Report

DATA QUALITY AUDIT – Yemen
25th November to 14th December 2006

Global Alliance for Vaccines and Immunisations

EURO HEALTH GROUP
consultants

LATH
LIVERPOOL ASSOCIATES
IN TROPICAL HEALTH

Table of Contents

Executive Summary

Objective of DQA

The DQA has been designed to assist countries receiving GAVI support in improving the quality of their information systems for immunisation data. In addition, it calculates a measure of the accuracy of reporting.

Method

The DQA was undertaken by two external auditors and two national auditors who worked at national level of HMIS and EPI before visiting four districts and six health facilities in each district. The four districts and 24 health facilities were selected randomly. The standard DQA method (GAVI, 2003) was applied, which included use of interviews, administration of questionnaires and recounting.

Table 1: DQA Indicator Dashboard

	2003	**2004**	**2005**	**change since 2003**
Verification Factor (>0.8) *(Compares recounted to reported DPT3)*	0.735	n/a	0.999	+ 0.264
Core Indicators				
DTP3<1 Coverage	66%	78.4%	85.0%	+ 19%
Drop Out Rates		15.3%	16.5%	+ 0.8%
Safety of Injections and Vaccine Safety	n/a	Yes	Yes	
Wastage Rate (National level)	n/a	n/a	0.0%	n/a
Completeness of Reporting (National level)	n/a	94.2%	96.6%	+ 2.4%
Vaccine Stock-Outs	n/a	No	No	
Action Plans for Districts	n/a	Yes	Yes	
QSI at National Level	46%	n/a	84.9%	+ 38.9%
Average QSI for Districts	56%	n/a	93.78%	+ 37.75%
Average QSI for Health Units	58%	n/a	87.82%	+ 29.82%

Summary of principal findings and prioritised issues

The performance of immunisation services in Yemen as found during this DQA is very satisfactory, as can be seen in the graphs below. The ground work done at national level to design, produce, distribute and train health workers on the use of data collection tools at all level could be said to be at the base of this good performance. The overall result of this DQA was very good; a Verification Factor (VF) of 0.999.

During the audit, all health workers worked hard to make the mission a success. In addition, health workers at national, governorate and district levels are dedicated to their work and have a good understanding of problems linked to immunisation activities which they resolve in a satisfactory manner.

Reporting
The availability of data and vaccine management tools, coupled with proper used of these, makes this aspect of the programme well rated. Some improvement is still possible as 13 monthly reports from HUs were missing at district level and 12 monthly reports were missing at HU level out of the 288 monthly reports expected to be available at HU level.

Use of Data
Data is collected, promptly processed and copies are well stored in files designed for each district according to their respective Governorate. Monitoring of indicators such as coverage rates, drop out rates, timeliness/completeness of reports, vaccine wastage, stock outs and supervision activities are done regularly.

Design
Good directives have been issued from central level, as can be seen in the uniformity of data collection tools and the displayed instructions on filling and updating them. The Yemen programme has an interesting guideline document on the essential procedures of the EPI which has been well circulated to units at all levels.

Key Recommendations

- Tabulations of results for all antigens should be prepared and pasted. The Programme could consider creating its own journal, newsletter or magazine to publish its performances and other information related to the EPI.

- Vaccination activities should be increased by maintaining activities during official feasts, conducting outreach and mobile strategies all year round and advocating to address the problem of insecurity. This should be coupled with dynamic community mobilisation and involvement in vaccination activities.

- Reporting to higher levels from HU for vaccination by all strategies (fixed, outreach and mobile) should be aggregated on one report. Therefore, efforts should be made to keep and use evidence (tally sheets and registers) of vaccination activities in the health area concerned, even if the activity was carried out by a mobile team from the district. In this way coverage for each area will be more realistically expressed.

- A distinction should be made between the denominator of children under one (surviving infants) and pregnant women as per WHO guidelines.

- The denominator of pregnant women needs to be mastered at all levels to draw attention to the need to improve the currently poor vaccination coverage of this important target population of the EPI

- Guidelines for the surveillance and action to take in case of an adverse effect following immunisation (AEFI) should be developed and put in place at all levels. This should constitute part of the general EPI guideline.

1. Introduction

The Data Quality Audit (DQA) is part of the Global Alliance of Vaccines and Immunisation (GAVI) programme. It has been designed to assist the countries receiving GAVI support in improving the quality of their information systems for immunisation data. In addition, it calculates a measure of the accuracy of reporting, the country's 'verification factor' for reported DTP3 vaccinations given to children under one year of age (DTP3 <1). In 2006, the DQA is being performed in five countries. It is hoped that participation in the DQA will assist each country in understanding the extent and details of the verification, while providing guidance on how the country's system for recording and reporting immunisation data can be improved. It is the explicit goal of the DQA to build capacities in the participating countries.

This DQA was undertaken in Yemen, from the 25th November to 14th December 2006 by the following team:

Table 2: Auditors

Name	***Position***	***Districts Visited***
Mr Njweipi Jet	*External Auditor*	*Jabel Ash Sharq, Bajil*
Dr Tollo Bienvenu	*External Auditor*	*Ba'adan, Al - Misrakh*
Dr Abdul Nasser Rubai	*National Auditor*	*Jabel Ash Sharq, Bajil*
Dr Mohammad Emad/Mr Muaad Al-Hakimi	*National Auditor*	*Ba'adan, Al - Misrakh*

The team worked at the national level of HMIS and the EPI before going to district and health facility levels. Based on a random selection carried out in advance, the following four districts were visited: Ba´adan, Bajel, Al-Misrakh and Jabal Ash Sharq. Only secure districts were included in the sampling. As such, a total of 157 districts (47%) with 31% of the reported DTP3<1 for the audit year were not included in the sampling.

Six Health Units (HUs) were selected randomly in each of the four selected districts (24 HUs for the audit exercise). However, 13 of the 55 HUs in the four selected districts were not eligible for sampling (9 regular HUs and 4 districts mobile teams). Of the 9 HUs which were not eligible for selection:

- In Bajel district, two HUs were insecure (recent inter tribal conflict);
- In Al-Misrakh district, three are non functional in 2006;
- In Jabal Ash Sharq district, two were insecure (inter tribal conflict) and two were inaccessible due to impassable roads.

All selected districts and health units were visited according to a pre-established schedule.

A debriefing meeting was held on 16th December 2006 with members of the Interagency Coordinating Committee, presided over by the Minister of Public Health of Yemen (See attendance list in Annex 1).

2. Background

Country Profile

Yemen is situated in the south western corner of the Arabian Peninsula occupying an area of over half a million square kilometres. It is bordered by the Kingdom of Saudi Arabia to the north, the Arabian Sea and Gulf of Aden to the south, Sultanate of Oman to the east, and the Red Sea to the West. The natural topography of the country divides it into four major regions: costal, highlands, Tihama plateau and the eastern plateau in addition to many islands in the Arab and Red Seas.

Yemen has a population of 21,069,869 as of the year 2005 (based on estimates from the latest national population census in 1994) in more than 122,000 settlements and villages.

The population is predominantly rural, where 76% of Yemenis live, and the under-15 age group represents 46.3% of the population with a rapid annual growth of 3.5%.

Administratively, the country is divided into 22 governorates which are further divided into 333 districts, each of around 45,000 inhabitants. Yemeni society is labelled as traditional, with the agricultural sector absorbing about half of the total work force. Easy access to health care by both rural and urban populations is estimated at about 62%.

The Ministry of Health and the EPI
The health structure of Yemen is divided into 3 levels as demonstrated by the following table:

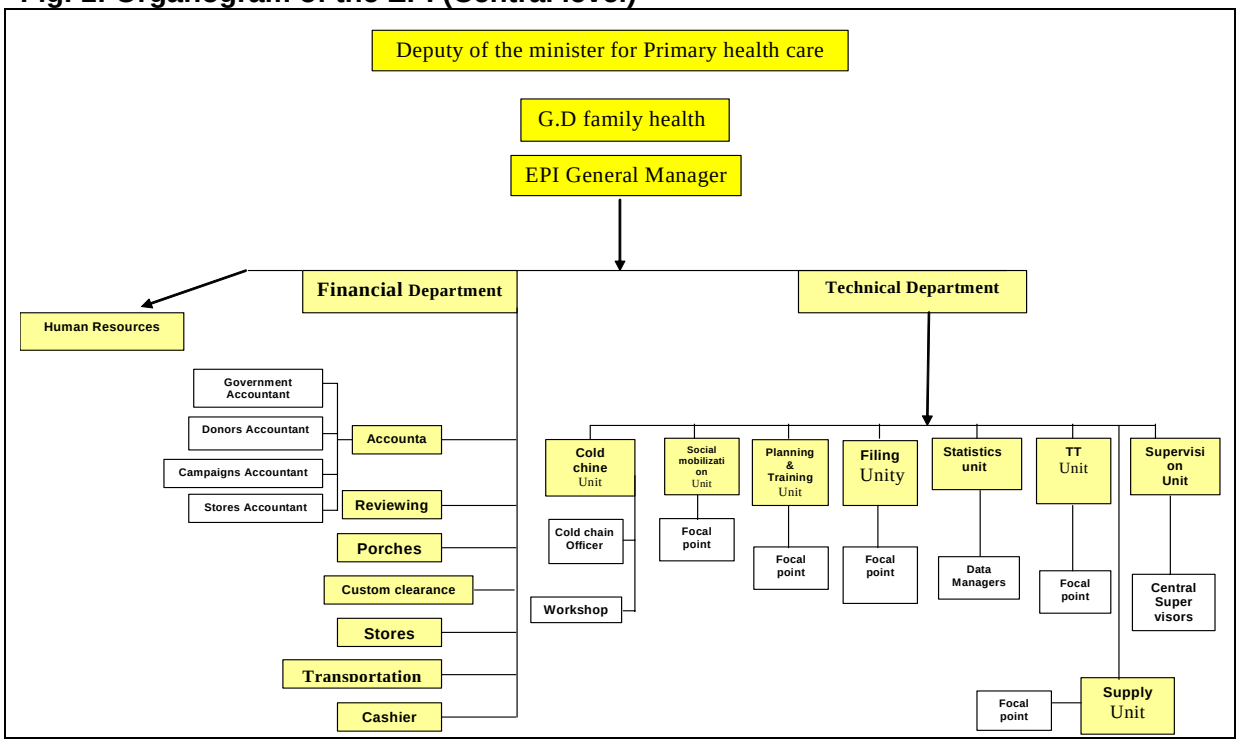
Table 3: Levels of the health structure

National (Central) level For elaborating health policies	**Intermediate level** Helping to transmit the policies to the peripheral level and ensuring effective execution as prescribed	**Peripheral level** Execution of the country's health policies as prescribed	
Ministry of Health	**Governorate (22)**	**Districts (333)**	**Health Units**

Information flow (including immunization) follows the same schema, namely: the central level through the intermediate level through the districts to the health facilities and vice versa. The basic documents which generate immunisation information from the health unit to the national level are immunisation cards, tally sheets and EPI reports. These documents are sufficiently available in the field at no cost.

This following diagram shows the organogram (at central level) of the EPI and the analysis of the immunization system components which are divided into two main parts: routine immunization & disease surveillance:

Fig. 1: Organogram of the EPI (Central level)



Routine immunization

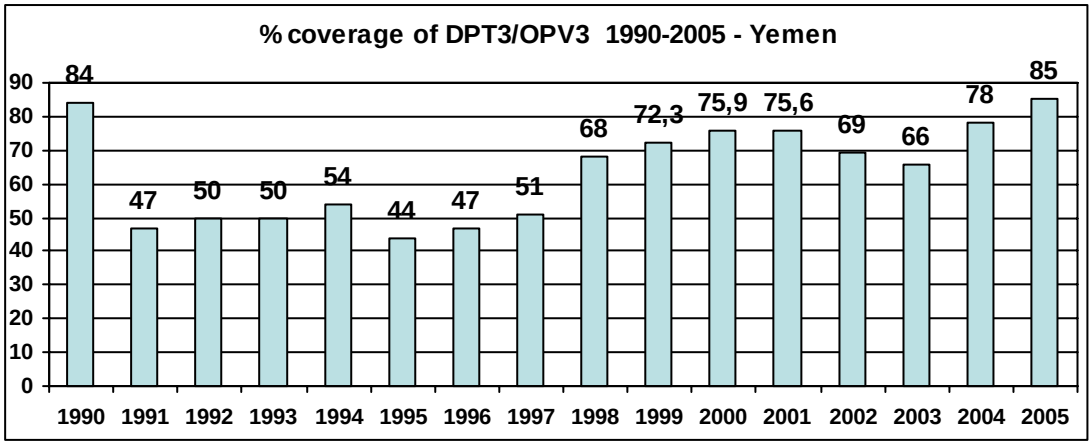
Historical review of routine coverage

EPI activities, as measured by reported coverage, underwent gradual development until 1987. Reported coverage in 1990 for DPT3/polio3 and measles immunization reached 84% and 74% respectively due to the conduction of a national campaign supported by WHO and UNICEF. Due to discontinuity of support during the period 1991–1997 the reported DPT3/Polio3 coverage deteriorated to around 40%. In 1998, the coverage rate increased to 68% and continued to be around 70% until 2001. Additional resources and revitalization of the programme contributed to this substantial increase during this period.

Unfortunately, coverage declined in 2002 and 2003 to 68% and 65% respectively due to a management gap. Those management gaps have been overcome to a large extent, which is reflected in the increased coverage in the following years. Further analysis will follow on the reason behind the increased coverage in 2004 and 2005.

In general, the reasons for low immunization coverage is due to poorly functioning health services and facilities in rural areas, limited vaccination outreach activities, difficult access to the immunisation services, and limited awareness in the local communities regarding the importance of child immunization.

Figure 2: % coverage of DPT3/OPV3 1990-2005



Source: National EPI

Analysis of routine coverage

The increased coverage in 2004 (78%) was attributed to an acceleration campaign conducted in 159 low coverage districts. In 2005, and for the first time, DPT3/OPV3 coverage reached 85%. The main reason for this achievement was the adoption and nationwide implementation of the Reach Every District (RED) approach, which mainly comprises outreach activities. With technical support from WHO, efforts were exerted to advocate the outreach activities. Therefore, an advocacy Excel sheet has been developed and used to convince the decision makers about the importance of these outreach activities in reaching the un-reached children. The Excel sheet presents many scenarios, including analysis of the cost of outreach and mobile sessions and the expected coverage increase as a result of the outreach activities.

The concept of the outreach activities was introduced in a national workshop attended by H.E. MOH and the leaders in the governorates. The outreach depended basically on micro-plans developed by the district staff and the vaccinators themselves. Many workshops have been convened for training on formulating micro-plans at the health facility level. The micro-plans contained maps of the catchments area and for every mobile team, and timetable for each outreach & mobile sessions. Although many partners contributed to the cost of the

outreach, the Government of Yemen's contribution was greatest. The WHO/UNICEF recommended RED approach has 5 components, namely:

1. Re-establishing of outreach services: with regular outreach for communities with poor access

2. Supportive supervision: including on site training by supervisors

3. Linking services with communities: especially regular meetings between community and health staff

4. Monitoring and use of data for actions: including chart doses, map population in each health facility

5. Planning and management of resources.

3. Key findings

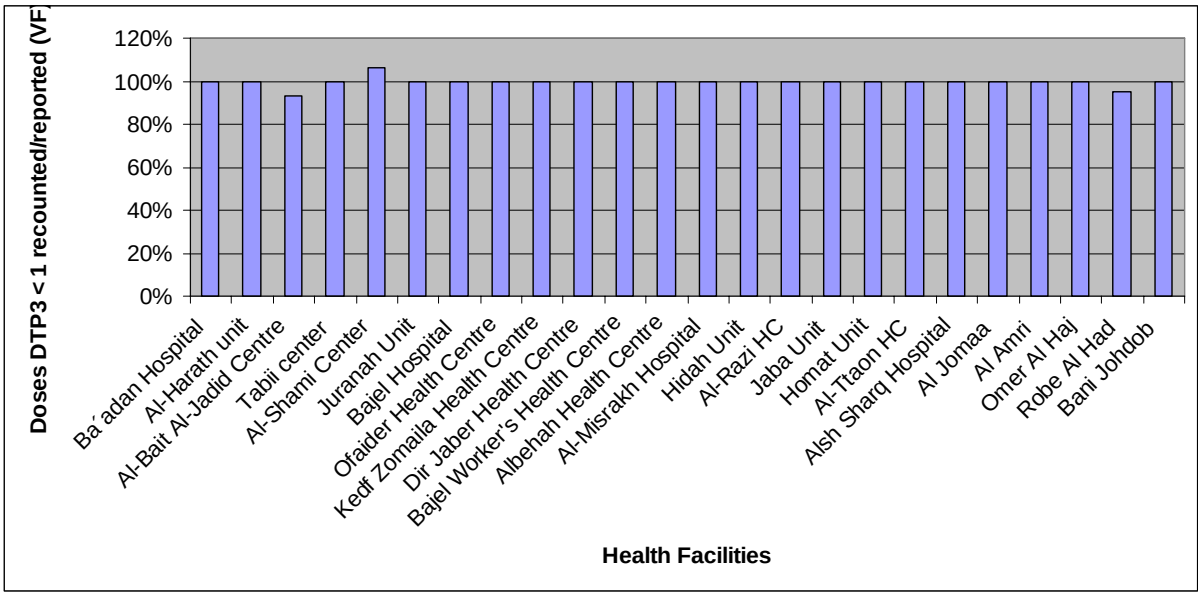
3.1 Data Accuracy

Data accuracy is measured by the verification factor (VF). The VF refers to the ratio of DTP3<1 recounted at selected health units to DTP3<1 reported by the health units to their respective districts for a full calendar year. The VF for Yemen is **0.999 (95% confidence intervals 0.99 to 1.00)**; well above the GAVI threshold of 0.80.

The factors that contributed to the high VF, with high narrow confidence intervals, include the following:

1. HUs/Districts recounted/reported-values: In 21 of 24 heath units the recounted and reported doses were equal (Fig. 3). Only two health units (Al-Bait Al-Jadid and in Ba´adan district and Robe Al-Had Unit in Jabal Ash Sharq district) had recounted values slightly less than reported ones and one health facility (Al-Shami centre in Ba´adan health district) had recounted values slightly higher than the reported. The insignificant inconsistency for the three health units resulted mainly from arithmetical errors at district levels.

Fig. 3: Recounted value of DPT3<1 at HU level



2. District and Central Levels: errors between reports at the district and central levels can also compromise the VF. Table 4 shows the level of consistency between reports and tabulations found at the district and central (EPI) levels. Ideally, all four values should be equal. Inconsistency was noted only between the reports found in Ba´adan and those at the central level and district tabulation. This insignificant difference (89 DPT3<1) arose from tabulation errors at district level. All totals for the health units were entered correctly, but a calculation error (addition) was made during the tabulation.

Table 4: DTP3<1 data at district and central level

	Ba´adan	Bajel	Al-Misrakh	Jabal Ash Sharq
Nat. Distr. Tab.	3195	4647	3181	1970
Nat. distr. Rep.	3195	4647	3181	1970
Distr. Tab.	3195	4647	3181	1970
Distr. Rep.	3284	4647	3181	1970

3. The reported JRF value and the national data: for Yemen, the JRF reported DTP3<1 for 2005 and the latest national district tabulation was equal (601,123). Also the comparison of the latest national tabulation and latest national district tabulation was equal (601,123).

In conclusion, Yemen's high verification factor in the current DQA is due to:

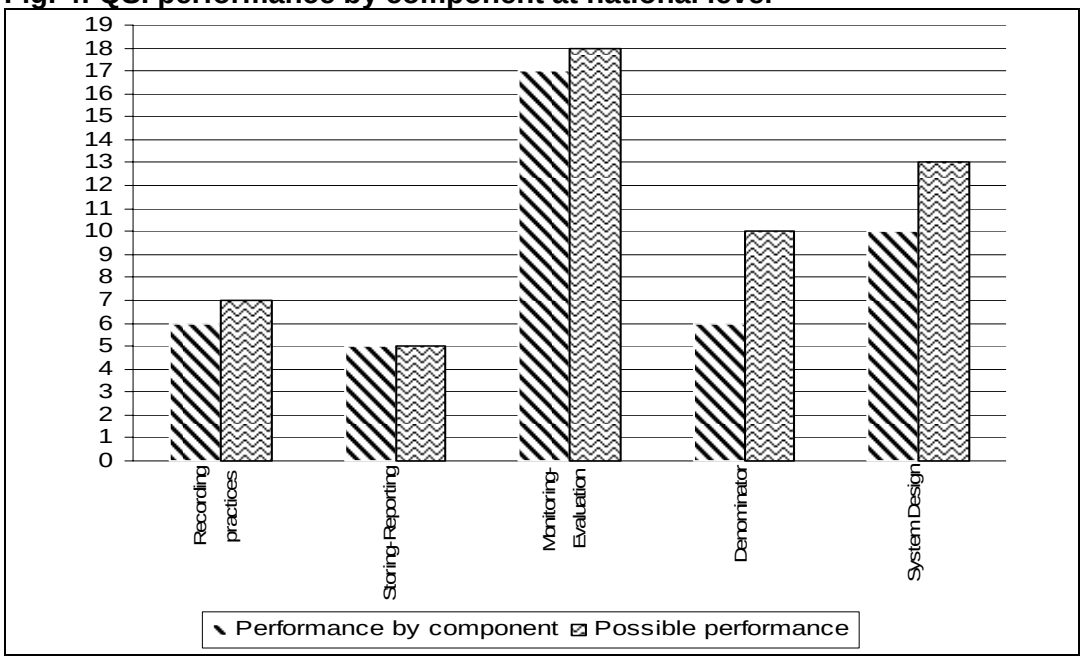
- the excellent performance of the health units visited. Twenty one of the 24 health units had a VF of 100% (recounted and reported doses were equal). Amongst the remaining three, one had VF slightly higher than 100%, two had VF slightly less than 100%;
- the excellent data consistency between the reported JRF value and the national data;
- the high data consistency between central and district levels.

During this DQA in Yemen no evidence of "creative accounting" or mis-management of data were found.

3.2 Key Issues at National Level

The quality of the system index (QSI) at central level is 84.9%. The central level has excellent storing & reporting practices, but the recording practice, system design, monitoring & evaluation and denominator issues still pose a few problems – as shown in Figure 4.

Fig. 4: QSI performance by component at national level



The availability of data and vaccine management tools, coupled with proper used of these, makes this aspect of the programme well rated. Although this audit coincided with the EPI Unit transferring to a new building with things not quite completely arranged, the auditors noted that data was still collected, promptly processed and copies well stored in files designed for each district according to their respective Governorate. Data is handled by a very capable team on computers that are networked between themselves and with those of other offices (such as the manager's and others) of the EPI. Backups are regularly made on compact discs and memory sticks and copies are stored with the Data Manager, the EPI Manager and the EPI Focal point at WHO.

Monitoring of indicators such as coverage rates, drop out rates, timeliness/completeness of reports, vaccine wastage, stock outs and supervision activities are regularly done. This can be seen on the displayed charts and tables for the audit and current year.

Though the mastery of the population figures continues to be a problem, it changes every year according to the growth rate (3.5%). Good directives have been issued from central level as can be seen in the uniformity of data collecting tools and the displayed instructions on filling and updating them. The Yemen programme has an interesting guideline document on the essential procedures of the EPI which has been well circulated to units at all levels.

Recording practices

- Record keeping for Tetanus Toxiod (TT) should also and regularly be updated in the vaccine ledger.

Storing and reporting

- There is no particular issue relating to this aspect.

Monitoring and evaluation

- There is no publication in a form of a newsletter, journal or newspaper of the EPI relating to its matters and performance.

Denominators

- For the audit year 85 districts (25.5% of all districts) for immunisation of children (DTP3<1) and 7 for immunisation of pregnant women (TT2+) had a vaccination coverage score over 100%, suggesting a poor mastery of population figures, especially in towns. The reasons given are the preference by mothers of certain vaccination centres to others. However, this cannot explain the large number of districts with DTP3<1 coverage over 100% with one district calculating coverage of 224.7%. The most obvious reason must be in-correct denominators, which put a question mark about the overall DTP3<1 coverage rate of 85.0%.
- The denominator for pregnant women is the same as that of children under one year.
- Vaccination coverage for pregnant women is low

System design

- Reporting is not integrated between the EPI and other programmes as the EPI reporting is independent. This is a major issue which should be addressed by Yemen.
- A procedure for surveillance and management of adverse effects following immunisation (AEFI) has not been put in place.

3.3 Key Issues at District Level

The mean QSI for the four districts is 93.78%. As illustrated in Figure 5, the QSI component is very good across the board in recording practice and storing and reporting. The components of demographic & planning matters and monitoring & evaluation however still

have some issues to be addressed in one district (Bajel) for monitoring & evaluation and in all the districts for demographic & planning matters. The quality indices for the four districts are illustrated by the following table:

Table 5: QSI for the districts

District	Percentage
Ba´adan	96,9%
Bajel	87,5%
Al-Misrakh	93,8%
Jabal ash Sharq	96,9%
Average	93,78%

Fig. 5: QSI performance by component for all districts level

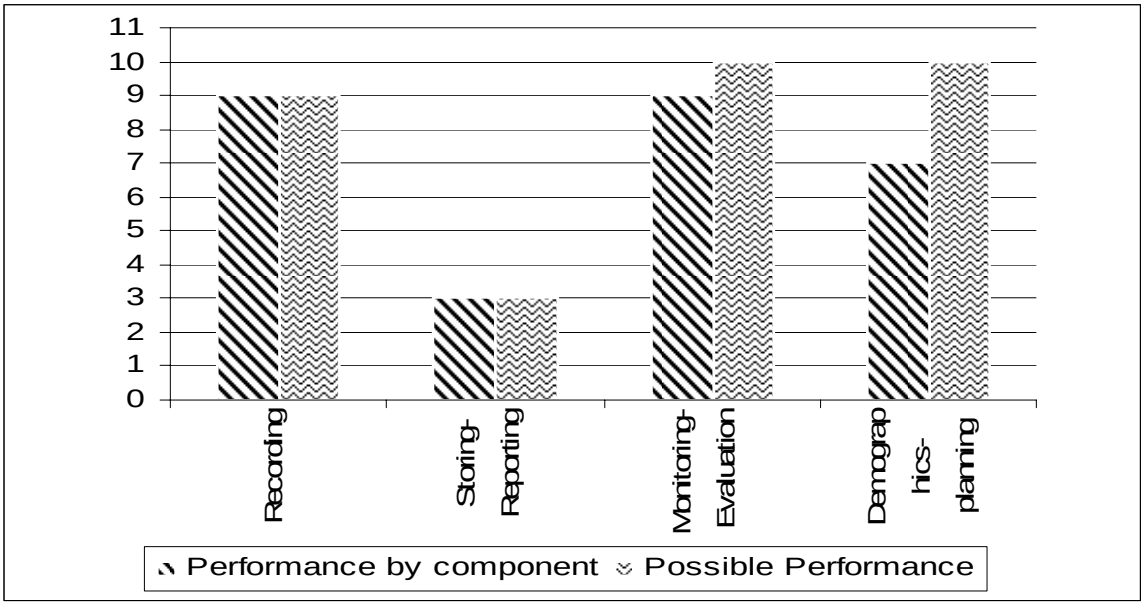
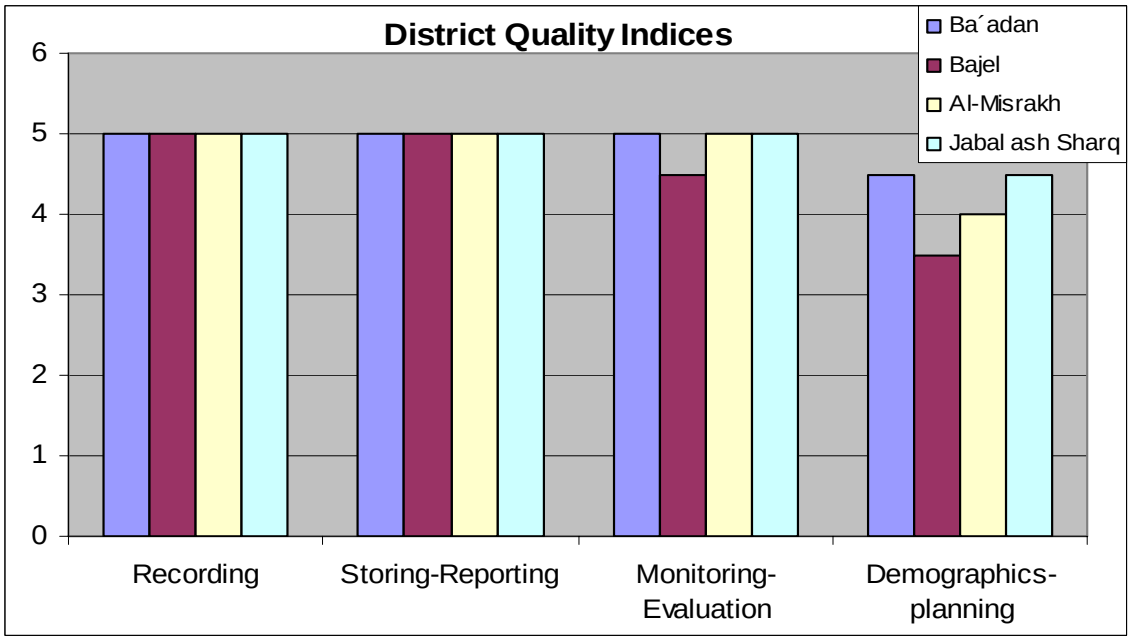


Fig. 6: Quality indices by district



Demographic matters and planning

- A good mastery of target population was demonstrated at district level and figures were identical to those used at national level (with one district recording a figure of 4,098 compared to the national level figure of 4,097).
- Micro-plans are generally drawn up.
- Maps of catchments areas are on display.

The issues to address related to this component are:

- The denominator difference for different programmes (Ba'adan and Al-Misrakh).
- No good mastery of the target to be vaccinated per year, especially pregnant women. This links to the poor vaccination coverage with TT (average 27% for the four districts visited). This was explained by customs. Women rarely attend health facilities with only male staff.

Monitoring and Evaluation

- Good use and display of monitoring chart (graph) with indicators such as drop out rate and immunisation coverage rate;
- Displayed charts for monitoring timeliness and completeness, vaccine wastage and stock outs and supervision schedule which is generally respected.
- Regular feedback and data monitoring meetings.

The issues to be addressed here are:

- Too many breaks in vaccination activities due to problems of insecurity, festivals, and designed periods for outreach and mobile strategies vaccination.
- The supervision schedule for one district (Bajel) is not well prepared and displayed.
- Lack of definite instructions on handling AEFI.

Recording Practices

- Report and tally sheets formats and vaccination registers are uniform, made in duplicated thick booklet form and well understood and used by all the 24 health units of the four districts visited.
- On arrival at the district, reports are promptly stamped, dated and signed by the officer in charge.
- Vaccine ledgers are used in all the districts visited and are uniform. They are well kept up to date for all antigen, including pentavalent and tetanus toxoid.
- All records of receipts for the audit and current year are available. Records are kept of the large stock of auto disable syringes, reserve vaccination cards etc.

This is evidently the best component of the programme as there is no particular issue to address.

Storing and Reporting Practices

- Large, well secured folders are provided to file reports arriving from the health units and arranged by month.
- Reports are stamped and signed and data is promptly processed – the monitoring charts are up to date in the four districts audited.
- The procedure for dealing with late reports is available and even pasted.
- 13 monthly HU reports out of 288 were not found at district level with 12 of the monthly reports not found at HU level. In a well functioning reporting system each HU should submit a monthly report even with "zero" reporting.

The issues to address here are:

- Tabulations are generally not made and pasted on the monitoring chart for other antigens except DPT or pentavalent.

- Data is not yet managed on computer at any of the districts visited, so there is no system of back up except the filed hard copies.

The following table illustrates the number of children under one year vaccinated in the four selected districts with DPT3 or Pentavalent 3, the difference the change in the reported to the year previous to the audit, and the coverage and drop out rates.

Table 6: Number vaccinated, coverage and drop out rate in the four districts

	Vaccinated < 1year in 2005	Difference with year previous to audit	Coverage	Drop Out Rate
Ba´adan	3195	862	66%	7%
Bajel	4647	659	71%	19%
Al-Misrakh	3181	-156	78%	14%
Jabal ash Sharq	1970	336	94%	33%
Average	3248	425	77%	18%

As can be seen from the above table, although Al-Misrakh and Jabal Ash Sharq have high scores - 78% and 94% respectively - they could still do better. Al-Misrakh could not vaccinate the number of children it vaccinated the previous year (2004) while Jabal Ash Sharq has a big drop out rate (33%), the biggest of all the four selected districts. Ba'adan and Bajel have to make efforts to increase their coverage to at least 75% each. The other area which is not presented on the table but which warrants particular attention by all the districts is making an effort to improve on the vaccination coverage of the other EPI target group – pregnant women.

3.4 Key Issues at Health Unit Level

The mean QSI for the 24 health units is 87.82%.

Recording
The immunisation data collection tools used in health units comprised immunisation registers and tally sheets. The tallying was so well done that the auditors had no problems extracting the required data. However, we noted the following shortcomings:

- There is no vaccination of pregnant women in some HUs: Al-Harath in Ba´adan District, Ofaider and Dir Jaber Health Centre in Bajel District.
- Stock keeping for vaccines and injection material was very satisfactory in the audit and current year. In the audit year (2005), the majority of the visited health facilities (22 out of 24 health units) were using ledger books for vaccine and injection materials. However, daily stock management in the current year is particularly poor in some health facilities in Bajel and Jabal Ash Sharq as updating is done monthly. The Health Units in Al-Misrakh District had very satisfactory stock keeping. However, a "negative" DPT vaccine wastage was recorded at 11 HUs out of the 24 HUs visited, which indicates some problems with appropriate vaccine stock ledger management.

- HUs do not generally record batch-number for issued vaccine.

Storing and reporting
In all health units visited, documents were well filed. Immunisation registers, monthly reports and tally sheets (for the audit and, sometimes, previous year) were well filed by date. However, the auditors noted some deficiencies in the use of monthly report forms. After the introduction of pentavalent vaccine (DTP + Hep + Hib) and outreach, data is reported

separately on a second identical form without any report carrying the general aggregate. This will not permit the HU to appreciate its own performance on the spot.

Zero-reporting is still a problem for the months where there was no vaccination session or the HU has been closed. This was observed in 7 of 24 HUs with missing reports for some months.

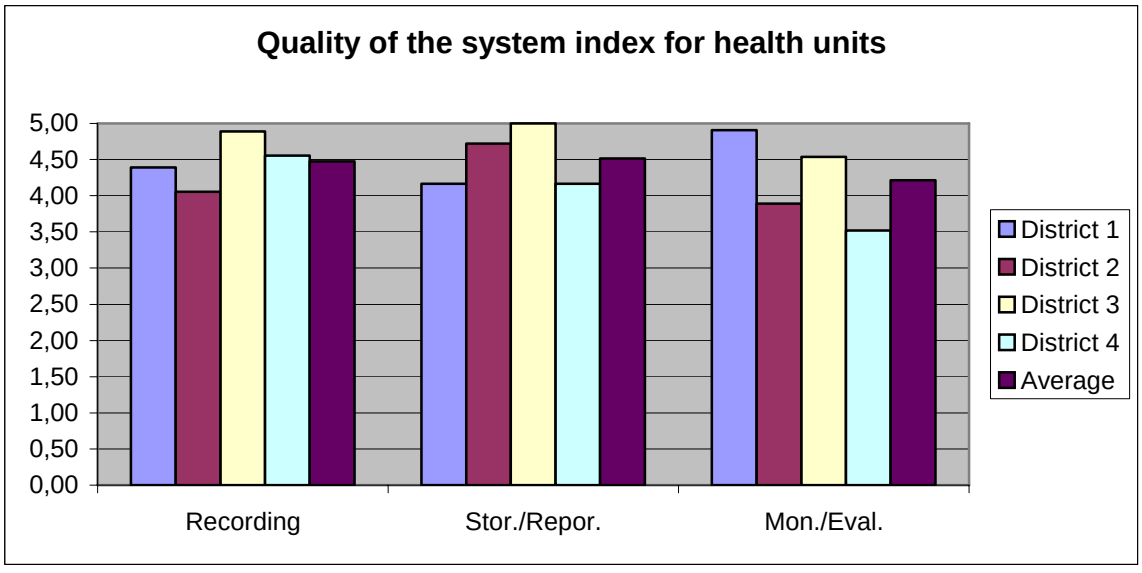
In all health units visited, the staff are not aware of AEFI standard operating procedure.

Monitoring and evaluation
Most health centres visited carried out very good monitoring of vaccination indicators such as coverage, drop-out and wastage rates, with monitoring charts well displayed. However, fixing objectives of numbers to be vaccinated was not a regular exercise in most of the health units in Bajel, Al-Misrakh and Jabal Ash Sharq districts (not earlier calculated and displayed), for children under 1 and pregnant women. The reasons for this are mainly:

- some health workers did not carry out annual tabulations of immunisation data for all antigens, and consequently have difficulties in fixing coherent, realistic and realisable objectives. This can be attributed to lack of training.
- in some health units, where the vaccinator is a man, women do not attend vaccination sessions due to customs barriers. This situation is different in some health units such as Bajel Workers in Bajel health district and Hoamah in Al-Misrakh health district where female midwives do vaccination. In Hoamah for instance, the HU has increased the TT coverage from 16% (audit year) up to 70% (current year).

Figure 7 below shows the variation in the mean health unit QSI per district. Generally speaking, the health units performed very well. The best performance was observed in storing and reporting practices as well as for recording practices and was good across the board. For monitoring and evaluation however, some health units (in Bajel and especially in Jabal Ash Sharq) still need to make some efforts.

Figure 7: Health unit QSI for each component per district



3.5 Core indicators

Vaccine Safety
Auto-disable syringes and safety boxes were available and used in all health units visited, and no stock-outs were reported. However, in some health units there were no stock cards for monitoring the receipt and issue of injection materials.

On the monthly report form there is no provision for reporting of AEFI, and there are no guidelines on AEFI investigation and management. The current practice only requires all AEFI cases to be referred to a medical doctor.

Wastage

Table 7: DQA Vaccine Wastage Rates (Weighted Means)

	Ba'adan	Bajel	Al-Misrakh	Jabal Ash Sharq
District WR (unopened)	0	0	0	0
Average WR for Hus (opened and unopened)[1]	n/a	n/a	n/a	n/a

National WR (unopened): 0 (from excel spread sheet); but 7% recorded at the time of the audit)
Weighted Mean of the 24 HU wastage rates: n/a

The vaccine stock for the various antigens is obtained from stock keeping books. In health units, according to the declaration of health workers, wastage is generally from opened vials, as it is extremely rare for unopened vials to expire, break or freeze at the health units. Wastage rates are calculated by the health workers in all health facilities visited. But the wastage rate calculated by the HUs did not necessarily reflect the reality in the field. There may be some confusions in the calculation of the WR after introduction of pentavalent vaccine in March/April 2005.

Completeness of Reporting
The completeness of reports at central level is 96.6%. All health units report data on time. Monthly reports are carried to the district office by the health workers themselves, in the first week of the following month. Therefore, transmission of reports from health units to districts is reliable. Each district carries out a district synthesis and transmits a monthly report to the Governorate EPI officer in the second week of the month. Data synthesis is either computerised but in most of the districts done manually for those without computers. In most cases, the district medical officers carry the monthly reports to the Governorate themselves.

The Governorate, in turn, makes its own monthly synthesis and couriers this, along with all district reports, to the central level by air or by road in the third week of the month. The central level then uses the district reports to carry out a national synthesis in the last week of the month.

All monthly reports for the four visited districts were found at national level. HUs' monthly reports were found at the districts as follows:

Table 8: Availability of HUs reports at district level

District	Ba´adan	Bajel	Al-Misrakh	Jabal Ash Sharq
Completeness of health unit reports	77.8%	91.7%	86.1%	92.9%

HUs should submit a monthly report every month even if "zero" reporting.

Other core indicators
- The national DTP3<1 coverage and the DTP drop-out rates were respectively 85% and 16.5% in 2005;
- Between 2004 and 2005, reported DTP3<1 increased by 68,267;

[1] Weighted mean of the 6 HUs in that district. Note beginning balance + receipts – ending balance = total use. Total units used (at all 6 HUs)/Total wasted (at all 6 Hus) = weighted mean for district

- The proportion of districts between 2004 and 2005 with DTP3<1 above 80% increased from 44.0% to 55.6%. However, this figure may be less accurate due to problems with accurate denominators (see comment above).
- The proportion of districts between 2004 and 2005 with DTP<1 drop-out rate less than 10% decreased from 36.9% to 30.2%.

Table 9 below shows these indicators for 2005 in the districts visited.

Table 9: DTP vaccination coverage per district in 2005

District	DTP3<1 coverage 2005	DTP1<1 to DTP3<1 dropout rate	Change in DTP3<1 (2004-2005)
Ba´adan	65.5%	7.4%	+ 862
Bajel	70.7%	19.0%	+ 659
Al-Misrakh	77.6%	14.0%	- 156
Jabal Ash sharq	94.5%	33.1%	+ 336

Between 2004 and 2005, Jabal Ash Sharq health district improved in vaccination coverage more than the other districts; though the district vaccinated fewer children than Ba´adan and Bajel districts. In Al-Misrakh health district, the change in reported DTP was unsatisfactory with 156 fewer vaccinated children under one in 2005. The DTP drop out rate was highest for Jabal Ash Sharq (33.1%) and least for Ba´adan (7.4%) health districts.

NB: *Data presented in Table 9 comes from calculations done with the GAVI Excel spread sheet from central level reports, and are not necessarily identical to data obtained from the district health management team during the audit (please refer to page 22, in the appendix). Data from the two sources should be consistent, but data processing deficiencies in some districts led to the differences observed.*

3.6 Changes Since last DQA

The Yemen EPI performance in the 2003 DQA was not satisfactory. Since then a great effort has been put in, which has led to a big improvement in data management at all levels. Whereas the verification factor (VF) following the last DQA in 2003 was under the GAVI acceptable level (0.80), the programme during the current audit has scored an excellent VF of 0.99. The DTP3 coverage rate increased from 66% (in last audit year 2003) up to 85% in 2005 (current audit year).

The table below shows the comparison of other data at national level between the last and current evaluation. As can be seen in table 10 below, the quality of the system index QSI improved very drastically at all levels.

Table 10: Changes in core indicators from 2003 to 2005

	2003	2005
Verification Factor (VF)	0.735	0.999
DPT3 Coverage rate	66%	85%
QSI National	46%	84.90%
QSI District	66%	93.78%
QSI HU	58%	87.82%

4. Recommendations

4.1 Priority recommendations

- Tabulations of results for all antigens should be prepared and pasted. The EPI could consider creating its own journal, newsletter or magazine to publish its performance and other information related to the EPI.

- Vaccination activities should be increased by maintaining activities during feasts, conducting outreach and mobile strategies all year round and advocating to address the problem of insecurity. This should be coupled with dynamic community mobilisation and involvement in vaccination activities.

- Reporting to higher levels from HU for vaccination by all strategies (fixed, outreach and mobile) should be aggregated on one report. All efforts should be made to keep and use evidence of vaccination activities (tally sheet and register) in the health area concerned, even if the activity was carried out by a mobile team from the district. In this way, coverage for each area will be more realistically expressed.

- A difference should be made between the denominator of children under one (surviving infants) and pregnant women

- The denominator of pregnant women needs to be mastered at all levels to draw attention to the search and vaccination. This should improve the currently poor vaccination coverage of this important target population of the EPI

- The population to be vaccinated by each strategy needs to be mastered

Guidelines for the surveillance and action to take in case of adverse effects following immunisation (AEFI) should be elaborated and put in place at all levels. It should also constitute part of the EPI guideline.

- Immunisation activities should be reported as part of the integrated reporting system.

4.2 Other recommendations

Recording

- In the vaccine store all antigens including TT should be registered in the vaccine ledger and regular periodic inventories done by the staff to ensure that the physical count agrees or is adjusted to tie with the registry in the ledger. Putting this information on computer (which is usually not done immediately) can then serve as a duplicate and back up.

Storing/Reporting

- The the data management team needs to be increased and staff members motivated;
- Reporting to higher levels from HU for vaccination by all strategies (fixed, outreach and mobile) should be aggregated on one report. Therefore all efforts should be made to keep and use evidence of vaccination activities (tally sheet and register) in a given health area in the health area even if the activity was carried out by the district mobile team. This way coverage for each area will be more realistically expressed.
- Tabulations of results for all antigens should be prepared and pasted.

Monitoring/Evaluation

- The Programme should start thinking of gradually introducing computers in the districts to facilitate the treatment and storing of data and other EPI information.
- Supervision schedules should be drawn and posted by all.

- The minutes of monitoring meetings should be regular developed and kept. Aspects such as key points, resolutions and the attendance list should be understood to be important parts of these minutes.
- Vaccination activities should be increased by maintaining activities during feasts, vaccinating by outreach and mobile strategies year round activities and creating dynamic community mobilisation to and involvement in vaccination activities.

Demographics and planning

- A distinction should be made between the denominator of children under one (surviving infants) and pregnant women.
- Realistic population data should be used to calculate denominators to prepare realistic targets for each catchment area. Children coming from other areas for vaccination should be recorded and reported separately to the HUs' catchment area to avoid coverages of over 100%, as observed in some districts.
- The denominator of pregnant women needs to be mastered at all levels to draw attention to the search and vaccination. This should improve the currently poor vaccination coverage of this important target population of the EPI
- Harmonise the populations used by all the programmes.
- Determine and publish the objective in numbers of the target to be vaccinated by each strategy at the beginning of each year.

System Design

- Integrated reporting is encouraged between the EPI and other programmes under the supervision of the information system of the Ministry of Health.
- Guidelines for the surveillance and action to take in case of AEFI should be put in place at all levels. This should be inserted into the general guideline of the EPI

ANNEXES

I. **Key Informants** - names and functions of those seen/visited and place and time of each visit to a facility: includes central and district staff, those attending the debriefing, and a list of the facilities visited*, but not* the names of each HU staff.

II. **Quality Index Analysis Table**

III. **Core Indicator Tables** (national and 4 Districts)

a. National, district and HU performance indicators (any additional analysis that is not presented in the body of the report) represented by facility, district and country of the data quality questionnaire.

ANNEX I - KEY INFORMANTS (DISTRICT AND NATIONAL) AND HEALTH UNITS VISITED

Health Units by District

District 1	District 2	District 3	District 4
Ba´adan Hospital	Bajel Hospital	Al-Misrakh Hospital	Alsh Sharq Hospital
Al-Harath unit	Ofaider Health Centre	Hidah Unit	Al Jomaa
Al-Bait Al-Jadid Centre	Kedf Zomaila Health Centre	Al-Razi HC	Al Amri
Tabii center	Dir Jaber Health Centre	Jaba Unit	Omer Al Haj
Al-Shami Center	Bajel Worker's Health Centre	Homat Unit	Robe Al Had
Juranah Unit	Albehah Health Centre	Al-Ttaon HC	Bani Johdob

District 1

Name	Position
Dr. Abdul Karim Al-Dois	Director Public Health
Mr. Jemil Ali Mouthna	EPI Focal Point District
Mrs abtihah Hassan	Cold Chain Officer

District 2

Name	Position
Mr. Ahmad Ali Burke	District Supervisor EPI
Mr. Mohammed Nasser	Cold Chain Manager
Mr. Faroo Mohammed	District Chief of Health

District 3

Name	Position
Mr. Mahmood Abdullah Abdul Haq	Director of District Office
Mr. Sadak Kasim Al-Barakani	EPI Focal Point
Mr. Ebrahim Mohamed Al-Sakher	Store Officer
Mr. Abdel Baset Al-Dabaee	Director Primary Health care

District 4

Name	Position
Dr. Mohammed Al-Murlada	District Chief of Health
Mr. Ali Meshreh	District Supervisor EPI
Mr. Abdul-Hakim Al-Nahari	Supervisor EPI Damar Governorate
National Level	
Name	**Position**
Dr. Majid Al Jonaid	Deputy Minister of PHC Sector
Dr. Ghulam Popal	WHO Representative Yemen
Dr. Mohammed AL-Emad	National EPI Manager
Dr. Abdul Nasser Al-Ruba´ai	EPI supervisor
Dr. Osama Mere	WHO Focal Point EPI
Dr Kamel Ben Abdallah	Health and Nutrition Officer, UNICEF
Mr. Muaad Al-Hakimi	Data Manager WHO/National
Mr. Ibrahim Al-Ansi	Data Manager WHO/National
Ms. Ghada Showgi Al- Haboub	EPI
Mr. Aref Hisam Anaam	Officer in Charge of CC
Mr. Abdul Hakim Malek	Store Accounter
Mr. Abduh Mohammed Al-Kori	Store Maintenance Officer

Debriefing	
Name	**Position**
Prof. Abdul Kareem Rasea	Minister Of Public Health Yemen
Dr. Majid Al Jonaid	Deputy Minister PHC Sector
Dr. Ghulam Popal	WHO Representative Yemen
Dr. Dhekra Dannu Zaili	Unicef,
Dr. Osama Mere	WHO
Dr. Ali Mudhwati	Family Health DG
Dr. Mohamed Al-Emad	EPI National Manager
Dr. Mohamed M. Hajar	WHO/GAVI
Dr. Abdul Nasser Al-Ruba´ai	EPI supervisor
Ms. Ghada Showgi Al- Haboub	EPI
Dr. Bienvenu Tollo	GAVI External Auditor
Mr. Jet Njweipi	GAVI External Auditor
Dr. wendy W. Ravano	World Bank
Dr. Abdulla Mahdi	World Bank

ANNEX III

CORE INDICATORS TABLES

Core indicators at National level

	JRF	Reported at time of audit
Districts with DPT3<1 coverage > 80%	185	185
Districts with measles<1 coverage > 90%	91	91
Drop-out rate	31%	31%
Type of syringes	AD syringes	AD syringes
Districts with AD syringes	333	333
Introduction HVB	Yes	Yes
Introduction Hib	Yes	Yes
Vaccine wastage DPT	15%	15%
Wastage rate HVB	10%	15% (national not updated)
Wastage rate Hib	7%	7%
Interruption in vaccine supply 2005		No
Number of Districts with interruption in vaccine supply 2005	0	0
% District disease surveillance reports received/expected	74%	74%
% District coverage reports received/expected		97%
% District coverage reports received on time		94%
Number of District supervised at least once in 2005		321 (96%)
Number of Districts which supervised all HUs in 2005	321	321
Number of Districts with microplans including routine immunisation	321	306 (92%) not updated at national level

Core indicators at District level

		D1	D2	D3	D4
District DPT3 coverage	At national	66%	71%	78%	94%
	At District	66%	70.7%	78%	94%
District measles coverage	At national[2]	55%	64%	60%	103%
	At District	59%	66%	61%	103%
District Drop-out DPT1-3[3]	At national	7%	21%	14%	33%
	At District	37%	19%	14%	26%
Syringes supplied in 2005	At national	Na	Na	Na	Na
	At District	43960	26492	19800	13900
Number of District coverage reports received/sent	At national	12/12	12/12	12/12	12/12
	At District	143/12	12/12	14/12	12/12
Number of coverage reports received on time/sent on time	At national	12/12	12/12	12/12	12/12
	At District	130/12	12/12	14/12	12/12
Number of HU coverage reports received/sent	At national				
	At District	30/12	12/12	12/12	12/12
Number of HU reports received/sent on time	At national				
	At District	25/12	Na	10/12	12/12
District vaccine stock out	At national	No	No	Na	No
	At District	No	No	Only BCG in May	No
Has the District been supervised by higher level on 2005	At national	Yes	Yes	Yes	Yes
	At District	Yes	Yes	Yes	Yes
Has the District been able to supervise all HUs in 2005	At national				
	At District	Yes	Yes	Yes	No (Zone of insecurity)
Did the District have a microplan for 2005	At national				
	At District	Yes	Yes	Yes	Yes (only for Outreach)

[2] Information not collected at national level.
[3] Unable to estimate due to the fact that the HMIS does not routinely collect DPT1 data.

ANNEX II

QUALITY INDEX ANALYSIS TABLE

District Quality Indices and District average (over 5)

	Recording	Stor/Repo	Monitoring	Demo/Pla
D1	5,00	5,00	5,00	4,50
D2	5,00	5,00	4,50	3,50
D3	5,00	5,00	5,00	4,00
D4	5,00	5,00	5,00	4,50
District Average	5,00	5,00	4,88	4,13

HU Quality indices and HU average (over 5)

	D1				D2		
	Record.	Stor/Rep.	Mon/Eval		Recording	Stor/Repo	Mon/Eval
HU 1	4,67	5,00	5,00	HU 1	4,67	5,00	3,89
HU 2	3,67	3,33	4,44	HU 2	4,33	5,00	3,89
HU 3	4,00	3,33	5,00	HU 3	4,00	5,00	3,89
HU 4	4,67	5,00	5,00	HU 4	3,00	3,33	3,89
HU 5	5,00	5,00	5,00	HU 5	3,67	5,00	3,89
HU 6	4,33	3,33	5,00	HU 6	4,67	5,00	3,89
HU average	4,39	4,17	4,91	**HU average**	4,06	4,72	3,89

	D3				D4		
	Record.	Stor/Rep.	Mon/Eval		Recording	Stor/Repo	Mon/Eval
HU 1	5,00	5,00	4,44	HU 1	5,00	5,00	3,33
HU 2	4,33	5,00	4,44	HU 2	4,33	5,00	3,33
HU 3	5,00	5,00	4,44	HU 3	4,67	3,33	3,33
HU 4	5,00	5,00	4,44	HU 4	4,33	3,33	3,33
HU 5	5,00	5,00	5,00	HU 5	4,00	3,33	3,89
HU 6	5,00	5,00	4,44	HU 6	5,00	5,00	3,89
HU average	4,89	5,00	4,54	**HU average**	4,56	4,17	3,52