

GAVI

Immunisation Data Quality Audit (DQA)

Zambia

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1. Executive Summary

The overall conclusion of the DQA team is that the Zambian immunization reporting system is comparatively robust and requires strengthening in a few areas rather than a major re-design. The verification factor (VF) of 0.789 highlights that there was a high level of consistency between primary immunization records, and reports at higher levels. Furthermore, the assessment of the quality of the immunization reporting system highlights a strong, integrated reporting system (HMIS) which provides a solid platform for implementing improvements.

The principal issues requiring further consideration are in the areas of data recording and use of the data, design issues regarding indicators not captured by the HMIS, and resolution of the debate regarding which population estimates to use for catchment area, district and national total populations.

Recording: Complete tally records for 2002 were available at only twelve of the twenty-four health facilities. In particular, tally sheets used for outreach activities were often missing, and outreach immunizations not always included in the reported performance. In most cases the issue was either one of poor storage of tally records, or shortages of forms leading to non-use for outreach.

Likewise there was a dearth of vaccine stock records with only one of the four districts and five of the twenty-four health units having complete inventory records for 2002. Lack of stock records inhibits efforts to calculate vaccine wastage rates, forecast vaccine requirements, and limit vaccine wastage. This issue is also likely to be a factor in frequent vaccine supply shortages.

Use of the Data: An unintended effect of the transition to the integrated HMIS has been a “disconnection” of programme staff from the relevant data at the district and national levels. Given that tracking reports from lower levels, receiving and compiling the data are now in the hands of HMIS staff, MCH Coordinators and UCI programme officers are not as involved with the reports as they were when EPI had a vertical reporting system. This is witnessed by the lack of wall charts and tables for monitoring immunization performance in the relevant district and National offices and the lack of on-going monitoring of performance at lower levels. Staff at all levels do utilize the HMIS for annual planning exercises although it was observed that in many cases districts continue to use the hard copies rather than computer generated tabulations.

Design: The HMIS necessarily does not report all the indicators that earlier vertical reporting systems captured. This is the case in immunization reporting and there is currently no reporting of DPT 1&2, nor DPT for children over one year of age. This information is required for generating drop-out rates and global wastage rates at the HU level.

Key (Immediate) Recommendations

1. The HMIS and UCI should hold a round table discussion regarding, a) tally sheet design and supply, b) alternatives for generating wastage and drop-out rates. These may include non-HMIS solutions such as annual register reviews, c) how to more closely link the MCH Coordinators to immunization data to promote monitoring and use.
2. Standard formats (tallies and stock cards) should be provided to HU and district staff as well as guidelines for their use and storage.
3. As soon as feasible the issue of population estimates should be resolved and clear guidance provided to the lower levels on what estimates should be used in calculating their denominators.

2. 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 DTP3 vaccinations given to children under one year of age (DTP3 <1). In 2003, the DQA is being performed in up to 14 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 was undertaken in Zambia October 2 – 21, 2003 by external auditors Mr. Steven Perry and Dr. Xavier Bosch Capblanch and national auditors Ms. Leo Chivundu (EPI Desk Officer, Central Board of Health) and Mr. Chipso Mpamba (Health Management Information System, Central Board of Health). The team worked at the national level of HMIS and EPI before going to district and health facility levels. Based on a random selection carried out in advance, the following four districts were visited: Kapirimposhi (Central Province), Mambwe (Eastern Province), Lusaka Urban and Mazabuka (Southern Province). Six Health Units (HU) were selected randomly in each district plus one additional "alternate" HU to be visited in the event that one of the first six was unreachable. All 24 selected health facilities were visited without the need to use to reserve one.

To conduct the DQA the standard method previously used on other countries was applied at national, district and health unit levels consisting of (1) a set of questions concerning the functioning of the EPI programme, HMIS and vaccines stock management at each level; (2) a set of questions specific for each level to estimate the quality scores and (3) a recounting of DPT3 doses administered during the audit year from the tally sheets present at health unit level.

A debriefing meeting in the headquarters of the Central Board of Health in Lusaka was held on Monday the 20th of October 2003 with representatives from Ministry of Health, UCI Programme, HMIS, UNICEF, WHO and USAID. The meeting was chaired by the Director General and included four members of the ICC. A comprehensive list of persons met during the DQA including the debriefing is included in Annex 1 of this report. Major recommendations/action points discussed during the debriefing included the following:

- Additional indicators required by UCI (DPT1 & 2, wastage rates and drop-out rates) and alternatives for collecting this information.
- Need for dedicated district HMIS officers (HMIS as only/principal responsibility),
- Need for monitoring vaccine wastage,
- Need for a round table discussion with HMIS and UCI to discuss responsibilities, how to re-connect the programme staff with the data, additional indicators.

3. Background

Zambia, in common with other African countries, experienced a decline in routine immunization coverage in the 1990s. According to the Zambia Five Year Plan for Immunization 2000-2004 (March 2001) the “coverage trend is slightly downward for all antigens, although coverage is not falling as sharply as it did in 1992-1993...”. By 1998 DPT3 coverage had fallen to 68% and measles coverage to 71%. Reasons cited for the declining coverage include low levels of district funding, inadequate maintenance of vehicles, a deteriorating cold chain, and staff shortages. Furthermore, the Five Year Plan notes that reductions in the staffing and budget for the central offices of the UCI (Universal Child Immunization) programme, and the lower prioritization for immunization in the decentralized district health authorities had a negative impact as well. It is against this backdrop that the current UCI programme, with significant support from UNICEF, WHO, GAVI and other development partners, is attempting to reverse the decline in antigen coverage rates and promote universal child immunization.

Administratively, the health structure is divided into 9 provinces, 72 districts and more than 1,200 health facilities. Immunization performance reporting is included in the routine HMIS which relies on quarterly paper reports to the districts, which then submit quarterly HMIS database diskettes to the Provinces, which communicate electronic data to the central HMIS office located within the Central Board of Health (CBoH). The CBoH, is organizationally within the MoH and is responsible for health planning.

The primary immunization records are tally sheets used for static and outreach activities. All children are supposed to be registered and tracked in the Children

Under 5 Register and pregnant women receiving TT2+ are included in the Safe Motherhood Registers. The tally sheets are used for compiling the immunization components of the monthly HMIS reports at the health facilities. The design of the registers is such that it would be very difficult and inaccurate to use them for aggregating immunization performance. Health units are responsible for compiling quarterly HMIS reports, based on the monthly reports, and submitting the quarterlies, with copies of the monthly reports attached, to the districts. At districts and above, all reporting and analysis are based on the quarterly data.

The HMIS unit is responsible for producing and distributing the formats for HMIS nationwide, and districts are expected to make up any shortfalls in formats caused by supply inefficiencies. The HMIS does not allow for some of the indicators that the previous vertical immunization reporting system provided. In particular, the HMIS does not report DPT1 data required for calculating DPT drop-out rates and DPT for children over one year of age. A UCI Officer estimated that children over one accounted for ten percent of all children fully immunized for DPT. In response some districts (i.e. Lusaka Urban district) maintain parallel reporting systems for immunization. It is not known whether this is a widespread practice and was only observed in one of the four districts visited.

Of the four selected districts one was Lusaka Urban, two were in relatively well communicated areas within 200 kilometers of the capital and one, Mambwe, was a newly created district in a remote area adjoining the South Luangwa National Park. As a remote, and newly formed, district Mambwe faces many challenges regarding both delivery of health services and monitoring of performance.

- With no district housing the district was understaffed and had no formal MCH Coordinator,
- The district has moved into newly built offices in the past two months, but still has few furnishings (i.e. no cabinets for record storage),
- No reliable district transport,
- No vaccine store or general health supply warehouse at the district headquarters,
- Computer hardware problems for most of the DQA audit year (2002).

As could be expected these constraints negatively impacted district performance in the DQA, as did the absence of the District HMIS Officer at the time of the DQA. It should be noted that the HU sampling was completed in Mambwe with very incomplete data. Because of computer hardware problems in 2002 some HU quarterly reports were used for the sampling, but due to the problems cited above less than half of those were located. However, after the sampling and questionnaire were completed, staff found many of the missing reports. The team made the decision to include the new data, but to stick with the original sample. Much credit

goes to the District Health Director and his staff who were extremely resourceful and made every effort to minimize the impact of the resource shortages on district health services, and to assist the DQA.

4. Key findings

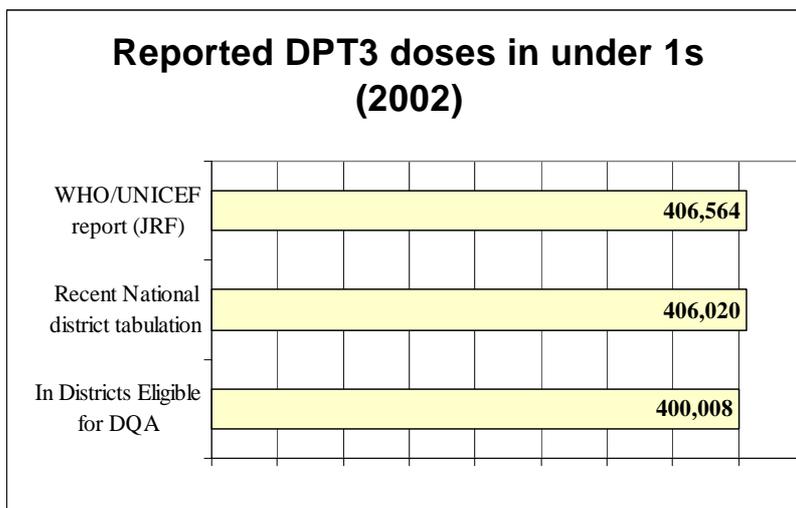
4.1 Data Accuracy

Data accuracy is quantified in the DQA verification factor. Principal pre-requisites for a good verification factor are:

- Accurate aggregations whereby national HMIS reported values for DPT3<1 reflect the exact number of clients tallied.
- Complete quarterly HMIS reports available at the HUs, at the districts and at National level. The district HMIS database should be up-to-date and complete
- Complete tally records for each month of the audit year (2002) available at all HUs. This requires that the records are not only completed, but well organized and easily retrievable as well.

One aspect of data accuracy is the consistency of the total national DPT3<1 in 2002 reported in different sources. There was a slight difference (0.13%) between the WHO/UNICEF JRF and the national district tabulation, but this was due to the fact that they keep a rolling tabulation and a couple of late reports came in after the time they prepared the JRF. Figures in the GAVI report (348,147) are also different due to the fact that they are projections based on an earlier cluster survey and not actual DPT3 doses administered. The following table summarises this information.

Figure 1. Reported DPT3 doses in under 1s for the year 2002 according to several source

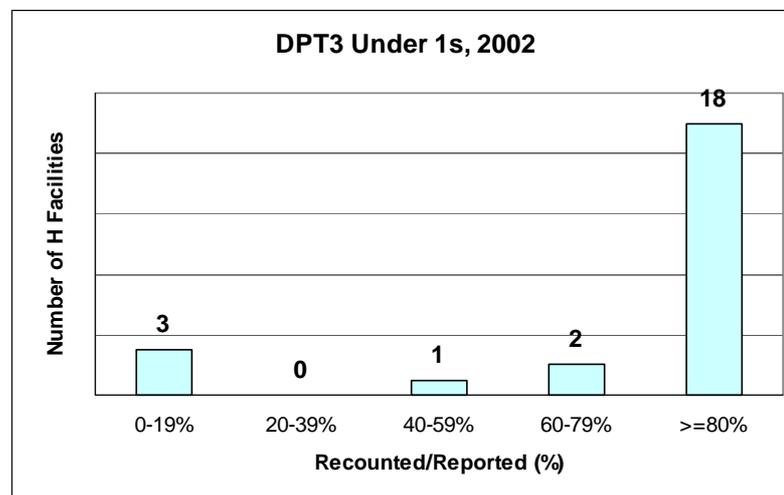


The verification factor (VF) is the ratio between the DTP3<1 recounted from tally sheets at the selected health facilities and reported from the health facilities (extrapolated to the whole district) and the national level. The verification factor found for Zambia is **0.789** (95% Confidence Interval: 0.06 to 1.52). The primary

reason for the large confidence interval is the large variation in the ratios of recounted to reported values between districts: from 0.5 in Mambwe district to a high of 1.4 from Mazabuka.

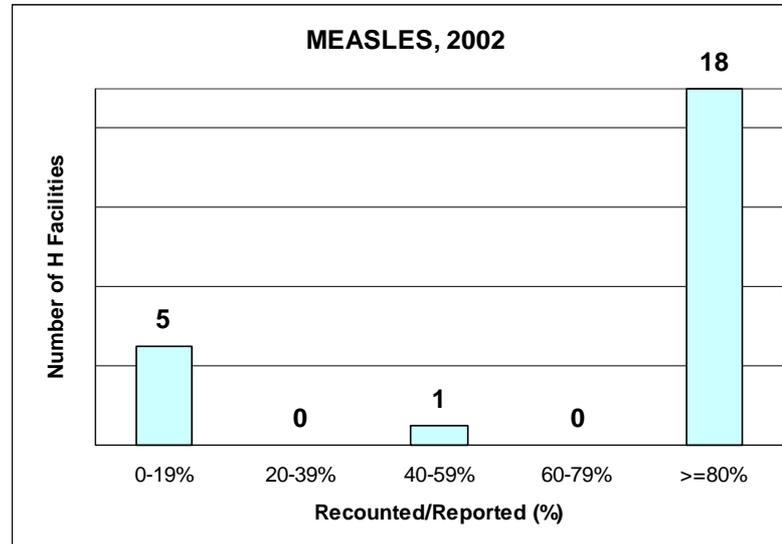
Low district recounts were largely due to missing primary records. As a proxy indicator of the contribution of low recounts into the VF, we have calculated the ratio of recounted to the reported DPT3<1 doses at health unit level and plotted the number of health facilities with different levels of concordance (see figure 2 below). This graphic shows that the group with the highest number of health facilities (namely 18) was the one in the group “>=80%” and that the lower intervals showed decreasing numbers of health facilities, except for the last one (0%-19%). The conclusion is that the use and storage of tally sheets was quite good, but in a very few facilities lack of most or all of the tally records negatively impacted the VF.

Figure 2. Distribution of the number of health units according to the percentage of DPT3 doses recounted in relation to those reported



A similar effect can be observed in the case of the 23 health units where measles could be recounted.

Figure 3. Distribution of the number of health units according to the percentage of Measles doses recounted in relation to those reported (only health units with data available)



In some health facilities TT2+ were also recounted. However, in several cases health workers were not clear when recalling whether they ticked only TT2 and subsequent doses or all TT (including TT1).

Table 1. Reported DPT3<1 2002, according to different sources, for Mazabuka district

DPT3<1	Mazabuka
2002	
National tabulation	8,456
District reports found at national level	8,456
District's own tabulation	11,203
District's reports found at district	5,595
HUs eligible for sampling	11,203

Table 1 above presents DPT3<1 performance figures for Mazabuka district which highlights the issue of district under-reporting to the national level. This happened in two districts resulting in a positive impact on the VF despite the data inconsistency. This is likely due to the addition of late HU reports to the district database, and the failure to forward updated HMIS diskettes from the district to the province or from the province to the national level.

Tally Sheets

Health units report immunization performance based on recounts from the tally sheets used for static and outreach activities. Problems with the use and storage of tallies compromised the accuracy of HU reporting and consequently the score for the verification factor. In two health centers they were not able to locate any of their tallies for 2002, and in most facilities they were not able to locate all of their tally records. Poor organization and storage of past tallies is certainly a large part of the problem. In many facilities the tally records were not kept in files or organized by date, and health staff was not able to locate them. Other issues with the tally sheets are listed below:

- Filling out the tallies: In many facilities staff attempted to break the monthly tally form into daily tally groups which confused them in aggregation.
- Outreach tallies: Different forms were used to tally static and outreach immunizations, but the outreach tallies were often not saved. In some cases only the static tallies were used in compiling the quarterly reports and hence the facility actually under-reported performance.
- Different formats: There were variations in tally sheet design between districts. One format included only the indicators recorded now in the HMIS (i.e. DPT3<1), and the other format listed DPT1 and 2, as well as the immunization of children over one year of age.
- Missing information. For example in Lusaka Urban district only one of the six health units had no tally sheets for the audit year. However, that health unit comprised 16% of the total performance of the selected health units and hence had a significant negative impact on the VF for the district as a whole.
- Almost as important as facilities with no tally sheets are the number of facilities with sizable proportion of their tallies not available. In many cases tallies were not at hand, kept in different files or in boxes and cupboards.
- Transcription errors. These were most likely due to improper use of the printed tally sheets as well as hand drawn tallies. Some tallies had hand drawn vertical lines to separate days which made the counting more difficult.

Reports

- Over-reporting. The number of doses reported at health unit level was higher than the recounted in 16 health units. However, this does not necessarily mean over-reporting because it was often not possible to determine if the tallies used for outreach were included. On the other hand some transcription errors were quite evident. Therefore, it is not possible to assure that there was over-reporting as such. There is no evidence in any case of inflated or creative reporting.

- Differences between health unit reports found at districts, and district tabulation can be explained by the fact that some districts have lost some of the quarterly health unit reports. This was the case in Mazabuka.

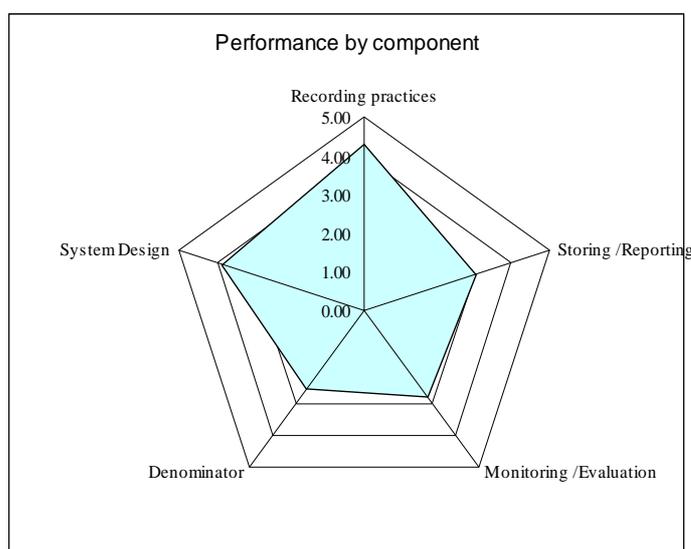
Table 2. DPT3 doses according to district tabulations and reports at the district level (2002)

	District tabulation	Reports at District	Comment
Kapirimposhi	10,778	8,845	13% of HU reports lost
Mambwe	2,587	2,557	11% of HU reports lost
Lusaka Urban	46,936	46,936	
Mazabuka	11,203	5,595	Half of the reports lost

4.2 Key Issues at National Level

The quality of the system index (QSI) is a composite indicator of the overall quality of the immunization reporting system which is calculated for each health unit and district visited, as well as for the national level. Please note the national QSI is not a composite of the scores at all other levels, but rather a score for findings at one level only. At the national level the QSI is composed of scores in the areas of 1) recording, 2) reporting and storage of data, 3) monitoring and evaluation, 4) demographics and planning, and 5) system design. The national level QSI for audit year 2002 is 66%. The figure below is a graphic presentation of the scores in the five components. Areas that were particularly strong include the design and implementation of the HMIS, routine feedback to the provinces, and the recording of vaccine stock data including batch number and expiry dates. Listed below are some areas for improvement in each of the QSI components.

Figure 4. Scores of quality indicators for the national level



Recording: At the national vaccine store the stock control system is automated and the data for 2003 was up-to-date and complete. However, there were some gaps in the 2002 vaccine supply data that required looking at the Receipt and Issue Vouchers (RIVs) to rectify. When the stock record system was automated they ceased using the stock cards on the floor of the store room and now use the RIVs as the

primary record for updating the vaccine balances. This has resulted in some missed entries and errors in current balance which are caught in the periodic physical inventories. HMIS forms (tally sheets and stock cards) from the national level were not available in all districts, and not always in consistent formats.

Monitoring and Evaluation: Although there is quality, up-to-date immunization data in the HMIS, very little of this is being routinely monitored by the UCI programme. The data is used for annual planning exercises, but not routine monitoring of performance at the lower levels. There were no up-to-date performance wall charts, or tables at the programme offices. With the HMIS unit having the responsibility for data collection and report production the UCI Programme officers are becoming somewhat “disconnected” from the data.

District stock-outs of vaccines were not monitored by the UCI programme, nor by the National vaccine store, although it is possible to capture this information in the current HMIS design.

Denominators: Populations of pregnant women and children under one are uniformly estimated as being 5.4% and 4%, respectively, of the total population. The problem is there is not now a uniformly used source for total population at the district or national level. The 2000 Census produced figures far less than what was expected which is likely to be a significant factor in the large number of districts (41%) presenting DPT3<1 coverage in excess of 100%. Another contributing factor to coverage rates >100% is the high level of internal migration between districts (i.e. Mambwe), and high levels of in-migration from the DRC in the districts near the border. There has been a subsequent “district head count” producing higher population estimates which are also cited in some documents. Confusion regarding which population figures to use is the most probable cause for the differences in district denominators found at national level and those found at the districts. District denominators observed at the national level are higher than those found at district level for Mambwe (2.7%), Lusaka Urban (10.6%) and Mazambuka (7.1%). In Kapirimposhi the national figure is 18.5% lower than the district population used at the district.

Storing-Reporting: Immunization data is well stored in the HMIS database and easily retrievable. Completeness and timeliness of provincial reporting is monitored at the HMIS office, but is another area where the UCI Programme is no longer involved despite their primary interest in this information. Lack of written, routine computer back-up procedures compromised the national storing/reporting score. The computerization of the HMIS has great potential to ease the availability and analysis of information. And, although there is some feed-back to lower levels and dissemination of information, there seemed to be some difficulties in fulfilling the needs of the EPI programme: early delivery of information requests and some indicators like DPT1 or immunization of children older than 1 year.

National vaccine stock: The cold chain equipment for the storage of vaccines is extremely good, with big cold chambers (refrigerator and freezer), good power supply

from the national grid and two stand-by generators. However, they have few vaccines, especially DPT (less than 300 doses). In fact, this was a “technical stock-out” since this amount was clearly not enough to respond to any district needs.

National Level DPT3<1 Reporting: The figures reported in the JRF for 2002 are highly consistent with the current national tabulation. However, the sub-population of children under one year of age is significantly different resulting in a higher coverage rate reported in the HMIS then in the JRF which used CSO 2000 for its denominator.

DPT3 Reporting

Table 3. Number of under 1s and DPT3 doses in different sources (2002)

2002	JRF	National tabulation	Difference
Under 1	458,030	425,454	32,576
DPT3	406,564	406,020	544
Coverage	88.8%	95.4%	-6.6%

The differences in the denominator are due to the recent release of the extrapolated figures from the 2000 Census and the general concern that the population figures produced significantly underestimate true populations.

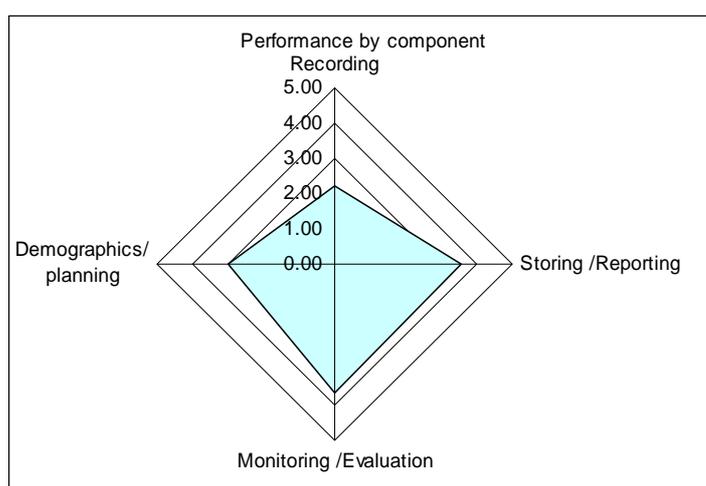
4.3 KEY ISSUES AT DISTRICT LEVEL

The Quality of System Index (QSI) for the four districts is as follows:

Kapirimposhi 70.3%, Mambwe 52.8%, Lusaka Urban 62.2% and Mazabuka 67.6%.

The four components of the district level QSI are Recording, Storing/Reporting, Monitoring/Evaluation, and Demographics/Planning. The figure below presents a “spider graph” of the performance of Lusaka Urban district from the 2003 DQA in Zambia. Please note that the best scores are for Storing/Reporting and Monitoring/Evaluation which is typical of the four districts visited. “Recording” performance was the weakest area in all selected districts.

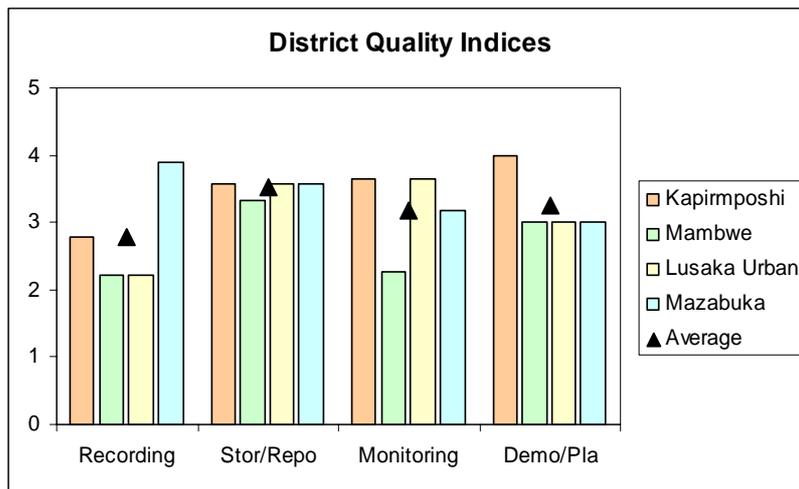
Figure 5. Scores of quality indicators for the district Lusaka Urban



Recording: Figure 6 below presents a graphic depiction of the QSI component scores for each district. With the exception of Mazabuka district, the worst scores were all in the area of recording. The most significant

determinant of the poor scores in this area was the absence of complete and up-to-date vaccine supply records. Only in Mazabuka were there complete records of DPT and TT vaccine supply for 2002, as well as up-to-date records for 2003. In each of the three other districts these records were either missing, incomplete or not up-to-date. Other health supplies, including syringes, are generally well monitored with stock cards or ledgers.

Figure 6. Scores of quality indicators for the four sampled districts



Demographics/Planning:

While the districts did relatively well in scores on demographics/planning there is still a lot of confusion and room for improvement. The two primary areas of confusion are target setting and the correct population estimates to use. Most facilities only

had targets to the degree that they were listed in their HMIS Quarterly Self Assessment forms which were duly recorded at a standard 80% of sub-populations (i.e. children under 1). These targets were usually recorded by the HMIS in-charge and the MCH Coordinators were only tangentially involved with them. The targets were not based on the previous year's performance and were not set by the MCH staff.

The other problem is that district staff work with several different estimates of total district population for a given year. The 2000 Census (CSO 2000) gave lower than expected population figures and has been criticized for methodological problems. Following the publication of CSO 2000 all districts undertook their own "head counts" which invariably present higher estimates of the total district population. At the time of the DQA districts were receiving CBoH population estimates as well. So while populations of pregnant women and children under one were consistently calculated as 5.4% and 4% of the total population, the fact that the total population estimates themselves were variable caused some lower than necessary scores.

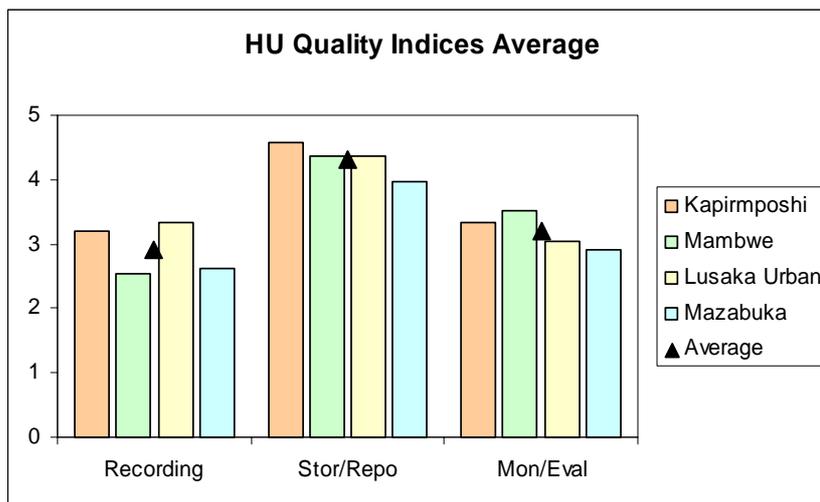
Storing/Reporting scores were the highest of any component largely due to the design and implementation of the HMIS at district level with high levels of completeness and ease of retrieval of data. The one area for improvement is computer back-up procedures which need to be formalized, documented and implemented. It should be noted that in many cases district staff refer to the original paper HMIS reports, rather than the computer tabulations, for planning purposes.

Monitoring/Evaluation: An unintended consequence of the implementation of the HMIS has been the disconnection of district programme managers from the relevant data from the HUs. Currently, HU reports are received and processed by the HMIS in-charge and the district programme managers are not getting full use of the data as witnessed by the lack of monitoring/evaluation charts and tables documenting immunization performance. On a positive note, there are regular meetings at the district with HU staff regarding immunization. Records of these meetings are available in meeting minutes that are also distributed to the HUs.

4.4 KEY ISSUES AT HEALTH UNIT LEVEL

The figure below presents the relative component scores for health facilities visited in each of the four districts. Each bar represents the average score for the six health facilities in that district for each of the QSI component areas. This graph highlights the relatively poor scores for immunization data recording compared to the scores for monitoring and evaluation and particularly storing and reporting.

Figure 7. District averages of scores of quality indicators for the health units



Recording: HMIS immunization recording depends on tally sheets for each antigen, as well as child health cards and registers for infants and pregnant women (Safe Motherhood Register). The system appears to be well designed and well functioning at the HUs visited. The principal reasons for the low recording scores

were the incompleteness of tally sheets and the lack of stock records at most health facilities visited. Only half of the HUs had complete tally sheets, and only five of the twenty-four HUs had complete vaccine stock records for the audit year (2002). The non-use of stock cards for vaccines requires health units to determine their usage and requirements exclusively from the issue voucher files which is a time consuming and less accurate method for vaccine monitoring. Please note that stock cards were generally used for monitoring supplies of drugs and syringes, but the standard MoH stock cards do not record either batch or expiry date information.

Storing and Reporting: Storing-reporting had the highest scores (as happened at the district level), showing that, in general, information is available and reported at health facility level. The HMIS quarterly reports are well organized in HMIS booklets that retain copies of each quarterly report as well as the end of year summary report. The one area for concern is that these booklets contain all the programmatic data for

the health unit and are used for many purposes. In two facilities the report book could not be located as it was borrowed for planning exercises by different staff. Almost all (22 of 24) health units had all reports available for the audit year.

Monitoring and Evaluation had an intermediate score. In all cases the HUs had maps on the walls showing their catchment area and had tables on the walls presenting their denominators for children <1 and for pregnant women. As described above, the HU denominators are based on percentages of the total catchment area population which had changed erratically in recent years due to the confusion over the best population estimates to use. Other areas for consideration are as follows:

- Tracking defaulters – the Children Under 5 and Safe Motherhood Registers are not used for following up defaulters.
- Only two of the 24 health facilities were able to monitor vaccines wastage.
- HUs do not use past performance data to set targets. Generally use national default targets (80%) when doing their annual Action Plans and their quarterly HMIS Self Assessments.
- Because the HMIS does not report DPT1 none of the facilities monitored drop-out rates.

4.5 CORE INDICATORS

Safety of Injections and Vaccine Safety (AEFI): is best ensured by (1) the use of auto-destructive (AD) syringes, (2) the use of safety boxes for their disposal and (3) the compliance with technical procedures. AD syringes were not available in any of the health units visited. Safety boxes, however, were available and correctly used in Many HUs.

OPV vaccines in the health units had vaccine vial monitors showing to be appropriate for their use. Although there are clear guidelines to report Adverse Events Following Immunization¹ which “should be monitored by all providers of immunization services”, the fact is that only 14 of the 24 health facilities showed awareness about the existence of AEFI reporting, and some of them had no forms available. A widespread belief was that AEFI was only applicable in measles mass immunization campaigns.

Wastage:

Wastage rate refers to the proportion of doses of vaccines that are in the system but that never will reach a child. Wastage may be due either to unopened vials that get expired, broken or lost (unopened or system wastage) or doses in opened vials remaining after vaccination sessions which are no longer usable. Global wastage

¹ Vaccination Manual. Expanded Programme on Immunization in Zambia. Ministry of Health – ZIHP – UNICEF, pages 48-56.

refers to the combination of both and is possible to calculate at the HU level only. To estimate vaccine wastage rate for a given vaccine in a given period of time we need two sets of information: the number of doses actually administered during this period of time and the total number of doses delivered, but not held in stock (unopened vials going to secondary stores in the case of unopened wastage and opened vials due for vaccination session, for global wastage).

Global wastage

It is not possible to estimate the global wastage rate at health units because there is no information on the total number of doses administered (only DPT3 doses are reported). Even if total DPT doses had been available for 2002, calculating a wastage rate would have been possible only at the four health units which had complete ledger books.

Unopened wastage

Wastage occurring within the vaccine stores due to losses of unopened vials can only be estimated if complete data on vaccines stock management does exist. This could be estimated for the national vaccine stores and two districts. These unopened vials wastage rates should be read as minimums, since it is not possible to assure that some other losses have not been recorded for any reason.

The following table summarises the information available for both types of wastage as could be estimated from the data collected during the DQA:

Table 4. Vaccine wastage rates by district

	Kapirimposhi	Mambwe	Lusaka U.	Mazabuka
District WR (unopened)	NA	NA	2.6%	0.0%
Average weighed WR for HUs (opened and unopened) ²	NA	NA	NA	NA

NA: not available due to the lack of information in the total number of DTP doses administered (only DPT3 doses are reported).

At the debriefing the issue of vaccine wastage was a topic of some interest. UNICEF has been supporting the procurement of vaccines and the UNICEF Representative commented that wastage was a significant problem that needed to be prioritized by the CBoH.

² 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

National WR (unopened): 0%

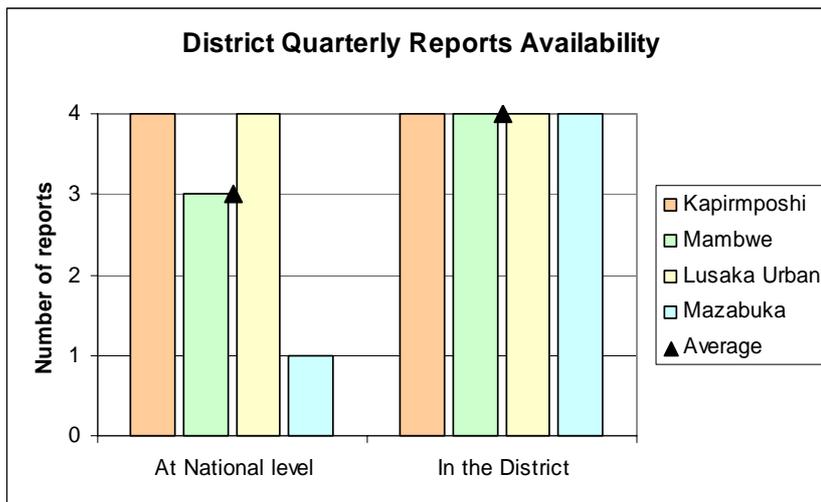
Weighted Mean of the 24 HU wastage rates: NA.

The global wastage rate in the JRF 2002 was 30%, but it came from an estimate at regional level provided by WHO Regional Office and does not reflect the real wastage in Zambia.

Completeness of Reporting

Completeness of reporting refers to the availability of quarterly reports at each level of the system. District quarterly reports at district level had 100% completeness in 3 of the 4 districts. This is due to the fact that data from health units is entered in the computer and the compilation from the computer constituted the district report without the need to write a paper report. This is the reason why only Mambwe had no district reports, because the district computer was not functional in 2002. However, the majority of HU HMIS reports were located in order to produce quarterly DPT3<1 data. At national level, however, the number of districts entries is lower than expected, with an average of 2.78 out of 4 reports for the 72 districts and 2 out of 4 for the sampled ones. The following table summarizes this information.

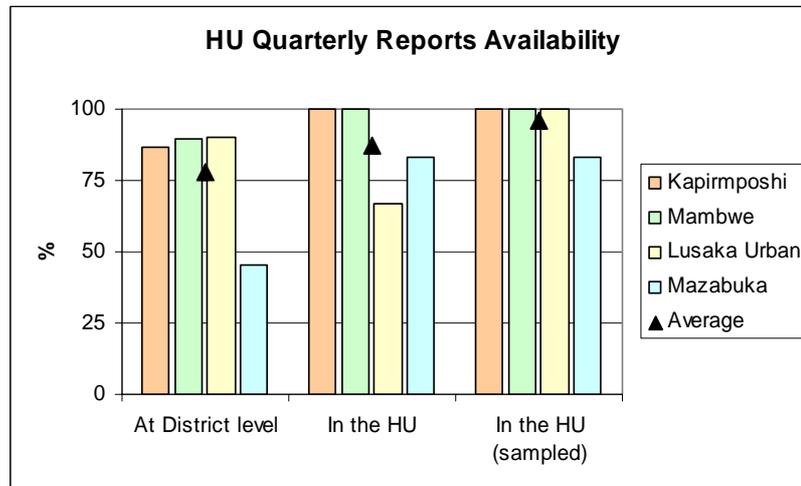
Figure 8. District Reports completeness at national and district levels.



78% of health unit reports could be found at district level and 87% at the health units. It is striking in the case of Mazabuka where less than a half of the quarterly health unit reports could be retrieved. This loss of information is considerable although we cannot state in all cases whether this

represents reports never done or reports done but lost later on. The following figure summarizes the findings.

Figure 9. Health Units Reports completeness at district and health unit levels.



Other Core Indicators

DPT3 coverage at national level was slightly different from the coverage reported at district level for the four districts in the sample. This is due to differences in all four districts between national and district figures for both DPT3 doses and denominators.

Drop out rates cannot be estimated in any case due to the fact that DPT1 information is not included in any of the levels of the HMIS.

Reports sent: it is not possible to find out at district level an historic of the reports sent to the superior level. This is due to the fact that the information is sent in electronic format and the HMIS software does not monitor when this has happened (and hand records for this purpose were neither found at district level). This would also be difficult to monitor since the whole data base is sent every time; i.e., there is no selection of “new data” or “last reporting period” to be sent to the higher level, which is one of the strengths to preserve the integrity of the information.

Vaccine stock-outs could only be monitored in two districts which had the necessary information for this. One of them had stock outs during 2002: two months for DPT and 2 months for BCG

Supervision: all districts have regular supervision of health facilities.

Action plans: all district showed action plans for the year 2002 except one of them. Interestingly, many of the health facilities visited had also action plans for a recent or the current year.

5. Recommendations

5.1 IMMEDIATE RECOMMENDATIONS

- The HMIS and UCI should hold an immediate round-table discussion regarding, a) tally sheet design and supply, b) alternatives for generating wastage and drop-out rates. These may include non-HMIS solutions such as annual register reviews, and stock card reviews c) how to more closely link the MCH Coordinators to immunization data to promote monitoring and use.
- Standard tally sheet formats should be provided to HU and district staff as well as guidelines for their use and storage. The Guidelines need to be clear regarding how to fill in the tallies, how to aggregate them, use for outreach and storage. Review of tallies should be included on district supervision team checklists.
- As soon as feasible the issue of population estimates should be resolved and clear guidance provided by the CBoH to the lower levels on what estimates should be used in calculating their denominators.
- HMIS and UCI should ensure that stock cards are distributed to all provinces, districts, and health facilities for tracking all vaccines. Clear Guidelines regarding how to use the stock cards should also be distributed.

HMIS and UCI should develop guidelines and tools to ensure that immunization data is actually monitored and used at the district, province and national level. UCI and MCH Coordinators need to define what information they need, in what format and at what time intervals and work with HMIS officers to facilitate the reporting.

5.2 SUPPLEMENTARY RECOMMENDATIONS

Recording

- Improve availability of vaccine stock records and ensure use at all levels.
- Ensure standard tally formats for all health centres.

Storing/Reporting

- Develop written "automatic" backup procedures and ensure implementation at district, provincial and national levels.
- Ensure consistency of data (i.e. DPT3<1) across the different levels and reports.

Monitoring/Evaluation

- Develop and implement procedures for monitoring drop-out and vaccine wastage rates.
- UCI should develop and implement guidelines for provincial and district MCH Coordinators regarding the analysis and use of immunization data for programme evaluation and management. This should include roles and responsibilities for regular retrieval of data from HMIS and use for maintaining wall charts and management tables.
- Provide guidelines to health units for the use of AEFI formats for routine immunisation (not just for measles campaigns)

Demographics and planning

- Disseminate clear instructions regarding which population estimates to use for health planning
- Provide guidance to district and health units regarding setting targets based on previous performance

System Design

- Ensure date of receipt is recorded on the reports arriving
- Determine best method and data source to generate wastage and drop-out rates.

6. ANNEXES

6.1 KEY INFORMANTS (DISTRICT AND NATIONAL) AND HEALTH FACILITIES VISITED

Health Units by Districts

Kapirimposhi	Mambwe	Lusaka Urban	Mazabuka
Kawama	Msoro	Chipata	Nakambala Urban
Mukonchi	Kasamanda	Kanyama	Mbaya Musuma
Chankomo	Chikowa	Matero Main	Hanjalika
Chibwe	Masumba	Matero Reference	Kaonga
NCMDS	Nsefu	Railway	Kaleya Small Hold
Mulungushi	Kakumbi	State Lodge	Mobe

Kapirimposhi District	
Dr. Charles Mninunda	District Director
Mr. Godfrey Chama	Acting Manager Planning
Sr. Veronica Nyambe	A/MPD
Mr. HM Fumbeshi	MA
Mrs. Joy Walubuta	A/DAO
Mr. Donald Muconda	H/A
Mr. Michael Piri	A/NSG Officer
Mr. Kelvin Chimanga	Cold Chain Technician
Mr. Jennifer Chibuye	MCH Coordinator
Mr. Loubinde Loubinde	Senior Environmental Health Technician
Mr. Chengo Bryan	Statistics
Mr. Alinami Amulenga	District Health Information Officer
Mazabuka District	
Ms. Victoria Nsofu	District Health Information Officer
Mrs. Vila Nyambe	MCH Coordinator
Mr. Leonard Mushabati Mulengula	Health Inspector
Mr. SK Ngwane	A/DDH
Mr. Romeop Sinogo	Manager CHD
Mr. Webster Shimalunga	ADAO
Mambwe District	
Mr. Charles Banda	District Director of Health
Mrs. Estel Banda	Acting MCH Coordinator
Mr. Njobvu Charles	Environmental Health Technician

Lusaka Urban District	
Mrs. Mary Banda	District MCH Coordinator
Mrs. Charity Neyambe	HMIS In-Charge
Mrs. Agnes Simonga	Public Health Nurse
Dr. Makungu Kabaso	MPD
National Debriefing	
Ms. Leo Chivundu	EPI Desk Officer
Dr. Mutale Mumba	WHO Immunization Adviser
Mr. Mutinta Moongu	CBoH HMS
Paul Chirhimba	ZIHP HMIS Adviser
Nuria Hohenes	WorldBank Consultant
Birthe Locatelli-Rossi	UNICEF Head of Health and Nutrition
Flint Zulu	UNICEF EPI Officer
Mkatepa Bwalya	CBoH Child Health Specialist
Chipalo Kaliki	Documentation and Statistics Specialist CBoH HMIS
Goran Carlsson	CBoH Adviser
Bona Chitah	CBoH CABS
Dr. B.U. Chirwa	CBoH Director General

6.2 CORE INDICATORS TABLES

Table 5. Core indicators at National level

	JRF	Reported at time of audit
Districts with DPT3<1 coverage > 80%	73.6%	72.0%
Districts with measles<1 coverage > 90%	52.8%	54.2%
Drop-out rate	NA	NA
Type of syringes	Sterilizable, non-AD disposable	Sterilesable, non-AD disposable
Districts with AD syringes	0%	0%
Introduction HVB	NO	NO
Introduction Hib	NO	NO
Vaccine wastage DPT ³	30%	30%
Wastage rate HVB	NA	NA
Wastage rate Hib	NA	NA
Interruption in vaccine supply 2002		3 months, DPT
Number of districts with interruption in vaccine supply 2002	40	NA
% district disease surveillance reports received/expected	97% ⁴	69%
% district coverage reports received/expected		69%
% district coverage reports received on time		NA ⁵
Number of district supervised at least once in 2002		NA ⁶
Number of districts which supervised all HUs in 2002	100%	NA ⁷
Number of districts with microplans including routine immunisation ⁸	NA	NA

³ No calculated wastage rate. Based on estimate of estimate of average regional wastage (WHO Afro).

⁴ 97% because JRF used provincial, not district, reporting.

⁵ District reports sent to provinces which aggregate and then send to national level. District timelines not recorded at National level.

⁶ Only known by provincial officers.

⁷ Impossible to know from HMIS, or any other source.

⁸ 3 of 4 districts visited had microplans. No HMIS reporting on microplan.

Table 6. Core indicators at District level

		Kapirmposhi	Mambwe	Lusaka Urban	Mazabuka
District DPT3 coverage	At national	154%	117%	99%	82%
	At district	148%	121%	97%	114%
District measles coverage	At national ⁹				
	At district	137%	103%	103%	89%
District Drop-out DPT1-3 ¹⁰	At national	NA	NA	NA	NA
	At district	NA	NA	NA	NA
Syringes supplied in 2002	At national	NA	NA	NA	NA
	At district	NA	NA	NA	6,000
Number of district coverage reports received/sent	At national	4/4	NA	4/4	1/4
	At district	4/4	2/4	4/4	NA
Number of coverage reports received on time/sent on time	At national	4/4	NA	4/4	1/4
	At district	NA	NA	4/4	NA
Number of district reports sent	At national	NA	NA	4/4	NA
	At district	4/4	NA	4/4	NA
Number of HU coverage reports received/sent	At national				
	At district	66/76	NA	NA	253/280
Number of HU reports received/sent on time	At national				
	At district	NA	NA	NA	NA
District vaccine stock out	At national	NA	NA	NA	NA
	At district	NA	Yes	NA	No
Has the district been supervised by higher level on 2002	At national	NA	NA	Yes	NA
	At district	Yes	Yes	Yes	Yes
Has the district been able to supervise all HUs in 2002	At national	NA	NA	NA	NA
	At district	Yes	Yes	Yes	Yes
Did the district have a microplan for 2002	At national	NA	NA	Yes	NA
	At district	Yes	No	Yes	Yes

⁹ Information not collected at national level.¹⁰ Unable to estimate due to the fact that the HMIS does not routinely collect DPT1 data.

6.3 QUALITY INDEX ANALYSIS TABLE

Table 7. District Quality Indices

	Recording	Stor/Repo	Monitoring	Demo/Pla
Kapirimposhi	2.78	3.57	3.64	4.00
Mambwe	2.22	3.33	2.27	3.00
Lusaka Urban	2.22	3.57	3.64	3.00
Mazabuka	3.89	3.57	3.18	3.00
Average	2.78	3.51	3.18	3.25

Table 8. HU Quality indices and average

	Kapirimposhi			Mambwe			
	Record.	Stor/Rep.	Mon/Eval	Recording	Stor/Repo	Mon/Eval	
Kawama	3.00	5.00	2.22	Msoro	1.33	3.75	3.33
Mukonchi	3.00	5.00	2.78	Kasamanda	2.00	5.00	3.33
Chankomo	4.33	5.00	4.44	Chkowa	2.67	5.00	3.89
Chibwe	3.00	3.75	3.89	Masumba	2.33	5.00	3.89
NCMDS	2.86	5.00	2.78	Nsefu	3.50	3.75	2.78
Mulunguishi	3.00	3.75	3.89	Kakumbi	3.33	3.75	3.89
HU average	3.20	4.58	3.33	HU average	2.53	4.38	3.52

	Lusaka Urban			Mazabuka			
	Record.	Stor/Rep.	Mon/Eval	Recording	Stor/Repo	Mon/Eval	
Chipata	3.67	5.00	3.33	Nakambala Urban	2.33	5.00	3.33
Kanyama	4.00	3.75	3.89	Mbaya musuma	2.67	3.75	2.78
Matero Main	4.33	5.00	3.89	Hanjalika	3.33	3.75	2.50
Matero Reference	2.33	3.75	3.33	Kaonga	2.33	3.75	3.33
Railway	2.33	3.75	1.67	Kaleya Small Holders	2.33	3.75	2.22
State Lodge	3.33	5.00	2.22	Mobe	2.67	3.75	3.33
HU average	3.33	4.38	3.06	HU average	2.61	3.96	2.92