Immunisation Data Quality Audit

Kenya

19th August – 3rd September 2002

Prepared by: The LATH Consortium*
On behalf of: Global Alliance for Vaccines and Immunisation (GAVI)
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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 to improve 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 DPT3 vaccinations given to children under one year of age (DPT3 <1). In 2002, the DQA is being performed in 16 countries. It is hoped that participation in the DQA will assist each country in understanding the extent and details of the audit 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, the second for Kenya, was undertaken from 19th August to 3rd September 2002 by two external auditors, Per Milde and Valerie Remedios and two national auditors, Pamela Ochieny (National EPI Training Officer, KEPI) and Stephen Kanyete (Chief Health Records & Information Officer, MoH HQ). The two teams were accompanied by a representative from the Provincial level, Sammy Kegan (Provincial Logistician, Rift) and Elinor Sidi Kenga (Provincial Logistician, Coast). In addition, two observers from CDC, Donna Rickert and Hussain Yusuf from CDC joined the team at National level and for two days in Nyeri District. An observer from WHO KCO, Dr Songa joined the team at the National level and Kericho District. The team worked at the National level (KEPI HQ), before dividing into two teams and going to the Districts and Health Units (HU).

Based on the Districts' reported DPT3<1 for the audit year at National level a random selection of four Districts was carried out in advance and the following were selected: Meru, Nyeri, Kericho and Busia. Six HUs plus one "reserve" HU were selected randomly based on reported DPT3<1 for the audit year at District level. The "reserve" HU was to be visited only in the event that one of the first six was unreachable due to impassable roads.

A summary analysis worksheet was created for each site visited (the National Office, 4 Districts, and 24 Health Units) and can be found in Annex 1.

The team were able to present their findings at an ICC meeting, held at the MoH on 3rd September. Major points of discussion at the meeting concerned the low verification factor and the reliability of the national figures on coverage, impact on future investments from GAVI, problems with the central database, the need for a further DQA and a plan for improvement from KEPI, and the need for supervisory activities from the national level downwards.

A list of the persons met during the DQA including the ICC meetings can be found in Annex 2.

2. Background

The Kenya Expanded Programme on Immunisation (KEPI) was established as a unit within the Ministry of Health (MoH) in 1980, with the goal of providing immunisations against six vaccine preventable diseases (diphtheria, whooping cough (pertussis), tetanus, poliomyelitis, tuberculosis and measles) to all children in Kenya. The KEPI immunisation schedule was later expanded to include tetanus vaccinations for women and vaccinations against hepatitis B. Vaccinations against yellow fever is provided in districts, where yellow fever is endemic. In December 2001 KEPI introduced the combined "Diphteria-Pertussis-Tetanus (DPT), Hepatitis B (HepB) and Haemphilus Influenzae B (Hib)" vaccine.

KEPI is integrated into the Maternal and Child Health/Family Planning (MCH/FP) services. The KEPI Manager reports to the Head of Preventive & Promotive Health in the MoH. It

operates in all the seventy-seven districts of Kenya. During an ongoing process of decentralisation, supervision and monitoring of health facilities' immunisation activities falls under the responsibility of the District Health Management Team (DHMT) managed by the District Medical Officer Health (DMOH). The District Public Health Nurse (DHPN) is the key person at district level regarding immunisation activities. The Provincial Health Management Team (PHMT) monitors and supervises the districts, and the KEPI MU continue to be responsible for development of policies and standards, donor coordination, vaccines and other supplies procurement, technical assistance to lower levels, operational research and monitoring and evaluation. A relatively new position has been created at the Provincial level, that of the Provincial Logistician, to assist in the monitoring and supervisory functions.

The operational level is the health facility, which includes government, mission, NGO and private facilities registered to provide KEPI immunisations with vaccine supplied by MoH free of charge. Immunisations are provided to children and women from the health facility's static clinic, normally on a daily basis, and for most health facilities also from scheduled monthly or weekly outreach clinics.

Information flow

The health facility uses a standard formatted pre-printed "Permanent Register Children" to register the child's first and follow-up visits to the facility including immunisations given to the child. At first registration a "Child Health Card" is issued by the facility, which identifies the child by a unique "child number". Immunisation and other key information are recorded on this card. Tetanus vaccinations given to pregnant women are normally recorded in an improvised register. KEPI immunisation tally sheets (MOH702) are used at the health facility on a daily basis to record individual immunisations. The tally sheets are normally summarised on a daily basis into an immunisation summary sheet (MOH710), which on a monthly basis is submitted to the district. Daily tally sheets are used both for static and outreach clinics. Outreach tally sheet figures are normally transferred to the static tally sheet. The MoH 710 also contains information about disease surveillance for the vaccine preventable diseases. The monthly reports are either delivered by health facility personnel when they collect supplies or collected by staff from the district (also sometimes collected by members of the DHMT during visits to the health facility).

Health facilities reports other MCH/FP and programme activities using separate report formats for this, which do not include immunisation data.

The district aggregates all health facilities immunisation summary data into a monthly district immunisation summary report (also using form MOH 710). This report is sent directly to KEPI with a copy to the Provincial level. A copy of the MOH 710 is retained both at health facility and district level. KEPI office, the KEPI Management Unit (MU), receives and aggregates the district reports in a computerised MIS section. KEPI's MIS database is thus the MoH's official immunisation database, which provides management with national data for planning, monitoring, supervision and other purposes. The annual WHO/UNICEF Joint Reporting Form on Vaccine Preventable Diseases (JRF) is prepared from this database.

The district also reports immunisation activities to KEPI and Provincial level on a monthly basis using a separate report "District Report for GAVI Activities". This report is used by KEPI for financial reporting on GAVI activities. A monthly "Cold Chain" report is submitted to KEPI containing information about e.g. status of the cold chain, vaccine used and vaccine wasted.

GAVI DQA

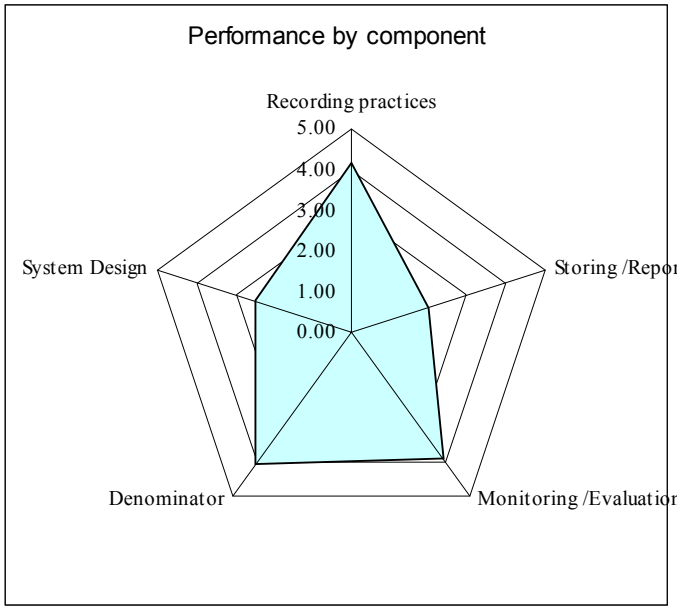
The first (pilot) Data Quality Audit (DQA) was conducted in August 2001 in Muranga, Bondo and Kericho district (which was sampled twice). Data from 19 health facilities were used in the 2001 DQA, with five health facilities in Kericho sampled twice. As mentioned above, Kericho district was also sampled for the 2002 DQA and one health facility in Kericho was sampled both in the 2001 and 2002 DQA.

3. KEY FINDINGS

3.1 NATIONAL LEVEL

Part of the DQA is a Quality Index based on, for national level, five components with a number of observations/issues per component. The DQA Quality Index for National level is **67.4%** (s*ee Annex 1 for the analysis worksheet).*

The individual components are shown in the following radar-graph:



Recording Practices:

The management of the Immunization programme seems to be functioning well. However the level of consistency of data at the national level is a **major** problem. In addition the system may be less robust than desired in that the processes, operations and data handling are not well documented with written procedures (SOP's). The major problem concerning consistency is discussed in section 3.6 Data Accuracy.

The national vaccine ledger is in general well maintained and includes monitoring of batch number and expiry date. Immunisation commodities (AD syringes, safety boxes, ice packs, etc) are also recorded well.

Processing of data at the National level require some attention (see completeness and timeliness of reporting) as district reports are received in different offices within KEPI and tracking timeliness may be compromised.

Data integrity continues to be a problem at both districts and national levels with a lack of written procedures on handling of data (both manually and with computers) with no written procedures for dealing with late reports. In 2001, over half of the district reports were received late at the national level. Data inconsistencies arise if the database is not updated systematically and the reports are not filed appropriately.

In a robust data management system it is important to register the time (i.e. date) on reports and other data information that are received at the various levels and to update this information regularly. KEPI is now recording the date of receipt at national level (for the 4 districts audited over 85% of the reports received at national level were date stamped) which allows them to measure the timeliness of reporting. A tabulation is maintained on the completeness of reporting from the Districts but is not complete for December 2001. It is important for the National level to maintain this information regularly and follow up on late reports.

Storing/Reporting :
The management of computerized immunisation data in not optimal. Two computers appear to be currently used to enter raw data but are not linked. There no written procedures and

guidelines for data handling between the computers including the identification of master files, lists on different formats of tabulations that can be generated, timing of different versions vis-à-vis generated reports and archived files as well as systematic back-up procedures (e.g. every Friday of the week with diskettes that are dated and filed). Some of the tabulations include the date of production (very useful in identifying the latest updated version) but this needs to be more consistently carried out.

Reports are generally filed well, but there are just too many reports covering the same reporting period, i.e. faxed copies, duplicates, preliminary and late reports, copies of the same report. These reports are not all clearly marked.

Monitoring/Evaluation:
Charts on immunisation performance were well displayed in several KEPI offices.
Wastage is not indicated in the JRF and does not appear to be calculated at the national level

Formalised feedback does occur to the lower levels and does include an analysis of the performance of the reporting units.
On supervision see under System design.

Denominator:
Denominator issues are a problem. The national definition[1] of the denominator for child immunisations is not consistent with the WHO definition. Denominators for the districts are calculated by KEPI. At the same time some Districts calculate their own denominators based on information provided from the CBS as they do not agree with the KEPI figures, e.g. Nyeri (see table below). Six districts indicated coverage rates over 100% in the audit year including Kericho (143%). This exemplifies the problems in the calculation of the denominator.

Table 1: District denominators and National denominators allocated for the district

District	*District denominator*	*National denominator for District*
Nyeri	***24245***	***19752***
Meru North	***24820***	***24819***
Busia	***17659***	***17465***
Kericho	***20186***	***20428***

In general the majority of health units do not know their catchment population or how to calculate realistic targets. In some areas several immunisation facilities exist within a catchment area making it difficult for an individual HU to calculate its target based on the catchment population.

System design:
Accurate and reliable information is a key requirement in any programme and KEPI has a major problem in this area at National level. An EPI specific programme has been tried but was not successful and Excel spreadsheets are currently used to capture the information. Use of a database or a system with internal checks and controls is urgently required.

The KEPI 'Operational Training Manual' (2000) is a comprehensive document but was not seen at the District or HU levels. The manual does not cover some management areas in sufficient detail, e.g. how long to keep documents, handling of late reports, signing and dating of reports, monitoring of TT2+, reporting outreach, zero reporting, etc.

[1] Not calculating surviving infants but using projected '0-11months' figures based on the 1999 Census.

The current reporting formats (Cold Chain Form or Monthly Summary MOH 710) do not include a space for reporting Adverse Events Following Immunization (AEFI) or for reporting of wastage from un-opened vials (expiry, breakage, cold chain failure, etc) of vaccines.

The TT5 schedule for pregnant women is not the official policy in Kenya (apart from campaign activities). The antenatal card, tally sheets and monthly summaries (for the audit year and still used in most places) are not designed to capture TT4 and 5 and a standard TT ledger does not exist. A standard national system including protocols and guidelines is lacking. KEPI is aware of the problem and is currently discussing the issue with UNICEF and WHO.

A supervisory and logistics function has been delegated to the Provincial logistician based at the Provincial office. In one district the DHMT staff were not clear who was responsible for this function. In several places the appointed person responsible for these tasks is the PNO. It is not clear if one person can optimally carry out both functions, i.e. that of the PNO and EPI Logistician.

The team identified that some DHMT responsible for immunisation activities would benefit from some refresher training.

The “Draft Vaccine Management Guidelines and Routine Immunisation Performance Monitoring Guidelines”, August 2002, include a number of new forms and tools for reporting, monitoring and supervision activities from the HU upwards. Some of the tools include a new vaccine ledger form which includes a section for diluents as well as vaccines, as well as forms for reporting wastage and charts to monitor wastage, and comprehensive supervisory checklists for supervision at all levels (provincial, district and HU). Whilst this is commendable, the auditors would like to strike a note of caution. It is clear that there are already several tools introduced in the HUs that are not being maintained properly e.g. ledgers, charts, and the permanent register. It is also clear that the HU staff are currently required to report on some information which is not even used by KEPI (vaccine wastage information on the “Cold Chain Recording” sheet). To avoid unnecessary confusion and work, it is strongly recommended to limit the number of tools and reporting forms to the minimum and to ensure that the reported information is used.

A number of key documents have been developed by KEPI and are in various stages of development, i.e. ‘Vaccine Management Guidelines and Performance Monitoring, August 2002‘, ‘National Immunisation Policy, February 2000’, and ‘Injection Safety and Immunisation Waste Management Plan of Action: 2001-2005, April 2002’.

Performance Indicators:
Seven Performance Indicators are included in the DQA. The final table is shown below followed by specific comments to selected indicators:

Calendar year	Reported DTP3 <1	Change in reported DTP3 <1	DTP3 <1 coverage rate	%Districts DTP3 <1 coverage >= 80%	%dropout DTP1 <1 to DTP3 <1	%Districts dropout < 10%	%DTP vaccine system wastage	Quality of the System Index Score
2000	619,715		56.10%	15.90%	18.10%	26.10%		
2001	768,708	148,993	66.40%	28.60%	14.30%	33.80%	0%	67.40%

Based on the figures obtained from the four Districts during the DQA (see section 3.6 Data Accuracy) these figures should be interpreted cautiously.

Change in reported DPT3<1 (2000 to 2001):
The change in reported DTP3<1 from 2000 to 2001 is 148,993. This has resulted in a rise in the coverage rate of nearly 10% compared to a 1.9% increase over the previous years 1999 to 2000.

Drop-out DPT1<1 to DPT3<1 (2000 and 2001):
Drop-out rates have decreased from 18.1% in 2000 to 14.3% in 2001.

DPT3<1 coverage rate (2000 and 2001):
The coverage rate has increased from 56.1% in 2000 to 66.4% in 2001. In addition the number of districts achieving a coverage rate of more than 80% has also increased by nearly 13% from the years 2000 to 2001.

DPT vaccine system wastage (2001):
This indicator cannot be calculated as no System wastage has been reported in 2001. The current reporting system does not allow for System wastage to be recorded. Vaccine wastage has not been included in the JRF. It is important to measure this indicator taking into account damaged and expired stocks throughout the system.

The Pentavalent form of DTP/HibB/Hepatitis vaccine was introduced country wide in September-December 2001 and at the same time Districts were requested to recall all vials of DTP from the Health Units and forward them to the National level in November 2001. 1,050,780 doses of DTP have expired and will be destroyed; the System wastage for 2002 should take this into account.

Completeness and timeliness of reporting from Districts to the National level:

Table 2: Completeness and timeliness of reporting for 2000 and 2001:

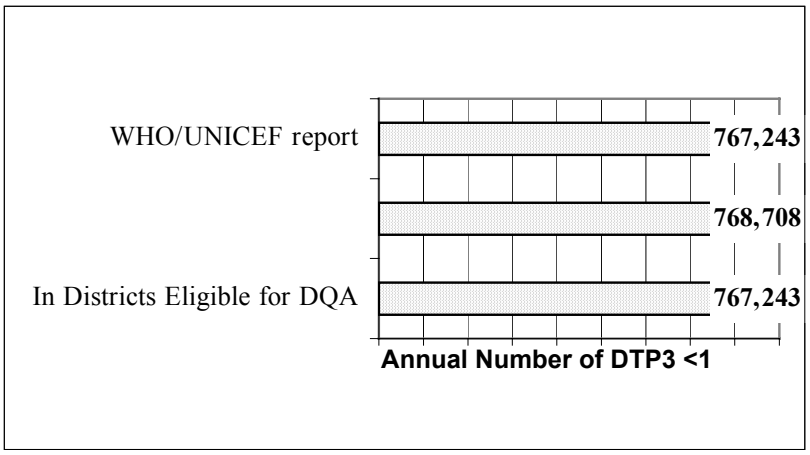
Date on WHO /UNICEF report	Districts reporting rate to National Level	% Districts reports on time at National Level
14/03/01	86.40%	1.90%
15/04/02	86.80%	55.50%

There is a definite improvement in the timeliness of reporting from 2000 to 2001 in that the number of Districts reporting on time to the National level has risen from 1.9% in 2000 to 55.5% in 2001.

The level of reporting has not changed as dramatically from 2000 to 2001. On average only 10 reports per District can be found at National level, and all 12 months reports could only be found for 33% of the Districts. This indicates a lack of completeness of data at the National level. However, KEPI's national reported annual immunisation data is most likely complete, as KEPI has used the annual summary report from the district or through direct contact to the district obtained the "missing" months' figures. Districts should still be encouraged to submit **completed** reports **on time** to the National level.

Ideally the national reporting completeness monitoring tool should reflect if a district has submitted first a preliminary report followed by a "late" (updated) report. In such cases, again ideally, the report is "complete" when the "late" report has been received.

Reporting consistency for Audit year (2001):



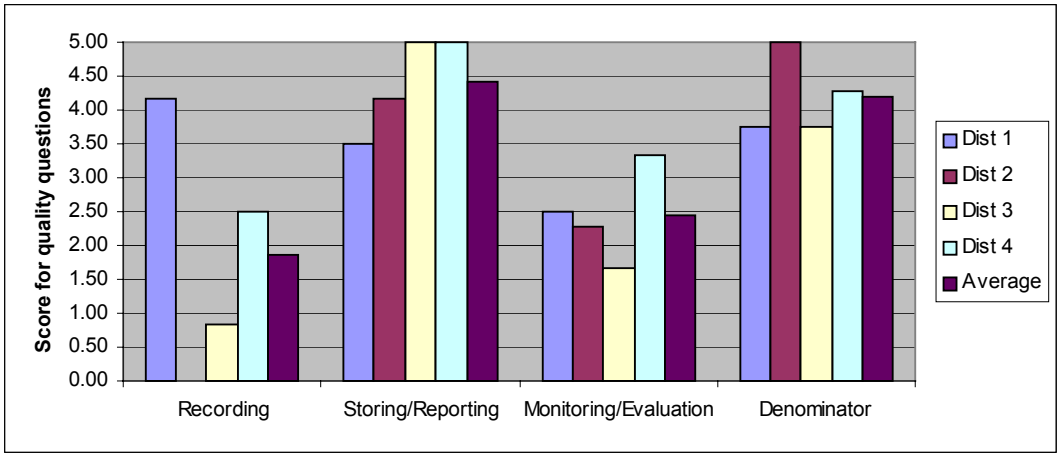
A perfect level of accuracy is seen between the reported DTP3<1 in the JRF report and the Districts eligible for the DQA. The difference between the National district tabulation and the other figures is 1,465 which is possibly due to late reporting.

3.2 DISTRICT LEVEL

The "Quality of System Index" for the four districts is indicated as (see annex 1 for the analysis worksheets):

Nyeri: 65.6%, Meru North: 55.6%, Kericho: 50.0%, Busia: 74.2%

The four components of the quality system index are shown below for the four districts including the average value:



Recording:
Contributing factors to the relative low average are:

Although all districts explained a process and procedure for handling late reports from HUs, this could not be demonstrated with a written instruction or procedure. Reported figures from the four districts illustrates a problem with late reporting, which are not always included in the districts or KEPI's final monthly figure for the district.

Only one district puts a "stamp" and/or date on the reports received from HUs. As mentioned in the DQA 2001 the district should stamp and date (or at least date) the HU report when received at district level. It is also important to clearly mark if the report is "preliminary" or "final". Interestingly Kericho district did start stamping and dating HUs reports from August

and September 2001, maybe as a reaction to the DQA 2001's observations and recommendations, but stopped from October 2001 onwards.

Processing of HUs reports at the district is not sufficiently systematic to ensure data integrity and consistency at all levels. The reports are mostly processed by the district's records clerk, who compiles and summarises the district data. In this system the DPHN and other DHMT members may not see the individual HU's report, and therefore miss the opportunity to analyse and check the figures.

Only two districts had a complete vaccine ledger book for the audit year. All six HUs in one district had received in-correct guidance for ledger keeping, which may be a problem for the whole district. One district's ledger was not up-to-date for DTP vaccine and two ledgers not up-to-date for TT vaccine. Other observations regarding vaccine ledger: some HUs record in vials instead of doses, only in a few ledgers were batch No. and expiry date recorded for each issue, no signs of routine or "surprise" physical stock-taking even when staff handed over, no recording or calculation of vaccine wastage (system as well as administrated wastage) at district or HU level except for the recording of doses used and doses wasted on the "cold chain monitor sheet", some problems with correct recording of receipts-issue-balance.

Other observations regarding recording:
HUs and districts report on TT2+ for pregnant women based on TT2 and TT-booster vaccinations given. However, no pre-printed standard permanent register for pregnant women ante/post natal recording has been supplied to HUs. Most HUs were observed using an improvised notebook or adapted register for this purpose.

Recording of "outreach" vaccinations is unclear. Some HUs record outreach activities using a separate daily "outreach" tally sheet and others used no tally sheet but a "loose piece of paper". Different practices exist for recording the "outreach" tallies at the HU: some HUs transferred the tallies from the "outreach" tally sheet to the "static" tally sheet and others maintained both tally sheets.

Storing/Reporting:
A relative high average with the single main problem being storing and archiving of HUs reports and lack of appropriate back-up procedures for the computerised report system.

Although all district reports were signed and dated for the audit year, it was found that the majority of reports were signed by the records clerk, who had compiled the district report, neither the DPHN or DMOH had signed the report.

All four districts use "Securicor" as a courier. This should ensure reliability and speedy reporting from the district to KEPI. However, the reported timeliness at KEPI for the four districts for the audit year ranges from 41.7% to 66.7%. This is based on the date for receipt as registered at KEPI vis-à-vis reporting deadline. It was not possible for the DQA to investigate this. One district suggested it unfairly low "score" as all reports were sent in time to reach KEPI within the reporting deadline. Delays with "Securicor" may be possible, but it is also possible that delays may occur at national level before the report is registered and dated as "received on date".

Other observations regarding storing/reporting:
Districts practice of reporting "outreach" is not coherent or clear. Some HUs include "outreach" with "static" in the routine monthly report, but also submit a separate report marked "outreach". See Annex 3, which illustrates reporting problems in one district with "outreach" and "static" (routine) reported figures. Some reports are not included in the monthly report and subsequently not included in the districts reported figures at national level

(i.e. under-reporting). It is impossible to determine the correct figure for the four HUs' monthly total DTP3<1 for the audit year.

In one district "outreach" vaccinations were reported as "DHMT" without referring to a health facility.

Not all reports were correctly filled with "zeros" for months where no vaccinations were given for a specific antigen ("zero" reporting).

Only one district utilises computers for data management.

A monitoring system of injection supplies including AD syringes and safety boxes has not been implemented in Kenya. These items are not routinely recorded in the same manner as vaccine. A draft plan of action for "Kenya Injection Safety and Immunisation Waste Management" is submitted for approval. This plan includes specific guidelines for monitoring injection safety supplies at all levels.

Monitoring/Evaluation:
All four districts "score" relatively low on this component. The main reasons are:

- Lack of supervision notes from DHMT to HU.
- Absence of a written, routine feed-back format from district to HU at all four districts. The suggested feed-back/report is a documentation of the findings, observations, discussion and action to be taken. A "visitors book" does not give this level of documentation.
- Two districts had a written supervision schedule.
- All districts had a target for children, but only one district a target for pregnant women (for TT2 plus booster).
- Not all districts record and update charts for immunisation performance or reporting completeness.
- Only one district (with computerised immunisation reporting system) dates tabulations, reports, print-outs etc. A "production date" on different district tabulations is a must in order to determine which "version" is the most up-to-date version.
- The district records-office in one district prepares a number of different district tabulations, which not completely match most likely due to human calculation errors and writing errors. Many of these tabulations seemed to have no real use or importance, as most tabulations could easily be retrieved from the district's monthly summary.

Other observations regarding monitoring/evaluation:

Appropriate supervision and feed-back of routine immunisation activities to HUs seems to be a problem. This was illustrated by the lack of HUs own targets for children to immunise and monitoring tools in the HU.

The DQA could see indications of a greater focus on accelerated immunisation activities (e.g. campaigns, disease surveillance) compared with routine monitoring, supervision and evaluation. Most HUs replied with figures used for campaigns when asked about targets, performance etc.

Two districts have problems with carrying out supervision activities due to an apparent lack of resources (funds, transport etc).

The PHMT is supposed to monitor, evaluate and supervise the DHMTs. Indications are that the role of the PHMT in this is not well defined or somewhat unclear, at least for some PHMTs. In one district the DHMT could not identify the provincial EPI supervisor/EPI logistician. Another DMOH claimed that they would appreciate more routine feedback on their performance.

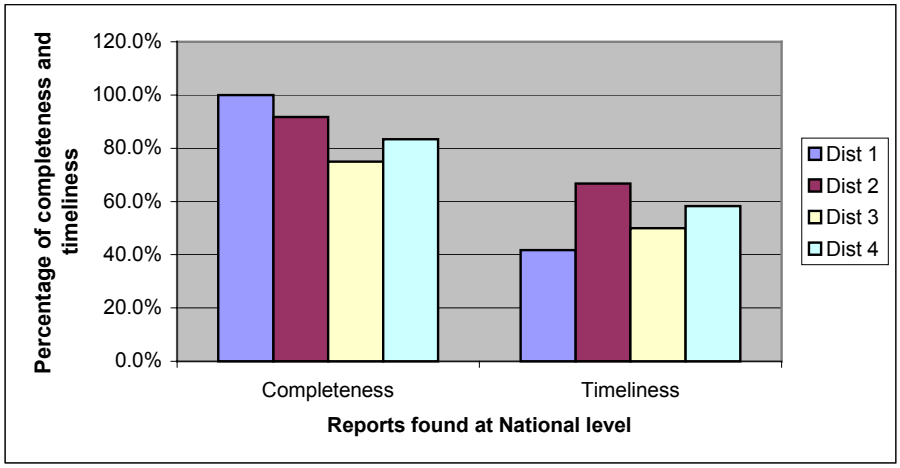
Some HUs were found to have DTP vaccine stock-out for a considerable length of time in spite of sufficient vaccines at district and regional levels.

Monitoring tools e.g. “Drop-out” charts and “DPT” charts were distributed to most HUs, but not consistently in use by all, demonstrating a need for DHMTs to sensitise or train the HUs’ staff in using the tools. This could be practised during supervisory visits preferably as “on-the-job training”.

It is unclear to what level the 77 districts’ DHMT members and HUs’ staff have received up-dated EPI “Mid-Level” and “Operational level” management training.

Denominator:
A high “score” for this component. Main observation is the different denominators used at the district level and national level for the districts. This issue is discussed above in detail under “National level”.

Reporting completeness and timeliness:



The reporting completeness and timeliness is based on the district reports found during this DQA at national level. Timeliness is based on the “date received” as stamped or recorded at KEPI vis-à-vis the reporting deadline. In a perfect situation all the reports from the district should be filed at the national level. Districts may have reported a preliminary monthly immunisation summary and later submitted a “late report” immunisation summary for the “missing” vaccinations in the preliminary report. In such cases, both reports should be filed at national level.

DTP3<1 coverage, drop-out and change:
The table below gives the DTP3<1 coverage rates for the audit year (2001) and year before (2000), the drop-out rate from reported DTP1<1 to reported DTP3<1 for the two years, and the change in reported DTP3<1 from 2000 to 2001 for the four districts in the DQA:

(Based on information found at district level and for Nat. denom. found at National level:):

DTP3<1 cover 2000	DTP3<1 cover 2001	Change in reported DTP3<1	Drop-out rate 2000	Drop-out 2001	District denom. 2000	District denom. 2001	Nat. denom. 2000	Nat. denom 2001
87.8%	73.4%	-3,082	5.0%	3.8%	23,770	24,245	19,777	19,752
61.5%	64.3%	1,118	16.3%	18.5%	24,154	24,820	21,264	24,819
62.9%	85.6%	1,927	8.4%	1.1%	24,400	20,186	21,251	20,428
73.3%	62.4%	-1,553	25.0%	23.9%	17,161	17,659	16,918	17,465

The DTP3<1 coverage rate is based on the district tabulated reported figure and the denominator found at district level. As discussed above ("National level") both the figures for district denominators and national denominators for the districts differ. The denominator for District 2 has decreased from 2000 to 2001 whereas the others have increased by roughly the average population growth rate (2.899%). For District 1, there is a considerable difference between the two sets of figures.

The drop-out[2] rates vary considerably between the districts and suggests a marked improvement for two districts, a moderate improvement for one and an increase for the fourth. However, the "improved" drop-out rate for two of the three districts should be seen in light of a decrease in the DTP1<1 vaccinations from 2000 to 2001. The change in DTP3<1 from 2000 to 2001 for one district is -3,082 but the drop-out rate "improved" from 5.0% to 3.8%. The reason for this was a greater negative change in DTP1<1 from 2000 to 2001 of -3,488.

The change in reported DTP3<1 is measured as reported figures for 2000 to 2001. It is encouraging to see a marked improvement in the performance for two districts, but also discouraging to see a lower performance for the other two districts. In total the change in reported DTP3<1 for the four districts in this DQA is negative (-1,590) which is almost 2% of the total child denominator for 2001 for the four districts.

3.3 HEALTH UNIT LEVEL

Twenty-four HUs were visited and included dispensaries, health clinics, and hospitals managed by Government, mission, NGOs and the private sectors, *(see Annex 1 for the individual analysis worksheets).*

Quality of system
Each HU was evaluated according to the criteria set below for recording, storing and reporting and monitoring and evaluation and a score was derived. For the twenty-four HUs a wide variation in performance was observed, from 21.7- 65.4%, with an average score was 45%. This is on the low side and there is clearly a need to address the following issues in most of the HU audited.

Recording:
Vaccine ledgers were either missing or incomplete for the audit year 2001 and administrative wastage could only be calculated in two HU (see section 3.5 on Wastage). The new KEPI ledgers were seen at most of the HUs but were generally not properly maintained (incomplete entries for vaccines, missing batch numbers and expiry dates, poor inventory control, deletions, not up-to-date). Without ledgers it is not possible to calculate wastage.

Recording and reporting of outreach activities is a general problem (refer to District level.

[2] Measured from DTP1<1 to DTP3<1 and not as the official Kenya drop-out rate from DTP1<1 to Measles<1.

The KEPI Permanent Registers for child immunisations were found in most HU but were not filled properly, i.e. missing the 'serial number' and/or 'child number', entering of vaccination records of children attending the HU from another catchment area, entering follow-up visits.

The system of 'zero' reporting was not seen consistently, and health workers need to be re-sensitised on this issue.

HUs record TT1, TT2 and TT- Booster for pregnant women using the tally sheet and report these on the monthly summary. However, many have devised their own ledgers for recording antenatal cases and the level of consistency in recording all TT doses in these ledgers varies greatly. A standard permanent ledger, similar to the immunisations ledger would great assist the HU in monitoring TT.

Where observations of immunisations were not possible an assessment of the vaccination schedule was conducted using an exercise based on 20 surrogate children (pre-filled Child Health Cards). Twenty-seven vaccinators were interviewed and scored an average of 18.1 for correctly responding to the questions (ranging from 15 – 20). One vaccinator had a score of zero and was not included in the above calculation. Knowledge of the immunisation schedule by the majority of staff is good, however the zero score is a serious problem and could have serious consequences.

Some Districts have encouraged their HUs to only carry out BCG immunisations once or twice a week to avoid BCG wastage. At one HU the auditors observed several cases where mothers were sent away as it was not the 'BCG immunisation day'. These are clearly missed opportunities which could have serious implications. Although wastage should be avoided, HU should also be encouraged to show some flexibility when implementing such a policy.

The national policy on injection safety is still in draft (see section on Vaccine Safety). The HUs obtain AD syringes and safety boxes as well as vaccines, all could be routinely included in the KEPI ledger.

The current MOH 710 does not include a section for reporting AEFI.

Storing/reporting:
Storage and filing of tally sheets, used ledgers, and monthly reports continues to be a major problem (as reported in the last DQA). Complete individual records of immunisations in the audit year (tally sheets and/or permanent registers) could only be found in a third of the HU's visited, making it impossible to verify reported figures. HU and DHMT staff are unclear how long documents should be kept (again, this was highlighted in the previous DQA).

The reports found at the HU and Districts were not always consistently signed and dated which posed difficulties in assessing the timeliness of reporting.

In 63% of HUs it was not possible to find all the monthly reports for the audit year. To maintain data integrity, copies of all reports should always be kept at the HU and both originals and copies should be signed and dated.

Only one case was observed where the reported figures were exceptionally high for the first 7 months of the audit year and bore no resemblance to the monthly recounted figures. This was seen across all the antigens. The problem was resolved when the member of staff was transferred and the remaining 5 months showed remarkable consistency between reported and recounted figures.

Monitoring &Evaluation:
In general the issue of denominators and targets is not well understood by the HU (see comments made at National level).

Only a few HUs are aware of their annual performance and record annual totals for one or any antigen.

Either one or both of the KEPI monitoring charts (Pentavalent or Drop-out) for 2002 were seen in the majority of HU, however many staff were not able to complete the charts properly. Even where charts existed, staff were not clear how their targets were set. However in one district, HUs were advised to set their targets based on the previous 6 months performance. In general the data presented on the charts are not analysed or used. This is important and builds a sense of performance monitoring into their activities.

The Pentavalent chart was often seen filled as a bar chart when a linear projection would seem to be easier to complete, especially when the chart is displayed on the wall.

No monitoring takes place of TT given to pregnant women.

Supervision and feedback are extremely weak areas (see District level). Only one HU had received a supervisory visit within the last four months where written comments were made and a copy of a checklist left at the HU. Although visits may have been made to other Hus, written records of the visit could not be found. On-the-job training should be encouraged at the HU level using the HU's own data rather than workshops. In addition HUs rarely receive any written feedback from the District level on their performance.

In general, the auditors were not able to see any systematic process for collecting information on new births in the community. A 'Birth Register' could be used to record new births. This could be maintained at the HU and updated and followed-up on a regular basis.

Completeness/timeliness of reporting:
Completeness of data reporting seems to vary. For the HU audited, on average 90% of their reports could be found at District level (range between 50-100%). All the reports for the audit year could only be found at the District for 50% of the HU audited. Only at one District could all HU reports for the audit year be found. This indicates a lack of completeness of data and incomplete reporting.

Timeliness could only be assessed for 50% of the HUs audited where receipt dates were recorded at the District level. Of these HUs between 8-75% of the reports submitted had been received on time at the District level. It is clear that some units have problems in getting their reports to the District on time. If the reasons for delay are genuine perhaps the District could assist by collecting the reports.

Change in reported DPT3<1, coverage and drop-out rates:
The change in reported DTP3 between 2000 and 2001 is only of relevance if complete data are available for both years. This was only available in one HU.

Drop-out percentages in 2001 for DTP3 ranged from minus 21% to 46.2% with an average of 13%. The negative dropout cannot be fully explained but could be due to a lack of data at the HU and reporting errors. HU with high figures (10%) should be encouraged to consider social mobilisation activities as well as outreach.

3.4 VACCINE AND INJECTION SAFETY

Vaccination safety
There is currently no national policy for the recording, reporting and monitoring of Adverse Events following Immunisation (AEFI). However, KEPI have developed a five year plan covering 'Injection Safety and Immunisation Waste Management Plan of Action: 2001-2005 (30th April 2002)' which is currently in draft form. It is a comprehensive document covering all aspects of safety and a plan of action to improve injection safety and immunisation waste management in Kenya.

Although the Plan discusses AEFI very briefly it is not clear how these events will be reported through the system and collected at National level. The Draft KEPI Routine Immunisation Performance Monitoring Guidelines includes, in the supervisory checklist, a section on monitoring AEFI, but again it is not clear which forms are used to report AEFI.

AEFI should be included in one of the monthly reporting forms from the HUs and staff trained on how to report.

Injection safety
Safety boxes for discarding used syringes were found in the majority of HU, but were not always used. A common problem was identified in the inappropriate assembly of the boxes. AD-syringes were introduced in December 2001, and are issued by the districts but not always in sufficient quantities. At the National level these items are managed separately to vaccines. Stock records are well maintained and issues are generally made using the S11 'Requisition and Receipts Vouchers' system. At Districts and HU levels these items were not routinely recorded in ledgers or on bin cards. In addition there is no procedure to show that filled safety boxes can be accounted for and that they have been safely destroyed.

Health unit staff are encouraged to follow a 'burn and bury' routine. However the filled safety boxes are usually burnt on site and the contents discarded into a pit latrine or thrown into a pit. Incinerators are not routinely used but are planned to be introduced initially in all Districts followed by all immunisation service delivery points by 2005 (the technology of choice could be the De Monfort University type incinerator).

A procedure should be developed to ensure that filled safety boxes can be accounted for and safely destroyed.

3.5 VACCINE WASTAGE

In the calculation of vaccine wastage a distinction is made between **System Wastage** and **Administrative Wastage** where:

- System Wastage is doses of vaccine damaged by breakdown in the cold chain, poor management (expired vaccine) or accidents (breakage, etc). DTP System Wastage calculation is applicable for National and District levels.
- Administrative vaccine Wastage is the unavoidable waste due to the administration of multi-dose vaccine vials where "left overs" will have to be discarded.
- Global wastage is the combined system and administrative wastage.

Vaccine wastage is calculated as a percentage wastage: (No of doses issued) minus (No of doses used for vaccination) times 100, divided by (No of doses issued).

The KEPI Draft 'Guidelines on Vaccine Management' states that the vaccine management system is constrained partly due to wastage which occurs as a result of overstocking and

subsequent expiry and poor storage. However, there is no system in place to measure these losses (System Wastage) as they are not routinely recorded and reported through the EPI system can therefore not be calculated at National or District levels. In the Districts visited, the auditors were informed that no System wastage had been encountered in the audit year.

A condition for calculating administrative wastage is 1) a proper vaccine stock registration, with registration of stock balance for DTP vaccine at the beginning and the end of the year and registration of incoming and delivered vaccine 2) reliable recording of all DTP vaccinations given within the health institutions covered.

The majority of HU keep stocks of vaccines and issue daily to a vaccine carrier for immunisation each day, returning unused stock to the refrigerator at the end of the day. At the HU level it is possible to measure Administrative wastage if the ledger is maintained and has complete entries for receipts and issues (opened vials) and the total number of reported DTP vaccinations. Administrative Wastage could only be calculated for two HUs, and the calculated figures were 74% (very high) and 23% (reasonable). The wastage for the remaining 22 HU cannot be determined because of missing ledger books or incomplete registration of incoming vaccines.

As a target for multi-dose vials, GAVI recommends countries to aim for a maximum wastage rate of 25% with a plan to gradually reduce it to 15% by the third year of support.

Vaccines wastages are not routinely calculated at the District or National levels. The National vaccine wastage has not been calculated and has therefore not been reported in the JRF.

Currently HUs report monthly on the 'Cold Chain Recording Sheet' information on the number of vials used/received on a daily basis as well as on the cold chain system. These records are sent each month to the District who forward them to the National Level, but no one at KEPI actually does anything with the vaccine stock information. KEPI intend to introduce two new tools[3] to monitor wastage, the 'Vaccine Stock and Wastage Monitoring Form' to be submitted to the District on a monthly basis by each HU, and the 'Vaccine Wastage Monitoring Chart' which should be retained by each HU and submitted to the District at the end of the year. The Districts are required to submit the forms to the Regional and National levels who will monitor vaccine wastage.

Apart from EPI, HUs are already required to submit several forms on a monthly basis as well as carrying out various monitoring functions. KEPI should limit the number of forms used to report information from the HU and District and ensure that the information provided is used.

The Draft Guidelines and new reporting forms do not include a separate section for recording System Wastage which is required in the JRF.

3.6 DATA ACCURACY

The verification factor is the ratio between the DTP3<1 recounted from tally sheets or permanent register during the DQA and the figures reported in the monthly summary reports: Recounts/ reported. The verification factor found for Kenya was 0.496. This is an improvement compared to the 2001 DQA (0.401) but still a very low score.

There are several reasons for the low verification factor in this DQA:

The national reported (JRF 2001) and most recent national tabulation for DTP3<1 for 2001 is 767,243. This figure equals the figure used for the sampling of the four districts. The figure is

[3] Vaccine Management Guidelines, Draft, KEPI, August 2002

slightly lower than the most recent national district tabulation of 768,708, which is due to "late reporting". KEPI could not identify the individual districts late reports making up this difference of 1,465 DTP3<1 in 2001.

The four sampled districts reported or recorded DTP3<1 for 2001 in the National tabulation is as follows:

	National tabulation	District report at National	District tabulation	District report at District	Difference National tabulation-District tabulation	Difference National tabulation-District report at National	Missing district reports at National
Nyeri	16,923	17,823	17,792	17,824	-869	-900	0
Meru North	15,966	15,098	15,966	15,966	0	868	1
Kericho	29,267	12,733	17,283	17,466	11,984	16,534	3
Busia	11,349	9,537	11,023	11,023	326	1,812	2

The largest reported figure of DTP3<1 found on the National tabulation or the district reports at national level is used in the formula for the verification factor. All four districts have different figures, the greatest disparity is seen with Kericho district. The values used in the verification factor for the four districts are:

17,823
15,966
29,267
11,349.

The figure for Nyeri (17,823) equals the district reports found at district level, whereas the district tabulation is 32 lower, which could not be explained (but is of little significance).

The Meru North (15,966) figure matches both district tabulation and district reports.

The figure for Kericho (29,267) is significantly higher than all other figures. The difference of 11,984 (National tabulation vis-à-vis district tabulation) is due to errors at KEPI in data entry: a total of 10,478 (March-1,293, April-41, May-2,347, June-1,183, July-1,473, August-1,423, September-1,190 and October-1,528) were recorded twice and 1,506 (recorded as February) was recorded most likely as a mistake under Kericho's district code number. This figure is most likely missing for another district. The difference for Kericho between 'district report at National level' and 'district tabulation' is due to missing three monthly reports at National level in KEPI. However, the monthly figures were recorded from the district's annual summary at KEPI. The data entry error is due to recording monthly figures from both the district's annual summary and individual monthly reports and insufficient quality assurance (checking figures, supervision, lack of written procedures and instructions for KEPI MIS, etc).

The difference of 326 for Busia is due to four data entry errors: April recorded with1,025 at KEPI but only 943 at district, June recorded with 1,090 at KEPI but only 940 at district, July recorded twice at KEPI with 1,026 and October not recorded at KEPI but with 932 at the district.

For Nyeri the following data entry errors were recorded at KEPI: KEPI recorded 1,511 instead of 1,528, recorded 1,507 instead of 1,508, recorded 1,359 instead of 1,360, did not record 1,493 and recorded 2,006 instead of 1,395.

The difference found with Kericho has an especially high negative effect on the verification factor.

Tally sheets were missing at health facilities: All tally sheets were missing in four of the 24 HUs in the DQA and the Permanent Register Children were not available. For all other HUs part of tally sheets were missing and registration either incomplete or only started with distribution of the new register in late 2001 or early 2002. A breakdown of the four districts reported and recounted is shown in the table:

Table 3:Reported vs recounted DTP3<1 for 2001

District	Reported	Recounted
Nyeri	2,838	1,973
Meru North	4,336	2,274
Kericho	3,169	1,261
Busia	4,482	3,181

Under-as well as over-reporting were observed in some HUs mainly due to transcription errors or calculation errors from tally sheets to monthly immunization reports or some confusion about reporting outreach as part of static reporting.

The team did not observe any evidence of “inflated” figures or any sign of “creative accounting” with impact for the DQA. However, in one HU, which was also sampled as part of the 2001 DQA, one of the staff informed the team that she had prepared the tally sheets the day before from the monthly reports as “all tally sheets were missing”. Unfortunately for this health worker her work was futile, as she had prepared the tally sheets for year 2000, obviously because this was the “audit year” in the 2001 DQA. Fortunately for the quality of this DQA, the team found some tally sheets for this audit year, 2001, which were undoubtedly original tally sheets. This HU must have been pre-informed about the DQA, creating records is not an acceptable action.

The verification factor confidence interval is very large, which again is partly due to the very large difference between National tabulation for the four district’s DTP3<1 and correct district tabulation, as explained above.

3.7 CHANGES FROM DQA 2001

The Verification Factor has improved marginally from 0.401 (for the audit year 2000) to 0.496 (for the audit year 2001). The major problem with regard to storage and filing of reports and tally sheets observed in the 2001 DQA still continues in 2002, health workers are still unclear how long to keep records. A number of guidelines and policy documents are in development, some were noted in the last DQA, however there seems to be some delay in the finalisation and dissemination of these documents which may explain the limited progress in some of the areas related to this DQA. Regular supervision and feedback, particularly from the district level downwards continues to be a major area of concern.

The inconsistencies found between the national tabulation totals and the reported totals from monthly reports for the districts audited in both years continues to be a problem. These inconsistencies have certainly contributed to the low verification factor seen in 2002.

Since the 2001 DQA a number of new KEPI reporting forms, tally sheets, ledgers, registers and charts have been disseminated and were seen in the majority of institutions. However, there is a general lack of understanding on the proper use and completion of these tools.

4. RECOMMENDATIONS

The KEPI is well established and operates well with committed and hard working staff. The challenge for KEPI is to maintain the momentum of programme activities and to strengthen the systems and procedures. As stated by a management expert in his publication 'The Goal', "if you can't measure it, you can't manage it" which is important in the management of any programme.

Recording practices:

- Develop standard operating procedures (SOP) for the handling and processing of immunisation data at all levels including late reporting, signing and dating before submission and on receipt, outreach, etc.
- Train staff at all levels on how to complete the ledgers for vaccine and injection safety commodities including the calculation of wastage.
- Train staff on how to maintain the Permanent Child Register.
- Encourage staff to keep a separate tally sheet for each month and not combine different months on the same tally sheet.
- Use the supervisory visits to strengthen knowledge on the vaccination schedule and to discuss possible lost opportunities, e.g. BCG.
- Provide computers to competent districts and train staff in electronic data management.

Storing /Reporting:

- Develop and disseminate clear guidelines on recording and reporting of outreach activities.
- Strengthen the filing of reports at all levels, ideally each reporting unit should have its own sub-file and be filed by month, reports should be clearly marked (duplicate/temporary/late/annual summary and only relevant reports should be filed, i.e. faxed copies where originals exist should be discarded.
- Monthly summary reports should be signed or counter signed by the EPI responsible staff in the HU and District.
- Ensure the retention of all immunisation records (including tally sheets, permanent ledgers and monthly summaries) for at least 10 years as stipulated in the national policy.
- Investigate the method of sending and receiving reports to KEPI to determine where delays occur.

Monitoring/Evaluation:

- Ensure that the same formula and base figures are used for the calculation of the denominator at District and National levels.
- For HU, consider an alternative method for the setting of realistic targets, i.e. past performance.
- Strengthen monitoring completeness and timeliness of reports received at the District and National levels.
- Train both District and HU staff on the current EPI tools to monitor performance, i.e. correct use of Pentavalent chart, and encourage a process of analysis and interpretation of the information rather than the mere collection of data. Encourage the display of all monitoring charts for all antigens at HU and District levels.
- Encourage regular written feedback from the District to the HU levels which should include some analysis of the data provided.

- Ensure that realistic schedules of supervision are made with reports on the outcome of each supervisory visit, and that a record of the key issues is left with the HU and used for follow-up.
- Supervisory checklists have been developed for supervision of the provincial, district and HU level. These should be finalised and implemented with a focus on on-the-job training utilising the HU's own data.

System design:

- Identify a suitable computerised software package (in a database form) for entry and processing of immunisation data with an inbuilt system to carry out routine checks on data accuracy.
- Finalise and implement the various policies, plans and guidelines currently in development

The KEPI Operational Training Manual 2000 is available but has not been widely disseminated. As the manual does not cover some management issues sufficiently (e.g. handling of late reports, reporting outreach, etc), measures should be taken to disseminate this information and sensitise staff on the additions. KEPI might like to consider an addendum to the Operational Manual.

- Consider the inclusion of reporting and calculating 'System wastage' before finalising the Draft KEPI 'Vaccine Management Guidelines and Routine Immunisation Performance Monitoring Guidelines'. Serious consideration should be given to what information is necessary from the HU and who will be responsible for evaluating the information at each level and feeding it back to the lower levels. KEPI should review the number of reporting forms that are required from the HU, not only by EPI but also for other programmes, to avoid unnecessarily burdening the HU staff with additional work.
- Introduce the recording and reporting of Adverse Events Following Immunization (AEFI) based on the National Plan.
- Agree and finalise the policy of TT vaccinations for pregnant women/women of child-bearing age including target settings, recording and reporting formats

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ANNEXES

1. **Summary Worksheets (national, 4 districts and 24 HU)**
2. **Key Informants (including those attending the debriefing)**
3. **Inconsistency of Reporting from Busia District**

GAVI DQA Kenya 2002 (Audit Year 2001) August-September 2002.	
National Level (19-20 August 2002):	
Dr. S.Sonoiya	KEPI Manager
Dr. Tatu Kamau	Deputy KEPI Manager
Mr. David M. Kiongo	Statistical Officer KEPI
Ms. Lydia N. Kirika	Information Officer KEPI
Mr. Charles W. Kinuthia	Information Officer KEPI
Ms. Beatrice Koki	Information Officer KEPI
Mr. Ibrahim Longolomoi	Safety Officer KEPI
Ms. Anne W. Kamau	Central Vaccine Store Officer KEPI
Ms. Margarete I. Rungoo	Procurement Assistant KEPI
Rift-Valley Province (21 August 2002):	
Dr. K.C.Chesang	Provincial Medical Officer
Kericho District (21-22-23-24 August 2002):	
Dr. Kalele Balaam	MOH Kericho District
Mr. David Koech	DPHO
Mr. Girosvenor Ngeno	DPHN
Ms. Eunice Langat	DHIRO
Mr. Kipkemoi A. Tum	DHMO
Mr. Alex Tabei	DMLT
Kabinga FTC HU (22 August 2002):	
Ms. Margaret Cherviyot	Ass. Nurse
Mr. Michael K. Mutai	Ag. Manager Tea Farm
Jamji Dispensary HU (22 August 2002):	
Mr. Joseph C. Sang	Clinical Supervisor I/C
Ms. Pauline Nandi	Enrolled Nurse
Kaitui HU (23 August 2002):	
Mr. Momanyi O. Mayuya	Community Nurse/FP - I/C
Mr. Vincent Korir	Public Health Technician (PHT)
Ms. Sally Koros	Enrolled Community Nurse
Kenegut Dispensary HU (23 August 2002);	
Mr. Phillip Mutisya	Enrolled Community Nurse
Mr. Geoffrey Tum	Community Worker
Chesinende Dispensary HU (24 August 2002);	
Mr. Geoffrey Kiriama	Laboratory Technician
Kericho Nursing Home HU (24 August 2002):	
Ms. Monicah Oyiela	Registered Nurse/Midwife
Central Province (21 August 2002)	
Dr Olango Onudi	PMO
Mrs Lucy Kiruki	PNO

Nyeri District (21, 22, 23, 24, 30 August 2002)	
Dr I.M. Kimani	DMOH
Mrs Lucy Gichuri	DPHN
Mrs Joyce Maini	DDSO
Mr Daniel Gichuru	Health Records & Information Officer, Hospital
Mrs Margaret Muchiri	Statistical Clerk (logisitics)
Mrs Rose N Maini	DDPHN
Gikondi Dispensary (22 August 2002)	
Sister Anastasia Wango	KECN, In Charge
Karaba Dispensary (22August 2002)	
Mr Newton Njiru	KECN
Mrs Mary Nyambura Mungi	KECN
Tumutumu Hospital (23 August 2002)	
Mrts Eunice Gikandi	EN/M/FP
Mrs Jane Njagi	KECN
Ndimaini Dispenary (23 August 2002)	
Mrs Nancy Kanyi	KECN/M
Mrs Florence Mukiria	KECN/M
Ebenezer Dispensary (24 August 2002)	
Mrs Jocelyn Macharia	KRN/M/MCH/FP
Island Farm Dispenary (30 August 2002)	
Mrs Esther N Njuguna	KECN/FP
Western Province (26 August 2002):	
Mrs. Miriam Watindi	Provincial EPI Logistician
Busia District (26-27-28 August 2002):	
Dr. Mukaisi-K. James	MOH Busia District
Ms. Roseline M Oboya	DPHN
Mr. Mirasi Tom	DHRIO
Mr. Samuel J. Ombita	DHAO
Mr. Stephen J. Nyongesa	P.Machine Oper.
Ms. Pauline O. Ojaji	Higher Clerical Officer-Records
Ms. Beliah Nyakowa Agang	KECN/KEPI
Mr. Michael O. Odeny	HRIO
Rukala Dispensary HU (27 August 2002);	
Ms. Boniface Wanjala Murefu	KECM-I/C
Ms. Praxides Achieno	Community HW
Bujunba Mission HC (27 August 2002):	
Ms. Judith M. Sewe	KEN/M-I/C

Bumala B HC HU (28 August 2002):	
Mr. Robert Asembo	Registered Clinical Officer-I/C
Mr. Peter R. Ochieng	KECHN
Mr. Willy A. Mukusa	KECHN
Malanga Dispensary HU (28 August 2002):	
Ms. Prisca Okemo	KEN
Matayos HC HU (29 August 2002):	
Mr. Aburili Massengo	RCO I/C
Ms. Rukia Namukuru Khaseng	KECN
Ms. Teresa Ojiambo	KECN
Ms. Florence Nabulindo	KECN Nurse I/C MCH
Ms. Ambrose Fwamba	PHO
Busia District Hospital MCH HU (29 August 2002):	
Ms. Veronica Ombita	KECN
Ms. Leonida Oundo	KEM
Ms. Sajome Muyale	KECN
Ms. Christine Odaba	KECN
Ms. Bharat Alenga	KECN
Meru District (26, 27, 28, 29 August 2002):	
Dr Kagimbi William Kimani	DMOH & Medical Superintendent
Mr Joseph Muringi	DDPHN
Mrs Eunice Muthoni	KECN
Mr A.K. Kanake	Hospital Administrator
Tigania Hospital (27 August 2002)	
Mrs Dorothy Ngondu	Matron
Ms Charity Kaibutia	KECN
Ms Priscilla Kananu	KEN/M
Mrs Priscilla Kirimi	Subordinate staff
Laare HC (28 August 2002)	
Mrs Stella Riungu	KECN/M
Mrs Judy Kubai	KECN Acting IC
Mr Festus Muthee	Nutrition Technician
Mutuate HC (28 August 2002)	
Mr Francis Kalunge	KECN
Mrs Gladys Thirindi	KECN
Mrs Agnes Mparata	KECN
Mrs Purity Kiraithe	KECN
Tuuru HC (28 and 29 August 2002)	
Mrs Christine K. Mathuri	KECN
Mrs Susan Kajuju	KECN
Sister T.M. Karimi	Sister in Charge

Mrs Salira Nkanatu	KECN
KK Clinic (29 August 2002)	
Mrs Jane Kathoka	KECN/M/FP
Akachiu HC (29 August 2002)	
Mr Valeriano Gitonga	KECN, Acting IC
ICC Meeting 3/9/02	
Dr. S.Sonoiya	KEPI Manager
Dr. Tatu Kamau	Deputy KEPI Manager
Mr. David M. Kiongo	Statistical Officer KEPI
Peter M Tukei	KEMRI/CDC
Munyiri Agoshno	UNICEF
Gezehegen Mengiste	UNICEF ESARO
Pamela Ochieng	KEPI Training Officer
Dr Jackson Sonya	WHO
Tonu Shimoda	JICA
Willie Nyambaji	JICA
Dorothy Kibiti	Kenyatta National Hospital
Agnes Koome	Kenya Red Cross
Elinor Sidi Kenga	PMO/ MoH Coast
Samuel M. Kigen	PMO/ MoH Rift
Stephen M. Kanyette	CHRCO MoH
Dorothy Katiechi	KMTC
Trisha Bebbington	DfiD
Dr D.M. Mutie	WHO
Margaret Ndanyi	MoE