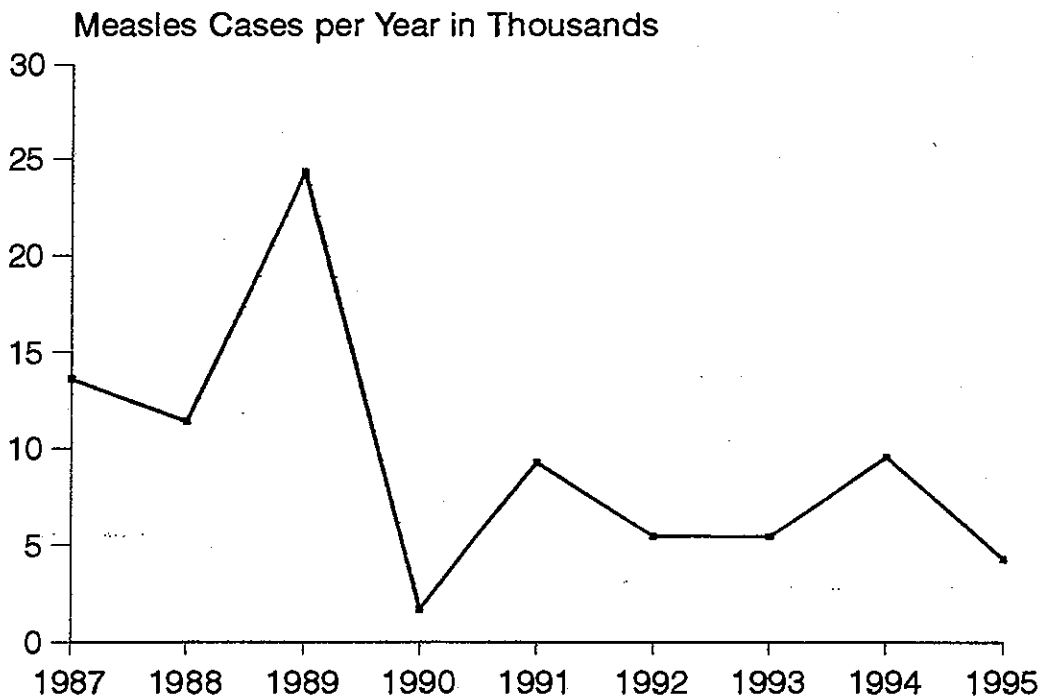
How effective is the vaccine?

No recent studies of vaccine efficacy have been carried out in Bangladesh. Considerable anecdotal data support the hypothesis of effective vaccination, significant decreases in the number of cases seen. There have not been major reports of outbreaks among vaccinees. However, as the program matures and the pool of susceptibles includes greater proportions of vaccinated children, outbreaks with a large proportion of cases among vaccinees can be expected. This does not mean the vaccine is not good. Well performed outbreak investigation will be required to be sure that the vaccine is, in fact, achieving the expected 80% level of efficacy. Answering the complaints of the press and politicians will require skill and diplomacy.

Are the disease reduction objectives being achieved?

The reported cases of measles are showing the expected change in epidemiology, a decrease in the annual peaks and a shift in the inter-epidemic period from 2-3 years, Figure 5.

Measles Cases Reported through EPI Information System Bangladesh, 1987-1995



Based on available trend data, the number of measles cases in 1996 will, in all probability, mirror the number of measles cases reported in 1995. If this is so, a significant increase in cases can be expected on the first 4 months of 1997. The magnitude of this outbreak can be decreased by intensive vaccination of high risk and low coverage 9-35 month children during the pre-epidemic September-November 1996. As indicated above, the routine system is reporting an estimated 7% of cases. While this is adequate to show trends, it is not sensitive enough to accurately assess impact. The hospital based sentinel system, where admissions are primarily for complications, is inadequate for this purpose.

Based on the survey determined 79.4% coverage and an estimated vaccine efficacy of 80%, it is estimated that the EPI program is currently preventing 1.88 million cases of measles. Using a CFR of 2%, an estimated 36,600 measles death are estimated to be prevented. The actual reduction in mortality may be greater due to herd immunity and a resultant shift in the age distribution of cases to older age groups where case fatality rates are expected to be lower. This suggests that 1.05 million cases and 21,000 measles associated deaths are still occurring.

Measles Recommendations

- The cost of measles in terms morbidity, disability, mortality, human, and economic cost, and its importance to child health and child survival must be publicized.
- In rural areas, there needs to be a shift in monitoring priority from HA vaccinations performed and Thana coverage, to monitoring of coverage at the union level, and identification and vaccination of low coverage areas.
- Coverage is lowest in the groups at the highest risk for mortality. Annual pre-epidemic season (September to November) assessment of coverage and catch-up measles vaccination for 9-23 or 9-35 month children should be institutionalized at the bastee, ward, and union levels.
- Although overall measles incidence will remain low, EPI needs to be prepared for outbreaks with increasing proportions of cases among vaccinees. Prompt investigation of these outbreaks to assess their epidemiology and vaccine efficacy will be required to maintain public trust and confidence.
- The routine reporting systems are providing useable data on measles trends: one but not two systems merit continuation.

STRENGTHENING EPI SURVEILLANCE TO FACILITATE THE ACHIEVEMENT OF THE YEAR 2000 TARGETS

As among the most cost-effective of disease prevention and control strategies, effective immunization is essential to the achievement of many of the Year 2000 Targets, Table 21.

EPI Contributions to Bangladesh 2000 Targets, Goal and Current Status[25]				
Goal Indicator	2000 Target	1994	1995	Gap
Under-Five Mortality	70	134		64
Maternal Mortality	300/100,000	459		159
% <5 below - 3SD (NCHS-WHO Ref)	13	25 (1992)		12
% 12-23 Month Children with DPT3/OPV3	90		69	21
% 12-23 month children with measles	90		79	11
% pregnant women immunized with TT2	90		59	31
% newborns protected by maternal TT	90		78*	90
NNT /1000 births **	=<1/1000	6/1000		5/1000
Polio Incidence**	0	3000	?	
Measles Morbidity**	-90%		-64%	26%
Measles Mortality**	-95%		-74%	21%

* This figure may be high, serologic confirmation required; **National goals added by author

25 *Progotir Pathey*. Bangladesh Bureau of Statistics and UNICEF, Dhaka. January 1996

Assumptions

While from an academic perspective surveillance refers to data on disease and heath status, this paper utilizes the term to reflect **"Data for Action"** which includes coverage.

- Achievement of Year 2000 targets is technically feasible
- Political will, commitment, and financial resources will be forthcoming from GOB and its national and international partners
- Health and family planning workers will catch the vision of their importance to the achievement of targets
- Community members and leaders will become partners rather than participants in the war to achieve the targets.
- Political stability will be achieved and maintained. Without it, many children will suffer, be disabled, and die.

This paper has shown that most current EPI information is collected at the periphery and forwarded through multiple channels for collation at national level. Data use is limited. This is not surveillance - Information for Action. It is unreasonable to expect implementation of new systems in time to be useful for achieving the Year 2000 targets. The challenge for Bangladesh is the better use of available data, i.e., selective use at various levels to meet level specific needs for information. The following table is not meant to be definitive, but to provide a "think piece" for those charged with the challenge, opportunity, and responsibility of improving the health of the Bangladeshi people. As the disease reduction strategies are different (eradication, elimination, and control), creativity is needed to identify the most appropraite way to monitor progress, Table 22.

Data Driven Strategies to Facilitate the Achievement of the Year 2000 Targets				
Level	Issue & Indicator	NNT	Polio	Measles
Community	EPI Access BCG Coverage	Hand-washing by person catching baby	Participation in NIDS	Home Gardens
		Use of clean/sterile cutting instrument	Aware of importance and route for reporting AFP	
HAs/NGO field workers	EPI Coverage Measles and TT2	Identification and Vaccination of all Pregnant/ Fertile Aged Women	Organization of NIDs	High coverage through routine measles vaccination
			Promotion of community reporting of AFP	During Sept. Nov. house to house survey to identify and refer for vaccination all 9-35 month left outs.
HIs at Union Level NGOs at Catchment Area level	Local area monitoring of coverage - administrative	Identification, assessment, and catchup vaccination of high risk areas	Weekly reporting positive/negative of AFP; immediate reporting of AFP	Identification, assessment, and catchup vaccination of high risk areas
		Identification of NNT compatible NND and action	Stool collection and 500 children vaccination under THFPO	
Thana/Ward	Monitoring of coverage by union ward- Measles TT	Prenatal Care and TT Coverage	AFP Surveillance	Measles Coverage by HA/Union

Municipality	Appoint Emergency Response Focus; Establish sentinel surveillance	Identification and catchup vaccination of high risk areas	Immediate reporting . og AFP Immediate Investigation of AFP Weekly +/- reporting	During Sept. Nov. Bastee surveys to identify and refer for vaccination all 9-35 month left outs
District	Monitoring of Thana Coverage and Surveillance for commendation, training, support	Support-a-vision for identification and vaccination of Hi-Risk Areas	Monitor timeliness, completeness, and effectiveness of AFP surveillance	Provide guidance for September-November catch-up vaccination
Division	Monitor and Follow-Up EPI Surveillance (WHO DSO)		Monitor and Follow-Up AFP Surveillance (WHO DSO)	Investigate notified outbreaks of measles (>100 cases in 1 ward or union in 1 m
National	Maintain one system not two for reporting NND, AFP, and measles	Epidemiologic Investigation of Tetanus using cases admitted to sentinel sites with >20 admissions per year	Active Surveillance for AFP as per WHO Performa	Assess feasibility of target achievement with current strategy
	Provide Monthly Feedback to Thana, District, Division, and National Authorities	Assess cost effectiveness of alternative strategies to NNT and maternal tetanus prevention	Maintain central database of all AFP cases	
	Continue Annual Progitir Pathey Monitoring adjusting indicators to measure impact rather than process, e.g., seroprevalence for TT, collection of household salt			

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Appendix 1A: Proceedings of Workshop on Data for Action
BARD, Comilla; January 27-31, 1996[1]

The workshop was organized by EPI and BASICS with participation by Health Officers from City Corporations and Municipalities, officers from EPI and IEDCR, representatives from NGOs, UNICEF, WHO Divisional Surveillance Officers and BASICS's Urban Operations Officers. The workshop was facilitated by Dr. Stanley O Foster, BASICS's Consultant and Dr. David Sniadack, WHO Epidemiologist for EPI.

The objectives of the workshop were
- Share current experience with EPI Surveillance in Bangladesh
- Identify important EPI indicators and use at each level
- Find methods to make better use of available data
- Develop surveillance strategic approach for urban areas

The followings summarizes workshop proceedings

1. A review of EPI Surveillance in Bangladesh

- Surveillance is ***Data for Action.*** Present systems are only disease reporting, not surveillance.
- Several disease reporting systems are already existing. The challenge is to make use of data for making decisions and taking actions.
- Each level has it's unique need of data. At present, data are mainly for central level use. Data transmission should be limited to that needed, used, responded to and feed back.
- There is also unique needs of data for surveillance for each of the three EPI diseases. It is important to know all the cases of AFP, and selective good quality data for Neonatal Tetanus and measles. Information on coverage by geographic subunits is also needed.
- Good quality data from one source is better that bad data from many sources. At present data generated from many sources is without proper quality control and local use.
- At present there is no feed back system from any level. Feed back from central level could be given in the form of monthly/bi-monthly Newsletter. At thana level, monthly meeting of the MCH committee should be held regularly to monitor and feed back on Neonatal tetanus control.

2. Strategic approach for surveillance in the Urban area

- To establish the surveillance system in urban area one needs to ask the following questions.
  Who collects data ?
  What type of data ?
  Who uses data ?
  How use data ?
- All sentinel sites are situated in urban area. There are ***gold mines (sonar koni) of data*** in some sentinel sites, particularly in Infectious Disease Hospitals (IDHs). At present, sentinel data are used centrally. Each City Corporation(CC)/municipality needs to have an integrated surveillance system (sentinel+community) for use of data locally. Sentinel dataare most useful at CC/municipal level.
- Each City Corporation needs to have a focal person (an interested young Medical Officer) designated for surveillance with a team of 2/3 paramedical personnel for making use of data locally (case investigation and initiating action). The designated disease control soldiers need an office, a telephone and an answering machine (particularly for CCs). In CC/municipality where there are Health Officers, he can take that responsibility. But, only 9 CC/mun (4 CC + 5 mun) have Health Officers. In the remaining municipalities, Medical Officer (Civil Surgeon Office) should be given the responsibility to carry out the task for the municipal area. A directive from Director General of Health Services (DGHS) to all Civil Surgeons needs to be issued in this connection.
- Urban surveillance system needs to be established in CCs and district level municipalities. Surveillance in thana level municipalities can be managed by Thana Health and Family Planning Officers (TH&FPOs) of the respective thana.
- NGOs are one of the major contributors of EPI, particularly in urban area. They have a lot of potential for surveillance NGO field staff can play an important role for inter-personal communication to the community for immediate reporting of AFP cases. NGO field staff (urban area) identify Neonatal Deaths (NND), it is important that they record date of death, no. of death 4-14 days and probable cause of death. NGO field staff can provide information on measles outbreaks.
- Private practitioners need to be involved in AFP surveillance and be provided with a card having a picture of a paralyzed child and contact phone number.
- Hospital (pediatric ward) should be asked to provide information of AFP cases (including G.B Syndrome). Provide card with contact phone number.
- To keep the momentum of surveillance in urban area, all partners involved (NGO, Private, Hospital etc) need to be given feed back. Feedback could be just a telephone call on cases reported ora one page write up from the designated focal person.

3. Methods to make better use of available data

3.1. Neonatal Tetanus (NT)

- Sentinel sites (specially IDHs) provide important data for NT control for CC/municipal areas. Focal person designated for surveillance needs to get data from IDH, map them to identify high risk areas ,and take control measures.
- Mothers of NT cases are a high risk group. So, they need to be identified and vaccinated (at least two doses of TT one month a part).
- As Govt. FP field staff (rural area) and NGO field staff (urban area) identify Neonatal Death (NND), it is important that they record date of death, numbers of deaths at 4-14 days and probable cause of death. If the death is due to NT (confirmed after investigation) the mother needs to be given TT (at least two dose).

3.2. Acute Flaccid Paralysis (AFP) surveillance

- There are various steps for AFP surveillance (with precise time limits). Timeliness of each step is important and stated as indicator of AFP surveillance.
- The present surveillance systems do not fully meet the requirements (indicators) of AFP surveillance. For AFP, an immediate reporting system needs to be established to identify and report all cases within the first week of onset of paralysis, investigation of all cases and stool sample collection.
- As it is important to know all the cases for AFP within a week of onset, community, local leaders, local healers, NID volunteers, private practitioners and NGOs need to be involved for AFP surveillance.
- In urban areas, NGO field staff can play an important role for inter-personal communication to the community for immediate reporting of AFP cases.
- The existing case definition needs to be reviewed. The present definition is for polio, not for AFP.
- Reward to be introduced for AFP case reporting (to the family and the reporter) to maximize reporting.
- The focal person designated for surveillance needs to equipped with an office, telephone and answering machine.
- Divisional Surveillance Officers (DSOs) and Urban Operations Officers (UOOs) need to work as safety net to make sure that all the AFP surveillance steps happen correctly for all reported cases.

3.2.1. Polio Laboratory AT IPH

- Lab needs to be properly equipped and provided with necessary logistics and fund to perform the job in time.
- At present, results of the tests are sent to the field through EPI HQ. The test results do not always reach the field, a common complaint from the field. Lab can send the result of the sample to the field with a copy to EPI HQ and another copy to respective DSO/UOO for reinforcement.
- Per Diem and actual Travel Allowance of the porter who carried the sample can be reimbursed from Lab.
- Lab needs to develop a mechanism to receive and preserve the sample after office hours (2:30 PM)

4. Measles

- Most important element of measles control is measles coverage.
- Outbreak investigation is an important part of measles surveillance. It provides information on a) Age group affected b) Risk factors c) Vaccine Efficacy
- In urban area, NGO field staff can provide information on measles outbreak.
- Data show that the high transmission season of measles in Bangladesh is between January and April. So, measles campaign should be carried out during the pre-epidemic low transmission season (September-November).
- Best criteria for identification of High Risk Area (HRA) is low measles coverage.
- If outbreak investigation shows low vaccine efficacy, possibility of cold chain failure must be considered.
- As program develops and higher coverage is achieved, a high proportion of measles cases among the vaccinated children is likely to be uncovered. This does not mean that there is a problem with the vaccine. These outbreaks need to be investigated; most show expected levels of vaccine efficacy.

5. Data as an important EPI indicators and use at each level.

What data

A. Coverage	-	Polio 3, Measles and TT2+
B. Surveillance	-	AFP case, NNDs and Measles outbreak

Who collects data?

Coverage	-	Field workers
Surveillance		
AFP	-	Field Worker, Community, Volunteer, Practitioners, Hospitals
NND	-	Field Worker (Govt. FP/NGO)
Measles outbreak	-	Field Worker, Community, Volunteers.

Who uses data?

Coverage	-	HO,CC/Mun,C.S,TH&FPO.
AFP	-	Surveillance focal person (HO/MO, CS/TH&FPO/MO(EPI) for case investigation and sample collection.
NND	-	HO,MO(MCH),NGO Supervisor, SI, FWV for death investigation.
Measles outbreak	-	Surveillance focal person, DSO, UOO.

How use data?

Coverage	-	Assess unit wise coverage by antigen and take action for improvement.
AFP	-	Investigation of cases, outbreak response immunization
NND	-	Investigation of deaths (4-14 days). If NNT, vaccinate mothers with at least 2 doses of TT, identify and vaccinate high risk areas
Measles outbreak	-	Outbreak investigations provide information on (a) age group affected (b) risk factors, and (c)vaccine efficacy.

6. Training

- Epidemiologic training of surveillance focal person (Municipal and thana level)
- Surveillance training for NGO field staff and supervisors
  - AFP case definition (card with picture of paralyzed child and contact phone number)
  - NND (case definition of NT)
  - Measles outbreak (100 cases per ward(urban)/union/year)
- On the job training (monthly meeting) of thana/municipal staff.

Appendix 1B: Surveillance Workshop Participant Chosen Task Targets

Municipal Health Officers

A01

- Have a training programme with City Corporation Health workers and WARD Secretary.
- Discuss having a Seminar with Honorable Mayor and WARD Commissioner.
- Establishing a network for disease surveillance in the city especially in the community.
- Will try to use mass media for disease surveillance.
- Investigate Measles, NND especially NNT cases, and also AFP cases.

A02

- Meeting with Health workers of the City Corporation, NGO and family planning workers and inform them about the importance and strategies for effective case reporting
- Physical verification by me to NND and AFP case reports, sentinel site in IDH and measles outbreak site
- Meeting with supervisor every Monday of the week discussing disease surveillance system for case reporting strategies.
- Monthly/fortnightly visit to high risk site with UOO.
- Opening a "disease surveillance cell" in the EPI unit center. The Medical Officer for monitoring & evaluation and specific action.

A03

- Motivation program
- Orientation programme among the EPI.
- Registration of the slum areas with mapping.
- Community involvement in surveillance(private practitioners, Angels, Mahila clubs, Manila Sanstha, rotary and lions clubs)
- Investigate reports from sadar Hospital outdoor, dispensary and others.

A04

- I shall arrange monthly meeting with NGOs, local famous and responsible persons, Ward Commissioners, etc. to give them some ideas about the importance of disease surveillance and system of data collection.
- I shall try to give ideas about signs and symptoms of the EPI diseases (NNT, Polio and AFP and Measles) to our municipal vaccinators and health assistants.
- Some times I shall go to the fields to check my worker's activities.
- If I get any report or information, I shall go myself to observe and investigate the cases.
- I will make a committee in each ward level for disease surveillance and data collection activities.

A05

- Firstly, I speak with my chairman, about the importance of disease surveillance (AFP, NNT & Measles).
- I will organize a workshop in our municipality among, NGOs, political leaders, voluntary social workers and ward commissioners.
- Then I select field workers who bring the information and I shall give them training about the surveillance of NND, AFP and Measles.
- I select minimum one disease warden in each ward.
- I try to send news and value of surveillance to my municipal people through communication, advertising, miking etc. media.
- Then I form a municipal surveillance committee and start to do the surveillance.

A06

- Motivate the field worker to collect information on outbreaks of NNT, AFP and measles.
- Motivation of NGO workers to collect information of Measles NNT and AFP from slums and making map for slum.
- Correspondence with private practitioners, local hospitals, school teachers, local leaders to get information of outbreaks of any of three diseases.
- Arrange monthly meeting with concerned persons to evaluate the surveillance activities.
- Keeping records of the identified cases officially

MOH-EPI, IEDCR, IDH

B01

- Divisional workshop on disease surveillance.
- Review the activities of key informer (disease warden) one from each division.
- From EPI HQ I would like to visit at least one division to see the disease surveillance programs.
- In consultation with BASICS I will try to improve the urban disease surveillance system.
- I will try to make every body from EPI HQ involved in the disease surveillance system.

B02

- Identify key informer for case incidence
- Initiative to be taken by personnel receiving information from key informer for quick investigation and action.
- Action be taken immediately after investigation.
- Feedback mechanism will be thoroughly established in appropriate level.

B03

- Conduct measles outbreak investigation, AFP and NND investigation.
- Take measure to transfer responsibility of disbursing fund to the messengers carrying stool samples from field.
- Arrange training workshop for thana/mun. managers on disease surveillance in line with "data for action".
- Analyze and give feedback on monthly disease reports.
- Give regular feedback on lab. stool report.

B04

- Outbreak investigation if occur.
- Assist municipal workers, NGO's how to collect data, compilation and report data to higher authority for taking measure.
- Formation a working team at EPI HQ to give feedback and surveillance related information in a timely fashions to all respective level.
- Help UOOs to collect qualitative data and taking actions.
- Assists Cities/Muns to strengthen disease surveillance specially in High Risk Areas like BASTEES.

C01

- One outbreak investigation
- Development of personal computer skill for surveillance data analysis and feedback.
- Active participation in NID '96.
- To provide necessary data for surveillance of EPI diseases to Dr. Anwar from IEDCR.
- To participate in any disease incidence survey.

E01

- After getting all logistic help, I will improve to test stool samples in my lab.
- After tested stool samples, as quick as possible I will send its result to EPI HQ and field from where I receive sample.
- Disburse fund to messenger covering stool samples from field.

NGOS

D01

- To organize orientation session for UTPS total staff for identification and prevention of NNT, for eradication of Poliomyelitis, and for control of Measles.
- To inform the NNT cases to EPI HQs.
- To cover more areas of Polio and Measles.
- To give special attention to the slum of catchment areas of UTPS.
- All activities will be recorded and reported to EPI Hqs, organize monthly meetings with senior technical and non-technical staff. When necessary we will sit with concerned person of municipal, EPI and health department.

D02

- Share the workshop experience with office colleagues
- Two contacts with NGOs (TAF Funded) working in Dhaka urban areas to know their status in surveillance activity.
- One contact with "BASICS" to know the surveillance status.
- Receive workshop reports from BASICS, make photocopy of key issues and distribute to other program staff.
- Encourage NGO staff in quick identification of AFP case particularly and report it to focal point.

D03

- Sharing experience gathered from this workshop with other colleague.
- Contact with NGOs (FPSTC Funded) working in urban area about the present status of disease recording profile (or Surveillance system/status)
- Sharing the disease surveillance experience with the project Coordinators of other NGOs (FPSTC Supported).
- To tell the NGOs working in municipality areas for time to time contact with the municipality where they are working.
- Follow up the above actions.

WHO

F01

- Orient thana and district managers regarding disease surveillance and use of data at local level.
- Follow up and assist timely investigation of AFP cases.
- Follow up and assist investigation of NND cases (at least 10).
- Investigate measles out break (if any).
- Highest support for making the NID successful.

F02

- Returning home, I will re-read the subjects discussed in the workshop of "Data For Action" and main important themes for Disease Surveillance which will be needed in local level. These will be conveyed through letters/meetings to the districts/thana level managers/service providers involving Director of Health.
- Issue letter to the thana Managers through the Civil Surgeon of the districts on Director of Health instruction to inform address of the suspected AFP/NND/Measles cases occurring anywhere in the division immediately through the telephone to Director of Health office (DSO) where data will be recorded.
- Just on receiving the information of AFP cases, I will try to attend as maximum as the case possible to investigate /supervise investigator/follow up/assist in assistance needed locally.
- Attend monthly meetings of Civil Surgeon/THFPOs/HI/AHI/THPOS/FPI/HAsFWA to motivate them to search, inform immediately, help in case reporting; investigation/sample collection where needed, containment measures/developing awareness of the community by communicating needed massages on AFP/NND/Measles, inform to the Health worker/health centers for action.
- Attend informal meetings with TH&FPO/FPOS/MO's and other supervisors of thana and below; they will be briefed about the importance of disease surveillance and its reporting investigation, sample collection, containment measures with motivation for them to participate sincerely in the disease eradication/elimination and control measures.

F03

- I shall disseminate knowledge acquired from this workshop to the members of the field staffs working in the field at thana level.
- I shall prepare a line list of data collection activity with special attention to surveillance.
- I shall by to establish a channel of communication between focal point personal in the district/division with that of reporting areas in thana/union.
- I shall organize "disease warden plan" planning meeting with all sectors of community leaders and social elites esp. teachers and religious leaders in the community initially at thana level.
- I shall prepare a record/reports display board and discuss where all information regarding surveillance e.g. Maps showing disease incidence in the district/Thanas esp. AFP cases, NNT cases and Measles cases.
- I shall try to attend meeting in the thana health complex with the field staffs where surveillance activity will be discussed. Staffs will be given oriented about simple case definition about the diseases under surveillance.

F04

- Orient District and thana managers regarding disease surveillance and pursue them to use data at local levels.
- Follow-up and assist investigation of all AFP cases.
- Follow-up and assist investigation of 10 NND cases.
- Investigate measles outbreak if any.
- Highest effort will be made to make NID successful.

F05

- Conduct workshop on base epidemiologic methods for DSO's/UOOs/EPI HQ and other interested partners.
- Lobby for direct phone lines/answering machines for DSO and focal point staff.
- Assist mobilization/training workshop for districts and thana level staff for surveillance.
- Push for reward system for AFP surveillance.
- Push for social mobilization to report AFP cases.
- Coordinate lab improvement with rotary/Polio Plus/District 6400.

BASICS

G01

- Expansion of CBDS activities in at least 2 municipalities (Tongi and Gazipur) with workshop, training and logistics.
- Do 20 NND investigation from different municipalities.
- Visit 2 sentinel site and establish monitoring board and develop mapping system.
- Facilitate review meeting at Mymensingh municipality on CBDS.
- Try to convince at least 2 NGOs to record the causes of NND with address.

G02

- Organize advocacy meeting with DCC, NGOs and partners for surveillance.
- Hold 3/4 small group meeting with DCC, NGOs and partners on what specifically to do for surveillance.
- Identify focal person for surveillance and supporting team in EPI or DCC. Equip them with TOR, money and logistics for effective response to disease reports.
- 20 case NND investigation.
- Outbreak investigation (if any).

G03

- Assist municipal authority for organizing orientation on CBDS for all field workers in Tangail, Faridpur, Madaripur and Gopalganj municipality.
- Assist the authority of the three sentinel site for preparing a control board so that they can mapping the reported cases and can provide feedback.
- Will assist the municipal authority for organizing social mobilization activities on disease surveillance in 4 municipalities.
- Investigate 10 NND.
- Will investigate 5 AFP.

G04

- Workshop to sensitize the CCC/sent site authorities.
- Mobilize CCC authority to deploy a DS focal point.
- Measure the usefulness of NND data available with NGOs.
- Identify sentinel facilities for diseases information at community level.
- NNT mapping for CCC.

G05

- Orient the Health workers of NGOs in Comilla regarding getting more information of NND, AFP and Measles cases.
- visit Comilla general and 250 bed Hospital to have the list of any NNT, AFP or measles cases diagnosed by their OPD or Pediatrics ward from the Municipal area.
- Assist Sylhet Municipality to map out the high risk area for detecting NNDs, AFPs and Measles cases.
- visit Sylhet Medical College and IDH to look for any AFP, NNT and Measles cases detected by them from the municipal area.
- Orient the Health Workers of NGOs in Sylhet regarding how to get more information of NND, AFP and Measles cases.

G06

- Organize a training course for Khulna city corporation (KCC) and NGO field workers on disease detection and reporting.
- Investigate any AFP case(s) reported.
- Investigate 20 NND reported.
- Intensify community surveillance at slums of KCC and Barisal municipality.
- Assist in updating disease surveillance control board at KCC and Barisal.
- Ensure circulation of a copy of sentinel report to civil surgeon and municipality at Barisal.

G07

- Fix up surveillance focal point for respective CC/Mun.
- Investigation of 20 NND cases.
- Sentinel site report analysis and mapping.
- Initiation to motivate NGOs to create community awareness out surveillance.
- Training of NGO workers on surveillance reporting forms.

G08

- Promote Coordination - NGO/FP/Health with the City Corporation.
- Try to map Polio, NNT and measles cases on the basis of information from sentinel sites, NGOs and Mun./CC workers.
- visit more often the EPI stores of the Districts and City Corporation to check cold - chain maintenance.
- Motivate FP and NGOs to undertake investigations of all NND cases in their areas.
- Involve the ward secretaries of the city corporation in the collection of information on the 3 diseases from the community.

G09

- Assessment of [collection/compilation/analysis of base line data (who/how/why/use)]my assigned municipalities for effective EPI surveillance.
- Develop implement EPI surveillance strategic approaches for my assigned municipalities.
- Convincing the senior urban managers/administrators and making the field workers skilled in EPI surveillance through meeting/orientation.
- Investigation of AFP, NND and Measles outbreak (if any)
- Self reading to enrich my own knowledge and avail training on EPI surveillance (if any).

G10

- Put together workshop proceedings into a report.
- Facilitate with EPI HQ to issue letter from DGHS to Civil surgeons for investigation of AFP case in urban areas (where there is no Health Officer).
- Help Bikash for establishing disease surveillance in Dhaka.

Appendix II -
Opportunities of USAID/BASICS to Strengthen Municipal Disease Surveillance

Background

Municipalities in Bangladesh lack the health infrastructure that is provided by the Ministry of Health in Rural Areas. The USAID BASICS project is working with the EPI in supporting Urban EPI through the posting of 9 Urban Operations Officers, training, collaboration with NID communications, and support for disease surveillance. This report on EPI surveillance documents the absence of effective municipal surveillance and identifies opportunities for surveillance improvement.

Programmatic Options for Improving Disease Surveillance

Suggestions for strengthening urban surveillance are provided in the Executive Summary and in the section on Municipal Surveillance. These suggestions need to be reviewed collaboratively by EPI, BASICS, and USAID to assess needs, opportunities and resources. The list below identifies areas where BASICS has the capacity to contribute significantly to the strengthening of urban surveillance.

- Assist EPI in establishing an Urban Surveillance Task Force to include EPI, BASICS, 2 Municipal Health Officers, 2 UOOs and the WHO EPI Epidemiologist to oversee upgrading of EPI surveillance.
- Work with MOH to establish Emergency Response Focus in 4 City Corporations and in the District Level Municipalities (32 in 1996, and the remainder in 1997).
- Provide 3 days of training in disease surveillance and response to the designated Epidemic Response Officer.
- Through UOO on-site continuing education, work with Focal Point to identify a list of key contacts for disease surveillance: hospitals, NGOs, and private practitioners.
- Through UOO on-site continuing education, work with Focal Point on establishing municipal specific sentinel surveillance in the 20 largest municipalities utilizing hospital meeting criteria identified in report and NGOs.
- Work with Focal Point to develop, produce, and distribute data for action posters indicating conditions needing immediate and routine reporting and contact information.
- Continue to work with urban NGOs to expand their surveillance capacity not only to collect and use data to identify and reduce disease problems in high risk urban problems but also to serve as bridges to promote community reporting
- Promote linkages between NGOs and municipal authorities for the sharing or essential information for disease prevention and control.

Epidemiologic Studies

- Initiate and support a collaborative epidemiologic assessment of tetanus cases (NNT, child, adult) admitted to the 3-5 sentinel sites to assess issues related to tetanus policy, strategy, and implementation. Studies would focus on identifying and overcoming obstacles to improved tetanus control.
- Explore opportunities to utilize neonatal deaths identified, recorded, and reported by FWAs to identify mothers and populations at risk for NNT.
- Continue to explore use of LQAS to identify high risk populations for implementation of risk reduction strategies

Communications

- Continue to support NID social mobilization
- Develop and test an urban strategy to promote community reporting of AFP
- Participate with EPI and WHO in the development of a feedback strategy providing:
  - Advocacy for EPI to top decision makers and the public
  - Continuing education feedback to the Thana level providing a format of advocacy and problem solving for the monthly meetings.

Appendix III. Dhaka IDH Sentinel Site Assessment - 14 January 1996
Government of Bangladesh Expanded Programme of Immunization

Facility Service Area

The Dhaka IDH is located in Mohakali and is the main center admitting cases of Tetanus (Neonatal, Child, Adult). Tetanus cases are admitted to one of two wards on the third floor of the IDH. The wards are well organized, clean, and the patients are well cared for.

Key Contact

Mrs. Farida Kahnam, a senior sister with 16 years experience, has been on the Tetanus Ward for over 10 years.. She is very knowledgeable about tetanus and her patients.

Record Quality

All admissions are entered into a record book by name, address, age, sex, vaccination status, date of admission, date of discharge and outcome. Data are summarized monthly and are carefully transcribed from the monthly summary in the log book to the sentinel reporting form. Vaccination data are not included in the report. Quality of data are excellent. Summary data are available for 1989-1993. Individual case records are available for 1994 and 1995.

Neonatal Tetanus Admissions, Death, CFR
Dhaka IDH 1989-1995

Year	Admissions	Deaths	CFR
1989	339	244	72
1990	275	247	90
1991	246	188	76
1992	175	142	52
1993	176	93	53
1994	206		
1995	140		

Tetanus Admissions Dhaka IDH 1995

Month	NNT	Child	Women
January	5	23	2
February	12	21	0
March	7	21	18
April	5	15	16
May	12	16	8
June	19	21	3
July	13	13	10
August	15	9	14
September	21	15	15
October	17	14	10
November	6	10	8
December	8	10	8

Assessment of Data Quality

- Data are carefully collected and transcribed
- Completeness of reporting is 100%
- Timeliness of data is 100%
- Predictive value positive (the percent of cases that are in fact neonatal tetanus-actual tetanus/reported tetanusX100) is estimated by the staff to be nearly 90% for neonatal tetanus, 70-80% for child tetanus (occasional encephalitis), and 90% for women's tetanus.

Epidemiological implications

Neonatal Tetanus

The age distribution for reported neonatal tetanus, with possibly a few exceptions, is as expected: 2 d-1; 6d-2, 7d-5, 8d-3, 9d-1,10d-1, 11d-2, 12d-1, 14d-2, 15d-1, 22d-1, 25d-1

Child Tetanus

Prime reported sources of infection are injuries, burns, and inner ear infections. Information is needed as to whether lack of protection is due to non-immunization or declining immunity following infant immunization

Women's Tetanus

Approximately 80% are reportedly related to septic abortions, 10% to normal deliveries, and 10% to injuries.

Programmatic Implications

- The Dhaka IDH is an excellent sentinel site and serves as an essential source of information to monitor effectiveness of tetanus control in the Dhaka Metro Area.
- Tetanus is still a major cause of morbidity and mortality in Dhaka City
- Using conservative estimates of population growth, incidence of neonatal tetanus has decreased 60% from 3.96/1000 in 1989-1990 live births to 1.61/1000 live births in 1994-1995. This decrease is consistent with the reported increases in coverage.
- The high incidence of abortion related tetanus is an under-recognized health issue which needs to be documented and addressed with the Family Planning Program.
- The sentinel site at Dhaka IDH is an excellent sentinel site providing quality data on an important health problem in the major urban area.
- While actual cases may only reflect 1-20% of tetanus cases occurring in the Dhaka area, this single site provides adequate data to monitor tetanus control and to provide the information needed to focus limited resources on high risk populations.
- The excellent data are currently only being used for archival purposes, and do not meet the definition of surveillance: "data for action".

Programmatic Opportunities

- Dhaka City Corporation, Dhaka District, EPI, and BASICS need to recognize the untapped epidemiologic potential of the Dhaka IDH to improved neonatal tetanus control in Dhaka and Bangladesh.
- A physician with public health training, with 1-2 para medical personnel, need to be made available to the IDH to carry out epidemiologic and programmatic studies to fully exploit the "goldmine" of data to improve the quality of neonatal tetanus control such as:
- Mapping the location of cases of the 3 types of tetanus by geographic area for 1994-5
- Initiate ASAP investigation of all tetanus admissions to the IDH including demographic, geographic, risk and programmatic factors. A research protocol has been developed by Michael Deming at IHPO/CDC "using hospitalized neonatal tetanus cases as sentinel events for public health action (e-mail msd1@ihpod1.em.cdc.gov, fax 770-488-1003)
- Visit area of residence and obtain similar data on 3 controls per case
- Carry out an LQAS survey of obviously pregnant women in the geographic area of the case. If coverage is below the cut off, meet with the zonal medical officer to target intensive vaccination at the at risk area (two rounds of vaccination(?evening) targeting children and fertile aged women 12-40.
- The MO could also be given responsibility for the investigation of reported AFP cases.
- Resource requirements would be minimal
  - Medical officer with public health training
  - Office with unique telephone number and answering machine (hot line for AFP)
  - 2 paramedical personnel (nurses or health inspector-?volunteer from IDH)
  - Access to computer, printer, and epi-info
  - 20 days of epidemiological support from BASICS
  - Epidemiologic support from WHO epidemiologist
  - Funds for local (baby taxi) transport

Appendix IV - USING DATA TO IMPROVE QUALITY, EFFECTIVENESS, AND IMPACT OF EPI IN BANGLADESH
Underline indicate information known - **BOLD INDICATE PRIORITIES FOR ACTION**

Question	Measles	Neonatal Tetanus(NNT)	Poliomyelitis (AFP)
National Targets	*Achieve 95% reduction in mortality and 90% reduction in morbidity*	*Decrease incidence to < 1/1000 live births*	*Eliminate transmission by the year 2000*
What are the National Strategies to achieve targets?	*1. 80% coverage by 12 months;* *2. 90% by 24 months:* *3. Catch-up October-November campaigns in low-coverage areas* *4. Reduce mortality though improved case management of cases under 36 months of age* *5. MNT Campaign 1995*	*1. 90% protection of births through immunization of pregnant women* *2. Increase safety of delivery though upgrading of delivery skills* *3. Increasing life-time protection of at-risk fertile-aged women through routine and campaign immunization* *4. MNT Campaign in 1995*	*1. Achieve 90% coverage of children with OPV by 12 months of age* *2. Achieve 90% coverage if children 0-5 with 2 doses through National Immunization Days* *3. Identify/investigate every identified case of Acute Flaccid paralysis.* *4. Vaccinate infected areas.*
How big is the problem?	*1. Outbreak investigations* *2. Prospective Studies (Koster 1981, Shahid 1983, Fauveau 1991, DeFrancisco 1994)*	*1. Population Surveys for NNT compatible neonatal mortality* *2. Prospective Studies of neonatal mortality with verbal autopsy*	*1. Surveys to assess prevalence of polio-compatible lameness*
Who are at risk? What factors increase risk?	*1. Outbreak investigations* *2. Prospective studies (Bhuiya 1987, Koster 1988)*	*1. Surveys with case-control studies of NNT cases (Hlady 1992)* *2. Prospective studies with case control studies of NNT cases (Chen 1980, Black 1980, Rahman)*	1. Case Investigation
What unions/wards are at high risk of infection?	**1. Coverage less than 70% by administrative method** **2. Absence of measles outbreak in area for 2 or more years**	**1. Presence of NNT** **2. Low coverage of pregnant women with TT.** **3. High percentage of deliveries (baby caught and cord tied) by untrained person**	**1. Union with case of AFP**
What actions are needed at local levels identified as at risk?	**1. Identification and vaccination of unvaccinated 9-12 months** **2. If coverage <70%, October-November vaccination of all children 9-23 months.**	**1.Vaccination of mothers of NNT Cases** **2 Identification and vaccination of unprotected pregnant and fertile aged women** **3. Campaign vaccination of women 10-30 in high risk areas.(Low coverage, high rate of attendance by untrained TBA, % neonatal deaths 5-14 days >20% or NNT deaths identified)**	**1. Investigation and area vaccination.**
How much progress is being made toward target?	**1. Routine Surveillance**	**1. Sentinel Surveillance** **2. Investigation of Family Planning enumerated neonatal deaths occurring at 5-14 days**	**1. Active Surveillance for AFP** **2. Routine Reporting**
Is strategy being implemented as planned?	**1. Coverage by administrative method** **2. Coverage by survey** **3. Quality assurance by local monitoring**	**1. Coverage by administrative method** **2. Coverage by survey** **3. Quality assurance by local monitoring**	**1. Coverage by administrative method of routine and NID vaccination** **2. % of AFP cases reported investigated per proforma**
How can implementation be improved at local level?	**1. Quarterly review at thana level of area by coverage and disease occurrence** **2. Increase emphasis on measles vaccination in low coverage unions in pre-epidemic season (September-November)**	**1. Quarterly review at thana lever of area by area performance**	**1. Quarterly review at thana level** **2. Semiannual review at district level** **3. Annual review at national level**

How complete/timely is routine reporting?	1. Monthly monitoring (Health Area) at thana/municipality level (received/expectedx100) 2. Every 2 months (thana) at district level (received/expectedX100) 3. Every 3 months (thana) at divisional/national level (received/expectedX100)	1. Monthly monitoring at thana/municipality level (received/expectedx100) 2. Every 2 months at district level (received/expectedX100) 3. Every 3 months at divisional/national level (received/expectedX100)	1. Monthly monitoring at thana/municipality level (received/expectedx100) 2. Every 2 months at district level (received/expectedx100) 3. Every 3 months at divisional/national level (received/expectedx100) and observed AFP/expected AFP X 100
How can routine reporting be improved at local level?	1. Focusing on surveillance at monthly meeting 2. Feeding back local, district, and national data 3. Monthly disease surveillance bulletin with continuing education lesson plan for monthly meeting 3. Commending good performance 4. Identification and solution of identified problems	1. Focusing on surveillance at monthly meeting 2. Feeding back local, district, and national data 3. Commending good performance 4. Identification and solution of identified problems 5. Monthly disease surveillance bulletin with continuing education lesson plan for monthly meeting	1. Focusing on surveillance at monthly meeting 2. Feeding back local, district, and national data 3. Commending good performance 4. Identification and solution of identified problems 5. Monthly disease surveillance bulletin with continuing education lesson plan for monthly meeting
How can routine reporting be improved at district, divisional, and national levels?	1. Routine feedback of reporting completeness, timeliness, results, and analysis 2. Recognition of superior performers 3. Identification and solution of identified problems	1. Routine feedback of reporting completeness, timeliness, results, and analysis 2. Recognition of superior performers 3. Identification and solution of identified problems	1. Routine feedback of reporting completeness, timeliness, results, and analysis 2. Recognition of superior performers 3. Identification and solution of identified problems
Is public aware of importance of immediate reporting of AFP cases?			1. Record of advocacy strategies to improve immediate reporting of AFP 2. % public in high risk areas know importance of immediate reporting of AFP 3. % of AFP cases reported by public
Is implementation strategy achieving desired impact?	1. Annual review of routine reporting 2. Investigation of outbreaks of 25 cases or more occurring in ward/union during January -April. 3. Prospective studies (Clemens 1988, Koenig 1990, Bhuiya in process)	1. Annual review of sentinel reporting? 2. Investigation of cases identified through surveillance? 3. Collaborative case/control study of cases identified by major sentinel sites including community investigation.	
Are their issues of targets, strategies, or implementation that need to be addressed?	Annual collaborative review with partners at national level Recognition of partners	Annual collaborative review with partners at national level Recognition of partners	Annual collaborative review with partners at national level Recognition of partners
Is national level providing monthly feedback and continuing education syllabi to district and thana levels?	1. September-November focus on coverage and opportunity to prevent outbreaks 2. Sharing of trend data assessing progress toward targets 3. Sharing epidemiological data in understandable terms on measles epidemiology	1. Annual sharing of thana/district level of coverage 2. Reports of case investigations and actions taken 3. Strategies to improve surveillance	1. Importance of AFP surveillance 2. Methods of AFP surveillance 3. Reports of quality response to AFP cases 4. Reports of innovative approaches to improve community reporting 5. Progress toward polio elimination

Appendix V - Acronyms

AFP	Acute Flaccid Paralysis
AHI	Assistant Health Inspector (Health Supervisor at Union Level)
ARI	Acute Respiratory Infection
BARD	Bangladesh Academy for Rural Development
BASICS	Basic Support for Institutionalizing Child Survival
BCG	Bacillus Calamette Guerin (Tuberculosis Vaccine)
CC	City Corporations
CDC	Centers for Disease Control and Prevention
CFR	Case Fatality Rate
CEO	Chief Executive Officer of Municipality
CI	Confidence Interval
CMC	Chittagong Medical College
CS	Civil Surgeon (Head of District)
DPT	Diphtheria Pertussis Tetanus Vaccine
DT	Diphtheria Tetanus Adult Toxoid
DSO	Divisional Surveillance Officer - WHO
EPI	Expanded Programme on Immunization
FWA	Female Welfare Assistant (Family Planning)
GB	Guillan Barre Syndrome (a non polio form of AFP)
GOB	Government of Bangladesh
HA	Health Assistant (Health Worker at Community Level)
HQ	Headquarters - EPI
ICDDRB	International Center for Diarrheal Disease Research, Bangladesh
IDH	Infectious Disease Hospital
IEDCR	Institute of Epidemiology and Disease Control Research
IPH	Institute of Public Health
LQAS	Lot Quality Assurance Sampling
MCH	Maternal and Child Health
MOCS	Medical Officer of Civil Surgeon (District)
MLG	Ministry of Local Government
MNT	Measles Neonatal Tetanus Catchup Campaign (1995)
MO/EPI	Medical Officer for EPI at Thana Level
MOH	Ministry of Health
NA	Not Applicable
NGO	Non-Governmental Organization
NID	National immunization Days for Polio
NND	Neonatal Death
NNT	Neonatal Tetanus
OPV	Oral Polio Vaccine
p	Probability
PHC	Primary Health Care
RIHD	Rehabilitation Institute for Hospital and Disabled
Support-a-vision	A new word to refocus supervision from control to support
THFPO	Thana Health and Family Planning Officer
TT	Tetanus Toxoid (Tetanus Vaccine)
UNICEF	United Nations Children's Fund
UOO	Urban Operations Officer - BASICS
USAID	United States Agency for International Development
WHO	World Health Organization