



*The Ghanaian-Dutch Collaboration for Health Research and Development*

**A COMPREHENSIVE ASSESSMENT OF THE QUALITY OF  
IMMUNISATION IN TECHIMAN DISTRICT**

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**2005**

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**Project Number: 2002/GD/37**

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**2005**

*Funded by the Ghanaian-Dutch Collaboration for Health Research and Development*

## SUMMARY

Evaluation of Expanded Programme in Techiman District in general has focused on the coverage of the target population. There has been no effort so far to assess the quality of immunisation service provision. The District Health Management Team of Techiman District decided in 2003 to undertake a comprehensive assessment of the quality of immunisation in the district to ensure that all children living in the district are adequately protected. The following aim and objectives were set:

**AIM:** To assess the quality of EPI in the Techiman District (mid-Ghana) and make appropriate recommendations

### SPECIFIC OBJECTIVES

- To determine the adequacy and management of EPI logistics for vaccination.
- To determine the immunisation coverage for the various antigens in the district.
- To assess the immunisation knowledge of health workers.
- To determine the knowledge of mothers/caretakers about immunisation.
- To determine the level of satisfaction of the mothers.
- To assess the effectiveness of surveillance on the target diseases.

The project design composed of a cross-sectional descriptive survey at both the health facility and community levels involving health staff within the district.

The following approaches were used for data collection:

- Household survey among mothers/caretakers with children 12–23 months.
- Facility inventories.
- Facility record review.
- Health worker interview.
- Observation of client-provider interactions.
- Exit interview of clients at vaccination points.
- Focus group discussion.

The results indicate that the clients are satisfied with the services that they receive. They, however, complained of the high cost of the services. Access and utilisation of services was found to be very good. The proportion of children less than one year fully vaccinated with valid doses was 35.5 per cent. The major reasons for failure of immunisation was absence of caretakers, health workers and unavailability of services.

The following weaknesses were identified with the programme which need to be addressed: poor logistics management, inadequate knowledge of both health workers and caretakers, missed opportunities for promoting immunisation, high number of invalid doses given to children, weak supervision and a weak surveillance system.

The number of health workers and transport were also found to be inadequate.

Effort to address these weaknesses will go a long way in providing quality immunisation services in the district

### Acknowledgement

The investigating team will like to thank the staff at the Techiman DHMT, especially Dr. Gladstone Kessie; all the health workers in the Techiman District as well as the Community members and opinion leaders of the Techiman district

The team benefited from lots of technical support from the late L. Palmer Dzirasah, a tutor at the Rural Health Training School, Kintampo; Elizabeth Awini, a statistician at the Navrongo Health Research Centre; S. Amenga-Etego, a senior data manager at the Kintampo Health Research Centre; and Mr. Richard Hene, the Nkoranza District Director, who assisted in the qualitative data collection and analyses.

Our deep appreciation goes to Dr. John Gyapong, the Director of the Health Research Unit, Ghana Health Service and his team at the HRU for all their support.

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## LIST OF ABBREVIATIONS

1	EPI	Expanded Programme on Immunisation
2	HSR	Health System Research
3	RHD	Regional Health Directorate
4	DHD	District Health Directorate
5	VPD	Vaccine Preventable Diseases
6	FGD	Focus Group Discussion
7	DHMT	District health management team
8	DHS	Demographic and Health survey
9	NID	National Immunisation Days
10	WHO	World Health Organisation
11	VVM	Vaccine Vial Monitor

## Chapter 1

### INTRODUCTION AND BACKGROUND INFORMATION

#### **Location of Study and Size**

The Techiman district is one of the thirteen administrative districts in the Brong Ahafo Region of Ghana. The district shares common boundaries with the Wenchi district to the north-west; Kintampo district to the north-east, Nkoranza district to the South-east and Offinso district in the Ashanti Region to the South. Techiman, the district capital is the second largest city in the Brong Ahafo region. It is 120 kilometers North West of Kumasi and 392 kilometers from Accra. The district has a total land surface area of approximately 670 square kilometers and comprises of about 175 settlements.

#### **Relief and Drainage**

There are two main relief features in the district, namely highlands and lowlands. It can generally be described as low lying and gently undulating. The district is well drained by three major rivers namely: the Tano to the south and Subin and Kar to the north.

#### **Climate and Vegetation**

The district has two main seasons, a longer rainy season between April and October each year and relatively shorter dry seasons that is experienced between November and March each year. Annual maximum temperatures range between 26 and 35 degrees Celsius. The district has three main vegetation zones, namely: the guinea savannah woodland located in the north-west, semi-deciduous zone located in the south and the transitional zone which stretches from the south east and west up to the north of the district.

#### **Population**

The 2002 population of the district was estimated as 186,301, using an annual growth rate of 2.5 per cent. The district experiences weekly population fluctuation due to influx of visitors to the renowned Techiman weekly market. The most densely populated settlement in the district is Techiman, the centrally placed district capital with a population density of about 2,800 people per square kilometre.

#### **Ethnicity**

The indigenous group is the Bono. There are, however, other tribes such as the Asantes, Fantes, Gonjas, Hausas, Ewes, and Gas in the District.

#### **Economic Activity**

The main economic activity of the people is agriculture; main crops compose of yam, plantain, cassava, cocoyam among others. A fair number of residents are involved in livestock rearing of cattle, goats, sheep and pigs as part of their economic activity.

#### **Transport and Communication**

Most of the roads from the district capital to the service points are untarred and difficult to use during the rainy season. The District Health Management team has one pick up and six motor bicycles for its activities.

The telephone communication system has improved of late. The district Health administration is connected to the telephone system. There is also a motorola facility at the main district hospital, the Holy Family hospital; linking other catholic hospitals in the region. Radio broadcasts are mainly from the National radio stations, the radio BAR as well as two local FM radio stations.

#### **Health Service Delivery**

In line with the ongoing decentralization of the health system, the district has been demarcated into 8 sub-districts. There are two hospitals and eight health centres. Buoyam is the only sub-district without a functioning health facility.

#### **Background to EPI**

The induction of immune response to infectious diseases has become a widely applied and accepted public health intervention<sup>1</sup>. Each child in Ghana is required to receive vaccination against tuberculosis, poliomyelitis, diphtheria, whooping cough, tetanus, hepatitis B, haemophilus influenza type B, measles and yellow fever before the first birthday<sup>2</sup>. The schedule for the vaccination programme in Ghana is

**Table 1**  
**Expanded programme on Immunisation schedule**

<b>Antigen</b>	<b>Schedule</b>
BCG	At birth
OPV0	At birth
OPV 1	6 weeks
OPV 2	10 weeks
OPV3	14 weeks
Penta 1 (DPT-HepB+Hib)	6 weeks
Penta 2	10 weeks
Penta 3	14 weeks
Measles	9 months
Yellow fever	9 months

as shown in Table 1 below: In addition all pregnant women are to receive vaccination against tetanus to prevent postpartum tetanus and neonatal tetanus.

The immunisation programme in the district is delivered using both static and outreach strategies. All health facilities have been supplied with cold chain equipment for the storage of vaccines. The District Health Directorate collects vaccines and other logistics monthly from the Regional Health Directorate and the sub-districts also collect their requirements weekly from the District Health Directorate.

For immunisation to continue to be effective as a long-term childhood disease control strategy, it is important that:

- a) target population coverage is very high and timely, if not complete;
- b) mothers perceive services provided to their children to be of high quality<sup>3</sup>;

- c) interactions between the antigens given are well understood;
- d) community involvement in the planning and monitoring of vaccination services;
- e) adequate logistics
- f) stringent cold chain monitoring and its management and antigens' viability prior to administration;
- g) high level of injection safety practices and surveillance is maintained on the target diseases.

The evaluation of the Expanded Programme on Immunisation (EPI) in the Techiman District has so far generally focused on target population coverage with little emphasis on assessing the quality of all the other components of EPI. This study has focused on issues related to the assessment of the quality of immunisation services provided.

Ensuring a high quality of care is one of the pillars of

## Chapter 2

### PROBLEM STATEMENT

the HSR that underpins the second five-year programmes of work in Ghana<sup>4</sup>. The importance of quality in improving service uptake cannot be over-emphasised. Poor quality of EPI services will lead to low service uptakes, and failure to protect the target population, and impact negatively on the incidence of vaccine preventable diseases (VPD)<sup>5</sup>.

In the Techiman District there are 29 Technical Staff directly involved in the EPI, either as service providers or their supervisors. Some 350-community volunteers support these technical staff in the provision of routine immunisation services. These services are provided at a total of 149 outreach and 8 static points carefully distributed to serve the 175 communities in the eight sub-districts in the district. Table 2 below shows the District's immunisation coverage for the year 2001<sup>6</sup>.

(Table 2). Up to 58 per cent (38,295) of these were injections with their accompanying waste, the quality management of which cannot be underestimated.

The National Immunisation Programme (NIP) has introduced several measures aimed at ensuring quality of immunisation. The Techiman District, like all other districts in the country, benefited from these interventions, in the form of capacity building in quality issues, related to vaccine supply and quality; service delivery; provision of the appropriate logistics support, surveillance and advocacy and communication. Expected outcomes should include high standards of service delivery, vaccine management, immunisation safety practices, surveillance on EPI target diseases, advocacy, social mobilisation and programme communication. The overall impact of the intervention should reflect as

**Table 2**  
**Immunisation coverage by antigen. Techiman district: Jan to Dec 2001**

ANTIGEN	NO. IMMUNISED	% COVERAGE
BCG	6,286	86
OPV <sub>0</sub>	7,003	96
OPV <sub>1</sub>	6,978	95
OPV <sub>2</sub>	6,874	94
OPV <sub>3</sub>	6,421	88
DPT+HEPB+HIB <sub>1</sub>	6,963	95
DPT+HEPB+HIB <sub>2</sub>	6,489	89
DPT+HEPB+HIB <sub>3</sub>	6,339	87
MEASLES	6,553	90
YELLOW FEVER	5,665	77
TETANUS TOXOID 2+	7,161	98
<b>*TOTAL IMMUNISATIONS (Infants only)</b>	<b>65,571</b>	—

\* Excluding TT2+ data.

From the immunisation performance figures in Table 2 above, one can appreciate the magnitude of the numbers of children and women involved in this district, and therefore, the possible effect of any deficiencies in the quality of the immunisation programme. For example, over 65,000 immunisations were performed on infants only, when the target population of 7,277 infants were assessed

increased access to quality immunisation and reduction in disease incidence and mortality.

Despite all these interventions, it is evidenced from immunisations records and surveillance data in the district, and programme monitoring and supervision reports that there could be problems with the quality of immunisation services in the district. For example, the coverage survey carried out in the dis-

tract in 2001 resulted in an 89.7 per cent coverage for those fully immunised, while 74.2 per cent were fully immunised before one year of age, a measure of the quality of the programme. Lack of information was also cited as the major reason why mothers did not complete their children's immunisation<sup>7</sup>. The district data further revealed that eighty and eighty-one cases of measles were reported in the years 2000 and 2001 respectively. Nearly half of those identified in 2001 had not been vaccinated in the past.

Supervisory reports at the regional level also point to weak supervision at the district and sub-district levels as well as inaccuracies in EPI data collection. EPI service performance assessment in

the district has so far not focused on all the operational components of the Service.

It is hypothesised that poor quality of immunisation services leads to low service uptake, which then leads to low protection of target population, and eventually results in higher incidence of Vaccine Preventable Diseases (VPD) and mortality.

This study will, therefore, assess the quality of the immunisation programme in the Techiman district in order to identify its strengths and weaknesses and to make appropriate recommendations to improve on the quality of immunisation services in the District.

## Chapter Three

### AIM, SPECIFIC OBJECTIVES, PROJECT DESIGN AND METHODS

#### AIM

To assess the quality of EPI programme in the Techiman District (mid-Ghana) and make appropriate recommendations.

#### SPECIFIC OBJECTIVES

These include

- To determine the adequacy and management of EPI logistics for vaccination.
- To determine the immunisation coverage for the various antigens in the district.
- To assess the immunisation knowledge of health workers.
- To determine the knowledge of mothers/caretakers about immunisation.
- To determine the level of satisfaction of the mothers.
- To assess the effectiveness of surveillance on the target diseases.

The then district director of health services, the district public health nurse in collaboration with the Kintampo Health Research Centre, decided to apply for funding from the Ghana-Netherlands research Group to answer these pertinent questions.

#### PROJECT DESIGN AND METHODS

The project design composed of

- (i) A cross-sectional descriptive survey at both

the health facility and community levels involving health staff within the district. The selection criteria involved 6 out of eight sub-districts in the Techiman district and was based on location of health staff in relation to health facilities and immunisation points, DPT3 coverage for 2002, availability of social amenities such as roads and electricity.

#### Health facility

The questionnaire targeted the district EPI in-charge, the district Public Health Nurse, the sub-district EPI in-charges, community health nurses and field technicians. Clients were interviewed at the health facility (fixed clinic or outreach using the exit interview questionnaire in order to capture a feedback on their perception of how the EPI clinic was organised.

#### Community level

The community level selection involved listing out all eligible respondents (i.e. mothers of children born from January 2002 to 31<sup>st</sup> December 2002) generated from the Kintampo Health Research Centre data bank. The number of children eligible from each of the six sub-districts selected was based on the target population of children who were between 12 months and 23 months on the day of selection. Equal chance was given to all eligible children in all the villages. A total of 218 eligible children were selected for interviews to be carried with their mothers/caretakers. A supplementary list was generated in case some of the mothers/caretakers selected were not present for in-

**Table 3:**  
**Weighted-stratified selection of infants**

SUB-DISTRICTS	POP.CHN 12-23 MO	QUOTA
TECHIMAN	1554	96
TANOSO	405	39
NSUTA	381	37
TUOBODOM	322	21
OFFUMAN	216	13
BUOYAM	168	12
TOTAL	3,046	218

terview. The Table 3 below shows the allocation of respondents per sub-districts.

**(ii) Qualitative study**

Focus group discussion and in-depth interviews were conducted on health care providers and on community members. This included client provider observations during EPI services. The focus group discussion was conducted on groups of men and women selected from two communities in each of the six sub-districts. The two communities were purposively selected. One of the two communities was the sub-district capital where a static Child Welfare Clinic (CWC) was organised and the other a rural community with an outreach point. In each community two focus group discussions were conducted. One was for women who had ever sent their children for vaccination and one for men or husbands (but not necessary the husbands of the women interviewed). In all 24 Focus Group Discussions (FGD), 12 for women and 12 for men were conducted. In all 216 people, 107 men and 109 women took part in the various FGDs. The number of participants in any one group was between 6 and 12. The discussion was moderated by facilitators with previous training and experience in FGD. The discussion was taped in order to update the notes at the end of each day.

- Household survey among mothers with children 12-23 months
- Facility inventories
- Facility record review
- Health worker interview
- Observation of client provider interactions
- Exit interview of clients at vaccination points
- Focus group discussion

**Quality-control procedures**

Much time was devoted to the design, developing and translating and back translating of the questionnaires to ensure that the questions are clear and unambiguous in the local language and account was taken of local terminologies. All field staff were given intensive training. Supervisors checked completed forms manually before data entry.

**Data Analysis**

The quantitative data was analysed using Stata 8 programme and appropriate statistical analyses in order to determine significant differences in the parameters of interest.

**Ethical Consideration**

Ethical clearance was sought from the national and regional research committees. Thorough explanation was given to all respondents in a language that

**Table 4  
Details of Data Collection**

Level	Objective(s)	Method/Tool	Respondent
<b>FACILITY·</b> DHD· HEALTH CENTRE	1, 2, 3, 6	- Logistics Inventory -Record Review -Questionnaire Adm.	In-charge In-charge
<b>SERVICES PROVISION POINT·</b> OUTREACH POINT STATIC POINT	3, 5	-Questionnaire Adm. -Observation/Checklist- -Questionnaire Adm.	Service Providers Service Provider/Client Client
<b>COMMUNITY</b>	2,4,5	-Questionnaire Adm. - FGD/FGD Guide	Mothers Men/Women Groups

**Data Collection**

Data was obtained from three levels of the immunisation programme to meet the specific objectives of the study (Table 4 below). The following approaches were used:

they understood. They were made aware that refusal was not going to affect them in any way.

## Chapter 4

# RESULTS

### Demographic characteristics of respondents

Table 5 below shows that approximately 69 per cent of the caretakers were Christians while 28 per cent were Muslims. Most of the women (54 per cent) were Bonos. Other prominent groups such as women of northern origin who constituted 30 per cent of the women population followed this. Most of the women (91 per cent) were married at the time of the survey; the remaining few were either divorced or separated.

**Table 5**  
**Background information on caretakers**

<b>Factor</b>	<b>Percentage</b>
<b>Religion</b>	
Christian	68.3
Muslim	28.3
Others	3.2
<b>Tribe</b>	
Bono	53.8
Northern origin	29.7
Akan	14.6
Other southerners	1.4
Others	0.5
<b>Mother's Education</b>	
Illiterate	55.0
Read and Write	45.0
<b>Father's education</b>	
Illiterate	23.4
Read and Write	76.6
<b>Marital status</b>	
Married	90.8
Divorced	3.7
Separated	3.2
Never married	2.3
<b>Mother's occupation</b>	
Self employed	50.2
Farmer	34.7
Housewife	9.1
Others	6.0

### Educational and social characteristics

Literacy rate was higher (77 per cent) among the fathers of the children compared to the mothers (45 per cent) in this study population Table 2. Most of the women (50 per cent) were either self-employed

or farmers (35 per cent); only 9 per cent were housewives. Religion, occupation, education, tribe and marital status did not have any significant effect on the immunisation status of the child (Table 6).

As shown in Table 7 below, a child was however, likely to be fully vaccinated whenever the father was the main person in the decision making process ( $p < 0.049$ ).

### Adequacy and management of logistics

With the exception of the district level, none of the facilities had adequate supply of vaccines, autodestruct syringes and needles, stationery and cold chain equipment. All the six facilities visited had functional refrigerators for the storage of vaccines. Three of the facilities did not, however, have a back-up power supply; vaccines have to be transported to the district cold room when there was power outage. Vaccine stock out was observed in three out of six facilities. Wastage of vaccines was monitored in four out of the six facilities. Cold boxes were not available in four out of the five health facilities. All facilities had adequate vaccine carriers and ice packs.

The cold chain was, however, well maintained, as the temperature in the refrigerators was monitored twice a day and always read between +2 and +8 degrees Celsius, an acceptable range of vaccine storage temperature at the district level.

Vaccines and diluents were stored together in five out of six facilities. Three health facilities still stored vaccines in the freezer, contrary to the national guidelines. Only vaccines were found in all the refrigerators. None of the facilities had a freeze watch indicator in the refrigerator. Four of the facilities visited had frost in the refrigerator. Three out of the six facilities did not have their own reliable transport.

Guidelines for vaccine, cold chain transport and immunisation safety management were not available in most facilities. Only two facilities had vaccine and cold management guidelines. Health education materials were also not available in most

**Table 6**  
**Background characteristics and immunisation status**

<b>Factor</b>	<b>OR (95% CI)</b>	<b>P-value</b>
<b>Religion</b>		
Muslim	1.00	
Christian	1.58 (0.86, 2.92)	0.141
<b>Marital Status</b>		
Single parent	1.00	
Married	1.01 (0.38, 2.64)	0.989
<b>Tribe</b>		
Bono	1.00	
Akan	1.21 (0.51, 2.8)	0.659
Northern origin	0.59 (0.32, 1.10)	0.097
<b>Mother's educational status</b>		
Illiterate	1.00	
Read and write	1.34 (0.77, 2.36)	0.304
<b>Father's educational status</b>		
Illiterate	1.00	
Read and write	1.54 (0.81, 2.93)	0.184
<b>Mother's occupation</b>		
Housewife	1.00	
Self employed	1.43 (0.55, 3.75)	0.465
Farmer	1.67 (0.61, 4.55)	0.317

facilities. Management of the supplies was found to be poor. With the exception of the district level, none of the sub-district facilities visited had vaccine requisition books. Vaccine requests were either made verbally or on a piece of paper. Only three of them had vaccine ledgers. The ledgers were however not up to date. The needles and syringes collected were not entered into the ledger books. It was only at the district level that minimum and maximum stock levels of vaccines and other supplies were documented.

Only one supervisory visit had been conducted at three of the 5 health facilities in the past six months and two of them had no visit in the 6 months; though the DHMT had planned to visit the health facilities once every three months. No feedback was given to those facilities visited. The last time that any training in immunisation was organised in the district was two years ago.

The knowledge of providers regarding the target diseases of the immunisation programme, official immunisation schedule, multi-dose vial policy, interpretation of the Vaccine Vial Monitor (VVM) and correct temperature of storage of vaccines was assessed and found to be satisfactory (Table 8 above).

This was, however, only after prompting them instead of expected spontaneous responses from the health workers. Of the 27

health workers 74 per cent or more were able to mention Tuberculosis, Polio, Pertussis, diphtheria, hepatitis B, influenza and yellow fever as EPI target diseases. Only 69 per cent of them could spontaneously mention tetanus. Only one health worker did not know that influenza was one of the target diseases.

**Table 7**  
**Association between who makes the decision to take the child for immunisation and immunisation status**

<b>Factor</b>	<b>OR (95% CI)</b>	<b>P-value</b>
Who makes decision?		
Mother	1.00	
Father	0.38 (0.14, 0.99)	0.049
Both	0.76 (0.35, 1.66)	0.488

Even though there were Child Health records at the district level, there was none in four out of the eight sub-districts. Immunisation tally books were, however, available in all the facilities.

### **Knowledge of Health Workers**

All the 27 health workers reported that they were never supervised during outreach vaccination sessions.

Most of the health workers (over 96 per cent) knew of the official schedule of the vaccination programme. Only one person did not know the schedule for the second and third doses of DPT-HepB+Hib (Pentavalent) (Table 9).

burning in a pit. Only one health facility has an incinerator. The disposal sites were generally kept clean. Two of the facilities however did not have a designated person for waste disposal.

Immunisation records were generally not well kept. Tally books were used on the field, but not all children were tallied immediately after vaccination. A look at the tally books revealed totals for some of the months were not made. All vaccines given were recorded on

All the health workers knew of the Multi Dose Vial Policy and how to interpret the Vaccine Vial Monitor (VVM).

the card of the child with the date given but the batch numbers were not written in some cases.

### Observation of health workers

The number of staff making EPI teams was usually very small, often made up of just one technical staff that has to contend with too many records at the

The staff spent more time selling drugs (paracetamol, chloroquine, and multivitamin syrups) and therefore had little or no time to tell them about the vaccination schedules, side effects and the number of sessions left for the child.

### Satisfaction of mothers

All the caretakers were asked about their impression of the immunisation services given in the district. Close to 96 per cent of the respondents reported that they were satisfied. Only nine were not satisfied and the reasons are as shown in Table 10 below:

**Table 8**  
Knowledge of health workers on EPI target diseases, n = 27

EPI Target diseases	% Yes Spontaneous	% Yes Prompted	% No
Tuberculosis	74.1	25.9	0.0
Polio	88.9	11.1	0.0
Pertussis	84.6	15.4	0.0
Tetanus	69.2	30.8	0.0
Diphtheria	92.6	7.4	0.0
Hepatitis B	85.2	14.8	0.0
Influenza	74.1	22.2	3.7
Measles	100.0	0.0	0.0
Yellow fever	92.3	7.7	0.0

**Table 9**  
Knowledge of health workers on EPI schedule, n = 27

Antigen	% Yes Spontaneous	% Yes Prompted	% No
BCG	100.0	0.0	0.0
OPV0	100.0	0.0	0.0
DPT+HepB+Hib1	96.3	3.7	0.0
DPT+HepB+Hib1	96.3	0.0	3.7
DPT+HepB+Hib1	96.3	0.0	3.7
Measles	100.0	0.0	0.0
Yellow fever	96.3	3.7	0.0

clinic, including the registration book, tally book, and child health record book.

There was proper reconstitution of vaccines and cold chain maintenance on the field. Auto destruct syringes were used and disposed off in safety boxes that were later transported for

**Table 10**  
Reasons why caretaker was not satisfied with the immunisation service

Reason	Percentage
Waiting time too long	55.6
Vaccine provider not friendly	44.4
Child became sick following vaccination	22.2
Vaccination area not clean	22.2
Injection equipment not clean	0.0
Waiting area uncomfortable	22.2

This finding is similar to those found during Focus Group Discussions held with some of the community members. Almost all the participants said that they were satisfied with the services in their communities. This is evidenced by the following remarks made by some participants:

“We are satisfied. We no longer have such diseases *as measles and polio*”- male participant from Adutwie.

“We are satisfied with the immunisation because we have seen a drastic reduction of polio and *whooping cough*” male participant from Tuobodom

Even though they were satisfied, they complained of high charges resulting from “token fees” which ranged from 1000 cedis to 5000 cedis (US\$ 0.11–0.54) per child vaccinated; long waiting time; unfriendly attitude and lateness of health workers.

One male participant said, “Yes we are satisfied. My only comment is that the nurses don’t come early.”

### Caretakers’ knowledge

From the focus group discussions (FGDs), measles and poliomyelitis were the most important vaccine preventable diseases known in the communities. At least one participant from 22 out of the 24 FGDs mentioned measles could be prevented by vaccination. This was followed by poliomyelitis that was mentioned in 17 out of 24 FGDs. Whooping cough, tetanus and tuberculosis were mentioned in only 6 FGDs. Yellow fever was also mentioned in only three of the FGDs. Only one out of the 216 participants mentioned diphtheria. Some participants mentioned malaria, typhoid fever asthma, yaws and leprosy as some of the disease that could be prevented by EPI vaccines.

Caretakers’ knowledge about the EPI target diseases, schedule and importance of immunisation was assessed. Knowledge was found to be generally low. As shown in Table 11, 60.5per cent gave the correct schedule for BCG.

Less than a third of the care seekers gave any correct answers for the schedule of oral polio vaccine, pentavalent vaccine, measles and yellow

**Table 11**  
**Caretakers knowledge of EPI schedule I**

Antigen	% Correct
BCG	60.5
Polio1	30.5
Polio2	25.5
Polio3	20.0
DPT/HepB/Hib1	32.3
DPT/HepB/Hib2	28.2
DPT/HepB/Hib3	20.5
Measles	26.8
Yellow fever	25.0

fever. Close to 30 per cent of care seekers did not know the schedule of even a single antigen. Only 5 per cent knew of the complete schedule as shown in Table 12 below. This finding is supported by the focus group discussion, which also found the knowledge of the caretakers generally low.

There is an increased likelihood of a child to be fully vaccinated before the age of one year if the

**Table 12**  
**Careseekers knowledge of EPI Schedule II**

Number of Antigens	Number correct	% correct
0	66	<b>30.0</b>
At least 1	154	<b>70.0</b>
At least 2	105	47.7
At least 3	93	42.3
At least 4	62	28.2
At least 5	57	25.9
At least 6	49	22.3
At least 7	41	18.6
At least 8	20	9.1
9	11	5.0

care seekers know of the schedules of the various antigens.

As shown in Table 13 below, those who knew of the schedule of two or more antigens were more likely to get their children fully vaccinated ( $p<0.05$ ). Literacy was found to improve knowledge on the schedule of all antigens (Table 14). Those who were literates knew of the schedule of at least one antigen. ( $p<0.001$ ).

### Coverage of various antigens

Three methods were compared for immunisation coverage; the routine reported coverage from the Techiman DHMT, the coverage using the 30-clus-

**Table 13**  
**Caretakers knowledge of EPI schedule and immunisation status**

Number of antigens	OR	P-value
0	1.00	
1	0.56 (0.26, 1.21)	0.141
2-7	0.42 (0.21, 0.82)	0.011
8-9	0.27 (0.08, 0.88)	0.030

**Table 14**  
**Role of literacy on knowledge of EPI schedule among caretakers**

Knowledge of Antigen	Illiterate (%)	Literate (%)	p-value
BCG	50.8	72.5	0.001
Polio3	15.0	25.5	0.052
DPTHepBHib3	15.0	26.5	0.035
Measles	18.3	36.7	0.002
Yellow fever	15.8	36.7	<0.001
At least one antigen	60.0	82.7	<0.001

ter EPI survey and the new method, stratified survey, adopted in this study (Table 15).

The coverage for the various antigens were similar when the 30-cluster EPI survey was compared with stratified survey method, except in the case of BCG where a significant difference (p-value= 0.006) was found.

**Table 15**  
**Percentage immunisation coverage**

Antigen	Routine report	Stratified Survey	EPI Cluster survey	P-value
BCG	109.0	90.5	96.3	0.006
Polio 3	92.2	90.5	91.6	0.632
DPTHepBHib 3	94.2	90.9	91.6	0.764
Measles	88.4	86.8	85.6	0.632
Yellow fever	69.0	84.1	79.5	0.169

**Table 16**  
**Proportion of children with valid doses compared with crude doses**

Antigen	Crude (%)	Valid (%)
BCG	90.5	82.4
Polio1	91.4	81.9
Polio2	90.9	76.2
Polio3	90.5	69.1
DPTHepBHib1	94.1	85.5
DPTHepBHib2	90.5	77.1
DPTHepBHib3	90.9	71.9
Measles	86.8	82.9
Yellow fever	84.1	81.9
Fully immunised (all children)	65.0	40.9

As shown in Table 16 below, the valid coverage is lower than the crude coverage for all antigens. Only 41 per cent of the children fully immunised received valid doses as shown in Table 16. The proportion of children fully immunised before one year of age with valid doses is however 35.5 per cent. This is comparable with the 36.6 per cent valid doses using the standard WHO 30 cluster methodology.

Children immunised with valid doses before on year is 35.5 per cent.

The crude coverage of the first dose of DPT-HepB+Hib was 90.9 per cent; a proportion far above 80 per cent. The drop out rate for Penta1-Penta 3 is 3.2 per cent. The Penta1–Measles drop out rate is also 7.3 per cent; all these are less than the 10 per cent and shows good utilisation.

As shown in Table 17 above, the main reasons for not completing the immunisation were absence of caretakers, absence of health workers and unavailability of immunisation services. Other reasons were child becoming sick after vaccination, poor staff attitude and high cost of the services. These findings were supported by the focus group discussion. When asked what factors impede the utilisation of services, mention was

**Table 17**  
**Reasons why child did not complete immunisation**

<b>Reason</b>	<b>Percentage (n=43)</b>
Waiting time too long	0.0
Vaccine provider not friendly	4.7
Child became sick following vaccination	4.7
Vaccination area not clean	2.3
Injection equipment not clean	2.3
Waiting area uncomfortable	4.7
Too expensive	2.4
Service provider available but caretaker absent	52.2
Health worker absent	14.0
Immunisation service not available	42.2

made of inaccessibility of the services, high cost of the services, fear of side effects and unavailability of descent clothing. These are illustrated by remarks by participants:

*“some women do not have descent clothes to wear.*

Money is also a problem. Some women are too preoccupied with their business. Some communities are far. The health workers do not go there. Some even walk over five miles”

On staff attitude one participant had this to say *“Some of the health workers are impatient and for that matter deter the women from attending the clinic”.*

### **Surveillance on EPI target diseases**

The district submitted weekly and monthly reports on all the EPI target diseases. The returns were how-

ever incomplete and untimely. Two health facilities never submitted weekly returns to the district level for the whole year. Only two out of the five health facilities could submit their weekly returns to the district level on time. Copies of reports sent to the district level were not kept at the sub-district level. The District Health Management Team (DHMT) never conducted facility records re-

view. The reported cases of measles were 13, three case of pertussis, no neonatal tetanus and no acute flaccid paralysis. All the cases of measles were investigated but none of the pertussis was.

There is established community based surveillance but reporting from the community volunteers had not been regular. Out of the 239 volunteers, only 65 per cent were reporting on the target diseases.

All the monthly returns submitted from the district did not include information on adverse events following immunisation. None of the health facilities had guidelines on adverse events following immunisation.

# DISCUSSION, CONCLUSION AND RECOMMENDATIONS

## DISCUSSION

The immunisation coverage in the Techiman district is quite high, ranging from 84–91 per cent in the target group that we considered. Some anxieties were initially entertained:

- With close to 88 per cent of the respondents being either farmers or self-employed, one would have thought that they might be too busy to send their children for vaccination. Occupation was, however, found not to have any significant effect on the child's immunisation status.
- General lack of education is a common phenomenon in this part of the country. Education is known to provide people with the knowledge and skills to lead quality life. Studies done elsewhere have found educational level of mothers to influence the attendance for immunisation<sup>8,9</sup>. The contrary was found in this study. This could be as a result of the low level of education of the caretakers in the district, though they were classified as literates who could read and write.
- This study has shown that knowledge of the schedules of the antigens was high among the literates. An increase likelihood of a child to be fully vaccinated before the age of one year if the caretakers know the schedule of various antigens was also demonstrated. Lack of knowledge of vaccine preventable diseases is one of the reasons why a mother fails to complete vaccination for themselves and their child<sup>10</sup>. Very good health promotional activities in the district will therefore be of great help. Whilst promoting literacy there is also the need to develop appropriate health educational materials, which will be understood by the illiterate community. The use of drama, folksongs and traditional ways of educating the populace will be helpful.

Women by convention present children at clinics for immunisation in this set up. The influence of men compared with women has always remained an issue and in a community where men are predominantly (two-thirds) heads of households; most of the decisions at home will be taken by the men<sup>11</sup>. Even though the women may be willing to send their children for immunisation, it needs a man with understanding of the importance of immunisation to offer the needed support. It is therefore not surprising that where the fathers helped in the decision-making process; there was higher compliance with immunisation. The men should therefore be targeted in the EPI education to help improve the coverage of children who get immunised.

Religion could adversely impact on immunisation coverage. In recent polio NID, the coverage in northern Nigeria was very low because a religious sect refused to participate<sup>12</sup>. This was however not the experience in the Techiman district where a high proportion of our caretakers belonged to religious sects; Christians (68.3 per cent) and Moslems (28.3 per cent). Coverage for all four rounds of the polio NID was above 99 per cent<sup>13</sup>. The readiness for these sects to work with the health personnel could serve as a useful channel of communication between the District Health Management Team and the community, since educational messages could be passed through the various religious bodies to the target groups.

Knowledgeable staff are most likely to offer quality service to target community members. This study looked critically at in-depth knowledge among the health workers. Some lapses noted among the health professionals included:

- In the past, the practice was to store oral polio, BCG measles and yellow fever vaccines

in the freezer. Staff are expected to know about the new policy on vaccine storage, where all vaccines are supposed to be stored in a refrigerator with temperatures between +2 and +8 degrees Celsius. This was however not the case with some facilities as the vaccines were still stored in the freezer contrary to the present policy. Lack of supervision and inadequate training could be the main reason why the vaccines were not properly stored. It is to be noted also that the presence of frost in the refrigerator affects the cooling system contrary to the belief that the ice in the refrigerator is required to maintain it at the required temperature. Defrosting is therefore needed periodically.

- Inability of health workers to spontaneously name the EPI target diseases. This will influence the quality of health education offered to the public. Inadequate knowledge of EPI has been found to be one of the causes of poor utilisation of services and this has been demonstrated in this study. Collaboration between the training institutions and the programme is necessary so as to enable institutions develop curriculum based on the existing immunisation policies.

- One third of the health workers did not know tetanus as one of the EPI target diseases. It is possible that they do not understand that the main purpose of maternal tetanol immunisation is to prevention of tetanus in the newborn. This is further supported by the practice of health workers in the district not administering tetanol toxoid at routine vaccination sessions. This has resulted in missed opportunities. The midwives only administer it at the antenatal clinics. This could have been as a result of the old policy of administering TT only to pregnant women. The current policy is to target all women in the reproductive age for TT vaccination. In-service training needs to be strengthened in the district to periodically update the health workers on current policies regarding the vaccination programme<sup>2</sup>.

- The unavailability of guidelines was a surprise as copies of these guidelines and health education materials are available at the regional level. This confirms the anxieties that materials and information are sometimes not passed on to the district level from the regional levels. To improve the knowledge and skills of the peripheral workers these must be made available to them with periodic updates.

Qualified staff in adequate numbers are needed to ensure quality services at immunisation clinics.

- It is however worrying that there were inadequate qualified personnel at the immunisation sessions; this always led to increased workload on the few. A tendency will be to request other non-technical staff on the team to assist either in the vaccination or recording, and thus decrease the quality of the service. The long-term solution will be to improve the human resource situation in the district. An interim measure will require some basic training for the field assistants to assist in the recording whilst the technical staff concentrate on the administration of vaccines. The involvement of the district assemblies in sponsoring qualified people for training is another way of curbing this problem.

- Lack of supervision of health workers also denies the DHMT the opportunity of training them and also maintaining the standards required.

Certain important observations made in this study that could mar the quality of service and needs redress included:

- Selling of drugs at the vaccination points; this is bound to increase the cost of the service, which may deter people from patronising the services<sup>14</sup>. This concern was supported by members of the community who were involved in focus group discussions. Though immunisation services are free in Ghana, the FGD participants complained about the high cost of the services. The costs being referred to are nothing more than the drugs that are

sold and sometimes weanimix as well as child health records by health workers at the clinics. If the need for these drugs is felt and has to continue, then it should be provided by the district health directorate and as part of the free medical care to children under- five years.

Another aspect of the concern is that involvement in selling will not give the health workers enough time to counsel and educate the women on the EPI programme. Provision of adequate information to caretakers is very important for the sustainability of the programme<sup>15</sup>. Attention has to be given to this by all health workers.

Availability of logistics was also identified as one of the key elements to achieving quality services. For example, the unavailability of reserved power supply with frequent interruption of electricity supply could affect the storage of the vaccines and have a negative effect on the potency of the vaccines. In situations of inadequate and reliable means of transport an alternative poor supply is essential to maintain the potency of the vaccines. Power supply is unreliable and availability of transport inadequate and of grave concern as it hampers the effectiveness of outreach services. Every effort therefore needs to be made to facilitate the services.

Wherever vaccines are stored, a system of stock management must be in place to record all receipts and issues. This will make sure that they are used before their expiry date and that there are no stock outs or over stocking. The focus of the immunisation programme in the district had been on the coverage of the various antigens to the neglect of the management of the logistics. The consequence of this is the poor logistic management observed in the study. Supervisors will have to develop a comprehensive checklist to ensure regular assessment. Lack of reliable transport is

Administering doses appropriately and timely to children will impact on the quality of care. Immunisations administered appropriately and timely lead to valid doses<sup>8</sup>. The low proportion of children fully vaccinated before one year with valid doses poses a great challenge for the effective prevention of child hood mortality due to VPD. This would increase the number of susceptible children and

could lead to epidemic of any of the vaccine preventable diseases. This could be improved by reduction of the number of invalid doses. These invalid doses are either because the child was vaccinated before the due date of the interval between the antigens was less than one month. Though health workers know of the schedule for the various antigens, the practice was on the contrary. This could be because the health workers do not know the implication of not vaccinating at the correct age. It could also be due to poor documentation with wrong dates. As all children with invalid doses may not develop immunity the number of susceptible will gradually increase.

The first dose of the DPT-HepB+Hib (Pentavalent 1) is the first time that a caretaker voluntarily comes into contact with the service. This has been used to measure access<sup>16</sup>. With crude coverage of pentavalent 1 above 80 per cent, one can say there is good access .

Utilisation of the services was also found to be good as the drop out rates was below 10 per cent<sup>16</sup>. The challenge to the district is to achieve the national target of 90 per cent for all antigens. This can be done by reduction of the invalid doses and developing plans to reach every child.

The weakness in surveillance was attributed to inadequate trained personnel and transport. Training could be organised for the public health unit at the hospital to carry out this responsibility with supervision from the district health management team

The small number of reported cases of measles has been as a result of a mass measles vaccination covering all children 9 months to 14 years conducted in 2002 in the region. The establishment of goals to reduce measles cases by 90 per cent, eliminate neonatal tetanus, and eradicate poliomyelitis has increased the need for effective disease surveillance. The present surveillance system which is beset with lateness and incompleteness is not robust enough to identify any of the target diseases should it occur. With 35 per cent of community volunteers not reporting disease could occur without being noticed. The small numbers of reported cases of measles, pertussis, and the zero report of AFP and neonatal tetanus might therefore not be true reflection.

Lack of supervision and motivation for volunteers has led to apathy among the volunteers.

If the community based volunteers system is to function well, efforts must be spent on training, supervision and motivation of volunteers. These must therefore be adequately budgeted for in the plans of the district and sub-districts.

Certain limitations of the study are however noted:

- First of all we observed only 27 client provider interactions and may not represent the whole process of vaccination.
- Secondly the quality of the routine data on immunisation in the district could not be fully explored.

## CONCLUSION

With the gaps identified in the adequacy and management of logistics, deficiencies in knowledge of both caretakers and health workers, weakness in surveillance and high proportion of invalid doses given rise to less than forty percent of children fully vaccinated before one year, the EPI programme cannot be said to be of high quality.

As we move towards the achievement of the Millennium Development Goals, mechanisms will have to be developed to ensure that children and women have access to quality immunisation services. The resources available in terms of human, logistics and financial will have to be increased and well managed. The rich lessons of the house-to-house polio NID that has been a big success need to be used to reach the unreached. Proper micro-planning, social-mobilisation, mapping with list of communities, proper training and supervision are some of the strengths that could be draw upon.

With limited resources to the health sector, collaboration with all stakeholders especially the district assemblies and the community will be key. Potential sources of health promotion for EPI are the numerous chemical sellers and traditional healers in our communities.

## RECOMMENDATIONS

After assessing the quality of immunisation for Techiman District, the following recommendations are offered:

- Health promotional activities should also target men
- Most of the respondents are either Christians or Moslems, the churches and mosques could be used to deliver health educational messages.
- The staff must be trained in communication skills
- Procure and distribute health education materials on EPI to sub-district staff
- Train all health workers and aides in EPI
- Train staff in logistic management.
- Prepare simple pocket guide on EPI for EPI staff.
- Procure and distribute all the relevant guidelines with respect to EPI
- Conduct regular supervision at both static and outreach clinics
- Conduct periodic client satisfaction surveys at the clinics.
- Establish a functional Community based surveillance in each community
- Strengthen facility based surveillance
- Collaborate with District Assemblies
- Abolition of illegal collection of fees at immunisation sessions.
- Plan to reach every child by creating an operational district map containing each village, town and health facility, total population, all known hard to reach areas, and indicate on the map strategy to cover each community.

The recommendations, if applied, could go a long way in improving the overall quality of the Expanded Programme on Immunisation.

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