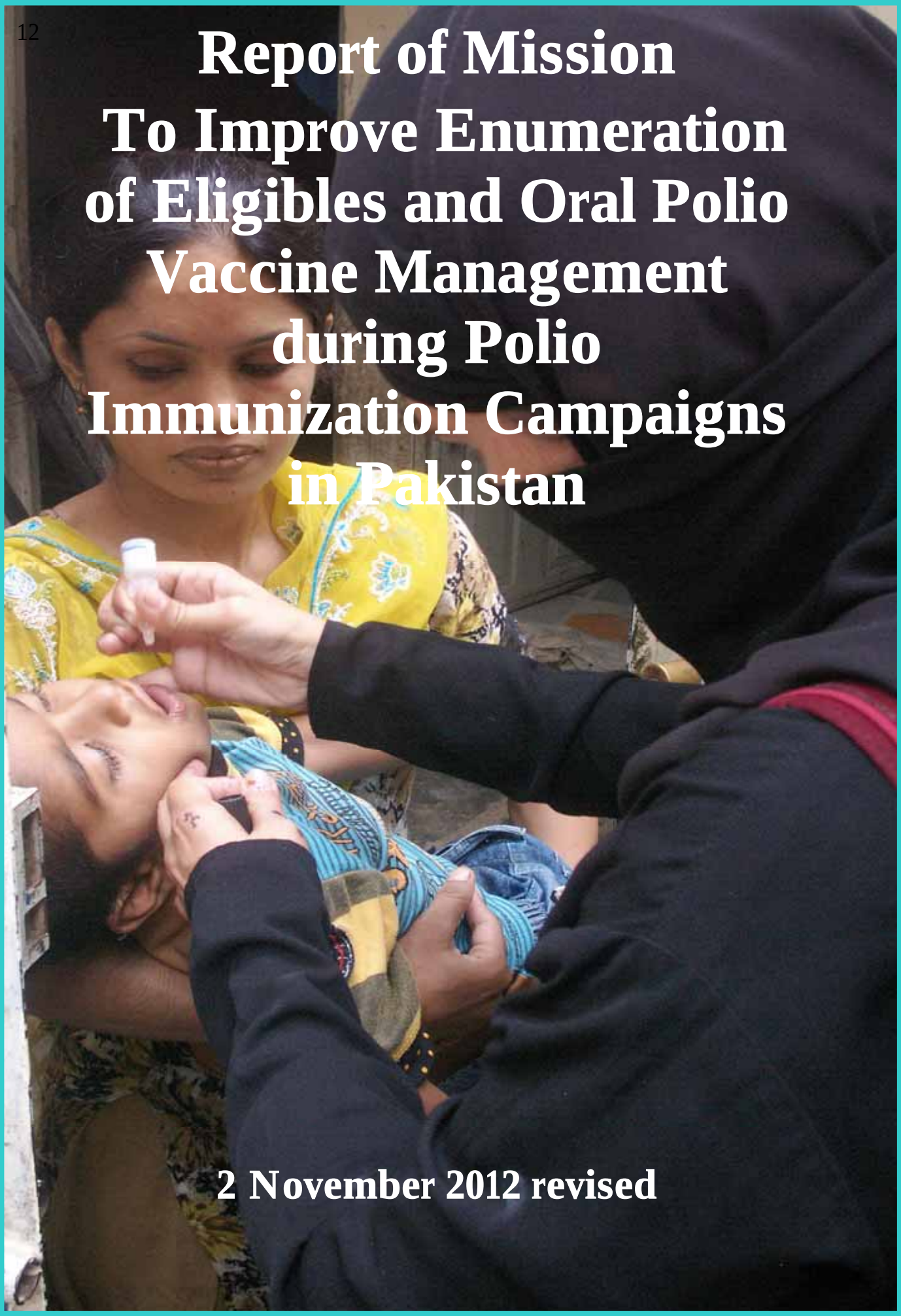
# Report of Mission To Improve Enumeration of Eligibles and Oral Polio Vaccine Management during Polio Immunization Campaigns in Pakistan



2 November 2012 revised

## Limitations of report and interpretations of its findings

It is not possible for an external review such as this to tell a country how to implement the recommendations it makes. The external team does not know the minutae of a country's organisation, division of responsibilities and limitations. Nor does it know the nature of the local politics, the "prides & prejudices" and preferences of the *dramatis personae*. The team's duty is to make recommendations sufficiently persuasively, that the country grasps the essence and then works out what to do about them. For example one of the most critical issues is the increase in the number of LHWs. India has demonstrated that staff of this type drawn from the community they serve, are critical to the success of the intractable problem of polio elimination leading to eradication. The World Bank and IMB reports have made the same point. Now it is up to GoP to assign sufficient priority to solve the problem. The team cannot say how that will be done. It may mean assigning budget that at present is being spent elsewhere, i.e. push LHW appointment higher up the priority list. It may also mean changes in terms of appointment and certainly in the organisation of the health service infrastructure to build a more integrated service and not one so heavily verticalised. Such changes will also apply to the way vaccine management for GPEI and routine EPI are managed in future.

## Acknowledgements

The team would like to thanks all the staff at national, provincial, district and field levels who gave their time to accompany the team and answer their questions. We would also like to thank the staff of UNICEF and WHO both in Islamabad and in the Provinces who spent time assisting the team. Without all their help this report would not have been possible.

# Glossary

| | |
|---|---|
| AIC | Area In-Charge |
| AJK | Azad Jammu and Kashmir |
| BCG | Bacillus Calmette-Guérin |
| BHU | Basic Health Unit |
| bOPV | bivalent Oral Polio Vaccine |
| CCI | Council of Common Interest |
| CDA | Capital Development Authority (Islamabad) |
| CIP | Carriage & Insurance Paid to place of destination |
| CR | Control Room |
| CSP | Campaign Support Person |
| Dai | Untrained birth attendant |
| DMO | District Medical Officer |
| DOH | District Officer (Health) |
| DPEC | District Polio Eradication Committee |
| EDO(H) | Executive District Officer Health |
| EPI | Expanaded Programme on Immunisation |
| EVM | Effective Vaccine Management |
| FANA | Federal Administered Northern Areas |
| FATA | Federally Administered Tribal Areas |
| FMT | Female Medical Technician |
| GB | Gilgit Baltistan formally FANA |
| GMP | Good Manufacturing Practice |
| GPEI | Global Polio Eradication Initiative |
| I/C | In Charge |
| ICT | Islamabad Capital Territory |
| ILR | Ice Lined refrigerator |
| IMB | Independent Monitoring Board |
| KPK or KP | Khyber Pakhtunkhwa |
| LHV | Lady Health Visitor |
| LHW | Lady Helath Worker |
| mOPV | monovalent Oral Polio Vaccine |
| MCH | Maternal and Child Health |

| | |
|---|---|
| NID | National Immunisation Day |
| NIH | National Institute of Health |
| NIPS | National Institute of Population Studies |
| NPM | National Programme Manager |
| OIC | Officer in Charge |
| OPV3 | Oral Polio Vaccine (3rd dose) |
| PCO | Pakistan Country Office (UNICEF) |
| PCR | Polio Control Room |
| PCV10 | 10 valent Pneumococcal Vaccine |
| PS | Procurement Services (of UNICEF) |
| RHC | Rural Health Centre |
| R&I | Receipt & Issue |
| Rota | Rotavirus vaccine |
| RED | Reach Every District (WHO strategy) |
| SD | Supplies Division (of UNICEF) |
| SIA | Supplementary Immunisation Activity |
| SIAD | Short Interval Additional Dose |
| SMS | Short Message Service |
| SNID | Sub National Immunisation Day |
| TBA | Trained Birth Attendant |
| Tehsil | Administrative area within a district |
| tOPV | trivalent Oral Polio Vaccine |
| TSC | Team Support Centre |
| UC | Union Council |
| UCMO | Union Council Medical Officer |
| UNICEF | United Nations Childrens' Fund |
| UPEC | Union Council Polio Eradication Committee |
| VAR | Vaccine Arrival Report |
| VM | Vaccine Management |
| VSSM | Vaccine Supplies Stock Management |
| VVM | Vaccine Vial Monitor |
| WHO | World Health Organisation |
| WMF | Waste Management Factor |

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## Summary

Concern has been growing since 2011 over the quantity of vaccine being used in Pakistan during Supplementary Immunisation Activities (SIAs). There is also uncertainty over the size of the eligible population (children under the age of five). To address both these issues UNICEF New York at the request of the Government of Pakistan, commissioned a review to understand the current system used for enumeration of eligibles, vaccine management and reporting and to make recommendations on how these both might be improved to ensure that resources invested in the Polio Eradication Initiative (GPEI) are being optimally spent.

**Enumeration of children** is based on the census of 1998; as a result estimates of eligibles are extremely inaccurate. The one reasonably hard data item, administered BCG, has been used in this report to cross check estimates of eligibles. Using adjusted estimates of administered BCG suggests that the size of the GPEI target population is close to 31 million under-fives, which would give a vaccine requirement (including WMF 1.15) of 36 million doses (rounded up) for a full NID. This conservative estimate is 12% less than the 40,966,000 doses requested for the first NID of 2013.

**The most effective way to obtain accurate numbers of eligibles is to expand the LHW programme and closely link it to EPI/GPEI. It is recognised that this will be an additional cost but experience from India[1] and elsewhere has shown that there is a huge benefit to the health service from such a commitment. Many of the problems identified in UNICEF's Polio Communications Quarterly Update October 2012,(see Appendix 4) could be addressed by recruitment of community based LHWs.**

**The plan to make LHWs formal health department employees is most welcome but the LHW posts have to be filled for them to effectively identify and locate eligibles. They should be able to do this far more efficiently than the present shotgun approach of vaccinators going house-to-house. Ways should also be investigated to encourage birth registration by linking benefits to the holding of a birth certificate, which has been very successful in Egypt.**

**Amendment 18** is already having an unfortunate impact on vaccine supply with stocks of non-WHO-prequalified vaccine being purchased. These vaccines are of unknown quality and come without VVMs. A consignment of 164,000 does of measles vaccine sent to Quetta in July 2012 had no VVMs had mismatched diluent and was short dated. **There should be a**

[1] Weiss, W. et al. *Outcomes of Polio Eradication Activities in Utter Pradesh, India: the Social Mobilisation Network (SM Net) and Core Group Polio Project (CGPP).* Department if International Health, Johns Hopkins Bloomberg School of Public Health. May 2011. BioMed Central Ltd

**review of vaccine procurement and funding by the Council of Common Interest (CCI) in which federal procurement options should be considered and if accepted, CCI could propose a) separate funding line for vaccines in the "national budget" under one of the federal divisions; b) placing the vaccine procurement budget and process under oversight of CCI.**

**Vaccine Supply** Issues relating to vaccine supply, storage and management apply as much to EPI as they do to GPEI. Most GPEI vaccine comes into Pakistan via UNICEF Procurement Services or through UNICEF programmes. In contrast, the majority of routine EPI vaccines including tOPV are bought directly by the government. The quality of these vaccines is unknown. Some routine EPI vaccines are bought at much higher prices than would be the case if they were bought using Procurement Services. On the one hand the government is wasting money buying unnecessarily expensive vaccine and on the other it is relying on donors to supply vaccine through donations. **All vaccines should be purchased from WHO prequalified manufacturers to ensure adequate quality and the best international price. To achieve this the Provinces and Federal governments need to agree the following:**

**a) a national commitment to vaccine standards,**

**b) establish a more accurate way of enumeration**

**c) establish a long term national vaccine forecasting and funding commitment to match the need,**

**d) commit to enlist all WHO pre-qualified suppliers as potential suppliers and invite bids only from them**

**e) The Public Procurement Rules changed to permit direct procurement from WHO prequalified sources only**

**The current guidelines** are not user friendly in their layout, and contain errors and incorrect statements. They also do not contain any guidance on cold chain, vaccine estimation, vaccine management, or waste management. **The guidelines need to be rewritten and their layout redesigned to make them more accessible and useful to vaccinators and their supervisors. Staff then need to be better trained how to follow them. Supervisors need to be trained in implementation of guidelines.**

**Stock management:** Although vaccine WMF is notionally set at 1.15(13%) for vaccine distributed to the Provinces, and at 20% for international purchase, in reality planned wastage[2] is about 30%; as a result substantial quantities of vaccine are distributed and either wasted or not used. Combined with extremely weak stock management and a lack of attention

[2] Percent of vaccine in excess of the number of planned beneficiaries.

to returned vaccine, these factors result in vaccine from previous campaigns remaining in the system but unaccounted for. As an example, the team found over 400,000 ignored doses of bOPV in the Karachi store.

Overall there appear to be 263,260 doses of bOPV vaccine unaccounted for somewhere in Pakistan.

**To stop this happening in the future, there must be much stricter stock management with manual stock registers/records at all levels down to and including the AICs and vaccinators.**

**Provinces and Districts should immediately carry out a stock count of bOPV vaccine left over in the province and district stores and at all fixed facilities after the October NID and report those stock data to the Vaccine Management Steering Committee so that a national stock balance can be established. This procedure should become the norm after each SIA**

**The Federal level should compile weekly stock reports to be shared with UNICEF & WHO so that UNICEF & WHO can analyse the data and propose any remedial action that may be needed.** This is especially critical as the new PCV vaccine – which has a street value of $44.60 per dose – comes into use. Under the present lax conditions it may be assumed that this attractive vaccine will find its way, in significant quantities, into the private sector.

**<u>Vaccine storage</u> at the Federal level needs to be improved by installing continuous computer-linked temperature monitoring. This was recommended in 2010 and nothing has yet been done about it. Likewise automatic starting for the standby generator should be installed, as previously recommended. At least three staff need to be appointed to run and manage the VSSM at the federal store.**

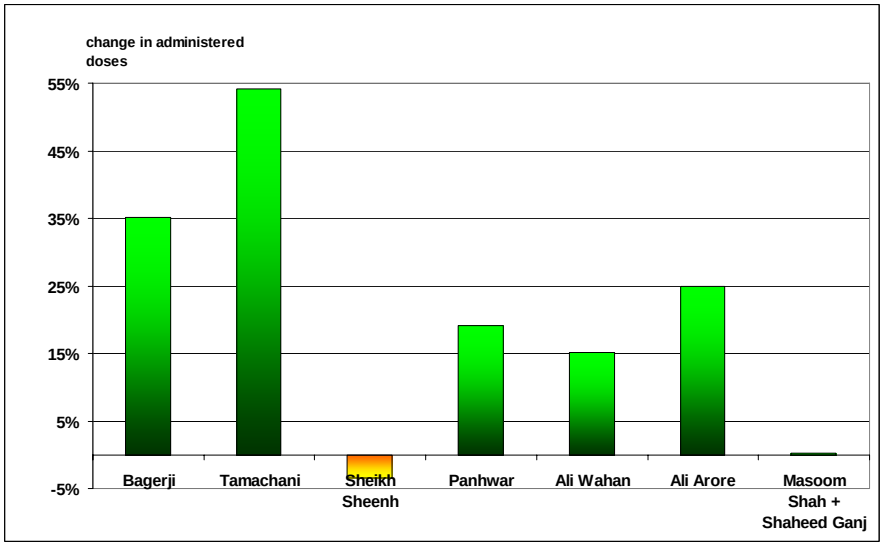
At provincial level the quality of vaccine storage is often poor and in some cases downright bad. Most cold rooms are old and even those that have been looked after are coming to the end of their useful life. In some stores the maintenance of the cooling units is appalling and the electrical wiring is a fire hazard. The decision to distribute the new cold rooms, brought in to accommodate PCV10, to the Districts rather than ensuring that Provincial stores have compounds big enough for them to accommodate all the functions they have to perform, is highly retrograde, and under present managerial circumstances will certainly lead to increased vaccine being stockpiled at best and lost at worst. **All Provincial store sites need to be surveyed to see if they meet WHO guidelines and if they do not alternative sites should be located that can meet the space needs of the expanded vaccination programme. EVM assessments should be conducted at all levels and the principles of cold chain management applied to all stores**

**Vaccine Wastage in the vial:** In some locations significant amounts of vaccine are being left in the vial. For example the team found in a small sample of locations that overall 5.7% of the vaccine was discarded in "empty" vials extrapolated to the whole country this would amount to 1.7 million doses of vaccine being discarded. **Vaccinators must be encouraged to make sure that all doses on all vials are used before the vial is discarded. AICs should check empty vials to make sure they are empty and if not instruct the vaccinators to make sure that they do use all the vaccine**

**Cold Chain equipment** The EVM study (2010) only covered the federal level it did not cover UC level, where the availability of electricity is worst. The use of domestic refrigerators at UC level is not good practice. **A programme to replace all domestic refrigerators with PQS vaccine refrigerators should be carried out as a priority, these may be either direct drive solar or units with passive cooling giving long hold over .**

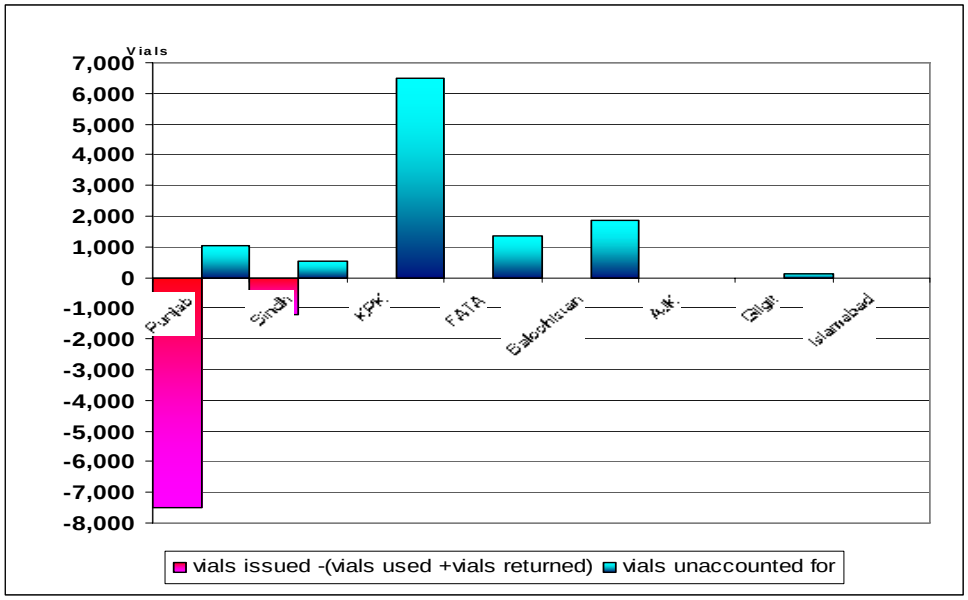
**Reporting / monitoring** Insufficient time is set aside for compiling and consolidating reports at the end of each campaign day. As a result, checking of data is ineffective and simple arithmetical errors go through from Tally Sheets to AIC reports. In the process of consolidating data from Tally Sheets up to Provincial Control Rooms huge discrepancies emerge, as shown in the following graphs. The first (Figure A), shows the discrepancy between Tally Sheet and Province in seven UCs during the September SNID. In six of these UCs, the team identified increases in the number of vaccinated children between Tally Sheet and Provincial Control Room (see green bars); in the seventh UC there was a decrease (shown in yellow). **There must be a focus on the importance of analysing vaccine utilisation. Sufficient AICs and vaccinators need to be employed to ensure that they will have at least an hour at the end of the day in which to compile and check their reports.**

**Figure A: Discrepancy between tally sheet and province control room**



The next graph shows, for each Province (district by district), during July NID 2011, the discrepancy between [vaccine issued and (vaccine used +vaccine returned)], and vaccine unaccounted for. In two Provinces (pink) more vaccine was returned than had been issued, and six Provinces (blue) had vaccine not accounted for, i.e. not enough doses had been reported as administered for the vaccine reported as used. Punjab and Sindh have some districts apparently returning more vaccine than they received as well as districts that have not accounted for all the vaccine they have received.

**Figure B: Discrepancy between issued vaccine and returned vaccine**




Much daily reporting is done either verbally or via SMS texts, and although there may be paper records these are not checked; it will prove very difficult to check data reported by those means. The team's conclusion is that the data reported from these two SIAs are unreliable.

Without accurate enumeration and performance reporting accurate vaccine management is impossible

**A detailed study should be undertaken to reconcile data reported on tally sheets with those date recorded at each stage upto and including the Polio Control Rroom**

**PEI/EPI** The achievement of the routine immunisation programme is low. The massive concentration on campaigning in Pakistan makes it almost impossible to allocate enough time to provide effective routine services. Yet GPEI cannot succeed without high coverage in routine services. **Ways have to be found to increase the emphasis on routine immunisation services. As a start**

**a) Invest some polio money and polio staff time to assist Union Councils (UCs) to develop joint GPEI and EPI microplans following**

**WHO RED approach so that both campaign and routine work gets reflected in the same plan. This could be started in the Polio-High risk districts.**

**b) Aligning additional support provided to Polio eradication by donors/partners to support Joint EPI-GPEI microplan implementation at UC level. In Pakistan districts are very large so the RED approach needs to be applied at the UC level for effective micro planning.**

**A Vaccine Management Committee should be formed at national level and be supported by vaccine management committees in each province. These committees should address all aspects of vaccine management and data management for ALL vaccines. WHO/UNICEF should be observers and a supporting resource to these committees (see Appendix 3 for draft TORs)**

Vaccinators are working hard to reach eligible children, and they deserve better management of GPEI, especially in enumeration, reporting and stock control. They in turn need to be more diligent when compiling their reports. The IMB in its October report[3] identified that *"further efforts are required to make the job of vaccinator and social mobiliser more attractive"*. These same staff could and should be used to help integrate GPEI activities with those of routine service to bring about improvements in other aspects of primary care such as attended births which are currently being neglected. Such integration could make GPEI more attractive to the population it serves.

At least two reports[4] in the last two years have already identified issues that constrain GPEI, these are reiterated in this report because some of their main recommendations have not been acted upon. **It is to be hoped that the findings and recommendations in this report will prompt effective action.**

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[3] Independent Monitoring Board of the Global Polio Eradication Initiative. *Every Missed Child* June 2012. page 40

[4] Haghgou M., Kenea H. *Effective Vaccine Management Assessment of the Federal EPI Store*. WHO 2009

[4] Mushtaq. M.U. *et al. From their own perspective - constraints in the Polio Eradication Initiative: perceptions of health workers and managers in a district of Pakistan's Punjab province.* BMC Int Health Hum Rights. 2010; 10: 22. Published online 2010 August 23. doi: 10.1186/1472-698X-10-22

# Report of Mission

# To Improve Enumeration of Eligibles and Oral Polio Vaccine Management during Polio Immunization Campaigns in Pakistan

## 20 September – 2 November 2012

### 1. Introduction

Concern has been growing since 2011 over the quantity of vaccine being used in Pakistan during Supplementary Immunisation Activities (SIAs). There is also uncertainty over the size of the eligible population (children under the age of five). To address both these issues UNICEF New York commissioned a review to investigate the current system used for enumeration of eligibles, vaccine management and reporting and to make recommendations on how both might be improved to ensure that resources invested in the Polio Eradication Initiative (GPEI) are being spent optimally.

It is a *sine qua non* that GPEI's success depends on a strong routine immunisation programme. However, the most recent coverage survey[5] for routine OPV, conducted in 2006, showed only 64.4% coverage for OPV3, meaning that one child in three had not received OPV3 before their first birthday (see Table 1).

**Table 1 Antigen wise EPI Coverage**

**Country: Pakistan** **N = 72280** **Children 12-23 months of age**

| Antigen | Card | | History | | Card+History | | Not Vaccinated | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % |
| **BCG** | 7392 | 10.2 | 48776 | 67.5 | 56168 | 77.7 | 16112 | 22.3 |
| **Polio1** | 7248 | 10.0 | 46007 | 63.7 | 53255 | 73.7 | 19025 | 26.3 |
| **Polio2** | 6871 | 9.5 | 42912 | 59.4 | 49783 | 68.9 | 22497 | 31.1 |
| **Polio 3** | 6558 | 9.1 | 39966 | 55.3 | 46524 | **64.4** | 25756 | 35.6 |

The routine reporting system reported 82% coverage for OPV3 in 2006 and this figure had only risen to 85% by 2010.

Table 1 shows that coverage for routine BCG is considerably higher than for OPV3, indicating that the health service is able to make contact with more than three-quarters of children under one.

[5] Anon, *EPI Coverage Evaluation Survey*, Pakistan 2006

GPEI is conducting a large number of SIAs each year. In 2012 eight separate campaigns have been planned.

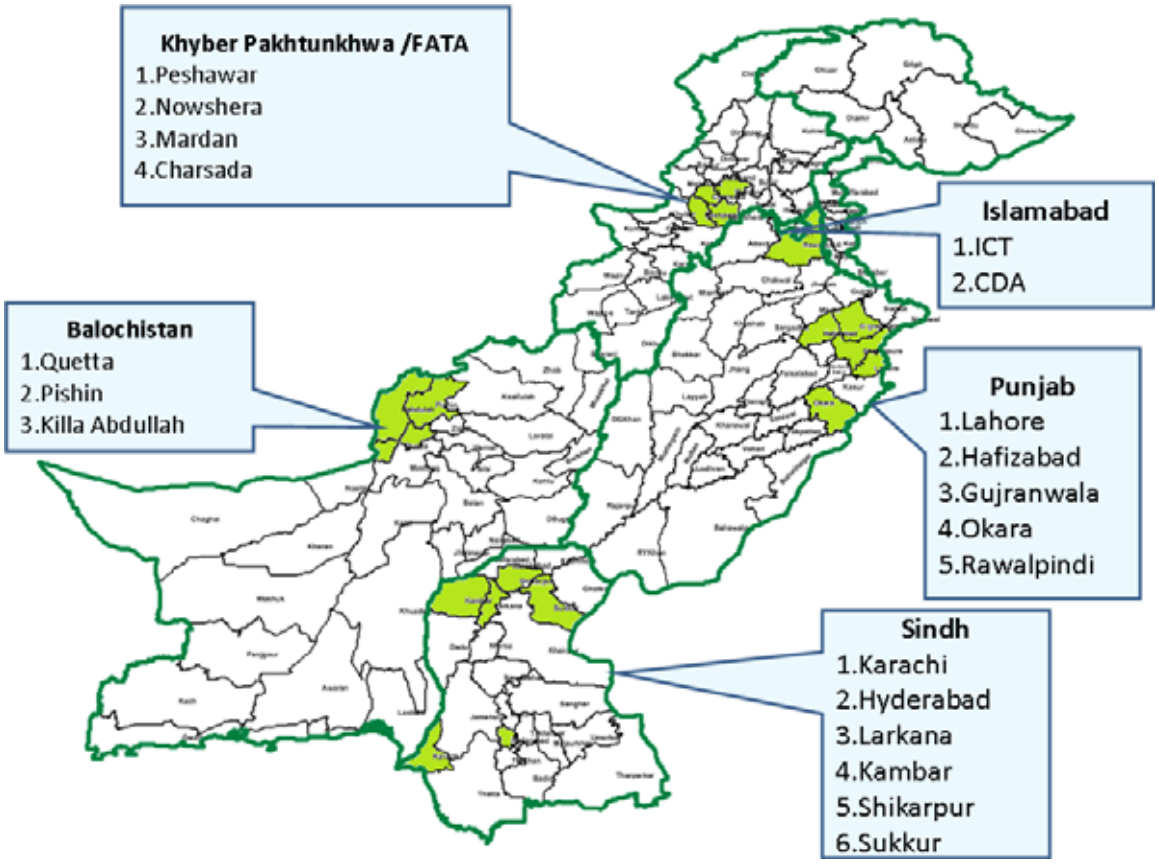
The team assembled for this review included two international consultants, two national consultants, seven UNICEF staff members and one WHO staff member. The team visited Punjab, Sindh, and Balochistan; Khyber Pakhtunkhwa (KPK) was covered by UNICEF staff based in Peshawar.

After preparatory work in UK and Islamabad the team went to the field on 10 September to follow the vaccination teams as they worked through the three days of the Sub National Immunisation Day (SNID) and the two days of catch-up following.

Figure 1 shows the locations visited.

**Figure 1**

**Locations visited by the team**




Due to floods in Sindh and Balochistan, the campaign there was delayed until 24 September and one national team member was deputed to follow the work of the teams in Northern Sindh during the delayed SNID.

During the preparatory work it became clear that a number of important recommendations have been made in the past and not acted upon. For example in 2009 during an Effective Vaccine Management (EVM)

Assessment[6] it was recommended that the cold rooms be fitted with continuous temperature monitoring. This report makes the same recommendation because continuous temperature monitoring has not yet been installed.

In 2010 a study was carried out by the Allama Iqbal Medical Collage in Lahore and the Department of Health, Government of Punjab[7] "to find the perceptions of health workers and managers regarding the constraints in GPEI to ultimately provide evidence for designing future interventions". The report concluded that the main constraints were [numbered bullets added]:

1. **the poor condition of the cold chain in all aspects,**
2. poor skills and a lack of authority in resource allocation and human resource management,
3. limited advocacy and communication resources,
4. a lack of skills and training among staff at all levels in the GPEI/EPI in almost all aspects of the program,
5. a deficiency of public health professionals,
6. poor health services structure,
7. administrative issues (including ineffective means of performance evaluation,
8. bureaucratic and political influences, problems in vaccination areas and field programs,
9. **no birth records at health facilities, and poor linkage between different preventive programs),**
10. **unreliable reporting and poor monitoring and supervision systems,**
11. **limited use of local data for interventions,**
12. **and unclear roles and responsibilities after decentralization.**

This assessment takes note of findings 1, 9, 10, 11 and 12; after two years there appears to have been little progress on these previously identified constraints.

## 2. National Guidelines for Planning, Implementation, and Monitoring of Polio Eradication Activities

The present Guidelines for Polio Eradication were last updated in March 2011. It has very good background information and operational specifications concerning the strategies, team responsibilities, strategies for high risk/insecure areas, IEC and training. However, this information is not well structured in a clear, easy way to use. It also omits topics such as detailed micro-planning guidelines, cold chain, vaccine estimation, vaccine handling and use, management of part used vaccine, and waste disposal.

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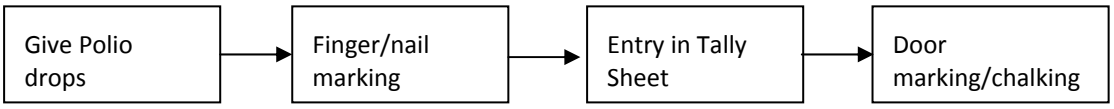
[6] Haghgou M., Kenea H. *Effective Vaccine Management Assessment of the Federal EPI Store*. WHO 2009

[7] Mushtaq. M.U. *et al. From their own perspective - constraints in the Polio Eradication Initiative: perceptions of health workers and managers in a district of Pakistan's Punjab province.* BMC Int Health Hum Rights. 2010; 10: 22. Published online 2010 August 23. doi: 10.1186/1472-698X-10-22

These omissions are highlighted by the flow chart on page 19[8] which sets out the process as follows:




The Guidelines' flow chart completely ignores how the vaccine is made available and how it is subsequently accounted for.

These comments apply to the English version of the guidelines. The team did not see an Urdu version of the guidelines, which would be essential for the Area In-Charge (AIC) and vaccinator levels.

The team found huge inconsistencies in the way that micro-planning was carried out and it is clear that the perception is, as one DMO put it, *"After so many NIDs, SNIDs and SIAs and concerned trainings, we sure know how to do it now"*.

Following are the main observations concerning points in the current Guidelines compared with the team's findings in Punjab.

- Micro-plans are not updated at UC level and local communities are not consulted.
- Most Union Councils (UCs) depart from the guidelines on micro-planning (i.e. to use the results of the last campaign with adaptation in consultation with local community) and take other references as their target.
- Other than *"We use the excess vaccines for the high risk areas after the campaign"* (quote at UC level), there are no clear written strategies for reaching the high risk populations described in the guidelines.
- Thus high risk areas and populations are not clearly mapped out and are not considered to be any different from the other areas to be covered. The result is that nobody can give an estimate of the target number children in high risk populations.

The Guidelines are ambiguous about targets, clearly stating that the target is an **area,** NOT a number, but then stating that the number of children vaccinated by one team should range from 100 to 200 depending on location.

Vaccine estimation, wastage rates, cold chain management, vaccine management and waste management are not mentioned in the Campaign Guidelines.

[8] National Guidelines for Planning, Implementation, and Monitoring of Polio Eradication Activities. Islamabad, Pakistan: 28-3-2011

The Guideline document is badly laid out: although it has a glossary at the front many of the abbreviations in the guidelines are not included. Its introduction does not appear until page 19, almost a quarter of the way through the document.

**Recommendations**

The Guidelines should be redrafted to correct errors and remove any parts that are counter productive, and redesigned to make them more user friendly.

The Guidelines should include guidance on: vaccine estimation, vaccine handling and use, vaccine consumption and reporting, and waste management

Particular attention should be given to ensure that staff adhere to what is laid down in the Guidelines and that staff do not invent procedures of their own without proper consultation. In particular staff at fixed centres must not turn away parents who bring their children for routine immunisation on a campaign day.

## 3. Training

The team observed several training sessions in and around Islamabad before the SNID began. Some training was found to be well carried out, but much left a lot to be desired. In several instances planned training simply did not happen and no explanation was given why the trainer did not turn up. At other sessions the trainees – who had attended numerous training sessions in the past – were clearly bored and kept leaving the room to do other things.

There were major deficiencies in training for micro planning, social mapping, and screening for target age children.

The only aspect of vaccine management addressed was reading the Vaccine Vial Monitor (VVM).

The Guidelines for carrying out training were not fully respected or followed:

Duration was less than 2 hours without any break, instead of the recommended 4 hours with a break.

Some Q&A performed, but no role plays or extended practical exercise.

The trainer brought a white board with marker, finger marker and a vaccine carrier with icepacks and vaccine, but did not bring any of the following:

Trainer's guide

Sample Tally Sheet and tally sheet from previous campaigns

Missed Children Sheet

Daily summary sheet

Micro plans

Sample team vaccination Map and Itinerary

The following topics were the main focus of the training:

1) Polio overview in Pakistan,
2) Target,
3) VVM,
4) Tally Sheet,
5) Administration of vaccine,
6) Recording on Tally Sheet,
7) Finger marking,
8) Door marking,
9) Communication with the caretaker.

The following topics were not completed:

Basic cold chain requirements for OPV

Receiving and returning supplies

Handling and usage of OPV

Recording and reporting

Accountability and wastage

**Recommendations**

Training needs to be improved: sessions should follow the prescribed pattern and not be arbitrarily shortened.

If trainees have been previously trained, the training should be refresher training to introduce the trainees to changes that have occurred since they were last trained.

The training must include sections on vaccine management, vaccine handling, the return of unused vaccine and the reporting of used vials, and waste management.

Supervisory check lists need to include, cold chain, vaccine estimation, vaccine management and waste management.

## 4. How Guidelines and training are implemented

The team saw staff flouting the Guidelines; for example on more than three occasions staff at fixed centres turned away parents who had brought their children for routine immunisation despite the fact that the Guidelines specifically state that “Routine EPI should not be suspended during polio campaigns”.

Contrary to the Guidelines, transit teams, although personally very well identified with green jackets, caps and identity card, are mostly working on

their own without any assistance from police or civil society. The transit post observed was not identified with IEC materials and thus was not readily visible.

Many vaccinators were observed to have no identification other than the vaccine carrier, while identity cards and caps are lying around in store rooms.

Not a single Zonal Supervisor was observed filling in the Supervisory Checklist and thus little feedback on important vaccine management issues is brought back to the UC In-charge.

The absence of vaccine management materials in the Guidelines and training materials means that the supervisors are ignorant about this subject and therefore cannot guide those whom they supervise.

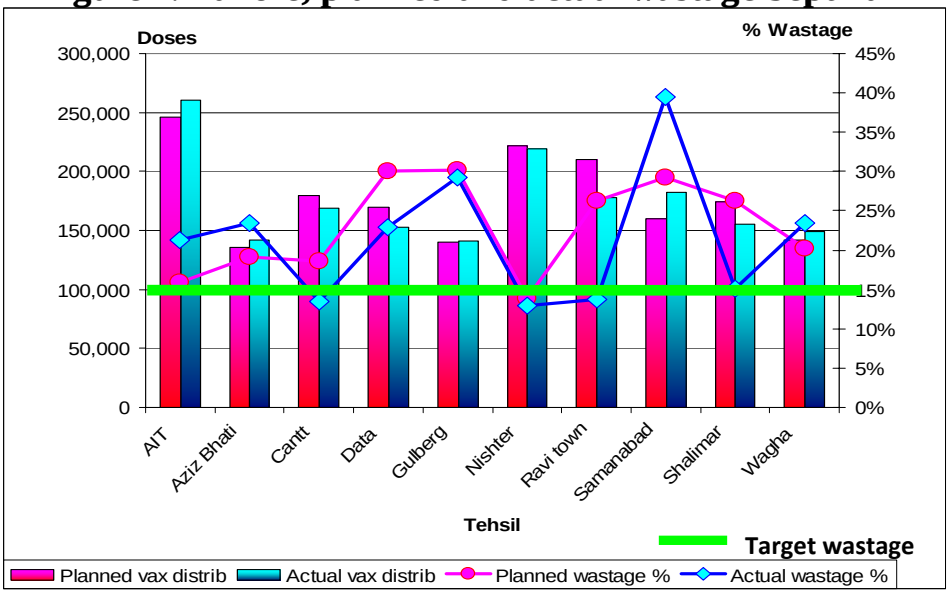
Wastage rates under campaign conditions were one of the key focuses of this assessment. For OPV forecast PCO, UNICEF is using WMF 1.2 (wastage rate of 16.7%). Untill 2010 WMF used was 1.17 (wastage rate of 15%). After 2010 WMF was changed to 1.20, for UNICEF forecasting,

However WHO Islamabad uses WMF of 1.15 (which actually is 13% wastage, for calculation of vaccine requirement before each SIA for Federal EPI Store. Federal EPI store reportedly is using WMF 1.15 for distribution to Provincial Stores and the same WMF is used by provincial stores for onward distribution to district stores.

The *de facto* wastage rate of 15%, which is not mentioned in the Guidelines, can really only be applied at the AIC level and above. Individual vaccination teams typically take small numbers of vials and because the vial size is 20 doses it is not possible to fix wastage at 15% for an individual team. Figure 2 shows planned and actual wastage for the Tehsils in Lahore in September 2012. Only one Tehsil had planned wastage as low as 15%, and seven of Lahore's ten Tehsils had actual wastage higher than 15%, with Samanabad's wastage at 40%. This graph shows the importance of disaggregating data for improving management of GPEI activities.

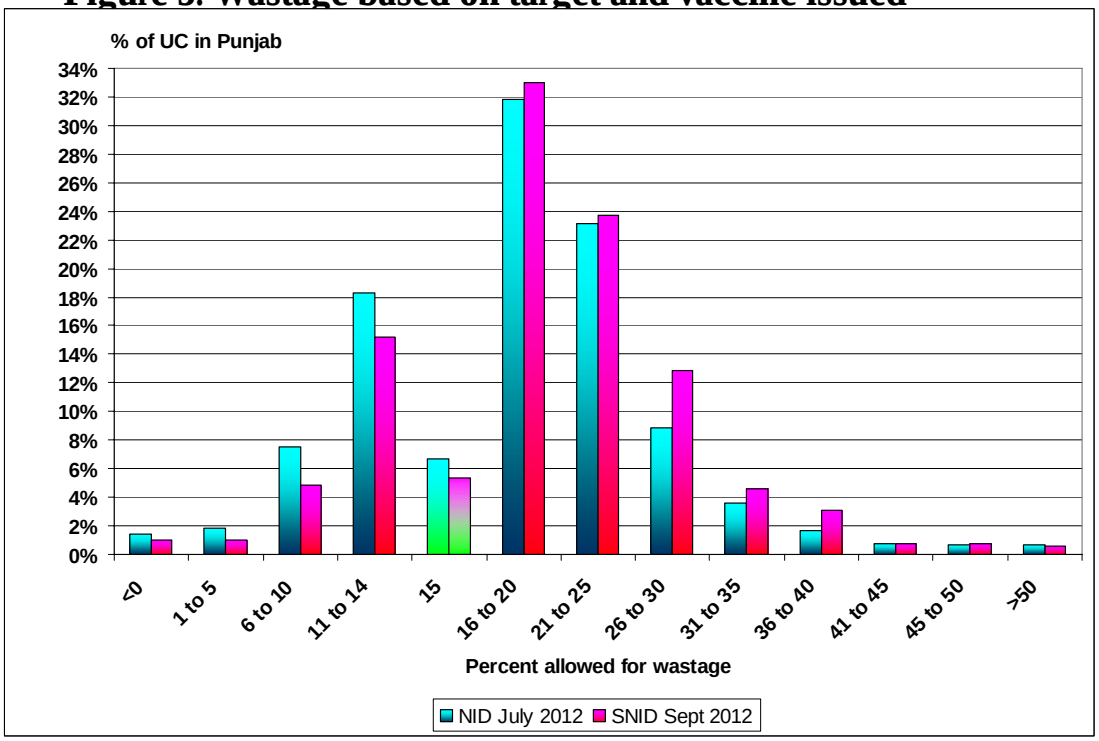
Figure 3 shows that in Punjab, over the last two SIAs (July NID and September SNID) the planned wastage rate of 15% was achieved in only 7% (July) and 5% (September) of UCs. The median wastage rate was 18% and 19% respectively. In just over 1% of UCs the planned wastage rate was negative (<0%) and in another 2% is was less than 5%. At the other extreme planned wastage exceeded 30% for 9% of UCs in July and 11% in

**Figure 2: Lahore, planned and actual wastage Sept 2012**



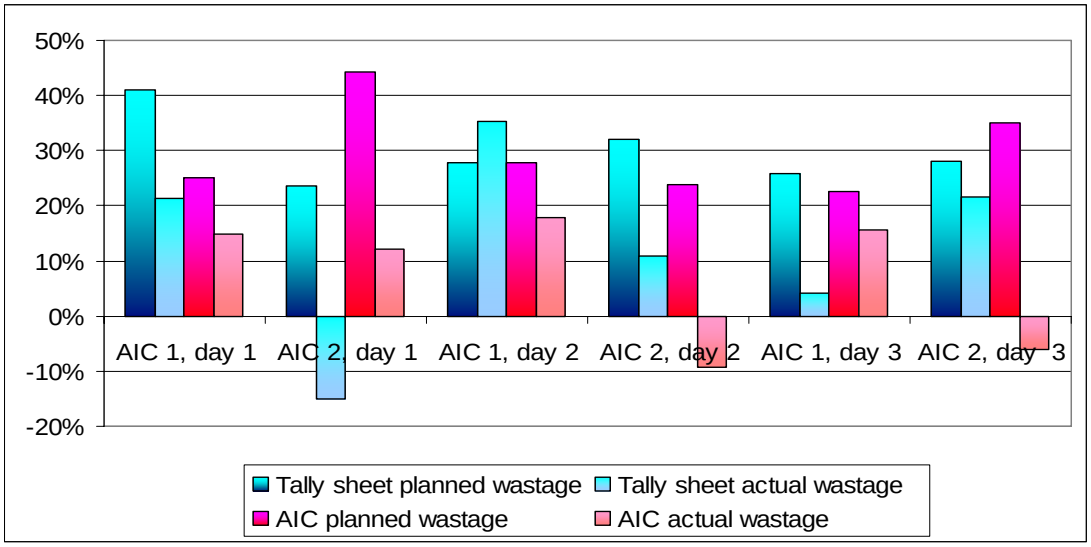

September.

**Figure 3: Wastage based on target and vaccine issued**



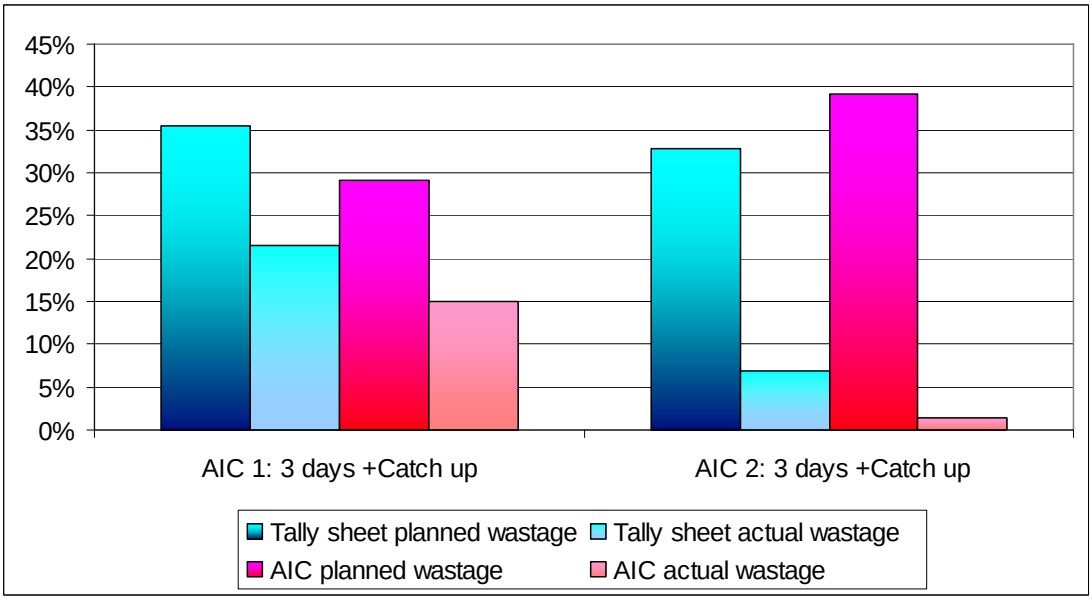
Figures 3a and 3b show how vaccine wastage is masked when report are consolidated. Figure 3a wastage by day of campaign while Figure 3b shows the three days plus the two catch-up days in addition to showing the effect of consolidation Figure 3b also shows how the fact that catch-up vaccine is

**Figure 3a: Wastage from AIC reports over 3 days of Sept. SNID**



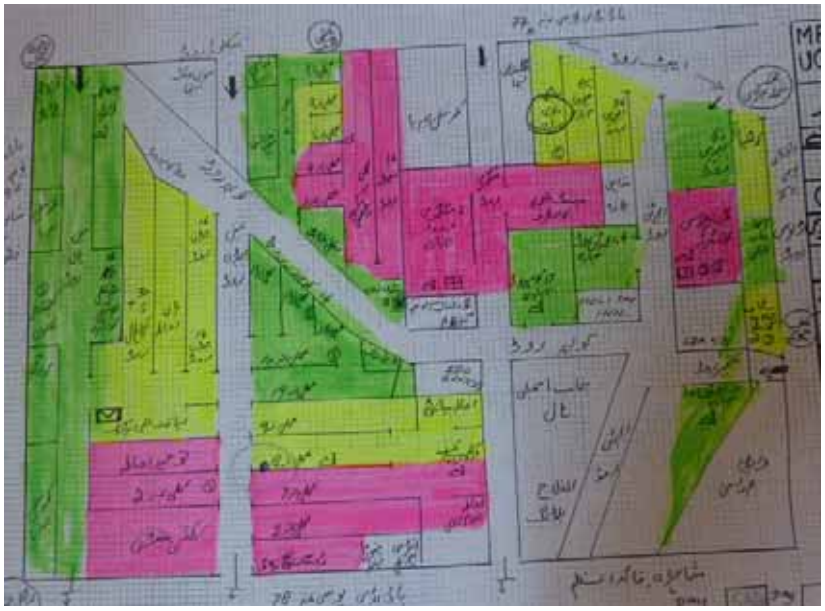

not shown as "vaccine given" masks actual vaccine wastage.

**Figure 3b :Wastage over 3 days including catch-up during Sept. SNID**



**Maps**: Teams have daily itineraries but do not have a detailed map of their catchment area. The best map available is usually an A4 sheet indicating team number and day 1, 2 or 3 by colour code. However transit sites such as shopping malls, markets and bus stations are not marked (see Figure 4).

**Figure 4: Example of a micro-plan map**



There needs to be much closer dealings between routine EPI and GPEI. Both benefit from the skills of the same staff and it is essential for the success of GPEI that EPI be more successful. Ways need to be found to strengthen EPI and GPEI should use some of its resources to do that. For example a) Invest some polio money and polio staff time to assist Union Councils (UCs) to develop joint GPEI and EPI microplans following WHO RED approach so that both campaign and routine work gets reflected in the same plan. This could be started in the Polio-High risk districts.

**Figure 4a: Basemap from Google Earth**

b) Aligning additional support provided to Polio eradication by donors/partners to support Joint EPI-GPEI microplan implementation at UC level. In Pakistan districts are very large so the RED approach needs to be applied at the UC level for effective micro planning.

Better base maps are readily available from Google Earth. See Figure 4a

## Recommendations

Supervisory skills need considerable improvement, especially vaccine estimation, wastage calculating, restocking vaccine, error checking and correcting, cross checking and data validation.

Vaccine used on catch up days must be recorded in the stock registers

Use some polio resources both time and money to strengthen routine EPI starting with activities which are immediately mutually beneficial, such as microplanning and developing the WHO/RED approach in high risk districts

## 5. Enumeration

Pakistan's last census was in 1998; since then eligible population has been estimated using an overall growth rate of 2.69%. The census identified different growth rates for different provinces as shown in Table 2. (AJK and Gilgit (GB) are not identified separately in the 1998 census.)

**Table 2**

**1998 census annual growth rate**

| Province | Growth Rate |
|---|---|
| Punjab | 2.64% |
| Sindh | 2.80% |
| KP/FATA | 2.39% |
| Balochistan | 2.19% |
| AJK | |
| GB | |
| CDA/ICT | 5.19% |
| **Pakistan** | **2.69%** |

However these are not the growth figures used either by EPI or by GPEI. For 2006 to 2009 EPI used growth rates of 2.7%, 2.7%, 2.9% and 2.9% respectively. In 2010 the rate fell to -9.3%[9]. Between the NID of March 2011 and the NID of July 2012 GPEI increased its target (both reported as 100% of eligibles) by 11.9%. When asked, the Federal EPI store reported that the growth rate was 2.88%, the birth rate was 35.5/$^{oo}$ and the under fives were 17% of the population.

While there is steady growth in the population there is also considerable internal movement brought about by the floods in previous years which left many people displaced. In addition there is significant movement from the countryside into the cities; while this affects numbers at provincial level it does not affect the total numbers of under fives in the country as a whole.

The team was told that there are a number of ways in which the population is estimated. These include:

(a) Take the average number of doses administered in the last three NIDs,
(b) Take the number of doses administered in the last NID,
(c) Extrapolate from the last census, and
(d) Ask WHO.

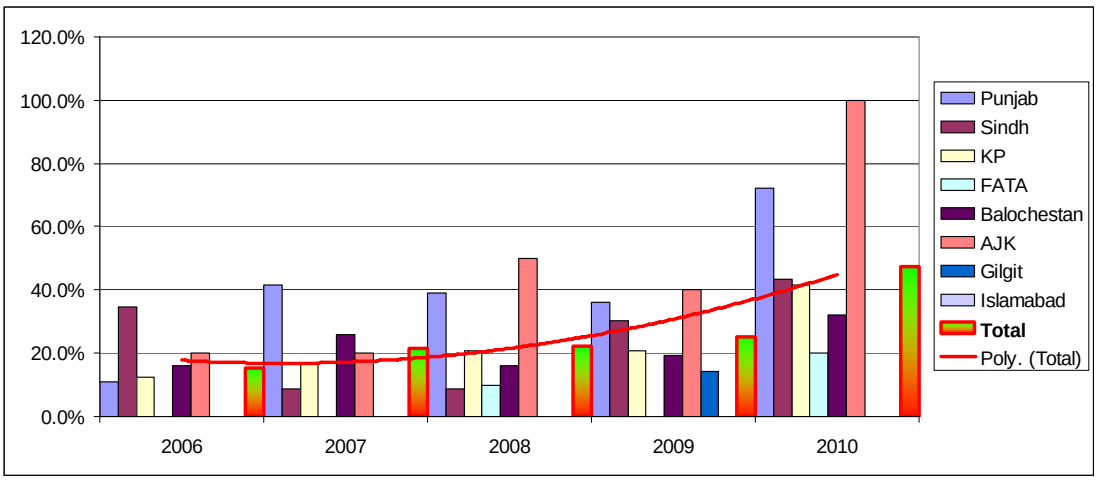
[9] In 2010 EPI started using estimates of population made by the National Institute of Population Studies (NIPS). Figure 5 indicates that these estimates are unrealistically low. For example NIPS uses a figure of 10.56% for the under fives, which is substantially less than the GPEI figure of 17%.

Taking the average of the three NIDs in 2011 (March 2011, July 2011 and October 2011) gives a target of 29,744,879 under-fives (a). If the last NID of 2011 had been used (b) then the target would have been 28,838,042 under-fives. Extrapolation from the 1998 census would have given a target of 34,545,952 under-fives (c). The NID of January 2012 had a target of 34,163,244, so it would appear that the figure used approximates to that derived from method (c), extrapolation from the census.

However, questions remain. The target for January 2012's NID was 14.9% higher than (a), the average of the last three NIDS: were different methods of calculating targets used for 2011's NIDs? If so, what evidence was used in the decision to change the methodology? The census data are now 14 years old and extrapolating over such a long period is not accurate. It would be useful to try to cross check the estimates used with a figure based on more recent hard data. Fortunately EPI offers such data in the form of administered BCG doses.

EPI conducted a coverage survey in 2006, and every year has reported numbers of doses of BCG administered. Over the last five years these reports have risen steadily and the number of districts reporting over 100% coverage has also risen steadily, indicating that EPI's method of estimating eligibles is not reflecting the actual population growth rate in Pakistan. Figure 5 shows, for each Province and overall, the increase in the percentage of districts reporting over 100% coverage. In 2010, 47% of Districts in Pakistan reported BCG coverage that exceeded 100% of their target population.

**Figure 5: Percent of Districts reporting over 100% coverage for BCG**




In 2010 EPI started using estimates of population made by the National Institute of Population Studies (NIPS). Figure 5 indicates that these estimates are unrealistically low. For example NIPS uses a figure of 10.56% for the under fives, which is substantially less than the PEI figure of 17%.

Table 3 shows how the BCG reported data can be used to cross check the robustness of the GPEI estimates. The first column shows the number of administered doses reported over the years 2006 to 2010. Many reports exceeded 100% coverage, and the second column shows what the denominator must be to give BCG coverage of exactly 100%: thus these upward-adjusted denominators are the absolute minimum number of children in the target cohort for BCG, assuming that reporting of administered BCG doses is accurate. The 2006 coverage survey returned coverage figures which in some instances were substantially different from the reported coverage; for example, Balochistan reported coverage of 66% but the survey found only 59%. It has been assumed that the number of BCG administered was correct and therefore the denominator was wrong, by dividing by the lower coverage figure and multiplying by the higher the denominator is increased proportionately to the difference in coverage to produce the totals in Column 5. These BCG figures refer to infant doses over the last five years and some of the babies immunised in that time will have died; using the estimate of under five mortality from UNICEF's *State of the Worlds' Children 2012* (Column 6) and subtracting it from the coverage-adjusted figures in Column 5 gives the final estimate for surviving children under the age of five in the last column. The total figure of 31,083,950 is for 2010 and needs to be increased by 2.7% to allow for natural increase in 2011. This brings the total for 2011 to 32,785,143: this is 1,378,100 less than the GPEI estimate used for 2012.

**Table 3: Number of under fives based on adjusted BCG data**

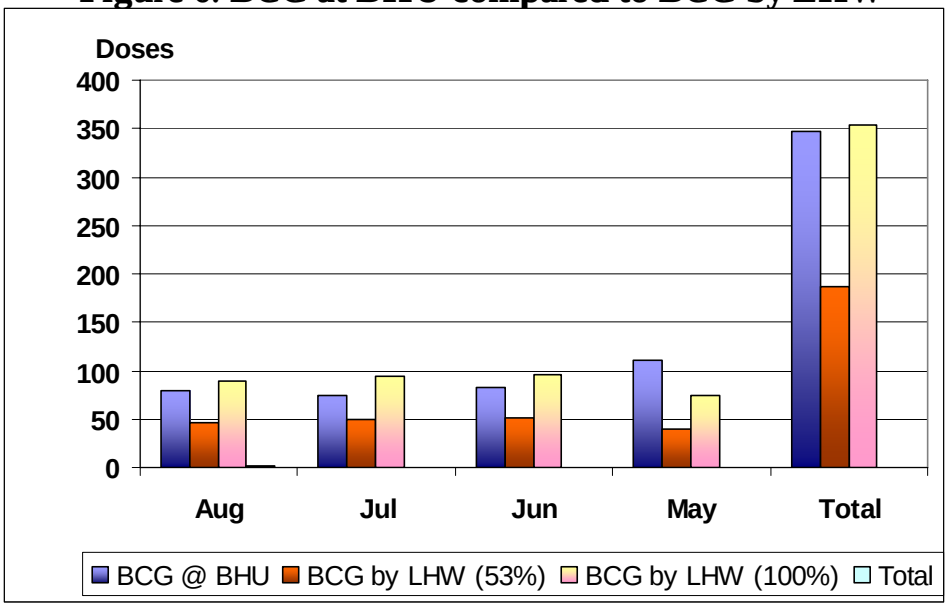
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| **Province** | **Reported BCG** | **BCG denominator increased to bring coverage to 100%** | **2006 reported coverage (%)** | **2006 survey coverage card+history (%).** | **Nbr. BCG adjusted for difference between coverage survey and reported coverage** | **children who die after receiving BCG and before the age of 5 @ rate of 423,000p.a.** | **Total number of <5 based on adjustified BCG to 100%** |
| **punjab** | 16,227,110 | 17,394,933 | 90.0% | 89.9% | 17,414,282 | 227,331 | 17,167,602 |
| **sindh** | 6,005,913 | 6,490,603 | 87.0% | 84.2% | 6,706,443 | 87,548 | 6,403,055 |
| **KP/FATA** | 4,026,853 | 4,920,847 | 80.5% | 70.3% | 5,634,825 | 73,559 | 4,847,288 |
| **Balochistan** | 1,215,034 | 1,565,444 | 66.0% | 59.0% | 1,751,175 | 22,860 | 1,542,584 |
| **AJK** | 657,143 | 696,499 | 71.0% | 95.5% | 517,816 | 6,760 | 689,739 |
| **GB** | 142,635 | 212,709 | 86.0% | 86.9% | 210,506 | 2,748 | 209,961 |
| **CDA/ICT** | 192,188 | 225,914 | 70.0% | 94.1% | 168,055 | 2,194 | 223,721 |
| **Pakistan** | 28,466,876 | 31,506,950 | | | 32,403,102 | 423,000 | **31,083,950** |

This cross check with adjusted BCG data suggests that the GPEI estimate for 2012 is reasonable, if perhaps a little high. The difference would suggest that a figure of approximately 34 million (i.e., under-five cohort for 2011 x 1.027) could continue to be used as the estimate for 2013.

## 5.1 Ways to encourage the retention of immunisation records and encourage the registration of births

Birth registration in Pakistan is very low and the 2006 coverage survey found that immunization card retention was only 10%. As a result there is

**Figure 6: BCG at BHU compared to BCG by LHW**




considerable uncertainty about the number of newborns and under 5s in the country. The report from the Allama Iqbal Medical Collage in Lahore cited one of the major problems being the lack of birth certificates (refer to item 9 in Section 1, Introduction, above). Two approaches may be taken to resolve this problem.

First, the Federal government can develop ways to encourage registration and immunization card retention. There are a number of relief and support programmes running in Pakistan, for example the Benazir Income Support Programme. In addition it has just been announced that the Government will make available Rs21 billion to subsidise small farmers. In other countries an applicant for subsidies must provide a birth certificate. This is the situation in Egypt, and as a result almost all Egyptians have a birth certificate. The Egyptian health service took advantage of the ubiquitous holding of birth certificates to have the EPI immunization card printed on the back: as a result, card retention in Egypt is very high. Given the size and nature of Pakistan's society it would take considerable time for such a national system to be introduced: nonetheless investigations should begin to see if attaching the birth certificate and the immunization card to something that all Pakistanis value should be developed.

Secondly, the health service should develop the Lady Health Worker (LHW) cadre to carry out the function of identifying pregnant women in their catchment area and ensuring that the health workers – whether they be

facility based or polio eradication vaccinators – have lists of the women and their children both newborn and under five. Such a system was successfully introduced in both Utter Pradesh and Bihar in India and was largely responsible for the elimination of polio in those two states, the last bastion of polio in India.[10]

The Guidelines emphasise the importance of LHWs, Female Medical Technicians (FMTs), Lady Health Visitors (LHVs) and Dais, stating that "Involvement of all available LHWs, FMTs, LHVs and Dais is a must". However, the team saw only LHWs in vaccination teams. Investment in LHWs will be an enormous benefit to the health service in general and to GPEI in particular. The use of Dais are especially important as they cross the boundary between the formal and informal health sectors. LHWs' effectiveness in providing immunization is illustrated in Figure 6, which shows, for Hyderabad an urban Basic Health Unit (BHU), the number of BCGs administered at that urban BHU compared with BCGs currently administered by LHWs working in the same catchment at the actual level of staff in post (54%), and the number of BCGs that could be administered by LHWs if 100% of Hyderabad District's urban posts were filled. See also World Bank Report page 10[11] .

A further reason for rapid development of the LHW cadre is that they not only know how many children there are: they also know where they are located. This is especially important for the neonates who are the most likely to be the ones that a campaign will miss. During the team's fieldwork there were a number of occasions when a mother was heard refusing to bring the baby because he/she was asleep.

**Recommendations**

Use a single method of estimating the number of eligibles and use BCG data from the routine EPI programme to cross check estimate of eligibles.

Develop incentives to encourage people to value the birth certificate and to retain both the birth certificate and the immunization card.

Focus on employing the full complement of LHWs in all Provinces.

Ensure that LHWs' monthly reports are shared with both EPI and GPEI.

## 6. Vaccine procurement in Pakistan

### 6.1 Current vaccine procurement routes

Polio vaccine can be purchased in one of three ways:
(i) through UNICEF procurement services where UNICEF procures for the

[10] Weiss, W. et al. *Outcomes of Polio Eradication Activities in Utter Pradesh, India: the Social Mobilisation Network (SM Net) and Core Group Polio Project (CGPP).* Department if International Health, Johns Hopkins Bloomberg School of Public Health. May 2011. BioMed Central Ltd

[11] *ibid* page 7

government and is responsible for delivery to the port of entry in Pakistan (CIP). At present, 92% of pentavalent vaccine and all PCV10 is brought in using UNICEF procurement services.
(ii) through UNICEF programmes, where a donor gives directly to UNICEF (e.g. the Government of Japan's gift of vaccine for case response) and UNICEF is responsible for delivery down to Province level. However the vaccine is stored and handled by Federal EPI so it is not clear how UNICEF's responsibility is fully discharged.
(iii) the Government purchases vaccine directly without reference to UNICEF. It is not known if these vaccines are purchased from manufacturers who are WHO pre-qualified. In some cases the vaccine purchased by the Government is bought in bulk and refilled in Pakistan. It would appear that the measles vaccine seen by the team and illustrated in Figure 7 is procured by this route. These vaccines and refilled vaccines are of unknown provenance, and in the case of the measles and hepatitis B seen, do not have VVMs. It is not known if the facilities where the refilling takes place follow GMP. They are reportedly costing the Government about twice what they would cost if they were purchased using UNICEF procurement services. This third route is used for all BCG, measles, tOPV and TT, and 8% of pentavalent vaccine.

At present the Federal level has stock of vaccines for routine immunization, but there is an acute shortage of routine vaccines in the Provinces. This provincial shortage appears to be a direct consequence of Amendment 18.

### 6.2 Impact of Amendment 18

Amendment 18 makes the Provinces autonomous; this has had several effects on EPI/GPEI. First, it resulted in a number of staff at Federal level being reallocated away from EPI to other sections. The most serious of these was the posting of the data entry clerk, which meant that the Vaccine Supplies Stock Management (VSSM) software package could not be used. Just before the end of our mission the clerk was restored to EPI; however, one clerk is not sufficient to ensure that the VSSM will be fully operational. A minimum of three people should be trained to operate the VSSM.

Secondly, Provinces now have the responsibility for purchasing their own vaccines. This is highly regressive; experience from other countries (e.g. Ukraine) showed in the 1990s that allowing sub-national authorities to procure vaccine leads to the purchase of vaccine that has not passed WHO's requirements for quality and safety (i.e. is not WHO-prequalified), excessively high prices being paid, and local purchasing officers being corrupted. The same mistake is being repeated two decades later in Pakistan.

During the field work the team found four examples of non WHO prequalified vaccine in stock. These vaccines are of unknown quality and do

not have Vaccine Vial Monitors (VVM) on them. Figure 7 shows examples of non WHO prequalified measles and hepatitis B vaccine in Pakistan.

**Figure 7: Examples of non WHO prequalified vaccine found by the team while in the field**


In addition inexperienced purchasing officers may procure vaccine in unsuitable presentations which use unnecessarily high volumes of cold storage, which then denies sufficient safe storage for other routine vaccines. Figure 8 shows three examples of inappropriate vaccine presentations seen by the team.

For example in July 2012 Quetta received 164,000 doses of measles vaccine of which 21,000 doses had an expiry date of September 2012, in addition none of the consignment had any VVMs and the vaccine was from NIH but the diluent contrary to good practice was from Pak Risen Pharmaceuticals[12]

Paying up to twice as much for vaccine compared to the same vaccine bought through UNICEF and at the same time accepting charitable donations of vaccine is unacceptable.

There should be a review of vaccine procurement and funding by the "council of common interest" in which federal procurement options should be considered and if accepted, council of common interest could propose a) separate funding line for vaccines in the "national budget" under one of the federal divisions; b) placing the vaccine procurement budget and process under oversight of "Council of Common Interest".

[12] EPI 3495/2500 Quetta 21 July 2012.

**Recommendations**

The Federal EPI should appoint and train three people to operate the VSSM.

Vaccine purchase for EPI/GPEI should be centralized for the whole of Pakistan and only WHO-prequalified vaccines should be licenced for purchase in Pakistan. To achieve this, the Provinces and Federal governments need to agree the following:

a) a national commitment to vaccine standards,

b) establish a long term national vaccine forecasting and funding commitment to match the need,

c) commit to enlist all WHO pre-qualified suppliers as potential suppliers and invite bids only from them

d) The Public Procurement Rules changed to permit direct procurement from WHO prequalified sources only.

Immediate steps need to be taken to ensure that vaccine held at the Federal store is distributed to Provinces which are now short of vaccine.

The purchasing policy of the government needs to be reconsidered by a review of vaccine procurement and funding by the "council of common interest" in which federal procurement options should be considered and if accepted, council of common interest could propose a) separate funding line for vaccines in the "national budget" under one of the federal divisions; b) placing the vaccine procurement budget and process under oversight of "Council of Common Interest".

## 7. Estimating vaccine requirements

There is lack of clarity over the way in which vaccine requirements are estimated. WHO told the team that the estimates are made by the Districts and Provinces while at Provincial level some of the team were told that the estimates are made by WHO.

Table 4 shows the quantity of bivalent OPV (bOPV) supplied this year according to various sources. The situation is complicated by the fact that (a) vaccine is recorded in both vials and doses, and (b) different wastage rates are used when calculating requirements: 20% at national level and 15% at provincial level.

## Table 4 bOPV vaccine supplied 1/1/12 to 18/7/12 according to different sources

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Province | VSSM Fed EPI store vax distributed 1/1/12 to 31/8/12(recorded in doses) | Stock register 1/1/12-31/8/12 (doses below but recorded in vials) | Stock reg to July NID 18/7/12 (doses below but recorded in vials) | UNICEF forecast and financing 30/1/12-18/7/12 | UNICEF vax supplied with VAR 1/1/12-18/7/12 |
| balance 31/12/11 | | 48,940,820 | 48,940,820 | | |
| Punjab | 91,447,200 | 91,447,200 | 81,117,000 | | |
| Sindh | 44,994,520 | 44,994,520 | 41,394,520 | | |
| KP | | | | | |
| KP & FATA | 40,267,300 | 40,267,300 | 36,686,300 | | |
| FATA | | | | | |
| Balochistan | 14,990,360 | 14,990,360 | 13,556,360 | | |
| AJK | 1,526,680 | 1,526,680 | 1,526,680 | | |
| GB | 506,800 | 506,800 | 506,800 | | |
| CDA | 663,020 | 663,020 | 586,720 | | |
| ICT | 499,000 | 449,000 | 449,000 | | |
| balance 25/9/12 | 465,640 | 465,640 | 673,440 | | |
| Total issued | **194,894,880** | **194,844,880** | **175,823,380** | **163,782,721** | **127,556,000** |

The actual vaccine arrivals as recorded in the Vaccine Arrival Report (VAR) (Column 5) and the UNICEF forecast (Column 4) differ by 29%. If the vaccine in stock at the beginning of the year (see Balance 31/12/11) is taken into account when estimating vaccine requirements, then the total available vaccine between 1/1/12 and 18/7/12 was 176,496,820 (127,556,000+48940,820). The vaccine balance on 18/7/12 was 673,440 which means that 176,031,180 doses were actually issued. This leaves a discrepancy of 207,800 doses unaccounted for.

It is highly unlikely that stock remaining at Provincial and District levels have been taken into account.

The Federal store is supposed to send a weekly stock report to UNICEF to help UNICEF ensure that supplies of vaccine are maintained. Despite regular requests, UNICEF has not received these reports since January 2012.

Table 5 shows the number of doses available (See Table 4) per target and actual administered dose between 1/01/12 and 31/07/12

## Table 5: Vaccine available per forecast child and per administered dose

| | Eligibles from Forecasting 1/1/12 to 18/7/12 | Administered doses |
|---|---|---|
| Eligbles | 150,318,272 | 143,548,034 |
| **Doses per eligible child** | | |
| **Authorised vax distribution** | 1.078 | 1.129 |
| **Stock register** | 1.162 | 1.216 |
| **VSSM** | 1.134 | 1.188 |

Table 5 shows that only the VSSM data approaches (13.4%) the planned 15% for wastage. The authorised distribution only allow 7.8% for wastage. Based on the reported number of administered doses VSSM had a wastage of 18.8%.

Table 6 shows the breakdown between provinces showing the vaccine wastage associated with supply according to different sources

**Table 6: Vaccine wastage associated with different sources of data, by Province**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Province | total vax issued (issue authorisation 1/1/12 to JULY NID incl.) | control room reported administered doses 1/1/12 to July NID incl. | wastage excludes vax balance | Total vax issued (stock reg. 1/1/12 to July NID incl. shown in doses but recorded in vials) | wastage, excludes vax balance | Total vax issued 1/1/12 to July NID incl.(VSSM - issue authorisation recorded in doses) | wastage, excludes vax balance |
| Punjab | 75,212,778 | 66,172,068 | 12.0% | 81,117,000 | 18.4% | 80,939,458 | 18.2% |
| Sindh | 37,990,715 | 38,003,466 | 0.0% | 41,394,520 | 8.2% | 41,363,045 | 8.1% |
| KP | | | | | | | |
| KP & FATA | 32,400,057 | 28,458,273 | 12.2% | 35,487,640 | 19.8% | 31,566,117 | 9.8% |
| FATA | | | | | | | |
| Balochistan | 13,569,372 | 7,880,509 | 41.9% | 13,556,360 | 41.9% | 13,555,306 | 41.9% |
| AJK | 1,530,714 | 1,331,056 | 13.0% | 1,526,680 | 12.8% | 1,526,680 | 12.8% |
| GB | 506,738 | 440,642 | 13.0% | 506,800 | 13.1% | 506,800 | 13.1% |
| CDA | 468,205 | 702,279 | -50.0% | 586,720 | -19.7% | 586,617 | -19.7% |
| ICT | 375,267 | 559,741 | -49.2% | 449,000 | -24.7% | 442,663 | -26.4% |
| **Total** | **162,053,846** | **143,548,034** | 11.4% | **174,624,720** | 17.8% | **170,486,686** | 15.8% |

The table shows that wastage, which does not include any stock already held at provincial and district level, varies considerably between Provinces. Sindh has the lowest wastage rate – between 0% and 8.2% – while Bolochistan has the highest at 41.9%. This high wastage was corroborated by the team's observations in Quetta and Pishin. Capital Development Authority (CDA) and Islamabad Capital Territory (ICT), both in Islamabad, have negative wastage, meaning that from the data above they did not receive enough vaccine to carry out the work that they reported.

Vaccine forecasts are made to the last dose, whereas actual supplies arrive in whole 20-dose vials. The habit of recording stock in both vials and doses adds confusion.

It is probable that a significant number of children over the age of five are receiving polio vaccine during campaigns, and this obscures the fact that the neonates may be being missed. More diligent use of the LHWs would help minimise this problem.

The conclusion is that vaccine estimation is extremely erratic, caused by a combination of factors including uncertainty over the size of the eligible population, the apparent failure to take account of existing stocks, and other stock keeping confusions and anomalies.

**Recommendations**

There must be a consistent method of estimating vaccine requirement.

Vaccine requirement should be estimated in doses and should use a consistent WMF 1.15 (13%) at all levels.

Existing stock balances must be taken into account when estimating need.

Federal store should submit weekly stock reports to UNICEF, as previously requested.

All provinces and districts should be requested to count stock balance at the end of the each SIA beginning with the October NID and report that balance to the Federal EPI and UNICEF.

The polio control room should monitor vaccine usage, stock balance, and wastage. In particular follow up on anomalies such as negative wastage.

## 8. Vaccine storage

### 8.1 Federal Level

Since the EVM of 2009 the Federal store has undergone a major refit and now has five cold rooms of 50$m^3$ at +4ºC, four of 25 $m^3$ at +4ºC, one 50$m^3$ t - 20ºC and four of 15$m^3$ at -20ºC.

**Figure 9: One of the Federal cold rooms**

**Figure 10: Interior of one cold room**

In addition the whole complex is served by a new standby generator.

In 2009 the EVM identified the following weaknesses:

1. Weak vaccine procurement system leading to shortage of vaccine (BCG, OPV)
2. Insufficient storage capacity (due to large amount of campaign vaccines)
3. Lack of continuous temperature monitoring device
4. Lack of established vaccine wastage monitoring system
5. Lack of an effective reporting system to improve vaccine forecasting and distribution management
6. Absence of automatic starting on the standby generator

**Figure 11: Standby generator**


Since then only Item 2 has been addressed. In addition to the above, there appears to be no provision for protective clothing, which is essential for working in -20$^{o}$C cold rooms.

With the introduction of PCV10 the value of the vaccine stored at the Federal store is about $50 million at any one time; this requires much more frequent temperature monitoring than is done at present. The continuous temperature monitoring recommended in 2009 should be installed as a matter of urgency, as should automatic starting of the generator. In addition the quality of stock management and the management of wastage needs to be drastically improved. This is especially important with the introduction of PCV10 which is available on the open market in Pakistan costing Rs.4,150 ($44.60) per dose. Given the level of inaccuracy already described in the stock management system, it is likely that leakage of this highly marketable vaccine will occur.

Stock management at the Federal level is not tight enough. For example it was reported to the team that 20,000 vials of b-OPV were returned from Karachi to be reissued to Peshawar. The Federal store confirmed that this had in fact happened, but there is no record in the stock register of the vaccine being re-stocked from Karachi and being subsequently reissued to Peshawar. If this unrecorded stock had been PCV10, then it would have been worth $892,000 on the street in Islamabad.

VARs are also supposed to be submitted within three days of arrival. At least one VAR[13] this year has not yet been submitted one month after the arrival of the vaccine.

It appears that on occasions there is significant delay between the arrival of a vaccine shipment and it being stocked in the Federal store. Table 7 shows all the shipments of bOPV upto the beginning of September 2012. It shows that 37% or 42% of vaccine arrivals were not stocked on the same day one case was apparently stocked one day before the vaccine arrived and in another there are two dates for the same stocking. It is not known why these delays occurred, it does not appear to be because arrival was close to the week end as three shipment were stocked on a Saturday

**Table 7: Delay between vaccine arrival and stocking in the Federal store**

| PO Nbr. | supplier | vials | doses | arrival date on VAR | Day of the week | Date in stock reg. | Day of the week | Delay between arrival and stocking (days) |
|---|---|---|---|---|---|---|---|---|
| 45119334 | unicef/wb | 167,730 | 3,354,600 | 30/01/2012 | Monday | 02/02/2012 | Thursday | 3 |
| 45119334 | unicef/wb | 282,070 | 5,641,400 | 01/02/2012 | Wednesday | 03/02/2012 | Friday | 2 |
| 45119020 | unicef/wb | 423300 | 8,466,000 | 23/02/2012 | Thursday | 25/02/2012 | Saturday | 2 |
| 45119608 | unicef/wb | 844,800 | 16,896,000 | 23/02/2012 | Thursday | 25/02/2012 | Saturday | 2 |
| 45119608 | unicef/wb | 385,100 | 7,702,000 | 23/02/2012 | Thursday | 25/02/2012 | Saturday | 2 |
| 45120552 | unicef/wb | 1,000,000 | 20,000,000 | 29/03/2012 | Thursday | 29/03/2012 | | 0 |
| 45120553 | unicef/wb | 1,225,000 | 24,500,000 | 24/05/2012 | Thursday | 24/05/2012 | | 0 |
| 45121843 | unicef/wb | 656,350 | 13,127,000 | 18/06/2012 | Monday | 18/06/2012 | | 0 |
| 45121843 | unicef/wb | 643,650 | 12,873,000 | 19/06/2012 | Tuesday | 19/06/2012 | | 0 |
| 45121773 | unicef/wb | 187,500 | 3,750,000 | 21/06/2012 | Thursday | 21/06/2012 | | 0 |
| 45121773 | unicef/wb | 187,400 | 3,748,000 | 21/06/2012 | Thursday | 21/06/2012 | | 0 |
| 45121773 | unicef/wb | 187,400 | 3,748,000 | 21/06/2012 | Thursday | 22/06/2012 | Friday | 1 |
| 45121773 | unicef/wb | 187,500 | 3,750,000 | 25/06/2012 | Monday | 25/06/2012 | | 0 |
| 45122026 | unicef/wb | 203,000 | 4,060,000 | 09/08/2012 | Monday | 09/08/2012 | | 0 |
| 45122026 | unicef/wb | 204,400 | 4,088,000 | 10/08/2012 | Friday | 09/08/2012 | Thursday | -1 |
| 45122026 | unicef/wb | 203,200 | 4,064,000 | 06/08/2012 | Monday | 06/08/2012 or 9/08/2012 | | 0 or 3 |
| 45122026 | unicef/wb | 203,000 | 4,060,000 | 13/08/2012 | Monday | 13/08/2012 | | 0 |
| 45122026 | unicef/wb | 198,800 | 3,976,000 | 16/08/2012 | Thursday | 16/08/2012 | | 0 |
| 45122026 | unicef/wb | 119,100 | 2,382,000 | 31/08/2012 | Friday | 31/08/2012 | | 0 |

[13] 7th VAR for PO 45122026 vaccine arrived 1/10/12 VAR had not been submitted by 31/10/10

**Recommendations**

Install continuous computer-linked temperature monitoring to all cold rooms.

Install automatic starting to the standby generator.

Keep running hour and fuel register.

Provide protective clothing for staff working in -20°C cold rooms.

Tighten up the stock management and ensure vaccine arrivals are stocked on the day they arrive at the airport

Take account of vaccine in stock when estimating future requirement.

## 8.2 Provincial Stores

It would appear from what follows that any cold chain standards that exist need to be updated to specify standards to be met by equipment at each level. This is particularly important now tht responsibility has been devolved to the provinces.

**Recommendation**

Review any existing cold chain standards and bring up to date specifying type and capacity required at each level.

### 8.2.1 Equipment

The team visited Provincial stores in Punjab, Sindh, KPK and Balochistan. Their quality varied. The Punjab store in Lahore is located in the Provincial Health Directorate in Lahore City. It contains three cold rooms approx. 29 $m^3$ each. Although the facility is old, it is functioning well and is regularly maintained. However it is over 20 years old and is coming to the end of its operational life and should be replaced. The facility has no loading/off-loading area in the shade and protected from the rain. Electricity cuts are frequent and while the facility has a functioning 32kVA generator for back-up with sufficient reserve of fuel, the generator can serve only one cold room at a time.

The Sindh provincial store in Karachi is of a very different quality. It has four +4°C cold rooms and one -20°C cold room which have been very poorly maintained. Cooling units are all badly maintained and pose a significant fire risk due to their filthy condition and the complete lack of casings to keep out the dirt. In addition the -20°C room which is 29 $m^3$ lacks enough shelves and is not big enough for the vaccine it is storing.

Figure 12 shows the interior of the Karachi cold room and the condition of one of its cooling units. The whole area of the store is cluttered with empty boxes and assorted junk and there was no visible fire protection equipment. All in all this store is an accident waiting to happen.

**Figure 12 Cold store in Karachi**

In contrast to Karachi the cold rooms in Peshawar are clean, tidy and equipped with shelves, as shown in Figure 13; however they have very limited stocks of vaccine.

**Figure 13 Minus 20ºC cold room Peshawar**

Peshawar has five cold rooms, two of which are broken. When there is a power failure the generators have insufficient capacity to run all the cold rooms at the same time. There is insufficient space, resulting in products being stored in the access area to the cold rooms, making it very difficult to get in or out. Lack of space results in new equipment being stored in the open air. Figure 14 shows the only access to the cold store, and a new cold room and an ILR (marked by red arrow) in their shipping crates out in the open. The ILR has clearly been there for a long time.

**Figure 14: Restricted access to cold rooms  Equipment stored in the open air**

**Recommendations**

A comprehensive EVM needs to be carried out at both provincial and district levels.

The Provincial cold stores at Lahore, Karachi and Peshawar are no longer big enough. Each needs to be relocated to new premises with a proper vaccine store plan arrangement, as set out in the WHO guide[14]. These stores should be sufficiently large to accommodate all cold rooms required, including those for new vaccines such as PCV10 and Rota.

In the mean time all items of equipment which now represent a fire hazard, such has filthy uncovered cooling units, should be cleaned and have their covers replaced. Stores should be cleaned and surplus and broken items of equipment should be removed and disposed of.

Temperature monitoring at Provincial level should be continuous and computer-linked.

Standby power generation should be of sufficient capacity to run all the equipment in the store. Generators should start automatically and a running hour log and fuel log should be kept for all generators.

## 8.3. District cold stores

District stores are mostly equipped with freezers. These include freezers specifically designed for vaccine storage, but they also include domestic freezers. While the latter are capable of maintaining freezing temperatures and are suitable for freezing ice packs they are not designed to handle large voltage fluctuations or to maintain safe temperatures during power failure and are not suitable for vaccine storage.

Well ordered and less well ordered District stores are shown in Figure 15. Note the use of a domestic freezer (arrowed). Note also the location of the

[14] WHO *Guideline for improving primary and intermediate vaccine stores* (WHO.V&B-02.34). 2002

freezer in the right-hand picture; it is sited so that the sun shines on it. Also note the fire hazard caused by the huge stock of empty cardboard boxes.

**Figure 15: Example of a well ordered store and a badly ordered store**

All the District stores seen were equipped with standby generators, however none of them had running hour logs or fuel logs. None of them had automatic start.

A number of generators were located in wholly unsuitable places, for example inside the building with inadequate ventilation, introducing the risk of carbon monoxide poisoning.

Temperatures are recorded during the week, but were typically not recorded over the week-end, particularly on Sunday.

The quality of vaccine management at District level was generally poor. Figure 16 shows two examples seen by the team. The first shows a stock of 8,000 doses of tOPV supplied to the store during the last month which shows mould growing on the carton boxes, and the VVMs reading either 3 or 4. The second shows a consignment of vaccine recorded with the wrong expiry date (9/13 recorded as 1/14) and with VVMs at 2.5 which should have been issued before less exposed vaccine

**Figure 16 Examples of poor vaccine management**


As with Provincial stores, some locations are quite unsuited to the storage of vaccines and pose a fire hazard.

The team visited 20 stores and found 48 different items of broken cold storage equipment including cold rooms. Table 8 shows a list, compiled by KPK, of equipment to be disposed of.

**Table 8 Equipment for Board of Survey**

| List of Broken Items EPI Store KP/FATA to be Auctioned | | |
|---|---|---|
| **S.NO** | **ITEMS** | **QUANTITY** |
| 1 | Cold room | 1 |
| 2 | Electric stabilizer small size | 53 |
| 3 | Electric refrigerator large size | 1 |
| 4 | Electric refrigerator small size | 18 |
| 5 | I.L.R M.K 144 | 26 |
| 6 | I.L.R M.K 074 | 16 |
| 7 | I.L.R M.K 202 | 4 |
| 8 | I.L.R M.K 304 | 6 |
| 9 | I.L.R TCW 1151 | 4 |
| 10 | I.L.R TCW 1990 | 13 |
| 11 | Vaccine carrier | 30 |
| 12 | I.L.R candy | 3 |
| 13 | Gas/ Electric refrigerator large size | 2 |
| 14 | Gas/ Electric refrigerator V.110 | 26 |
| 15 | Chest Freezer small size | 2 |
| 16 | Freezer waves small size | 1 |
| 17 | Compressor different size | 16 |
| 18 | Cold boxes | 7 |
| 19 | Freezer fan | 1 |
| 20 | Ice making machine | 1 |
| 21 | Compressor 2.5 kw | 2 |

**Recommendations**

All District stores should be reassessed, using the WHO guide referenced in this report, to decide whether they are suitable to be used for vaccine storage.

Rooms used for vaccine storage should not be used for other purposes, such as a dump for empty cardboard boxes.

District stores should have continuous, computer-linked temperature monitoring as well as manual recording twice a day, including weekends.

All generators must have running time logs and fuel logs.

Districts that have additional new equipment in store (generators, refrigerators, freezers, cold boxes and vaccine carriers) should compile an inventory and submit it to the Provincial level so that equipment can be reallocated to places where it is needed.

All areas should compile a list like the one compiled in KPK/FATA and identify equipment which should be written off by Board of Survey. This equipment should then be got rid of.

### 8.4. Facility stores

At the facility level the cold chain is at its weakest. Typically facilities have domestic refrigerators such as the one shown in Figure 17.

These refrigerators are quite unsuitable for the storage of vaccines especially as many areas are subject to routine load shedding, usually two hours at a time, three times a day. Under these circumstances a domestic refrigerator cannot hope to keep safe temperatures, nor will it manage to freeze icepacks at a sufficient rate to provide enough to supply vaccination teams.

**Figure 18: Sure Chill® vaccine refrigerator**

The temperature is not recorded at week-ends especially on Sunday and there is no standby power. Some facilities do have vaccine refrigerators, but it appears that the majority do not. However, a number of the vaccine refrigerators seen were not working; for example

in Nowshera District in KPK six BHUs have broken vaccine refrigerators.

There are alternative types of refrigerator available which are suitable for vaccine storage. These include equipment that is powered by direct drive (battery free) solar energy and equipment run from the mains. An example is the BLF100 using "Sure Chill®" technology, which ensures that vaccine will be kept cold during power cuts and at the same time does not run the risk of freezing vaccine (which can occur when using an ice lined refrigerator).

Temperature monitoring at facility level is weak and temperatures are not monitored on week-ends especially Sunday. An alternative to thermometers is to use the "Fridge Tag®" electronic monitor. These will record the maximum and minimum temperature for a rolling 30 days and trigger a visual alarm if the temperature falls outside the safe range. Figure 19 shows the device.

The Fridge Tag® has a life of 2 years. Towards the end if its life it shows a "Low Battery" signal allowing enough time for the device to be replaced. While this does increase the logistics burden to the programme, the benefit of being able to have continuous monitoring of vaccine at the facility level and the ability to interrogate 30 days of data far outweigh the additional logistics burden.

**Figure 19: Fridge Tag electronic temperature monitor**


**Recommendations**

All the domestic refrigerators used for storing vaccine should be replaced with refrigerators specifically designed for the storage of vaccine. The equipment must be WHO/PQS pre qualified. The preferred type is the "Sure Chill®" illustrated in Figure 19.

Where electricity is not available solar direct drive refrigerators should be used.

Temperature monitoring must be carried out daily, including week ends. The feasibility of using "Fridge Tag®" monitors, which record and store 30 days of temperature data, should be investigated and a pilot run in two districts (one urban, one rural) to assess the practicality of using the device.

## 9. Recording vaccine usage

There are a number of issues relating to how vaccine usage is recorded.

First, the team found that tally sheets were not fully completed.

Second, they are sometimes ambiguous. This may be introduced by the poor quality of filling them in; the example on the left of Figure 20 shows crossing out and over-writing, making it difficult for the vaccinator to add up the tally sheet accurately and for the AIC to check it. Another reason for ambiguity is the codes chosen: use of the letter "L" to indicate that a house is "locked" is easily confused with "2", as illustrated on the right of Figure 21, where the red circle is highlighting an "L" while the green circle highlights a "2".

**Figure 20: Ambiguity in completing tally sheets**


Third, vaccinators do not record additional doses used on Catch-up days; they simply use up any unfinished vials from the first three days.

Fourth, after the initial distribution of vaccine for a campaign additional vaccine distribution is usually made using "slips of paper" and this stock is not entered in the stock register.

Fifth, tOPV, which is used at the fixed centres, is recorded on the tally sheets as being bOPV.

Sixth, while there was only a little evidence of overdosing, in Balochistan there was evidence of unfinished vials being discarded. Figure 21 shows the quantity of discarded vaccine in unfinished vials from six sites.

While some of these sites show quite low levels of wastage, others are very high. The large number of sites means that any wastage in unfinished vials can accumulate to significant quantities overall. Overall 5.7% of the total vaccine available in figure 22 was left in the vial. If the quantities shown in Figure 22 are extrapolated to the whole campaign then 1.7 million doses would have been discarded in unfinished vials. This wastage is not recorded because it is within the "used vials".

**Figure 21: Wastage in unfinished vials**

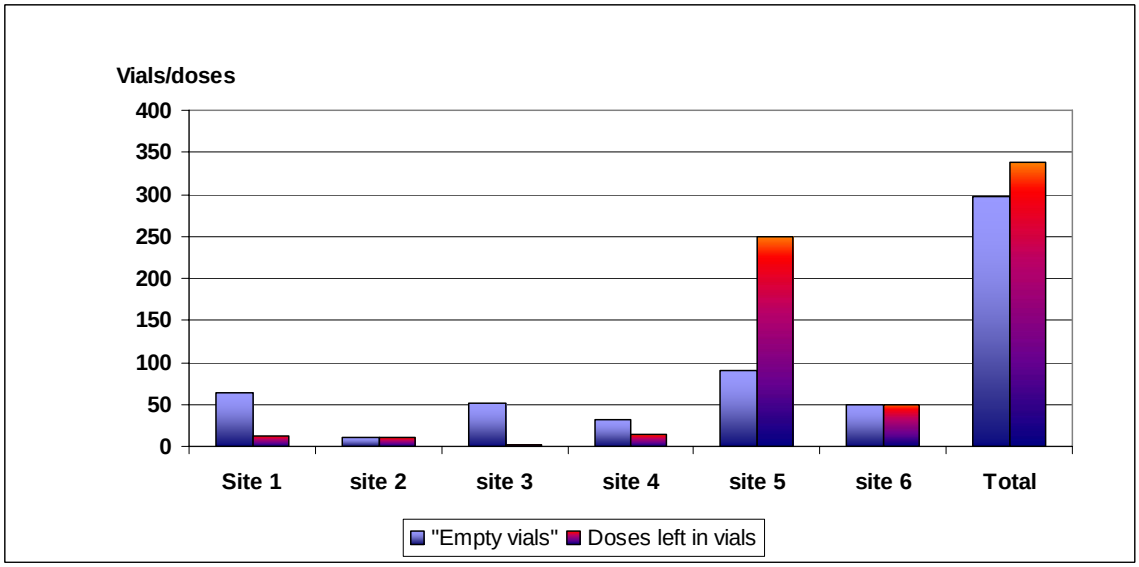
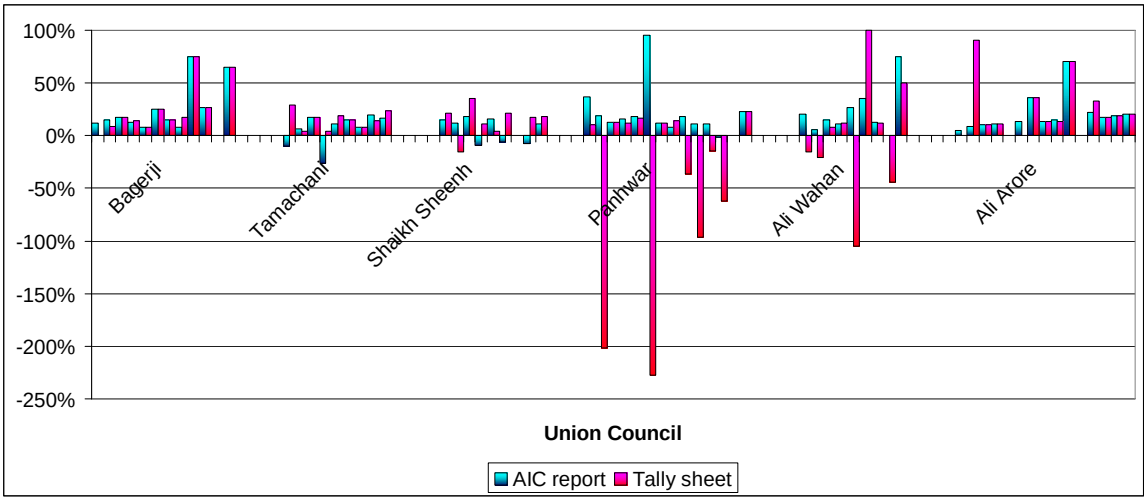



Figure 22 shows the wastage from "used" vials (i.e., vials that vaccinators considered to be empty) as recorded from tally sheets and AIC reports. On the tally sheets examined, 10% did not show the number of vials used. This figure fell to 4% in the AIC reports.

**Figure 22: Percentage of doses wasted from used vials**




Overall the tally sheets' data showed 4% of vaccine being wasted from the used vials, this figure rose to 19% in the AIC reports. Within these overall figures individual teams had extreme difference in doses used per vial, ranging from 2 doses per vial to an impossible 66 (negative wastage in the graph). The median and the mode for the sample (n=66) was 17 doses per 20-dose vial. There is no consistency in these data: it is not that errors in the tally sheet have been corrected by the AIC, for there are examples where the AIC's report has introduced impossible numbers. The erratic nature of these data make their validity highly suspect; nonetheless they have been reported and accepted in the data sets of higher levels. It would appear that insufficient time is allowed for

error checking at the lowest level. Once those errors leave the level at which they occurred, they are consolidated and become impossible to trace.

**Recommendations**

Vaccinators must ensure that all tally sheets are both complete – front and back – and legible before they pass them to the AICs.

The practice of using "L" for a locked house should be changed to using "A" for away or absent, which cannot be confused with a numeral.

All distribution must be recorded in a stock register, including restocking at the end of the day.

tOPV must not be recorded as being bOPV.

Greater care needs to be taken to ensure that all doses in a vial are used.

More time needs to be set aside for error checking on both tally sheets and AIC reports.

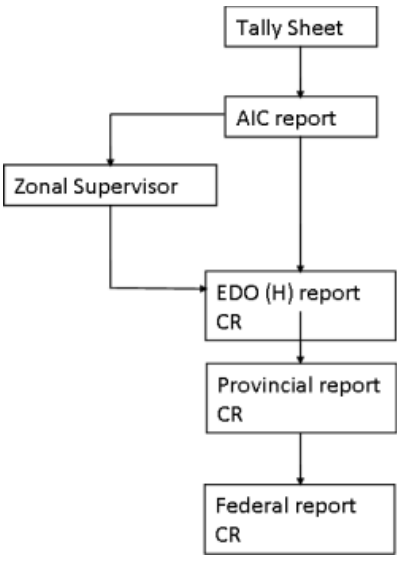
Supervisors and trainers should introduce the type of analysis presented here so that staff increase and improve their own use of the data that they generate and consolidate.

## 10. Data reporting and data management

### 10.1 Administered doses

Data reporting and management is one of the weakest parts of GPEI.

**Figure 23: Data flow diagram**



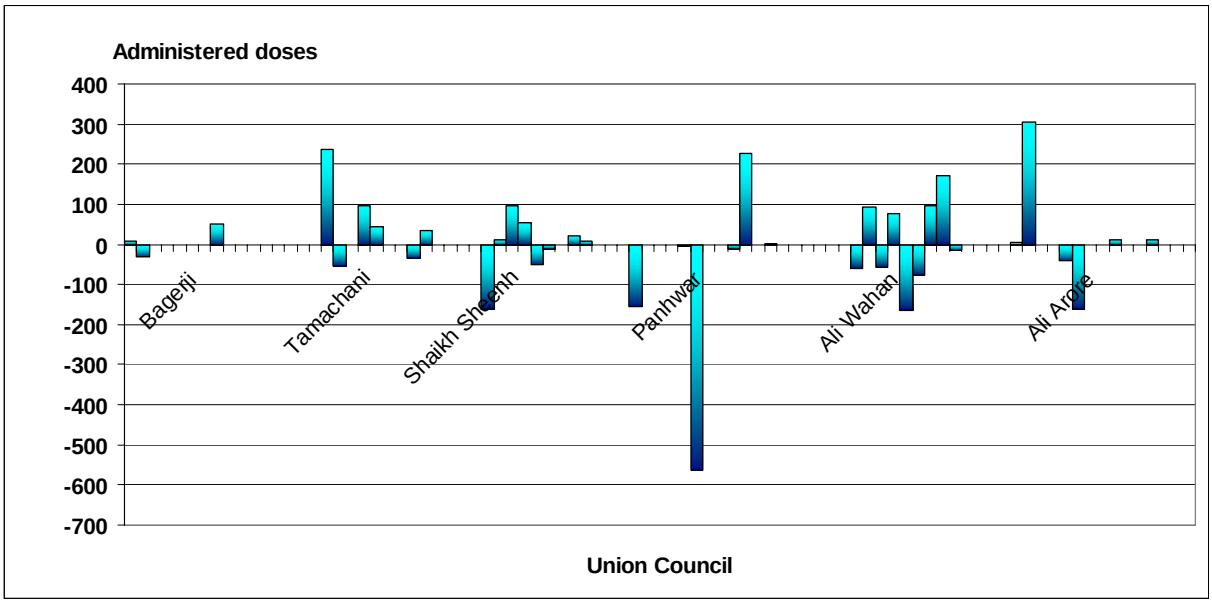

The data flow is illustrated in Figure 23. Although reports are supposed to be submitted on paper at the lowest levels, the team found that in fact they are submitted either over the phone or by text messages on mobile telephones. Consequently there is often no paper trail. At District level in some locations the data are recorded in a spread sheet before being transposed into the WHO database. All these give ample opportunity for data entry error.

The team carried out a detailed analysis of the recorded data in several locations. The most comprehensive was in Sakkur District when that district carried out its delayed campaign starting on 24 September.

At six locations the data on the tally sheets were compared with the data reported by the AIC for all three days of the campaign. This included data from vaccinators, fixed centres, transit points and mobiles. The

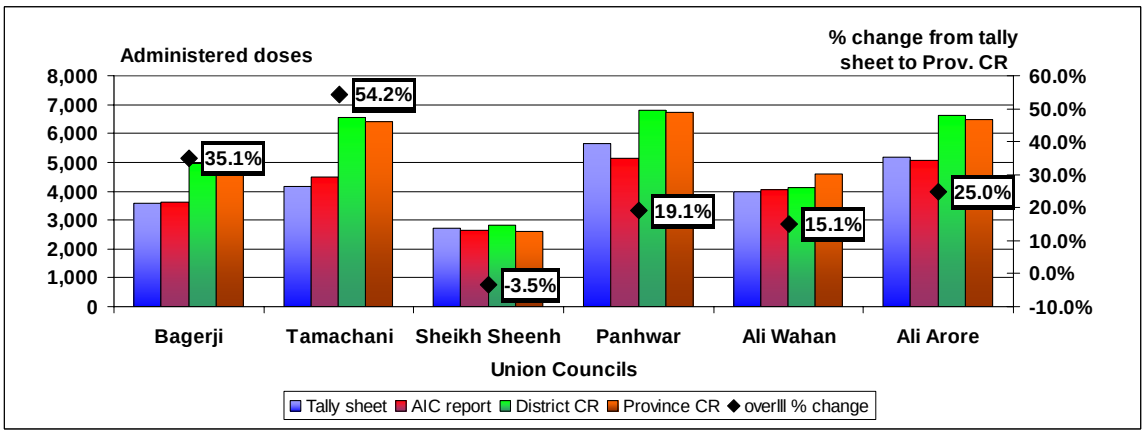
results are extremely erratic. Some AICs have reported more doses administered than appear on the tally sheets while others reported fewer. The analysis is shown in Figure 24. Negative numbers indicate fewer doses reported on the AIC report than on the tally sheets.

**Figure 24: Difference between administered doses reported by AIC and doses administered recorded on the tally sheet**




These results were then compared to the administered doses reported by the EDO(H) to the District Control Room (CR), and from the District Control Room to the Provincial Control Room. The alarming results are shown in Figure 25.

**Figure 25: Difference in reported administered doses from tally sheet to provincial control room**




The smallest change between tally sheet and Provincial CR is -3.5%. If this were extrapolated to the whole of the SNID it would decrease the number of administered doses by 120,048. However the percentage

change of all six UCs together is +25.3%, which would increase the number of administered doses by an astonishing 867,773 doses.

Reports on bOPV utilization are available on a daily basis and are collated from one level to another all the way to the Federal Polio Control Room. These data were readily available in Punjab (Lahore) Provincial PCR, but were not available in Sindh (Karachi) PCR. Sindh team advised the team to contact Islamabad for their disaggregated OPV utilization reports.

Analysis of daily OPV utilization from the July NID from Punjab revealed the following:

- These reports are available for each day of the campaign. However for the catch-up days (days 4 and 5), the reports are only on the number of children vaccinated, not on the number of OPV doses used. There is no record of OPV utilization during the campaign. In Punjab, almost 1 million children were reportedly vaccinated during catch-up. There is no record available of the number of OPV doses utilized during catch-up.

- When investigating the difference between the reported number of returned OPV vials and what is expected (OPV given minus OPV used), it is evident there are major discrepancies: some Districts report returning fewer OPV vials than expected based on their utilization. Others report returning more OPV vials than possible based on what they were given and their utilization. In July 2012, Punjab Province reported returning 2,541 OPV vials (50,820 doses) after the three days, which - based on their utilization - is less than expected.

- Similarly, when comparing the balance of OPV vials from day to day during the campaign, there is a discrepancy between the balance of OPV vials that the district reports at the end of the each day, compared with the calculation of the previous day's balance minus utilization. For example, in Punjab in July 2012, in total, there was a discrepancy of more than 31,000 OPV vials (620,000 doses) which were reported as a daily balance in excess of what is expected, based on their utilization.

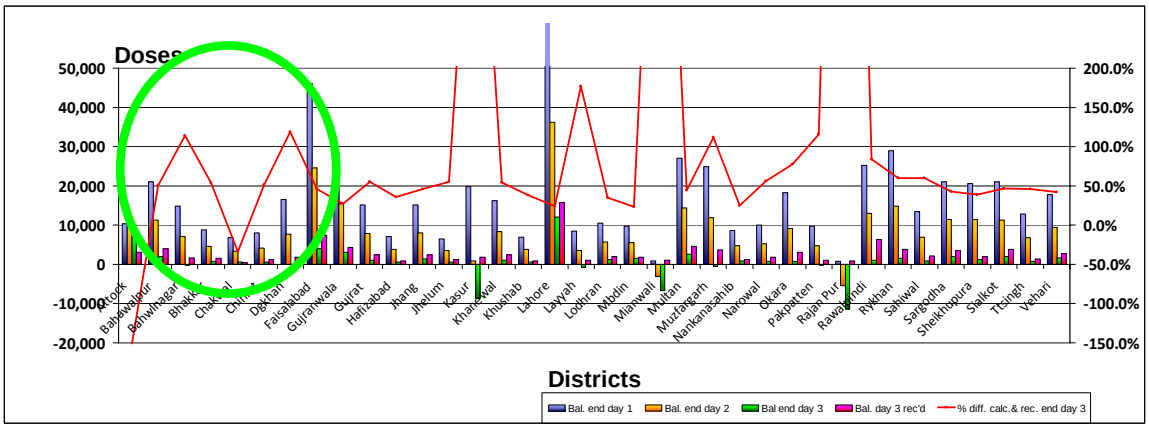
The team frequently found vaccinators still working at 1600 and this does not leave time to ensure that all reports are fully checked before the evening meeting.

### 10.2 Stock balance

The Control Room records the vaccine balance at the beginning of each day, vaccine issued (ambiguously shown as "given"), and vaccine returned. All are recorded in vials.

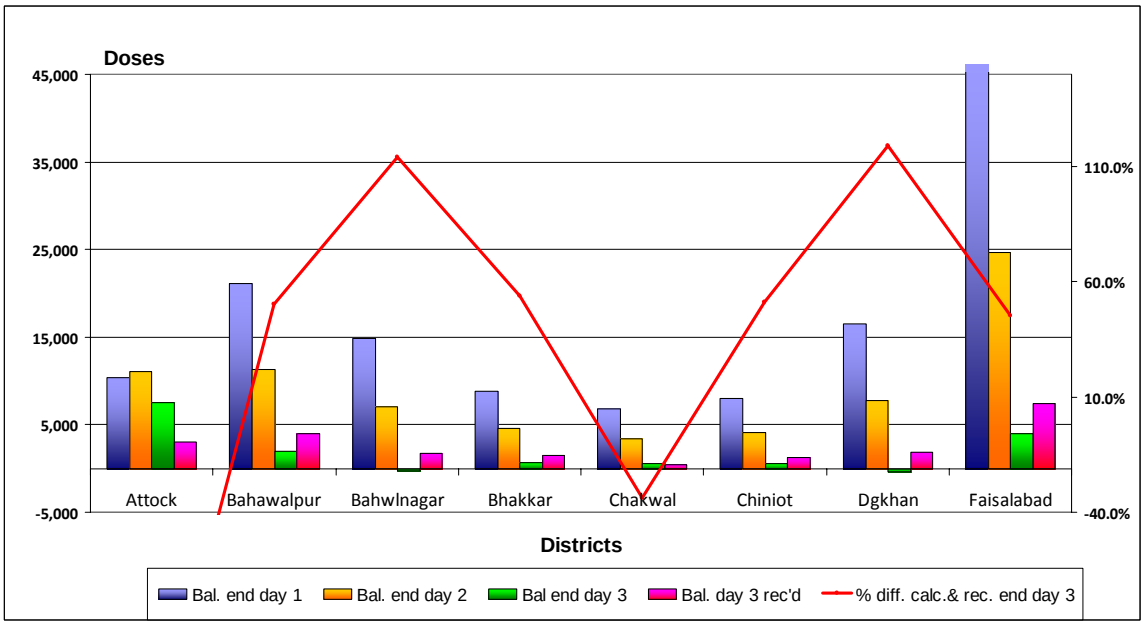
The team made a comparison between the daily stock balance recorded in the Punjab Control Room data and the calculated stock balance (stock balance – issued + returned). The result is shown in Figure 26.

**Figure 26 Difference between recorded balance and calculated balance**




For clarity Figure 27 shows the first eight districts only circled in green in Figure 26.

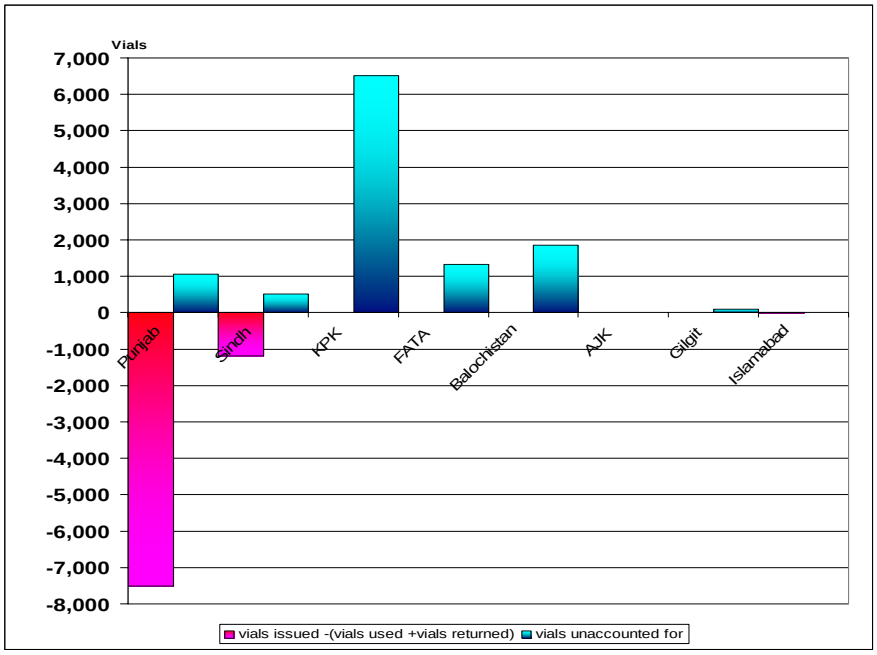
**Figure 27: Difference between recorded balance and calculated balance (detail)**




One would expect the stock balance to decrease daily as the vaccine is issued with the unused being returned for future issue. However the graphs show that by the end of Day Three there is a huge discrepancy between the recorded balance and the calculated balance (percentage difference is shown by the line graph).

Figure 28 shows the discrepancy for all Provinces in the 2011 July NID.This shows not only that some Provinces – like Punjab and Sindh – used and returned more vaccine than they received, but also that they have vaccine which has not been accounted for. Other Provinces like KPK have substantial quantities of vaccine that has apparently arrived without being accounted for.

**Figure 28: Discrepancy between vaccine issued and vaccine used +vaccine returned and vaccine unaccounted for during July NID**




Data on vaccine utilization is so unreliable that it is not possible to be definitive about what is happening. What is clear is that little attention is paid to the quality of reported data. The emphasis seems to be on quantity, but the quantities are uninterpretable with any degree of confidence.

**Recommendations**

Conduct a detailed and wide ranging assessment checking data recorded on tally sheets against reported data at each stage up to and including the Provincial PCR to find out how widespread the discrepancies this report four are.

All staff need to spend more time checking their data before making their reports.

Vaccinators need to carefully check their tally sheets before they hand them in to make sure that they are legible, arithmetically consistent and include all data from the back of the tally sheet. They should check the number of doses administered against the number of doses they have used.

The vaccinators should specifically account for all empty and partly used vials.

AICs need to ensure that their reports are consistent with the tally sheets, and where there are inconsistencies that they check back with the vaccinators to resolve the inconsistencies before sending the data on.

EDO (H) reports should use the official CR software to collate reports and their own invented spreadsheets. If there are inconsistencies with

the AIC reports these must be reconciled before finalising the District Control Room data.

Provincial level Control Room staff must likewise ensure that any data discrepancies between the District level and the Provincial level are resolved before finalising the provincial level Control Room data.

There should never be more than one part used vial per vaccination team at the end of the day and that part used vial should be used first the following day.

All vaccines used during catch-up must be accounted for in the normal way by being entered in the stock register. Where partly used vials are used this should be noted.

To ensure that there is time for proper reconciliation of data at the levels of vaccinator and AIC, there must be enough teams to enable the vaccinators to finish by 14:00 as set down in the Guidelines.

## 11. Stock Management

Stock management is generally weak, as already indicated in this report. Significant quantities of vaccine are scattered through out the Provinces, unaccounted for and untraceable. This is due to a failure to maintain basic stock records at all levels. At Federal level there appear to be different quantities of vaccine in stock, depending on which record is consulted. Even such simple matters as correctly recording the date of issue are not done accurately. For example out of 32 issues of vaccine for SIADs and case response, 6.3% had issue dates that were inconsistent between different records. At sub-national level the situation varied by Province. Punjab was reported to be good while in Sindh there was no stock record at Provincial level – that is to say, it could not be found at the time of the team's visit.

**Figure 29: Searching for the stock register**

This may explain why Sindh had 20,000 vials in stock before the September SNID was received. As the SNID required 47,650 vials this meant that 42% of the requirement was already in stock, unknown to the Federal store, and this was after another 20,000 vials had been returned to Islamabad for reissue to KPK, a transaction (as already noted) that took place without any record in the Federal stock register.

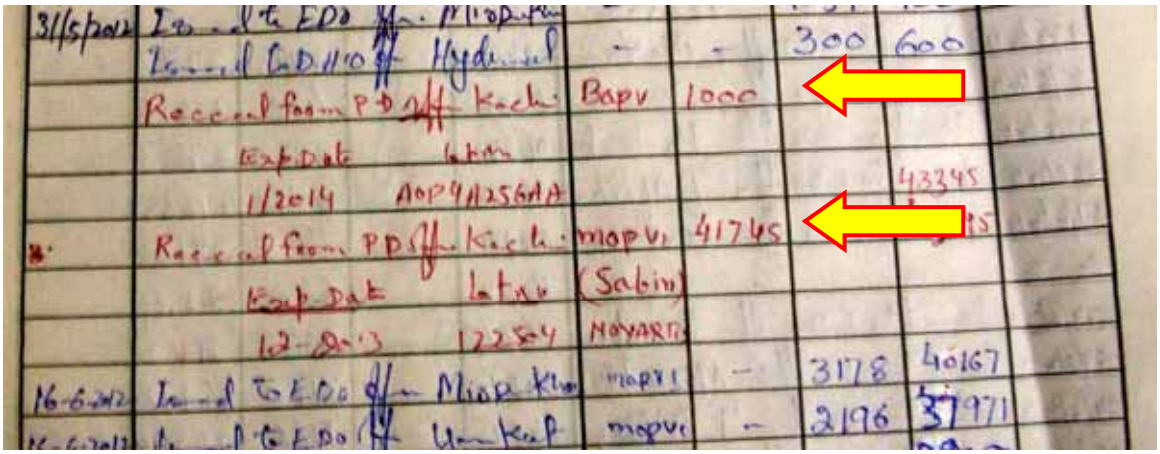
In Balochistan the team found 6,174 vials of vaccine left over from the previous campaign but the stock register showed zero doses.

In Lahore there were 34,000 doses of bOPV in stock before the vaccine for the SNID was delivered; this represents 2% of the requirement for the SNID. By the end of the SNID the balance had risen to 86,120 doses representing 5% of the campaign's requirement. It is not clear if these stock balances were reported to the Provincial level so that they could be taken into account when future estimates were made.

Stock management becomes even less reliable at the more peripheral levels. For example in one district the most recent entry in the stock record was 21/01/12. The staff had no explanation for this.

Generally bOPV and mOPV records are kept in the same register, as illustrated in Figure 30. This makes stock management almost impossible. In addition the tOPV used by fixed teams is not recorded separately making estimates of vaccine usage inaccurate.

**Figure 30: Example of bOPV and mOPV stock recorded in the same register**




At the level of the vaccinators, stock management is almost non-existent. Some vaccinators receive all three days' stock of vaccine on day one and then simply "dip in" as they wish, with unrecorded "top ups" as needed. Out of 68 tally sheets inspected in Sakkur District, 37% mis-recorded the quantity of vaccine returned.

Stock records are inconsistent in the way they record supplies, some record in vials and some in doses. Recording in doses is the preferred unit of recording

**Recommendations**

| |
|---|
| At all levels there must be much greater control over stock records. |
| Stock should be recorded in doses and not in a mix of vials and doses |
| There must be a separate record for each type of polio vaccine. |
| All locations handling vaccine must keep a record of every transaction. |

All facilities down to and including UCs must keep stock registers.

AICs must keep a stock record which shows the daily movement of vaccine, both vaccine issued and vaccine restocked at the end of the day.

These records must be reconciled daily by the AIC with the doses administered.

The number of returned empty vials and the number of returned part-used vials must also be recorded.

The nomenclature "Vaccine given" is ambiguous and should be replaced by "vaccine issued".

## 12. Returned empty vials and waste disposal

The returned empty vial can be an important cross check on vial usage, but at present very little attention is paid to empty vials. The vaccination teams mostly return the empty vials in their vaccine carriers.

As shown in Figure 22 above, the team found significant quantities of vaccine being discarded in "empty vials".

In most Team Support Centres (TSC) empty vials are just put out with the municipal trash. This is not good practice: once the empty vials have been recorded, they should be discarded into a proper waste facility. Such facilities should be available to receive all the waste from routine EPI. The team found little evidence of appropriate waste disposal

Figure 31 shows a suitable and unsuitable example of waste disposal.

**Figure 31 Good and bad disposal of campaign waste**

**Recommendations**

All empty vials must be returned by the vaccination teams to the AIC.

The AICs must check that the vials are empty; any which are not empty should be kept for use the next day, provided the VVM is less than stage 3. They should not be set aside for use during catch-up.

The AICs must record the number of empty vials returned by the vaccinators and use the data to cross check the data on used and returned vials and the number of administered doses.

Once recorded, the empty vials must be placed in a suitable waste disposal facility. This should be the same as the one used by EPI. They should not just be thrown out or put in the municipal waste.

**13 Way Forward (In order of priority)**

1. **Reported data accuracy survey:** Conduct a detailed study of Tally sheets from the October 2012 NID and reconcile with entries in AIC reports EDO(H) reports and PCR to establish if the findings of this report are representative.

2. **District and Province vaccine balance report:** All districts and provinces to report existing stocks of bOPV before supplies for next campaign are despatched

3. **SOP Workshops and Trainings:** see timetable Figure 33

4. **Form Federal Vaccine Management Committee** with satellite committees at provincial level This could be the vehicle used to meet the concern expressed by the IMB, for the *"the GPEI partners to identify a more streamlined mechanism through which the District Commissioners can seek their combined support".*[15]

5. **Fill LHW posts** Begin finding ways to expand the LHW posts to fill all posts

6. **WHO prequalified vaccine** Find ways to ensure that all vaccines purchased are from WHO pre-qualified sources

7. **Cold chain standards**: Update cold chain standards and specifications

8. **EVM:** Carry out EVM assessments at provincial and district level

9. **Equipment survey:** Survey existing equipment to establish the number of sub-standard units that need replacing and then replace them

10. **Diversify use of GPEI resources:** Develop a programme to implement RED strategies for routine EPI using GPEI resources to develop common microplans

11. **Integration with EPI**:Find ways to integrate GPEI more closely with EPI

[15] *Ibid.* page 39

**Figure 32: Timetable for SOP workshop and subsequent training**

| September | October | November / December | January | February | March |
|---|---|---|---|---|---|
| | Completion of draft report | Preparations for Workshop on SOPs | Workshop on SOPs and writing of Final SOPs | Training for UC officers, AICs & Supervisors | Monitoring / Assessment mission on VM Assessment |
| | | Preparations for Training | Revising of Operational Guidelines | Training for vaccinators | |
| Draft Framework for VM SOPs | | | Printing and dissemination of Guidelines | | |
| | | Establish VM Committee | Training on Guidelines for district level | | |

## Appendix 1 Terms of Reference

**CHALLENGE**

The current system of vaccine management during polio campaigns in Pakistan does not yield consistent data to demonstrate that –

(a) eligibles are accurately estimated
(b) all vaccines are fully accounted for throughout the distribution chain, and
(c) all used vaccines are being returned to the central store for utilisation in future campaigns.

This undermines the credibility of the involved actors and programme managers in the polio eradication effort and leads to a waste of valuable resources during the current funding crisis.

At the same time, there is no systematic evidence to define the root causes of inefficiencies, nor to explain why the existing vaccine utilisation monitoring processes and tools have not produced data that are demonstrably consistent and reliable.

There is no sustainable system of effective vaccine management without –

(a) accurate diagnosis of root causes (barriers), and
(b) bringing the actors on board with the recommended solutions and agreeing on better management system

Therefore the objective of this consultancy is to –

(a) establish a more accurate way of estimating eligible
(b) create a baseline of the current system of vaccine management and reporting, and
(c) recommend evidence-based options for improving vaccine estimation, monitoring and reporting at all levels based on current context

**1. Expected results: (measurable results)**

The consultant will be working in Pakistan to support the Polio Eradication Team in UNICEF's Pakistan Country Office, Government of Pakistan and Partners in achieving the objectives defined above. To do that, the consultant will be travelling to the field to observe the supply chain and vaccine management issues during the polio campaign and:

- Understand how estimates of eligibles are made
- develop a clear methodology for this consultancy to achieve its goals
- Undertake systems analysis (product lifecycle analysis, (actor network and activity cycle analysis and operations management by 'following' the vaccine and information/reporting, to assess current practices and map the existing supply chain for OPV during a polio campaign from central level (provincial) to the field and back up after the campaign is completed (September 10-13)
- Identify opportunities within the EPI and polio programme to improve vaccine management in the context of polio campaigns
- Identify operational and change management barriers that need to be overcome

- Develop recommendations in collaboration with the involved actors and programme managers including tools and processes to improve polio vaccine management with the goal of minimizing vaccine wastage, making estimation of eligibles more accurate, ensuring correct dosing, , accounting for and collating unused vials after the NIDs, and minimizing vaccine wastage.

Two consultants are required to cover more than one province and get a more comprehensive assessment of the current system. The consults are expected to conduct field visits in two separate areas and visit teams, supervisors, managers, cold rooms, vaccine storage facilities, health centres, WHO and UNICEF support staff, government officials at federal, provincial, district and Union Council levels. One of the two consultants, Anthony Battersby, will be the team lead responsible for pre-mission analysis of data and for consolidating the report of the other consultants into the final joint report. The lead consultant will do analysis of the data prior to arrival in Pakistan for a period of 5 days. The final report *(~20 pages excluding annexes*) which details the findings and recommendations based on the local context in line with the data the consultants have gathered and analysed and their observations. This will be the responsibility of the lead consultant. Preliminary outcome of the mission will be presented during a debriefing with government and partners. Peter Vanquille will submit his report to the lead consultant by September 23. The draft report will be submitted to UNICEF CO and HQ by September 27 and finalized to incorporate feedback and input by October 5, 2012. The report should include specific and relevant recommendations for the way forward. The final report will be submitted within 1 week of the consultants receiving comments on the draft report.

# SOPs (Standard Operating Procedures)
# for Vaccine Management
# Before - During and After Polio vaccination campaigns
# in Pakistan

| Component of the SOP | Step by step procedures | Institution(s) / person(s) responsible | When | To whom | Document(s) involved / signed / shared |
|---|---|---|---|---|---|
| ***1. ESTIMATING SIZE OF TARGET AND QUANTITY OF OPV*** | 1) Estimating the size of target population according to the guidelines and in consultation with the local community | UPEC (UC Work group) | Three weeks (21 days) before each campaign | | Micro plan on all levels |
| | 2) cross check size of population by comparison with the number of administered BCG administered adjusted to 100% coverage | UPEC (UC Work group) & EPI | Three weeks (21 days) before each campaign | | Micro plan on all levels and EPI district-wise monthly report for the last 5 years |
| | 3) Estimation of quantity of vaccines | UPEC (UC Work | Three weeks (21 | | Micro Plan on all |

| | | | | | |
|---|---|---|---|---|---|
| | according to the size of target population minus existing stock plus 15% wastage | group) | days) before each campaign | | levels |
| ***2. ORDERING OF VACCINES*** | 1) From UC to District | UCMO (Facility I/C) | 20 days before each campaign | EDO (H) | UC Micro Plan<br>Order request Form |
| | • DPEC (Work Group in consultation with local community) studies and approves the Micro Plan<br>• DPEC Work Group signs the Micro Plan and Order Request | DPEC (District Work Group) | 18 days before each campaign | | |
| | 2) From District to Province | EDO(H) | 18 days before the campaign | Provincial EPI Head / EPI Coordinator | District Micro Plan<br>Order request Form |
| | • DPEC (District Work Group) studies and approves the Micro Plan<br>• DPEC signs the Micro Plan and Order Request | | 18 days before each campaign | | |
| | 3) From Province to Vaccine Management Working Group (Committee) in Islamabad | Provincial EPI Head / EPI Coordinator | 14 days before the campaign | VM Committee | Provincial Micro Plan<br>Order request Form |

| | | | | | |
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| | • Provincial Work Group studies and approves the Micro Plan<br>• Provincial Work Group signs the Micro Plan and Order Request | | 14 days before each campaign | | Micro Plan<br>Order Request Form |
| | 4) From VM Committee to National Programme Manager (NPM) | VM Committee | 13days before the campaign | (NPM) | Micro Plan<br>Order Request Form |
| ***3. DISPATCH OF VACCINES*** | 1) From Federal Level to Provincial level (by Air) | Federal EPI (National Vaccine) store in charge / Store Manager | 10 days before the campaign | Provincial store keeper / manager | Dispatch Voucher.<br>Airway Bill<br>Packing List |
| | • Assure the following:<br>o Forwarding Agency is contacted<br>o Flights are booked<br>o Dispatch Vouchers are prepared<br>o Airway bills are prepared<br>o Packing Lists are prepared<br>o Manpower is on stand-by<br>o Vaccine correctly packed to ensure safe temperatures for twice as long as the journey's duration<br>o Recipient forewarned of arrival time | | | | |
| | 2) From Federal to Provincial (by Road) | Federal EPI (National | 10 days before | Provincial | Dispatch |

| | | | | | |
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| | Province picks up vaccines at the Federal Store | Vaccine) store in charge / Store Manager | the campaign | Store Keeper / Manager | Voucher.<br>Way Bill<br>Packing List |
| | • Assure the following:<br>o Refrigerated trucks are in good condition<br>o Fuel is available<br>o Dispatch Vouchers are prepared<br>o Waybills are prepared<br>o Packing list is prepared<br>o Recipient forewarned of arrival time | | | | |
| | 3) From Provincial to District or Towns (By Road) Districts pick up vaccines at the Provincial Store or may be transported by provincial level | Provincial Store Keeper / Manager | 6 days before the campaign | District Store I/C / DOH | Dispatch Voucher.<br>Way Bill<br>Packing List |
| | • Assure the following:<br>o adequate cold chain materials are prepared for transporting the planned quantity of vaccine<br>o Sufficient number of frozen icepacks are available to give cold boxes a cold life twice as long as the journey duration<br>o Adequate transportation is available | | | | |

| | | | | | |
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| | o Fuel is available<br>o Way Bill is prepared<br>o Packing list is prepared<br>o If delivered, recipient forewarned of arrival time | | | | |
| | 4) From District or Towns to Tehsils / Taluka or directly to UC level (BHU / RHC / MCH)<br>Each lower level picks up their vaccines from the District or Town | District Store I/C / DOH | 3 Days before the campaign | UCMO through EPI Technician | Dispatch Voucher.<br>Way Bill<br>Packing List |
| | • Assure the following:<br>o adequate cold chain materials are prepared for transporting the planned quantity of vaccine<br>o Sufficient number of frozen icepacks are available to give cold boxes a cold life twice as long as the journey duration<br>o Adequate transportation is available<br>o Fuel is available<br>o If delivered, recipient forewarned of arrival time | | | | |
| | 5) From UC level (Team Support Centre) to AIC | UCMO through EPI Technician I/C of | Every day of the campaign in the | AIC | AIC Micro Plan & Vaccine |

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| | | health facility | morning | | Distribution Plan |
| | • Assure in advance the following:<br>o That there are sufficient vaccine carriers available for every AIC according to the number of teams<br>o That also every AIC has 1 good vaccine carrier<br>o That there are enough frozen icepacks available , frozen 24 h. in advance so that they are available daily for replacement<br>o That all other materials (Tally sheets, chalk, finger marker, pens, team identification materials. are present and packed per AIC | | | | |
| | 6) From AIC to vaccination team | AIC | Every day of the campaign in the morning | Vaccination team leader | "Daily Team's Attendance, Performance and Vaccine Record Sheet" |
| | • Assure in advance the following:<br>o That every team has at least 1 good vaccine carrier for the campaign<br>o That also AIC has 1 good vaccine carrier | | | | |

| | | | | | |
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| | o That each team has adequate frozen icepacks for their vaccine carrier<br>o That enough budget is available for purchase of wet ice if there are not enough frozen icepacks<br>o That plastic bags with zip seal are available for packing wet ice<br>• That all other materials (Tally sheets, chalk, finger marker, pens, team identification materials... are available on a daily basis | | | | |
| | | | | | |
| ***RECEIVING OF VACCINES*** | 1) Provincial level picks up vaccines at Federal EPI (National Vaccine Store) | | | | |
| | • reception of the vaccines and inspecting of the vaccines (R&I)<br>o Counting the boxes and compare with what was ordered<br>o Inspecting damage of packing<br>o Inspecting damage of OPV vials<br>o Inspecting expiry dates / VVM<br>o Vaccine placed in date order on shelves in the cold room<br>• Officer in charge signs the dispatch | Officer in charge accompanying the trucks | Immediately upon transfer of vaccines | Federal EPI (National Vaccine Store) store keeper | Dispatch Voucher<br>Packing List |

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| | documents for receipt, notes on the back of the Dispatch Voucher any abnormality and hands it over to Federal EPI (National Vaccine Store) | | | | |
| | 2) Provincial level receives vaccines from Federal EPI (National Vaccine Store) by air or by road | | | | Dispatch Voucher.<br>Airway / waybill<br>Packing List |
| | • reception of the vaccines and inspecting of the vaccines (R&I)<br>o Counting the boxes and compare with what was ordered<br>o Inspecting damage of packing<br>o Inspecting damage of OPV vials<br>o Inspecting expiry dates / VVM<br>o Vaccine placed in date order on shelves in the cold room<br>• Store Keeper signs the dispatch documents for receipt and note on the back of the Dispatch Voucher any abnormality<br>• A copy of all documents except packing list are sent back to Federal EPI (National Vaccine Store) with the | Provincial Store keeper / OIC | Upon reception<br><br>Immediately after receipt and R&I | Federal EPI (National Vaccine Store) officer in | Return Dispatch Voucher. (with R&I on the back)<br>Return Airway / wayBill |

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| | Federal EPI (National Vaccine Store) transport (if by road) or by courier (if by air)<br>• A copy of all documents are kept in a FOLDER<br>• ALL correct numbers of OPV vaccines are entered in the Stock Register (1 register for m-OPV / 1 register for b-OPV / 1 register for t-OPV | | | charge / Store Keeper | Stock Register |
| | 3) Districts / Towns level picks up vaccines at the Provincial Store | | | | Dispatch Voucher.<br>Packing List |
| | • reception of the vaccines and inspecting of the vaccines (R&I)<br>o Counting the boxes and compare with what was ordered<br>o Inspecting damage of packing<br>o Inspecting damage of OPV vials<br>o Inspecting expiry dates / VVM<br>o Vaccine placed in date order in freezer<br>• Officer in charge signs the dispatch documents for receipt, notes on the back of the Dispatch Voucher any abnormality and hands it over to | District Store Keeper / DOH | | | Dispatch Voucher (with R&I report on the back).<br>Packing List |

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| | Federal EPI (National Vaccine Store) | | | | |
| | 4)Districts / Towns receive their vaccines from the Provincial Level | | | | Dispatch Voucher.<br>Waybill<br>Packing List |
| | • reception of the vaccines and inspecting of the vaccines (R&I)<br>o Counting the boxes and compare with what was ordered<br>o Inspecting damage of packing<br>o Inspecting damage of OPV vials<br>o Inspecting expiry dates / VVM<br>o Vaccine placed in date order on shelves in the cold room<br>• Store Keeper signs the dispatch documents for receipt and note on the back of the Dispatch Voucher any abnormality<br>• A copy of all documents except packing list are sent back to Federal EPI (National Vaccine Store) with the Federal EPI (National Vaccine Store) transport (if by road) or by courier (if by air) | District Store Keeper / DOH | | | Dispatch Voucher (with R&I report on the back).<br>Waybill<br>Packing List<br>Stock register |

| | | | | | |
|---|---|---|---|---|---|
| | • A copy of all documents are kept in a FOLDER<br>• ALL correct numbers of OPV vaccines are entered in the Stock Register (1 register for m-OPV / 1 register for b-OPV / 1 register for t-OPV | | | | |
| | 5) UC level picks up vaccines at the District store | UCMO/ Health Facility I/C though EPI Technician / EPI Center I/C Vaccinator | | | Dispatch Voucher.<br>Waybill<br>Packing List |
| | • reception of the vaccines and inspecting of the vaccines (R&I)<br>o Counting the boxes and compare with what was ordered<br>o Inspecting damage of packing<br>o Inspecting damage of OPV vials<br>o Inspecting expiry dates / VVM<br>o Vaccine placed in date order on shelves in the cold room<br>• Officer in charge signs the dispatch documents for receipt, notes on the back of the Dispatch Voucher any abnormality and hands it over to Federal EPI (National Vaccine Store)) | | | | Dispatch Voucher (with R&I report on the back).<br>Waybill<br>Packing List<br>Stock register |

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| | 6) AIC receives vaccines from UC level (Team Support Centre) | UCMO | Every morning of the campaign | AIC | |
| | • Check if quantities correspond with planned requirement of teams (in accordance to the Micro Plan)<br>• Check if vaccine is in dates and VVM are less that level 2<br>• Sign the UC Daily Distribution Sheet<br>• Enter the daily entry of vaccine into AIC daily reporting form 2A (Daily Team's attendance, Performance and Vaccine record)<br>o Record of this is kept by all the AICs at TSCs in a file for the last one year<br>• Additional vials of vaccine received during the day are recorded in a separate column on the Daily Vaccine Distribution Sheet and signed by the AIC | | Every morning of the campaign | | Daily Vaccine Distribution Sheet<br><br>Daily Team's Attendance, Performance and Vaccine Record Sheet |
| | 7)Vaccination Team Leader receives vaccine from AIC | AIC | Every morning of the campaign | Vaccination Team Leader | Daily Team's Attendance, Performance and Vaccine Record Sheet |

| | | | | | |
|---|---|---|---|---|---|
| | • Check if quantities correspond with the planned requirement of teams (in accordance to the Micro Plan)<br>•<br>• When checked and agreed, the vaccination Team Leader signs the Daily Team's Attendance, Performance and vaccine Record Sheet<br>• Additional vials of vaccine received during the day are recorded in a separate column on the Daily Sheet and signed by the Vaccination Team Leader | | | | |
| ***RETURNING OF VACCINE*** | 1) From Vaccination Team to AIC | | | | |
| | • At the end of each day or immunization session, count & record (at the Team Support Centre)<br>o unused vials<br>o open vials<br>o used and empty vials | Vaccination team leader | Every day | AIC | Daily Team's Attendance, Performance and vaccine Record Sheet |
| | 2) From AIC to UC | | | | |
| | • At the end of each day, count , record & compile: (At the agreed central Team Support Centre) | AIC | Every day | UCMO / EPI Technician | Daily Vaccine Distribution Sheet |

| | | | | | |
|---|---|---|---|---|---|
| | o unused vials of all teams and AIC<br>o open vials of all teams and AIC<br>o used and empty vials of all teams and AIC | | | | EPI/TSC Center Stock Register |
| | 3) From UC to District | | | | |
| | • At the end of the last day of each campaign record(At the agreed Central Support Centre)<br>o unused vials of all UCs<br>o open vials of all UCs<br>o used and empty vials of all UCs<br>o restocked vaccine entered in the stock register | | | | |
| ***STORAGE OF VACCINES*** | 1) Store and Stock management is the responsibility of the store keeper. | | | | |
| | • The store keeper has technical background and is trained on store management and storage of vaccines.. | | | | |
| | 2) Every Cold Storage on every level respects following minimum requirements: | | | | Cold Room Monitoring Check List |
| | • Adequate storage space, with respect to volume, accessibility, presence of | | | | |

| | | | | | |
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| | electricity, ventilation, protection from direct sunlight, protection from moisture, dust and pests<br>• All equipment is regularly maintained and repaired (all freezer are regularly defrosted)<br>• All cooling units have their outer casings intact, those without are repaired<br>• All cooling units are kept clean and dust free.<br>• Operational cooling unit alternated weekly<br>• Following are further minimum requirements in all cold stores:<br>o Every room has at least 2 functioning fire extinguishers inspected and certified annually<br>o Every room has a first aid kit available<br>o All rooms are free of pests and are treated against pests frequently<br>o Rooms are kept clean and tidy<br>o all cold rooms, ILRs and freezers can be individually locked and all store | | | | |

| | | | | | |
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| | rooms can be locked<br>o Doors and windows have iron bars to avoid break-ins.<br>o The compound where the store is located has guards 24/7<br>o All equipment is out of the sun and all rooms have enough electric lighting<br>o Rooms have safe electric wiring and sockets. all electric equipment is connected with a voltage stabilizer<br>o There is functioning generator on the premise in case of power failure<br>▪ Generator is turned on by every power failure ( Automatic on Federal, Provincial and District Level. Manually on the lower levels)<br>▪ There is always enough fuel present<br>▪ Fuel use is monitored on a consumption sheet<br>▪ The running times are monitored on the same sheet<br>o Every level has a designated secure disposal site | | | | Generator Operation Monitoring sheet<br><br>Declaration of Expiration / Disposal report |

| | | | | | |
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| | • Every warehouse on every level has identified at least 1 room to temporarily keep damaged and expired commodities before disposal or before returning<br>• Every warehouse on every level has identified at least 1 room to store new equipment and supplies | | | | |
| | 3) Store Keepers follow strictly following Stock Management principles | | | | |
| | • Vaccine stocks are stored according to the FEFO principle.<br>• During campaigns: Vaccines dispatched in the morning with the same expiration date and partly returned in the evening go out first the next day, before any other batch<br>• After the campaign: Vaccines dispatched before the campaign with the same expiration date and partly returned after the campaign go out first for the next campaign, before any other batch<br>• Returned vaccines are inspected, ,re-packed and labeled for First Out | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | • OPV vaccine stocks are regularly counted and checked against the Stock Register<br>• A separate Stock Register is used for each type and presentation of vaccine incl. m-OPV, bOPV - tOPV.<br>• The Stock Register is used on all levels except for AIC and vaccinator teams<br>• EVERY TIME vaccine vials are entered for dispatch, the quantity (doses) is recorded in the Stock Register<br>• Every cold room, ILR, freezer has a separate temperature monitor sheet. temperatures are measured and recorded twice a day including on Week-ends.<br>• -20 °C. C cold rooms and freezers are kept between -15 °C and -25°C<br>• 4 °C. C cold rooms and ILRs are kept between 2 °C and 8 °C<br>• Every cold room, ILR, freezer have a functioning thermometer inside the equipment, even if there is an outside display of the temperature. (inside | | | | Stock Register<br><br>Temperature Monitoring Sheet |

| | | | | | |
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| | temperature reading counts)<br>• Old temperature record sheets are kept in a designated folder<br>• Vaccines stored in the cold rooms are stored on shelves<br>• Vaccines stored in ILRs and freezers are stored in wire baskets<br>• | | | | |
| ***HANDLING of VACCINES*** | 1) Handling of vaccines by the vaccination teams | | | | |
| | • OPV is always packed in a water proof zip seal plastic bag<br>• OPV is kept out of the direct sunlight at all times<br>• OPV vials are always closed after each immunization and put back in the zip seal bag<br>• Part used OPV vials can be used the next day if stored at correct temperature and the VVM is below stage 3 and vaccine is in date<br>• Any open vial is used till the last drop.<br>• A new vial is not opened until the open vial is completely empty | | | | |

| | | | | | |
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| | • 2 drops of OPV are given, not fewer, not more<br>• Any unused or part used vial is returned to AIC after each vaccination day<br>• Unused or open vials are never stored at the home of the vaccinator<br>• Unused or part used vials are never stored in the vaccine carrier overnight.<br>• If it is not possible to return to the Support Centre due to team being far from the Support Centre then the days ice or icepack must be replaced by fresh ice or a frozen icepack to maintain a safe temperature | | | | |
| ***RECORDING and REPORTING*** | 1) From vaccination Team to AIC | | | | |
| | • Recording and reporting on the back of the tally sheet<br>o unused vials<br>o open vials<br>o used and empty vials | Vaccination Team Leader | In the morning and after each day (including Catch-up days) | AIC | Tally sheet |
| | 2) From AIC to CSP / Zonal Supervisor | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | • Collecting, checking, counting, calculating , recording and reporting the total for all teams of:<br>o unused vials<br>o open vials<br>o used and empty vials<br>o reconcile number of doses used with number of doses administered<br>o ensure that doses at fixed centers are recorded as tOPV | AIC | In the evening before the UC meeting | CSP or Zonal Supervisor | Tally Sheets<br>Daily Team's Attendance, Performance and vaccine Record Sheet |
| | 3) From CSP / Zonal Supervisor to District | | | | |
| | • Collecting reports from all AICs<br>• Calculates correctly all reported numbers from AIC<br>• mentions same information on received, returned, used and empty vials as on AIC report<br>o reconcile number of doses used with number of doses administered<br>• ensure that doses at fixed centres are recorded as tOPV | CSP / Zonal Supervisor | In the evening after meeting in UC | EDO(H) | Daily Feed Back Report for Zonal Supervisors to District Form |
| | 4) From District to Province | | | | |
| | • Compiling of all data from the Daily | District Focal Person | The next | Provincial | Electronic |

| | | | | | |
|---|---|---|---|---|---|
| | Feedback Reports from the CSP / Zonal Supervisors<br>• mentions same information on received, returned, used and empty vials as on CSP / Zonal Supervisor report | of EDO(H) | morning | Control Room at the Polio Cell<br><br>EPI Director | District report via Intranet<br><br>Hard copy |
| | 5) From Province to Federal<br>• report quantity of restocked vaccine | Provincial Control Room at the Polio Cell<br><br>EPI Director | The next morning | Federal Control Room at the Polio Cell<br>EPI Director | Electronic Provincial report??? via Intranet<br>Hard copy |
| | 6) From Federal Control Room to the Vaccine Management Committee | Provincial Control Room at the Polio Cell | For each day of the campaign | VM Committee | Hard Copies |
| ***WASTE MANAGEMENT*** | 1) Waste from each Vaccination Team | | | | |
| | • Used empty vials are kept till the end of the day, kept in a separate plastic bag, recorded on the back of the tally sheet and handed over to the AIC | Vaccination Team Leader | Every evening | AIC | Tally Sheet |
| | 2) Collected waste from the Vaccination Teams | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | • After inspection , counting and recording, used empty vials from all teams are collected in a waste bag or container in the Team Support Center | AIC | Every evening | BHU / RHC / MCH... officer in charge | *Define what document to be used!* |
| | 3) Disposal of waste from the campaign | | | | |
| | • All used empty vials and other waste are recorded and signed off by EDO(H) or designated officer, brought to a designated area within the support centre compound and correctly disposed<br>o Site is away from the public area, protected and fenced off<br>o Site has an open pit about 1 meter deep)<br>o Waste is burned after each day of vaccination<br>o Burned waste is buried with soil after the campaign.<br>o IDEALLY ALL DRY MEDICAL WASTE IS DISPOSED OFF IN A HIGH TEMPERATURE INCINARATOR (but burned and buried as above in a pit if incinerator is not available) | | | | |

## Appendix 3 Vaccine Management Committee draft TORs

**Aim:** To ensure adequate forecasting, procurement, storage and utilization of all vaccines

**Structure:** A Vaccine Management Committee will be responsible for regular monitoring and updating of the vaccine management situation in general terms as well as discuss any issues related to vaccine management. The Vaccine Management Committee will update the National Steering Committee present recommendations to the Steering Committee for further endorsement. The Vaccine Management Committee will meet once a fortnight (? Suggest defining this to sustain regular contact)

**Composition:** The Vaccine Management Committee will consist of one members from Federal EPI, GPEI each province plus Chair. WHO and UNICEF to be observers and a support resource.

**ToR for the Vaccine Management Committee:**

1) Estimating needs for vaccines in accordance with RI and SIA projections (vaccine mapping)
2) Addressing any bottlenecks / availability issues related to procurement of all vaccines (incl. registration)
3) Ensuring vaccines are distributed following the FEFO principle.
4) Spot check reports at AIC level for accuracy
5) Compile updates on consumption of vaccines after each SIA based on reports from the provinces and share this with Steering Committee members and MoIPC.
6) Ensure weekly stock position data is shared for both federal and provincial levels.
7) Ensure reports on incoming stock to federal NIH WH and outgoing stock to provinces are shared on biweekly basis.
8) Monitor wastage of vaccines per SIA and cross check with vaccine supply.
9) Ensuring all relevant SOPs are in place for:
    - clearance and receipt of vaccines, including timely submission of VARs;
    - distribution from federal to provincial levels without interruption in cold chain;
    - returning of vaccines from district levels to provincial levels after each SIA;
    - maintaining records on general stock management and monitoring of storage temperatures;
    - utilization of vaccines and stock levels at federal and provincial levels.
    - Liaising with Vaccine Management Committees in the provinces

**Appendix 4: Quotes from UNICEF's Polio Communications Quarterly Update Octovber 2012**

Highest-risk Pakistani families, largely Pashto speakers, remain those who live in security-compromised areas or are migrating to escape violence or to seek economic opportunity. However, risk factors that compound these families' vulnerability to polio are not limited to their geopolitical context. Analysis of 2012 KAP data from all of the country's high-risk areas highlights the socio-cultural determinants of whether high-risk families accept or refuse vaccination and shows how the two groups differ in knowledge, attitudes and beliefs (see table 2).

## The non -vaccinating family: a risk profile

Families that persistently refuse vaccination in Pakistan are united by low risk perception, patriarchal or traditional decision-making structures within the family and the larger community, concerns of OPV safety, dissatisfaction with team performance and low campaign awareness. While the major challenges to vaccination in Pakistan remain operational, managerial and political, multiple factors often converge at the doorstep, making engagement more complex. A frontline worker with the wrong profile, message or dialect could spark a reaction that may not necessarily be directly related to the vaccine or the programme. In this context, the interaction between caregiver and frontline worker must quickly evoke credibility and trust; dialogue must clearly articulate the risks and severity of polio, and the vital need for OPV. Outreach must go beyond primary caregivers to proactively engage elders.

## Low risk perception

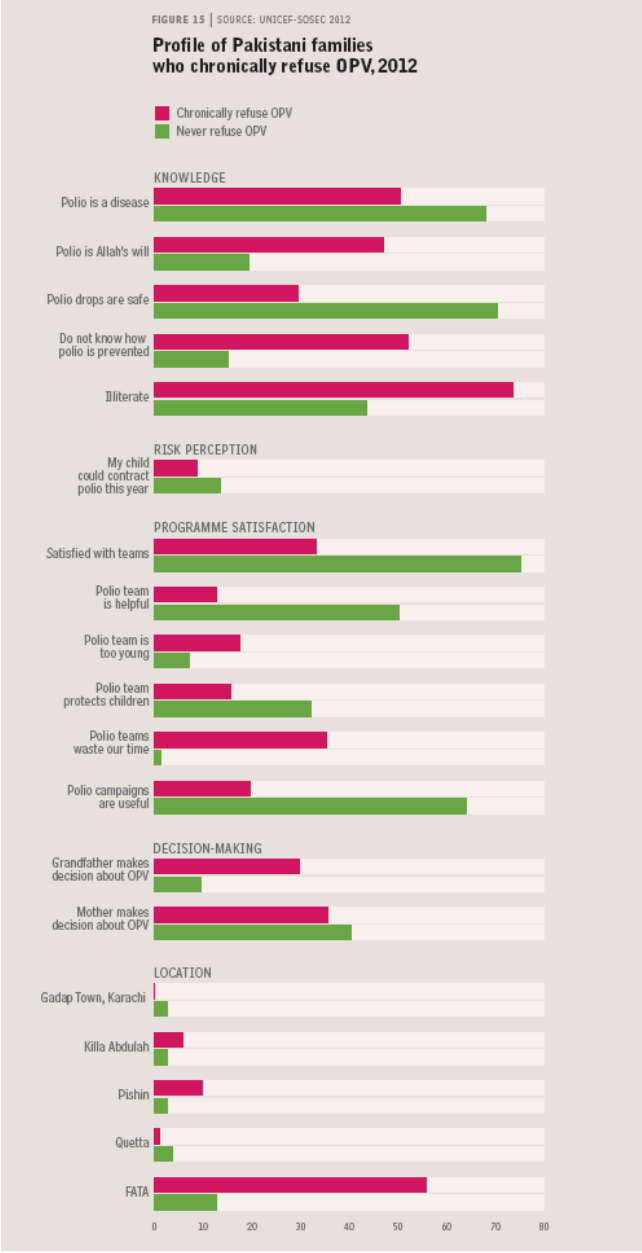
Many of the highest-risk families simply do not feel their children are at risk of contracting polio. Most recent data shows that parents in Balochistan are now less concerned about their children contracting the poliovirus than they were in January 2012, when 42% of parents reported such concern.

Their share has now halved, dropping to 21% in October (see figure 14). In FATA, risk perception has increased slightly during the same time period, from 16% to 20%, but despite such progress, the overall ranking of risk perception remains very low throughout Pakistan's highest-risk areas.

Pakistan is identical to other polio sanctuaries in that parents concerned their children are at risk are more likely to vaccinate them, while parents who do not experience the threat of a disease are less likely to take preventative measures (see table 2). The fact that half of chronically refusing caregivers—and 15% of families that always vaccinate their children—cannot articulate that polio is a disease suggests that educational communications efforts about polio are a high priority in Pakistan (see figure 15).

## Patriarchal or traditional elder-led decision-making

Men or elders make many family decisions in high-risk communities of Pakistan, and although the health of children is generally left to the mother, men often participate in or even drive the decision on whether or not to accept OPV. While there is a considerable body of evidence on the critical role mothers play in the health of their children, table 2 quantifies this effect: a Pakistan household where the mother is the decision maker is more likely to vaccinate a child with OPV. In households where the father is the decision maker, there is a potentially negative effect on vaccination. However, gender alone is not a dispositive indicator; programme data demonstrates that grandparents are more likely to impede than champion vaccination (see figure 15).




## Lack of campaign awareness

As is the case of neighbouring Afghanistan (see page 32), child vaccination rates among Pakistani parents who know a campaign is taking place are 9% higher than among parents unaware of campaign dates (see table 2).

## Concerns of OPV safety

Pakistani parents who believe OPV is safe are 15% more likely to vaccinate their children. In Balochisan, the proportion of parents who believe OPV is safe has dropped drastically since January: 94% compared to 74% in September. In FATA, historically the province with the lowest confidence in OPV safety, concerns remain at the same levels as in January. Still, maintaining the status quo can be viewed as progress—or at least not a setback— given the bans that exacerbated an already difficult operational environment and could have spread beyond the two districts of Waziristan.

Dissatisfaction with team performance

Perhaps the largest driver of vaccination in Pakistan is satisfaction with team performance. Families with a positive impression of vaccinators— as credible, knowledgeable and socially appropriate in both dress and age—are 26% more likely to vaccinate their children. While the vast majority of the population (96%) in Pakistan are satisfied with vaccinators' performance, those that state the least satisfaction reside in the most challenging areas where it is difficult to recruit qualified frontline workers, and where a lot of programme distrust is rooted. For example, in North and South Waziristan, 44% and 19% of caregivers respectively stated they were not satisfied with teams in the January KAP. Among high risk groups, 14% of Pashto speakers stated dissatisfaction with teams compared to only 4% of the general population. This highlights the critical need to review team profiles against minimum criteria of age, gender, linguistic fluency and interpersonal skills that are critical to projecting competence and establishing trust with caregivers. If global eradication is to be achieved, deeper knowledge of the local communities where the poliovirus continues to circulate will be critical. While the programme has mainly focused on deploying saff for maximum coverage in the highest-risk areas, it is now time to recalibrate teams, messages and the focus of communications strategies to respond to the most at-risk families with the programme's most targeted efforts.

## Appendix 5 Council of Common Interest

COUNCIL OF COMMON INTERESTS

1. After the passage of Eighteenth Constitutional Amendment, the Council of Common Interests (CCI) is responsible for formulation and regulation of policies in relation to matters enumerated in Part-II of the Federal Legislative List as provided in Article 154 (1) of the Constitution of Islamic Republic of Pakistan, and to exercise supervision and control over related institutions. In accordance with Article 154(3), the Council shall meet at least once in ninety days. Consequent to the deletion of the Concurrent Legislative List, important subjects relating to the Federation have been placed in the Federal Legislative List (Part-II) for the consideration of and decision by the Council of Common Interests.

2. The composition and functions of the CCI are enumerated in Article 153 and 154 of the Constitution. Accordingly, with the approval of the President of Pakistan, the CCI was reconstituted vide Notification No. 1(2)/2010-CCI dated November 21, 2011, with the following composition:

| | | |
|---|---|---|
| i. | Prime Minister of Pakistan | Chairman |
| ii. | Chief Minister Balochistan | Member |
| iii. | Chief Minister Khyber Pakhtunkhwa | Member |
| iv. | Chief Minister Punjab | Member |
| v. | Chief Minister Sindh | Member |
| vi. | Mir Changez Khan Jamali,<br>Minister for Science and Technology | Member |
| vii. | Dr. Arbab Alamgir Khan,<br>Minister for Communications | Member |
| viii. | Mir Hazar Khan Bijarani,<br>Minister for Inter Provincial Coordination | Member |

3. The Council in its meeting held on July 18, 2010 approved its Rules of Procedure. Matters enumerated in Schedule-I of these Rules fall under the purview of CCI. In terms of Rule 3(1) of the Rules of Procedure of the Council, Secretary, Inter Provincial Coordination Division, is the Secretary of the Council. The Secretariat of the Council is assisted by a Joint Secretary, a Deputy Secretary and two Section Officers.

4. Prior to the Eighteenth Constitutional Amendment, only eleven meetings of the Council were held since 1973. However, after passage of the

Eighteenth Constitutional Amendment, it is mandatory for the Council to meet once in ninety days. As such, the Council has held seven meetings since July 18, 2010, and has deliberated on vital issues and taken decisions on matters relating to the Federation, with the full participation of the provinces

## Appendix 6 Other issues considered

**Guidelines:** Overall the impression given by the document is that the interests and concerns of the individual parent/carer is secondary to the task of vaccinating eligible children, e.g. on page 26 "*workers should be actively moving to catch children and may need assistance from the local police.*" The concept of informed consent does not appear in the document.

The guidelines make some suggestions which are almost certainly counter-productive; for example in the section on transit teams it states "Police should be directed to stop all passenger buses and vehicles having children to administer polio drops to the target children." This statement raises several issues: first, how do the police know if there are target children in a vehicle unless they stop all vehicles and then have the transit team check for eligible children? Secondly, where are they supposed to stop them? Stopping them in the street will cause huge traffic delay. Thirdly, the level of irritation caused by such interference with people's normal day-to-day activity probably far outweighs any benefit to GPEI.

**Recommendation**

| |
|---|
| Those sections of the Guidelines that cover interaction with the public should be reviewed by a psychologist to ensure that what is included is not going to be counter productive. |

**LHW:** GPEI now suffers a major constraint: it is trying to "sell" a product that few wish to "buy". With only 47 cases of wild polio virus this year few young mothers in Pakistan will have seen a case of polio, which has never had the scourge status that made smallpox universally feared. The present situation from the public's perspective appears irrational: eight campaigns per year to get rid of a disease that few of them have experienced. In the NID of October 2011 Sindh[16] had 0.5% refusals; by the September 2012 SNID that figure had risen to 1.15%[17]. To overcome the fundamental lack of interest which the public appears to have in polio eradication the programme must offer a service which the public does value and then link that to the provision of polio immunisation. (See also World Bank report)[18] LHWs could play a vital role in fostering this approach which is likely to prove more fruitful than simply trying to persuade people to accept yet another round of polio immunisation.

Pakistan has a network of LHWs who already work as vaccinators in SIAs. However, not all LHW posts are filled. In Hyderabad District in Sindh 78% of rural LHW posts were filled but only 54% of urban posts. In addition

[16] 8-October 2011 Control Room UC wise data SIAs Oct 2011.xlsx

[17] CR_ControlRoom_F Sindh.xlsx

[18] Masud T., Navaratne K.V. *The Expanded Programme on Immunization in Pakistan.* April 2012. World Bank

the LHW programme is quite separate from EPI/GPEI and their monthly reports, which include the number of pregnant women and newborns seen, are not shared with EPI/GPEI. The understaffing of the LHW programme is highlighted by the fact that 64.7%[19] of women deliver at home; furthermore, 59.6%[20] of all pregnant women were not attended during delivery by a trained health worker, i.e. they have no formal ante-natal care.

Although the guidelines recommend the use of Dais for house-to-house vaccination the team found no evidence of their being used.

**Recommendations**

GPEI should conduct a survey to identify which health priorities young parents value most highly. One of those priorities should then be offered at the same time as polio immunisation.

Involve Dais as vaccinators to a much greater extent.

[19] National Institute of Population Studies Islamabad, Pakistan, *Pakistan Demographic and Health Survey 200 6-07.*

[20] *Ibid* page 117

## Appendix 7: Team members

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