



**REPUBLIC OF BOTSWANA  
MINISTRY OF HEALTH**

**TECHNICAL REPORT ON POST  
INTRODUCTION EVALUATION OF  
PNEUMOCOCCAL AND ROTARIX  
VACCINES IN BOTSWANA 2013**

**DEPARTMENT OF PUBLIC HEALTH  
CHILD HEALTH DIVISION  
EPI UNIT**



**GABORONE, BOTSWANA**

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## Acronyms

AD	Auto-disable syringes
AEFI	Adverse Events Following Immunisation
AFRO	African Regional Office for WHO
BCG	Bacillus Calmette-Guerin (vaccine against TB)
BSC	Balanced Score Card
cMYP	Comprehensive Multi-Year Plan for Immunisation
CHN	Community Health Nurse
CMS	Central Medical Stores
CSO	Central Statistical Office
DHMT	District Health Management Team
DPH	Department of Public Health
DTP-HepB-Hib	Diphtheria-Tetanus-Pertussis-Hepatitis B-Haemophilus influenzae type b
EPI	Expanded Programme on Immunisation
ESA	East and Southern Africa
ESARO	East and Southern Africa Regional Office (UNICEF)
GSK	GlaxoSmithKline
GVAP	Global Vaccine Action Plan
HEA	Health Education Assistant
HepB	Hepatitis B
HF	Health Facility
HPV	Human Papilloma Virus
LPG	Liquid Petroleum Gas
ICC	Interagency Coordinating Committee
IEC	Information, Education, Communication
IMCI	Integrated Management of Childhood Illnesses
IST	Inter-Country Support Team (WHO/AFRO)
MoH	Ministry of Health
OPV	Oral Polio Vaccine
PBM	Paediatric Bacterial Meningitis
PCV	Pneumococcal Conjugate Vaccine
PIE	Post introduction evaluation
RV2	Rotarix (reflects 2 doses)
RVGE	Rotavirus Gastroenteritis
ToT	Training of trainers
TV	Television
UNICEF	United Nations Children's Fund
VVM	Vaccine vial monitor
WHO	World Health Organization

## Executive Summary

This report presents the findings of the Post Introduction Evaluation (PIE) of Pneumococcal 13-valent (PCV13) and Rotarix vaccines conducted during 17-28 June 2013 in Botswana. The two vaccines Pneumococcal 13-valent (PCV13) and Rotarix (RV2) vaccines, in fully liquid formulations in 1-dose presentations) were introduced in July 2012. This followed a successful introduction of pentavalent (DTP-HepB-Hib) in November 2010 and post introduction evaluation (PIE) in September 2011.

The PIE was conducted in accordance with a World Health Organization (WHO) recommendation that all countries that have introduced a new vaccine should conduct a PIE, 6-12 post-introduction, to assess the overall impact of the introduction of the new vaccine(s) on a country's national immunization programme.

The PIE was specifically conducted to:

1. Identify, document and rectify any programmatic and logistical difficulties relating to the introduction of pneumococcal and rotavirus vaccines
2. Evaluate the incremental costs of introducing new vaccines
3. Provide lessons learned for similar experiences in future and for future countries that may introduce new vaccines

As part of the evaluation exercise, an orientation workshop for national evaluators and adaptation of tools was conducted. The evaluators were drawn from AFRO/IST/ESA, WHO and UNICEF Country Office staff in Botswana, and Ministry of Health officials from Botswana. The orientation workshop was followed by interviews with national, district and health facility level staff using a standardized questionnaire, visits to the national and district vaccine stores, and visits to 18 health facilities across the country for observation and record review using standardized questionnaires and checklists. At the end of the PIE, a debriefing of the senior management at the Ministry of Health was done.

The PIE identified numerous strengths that the EPI Programme should maintain and improve upon as well some weaknesses that should be addressed in order to strengthen programme performance and immunisation service delivery in the country. The key issues to be addressed included the following: target population and coverage figures; vaccine stock outs; communication and social mobilisation; and programme financing. The other issues were lack of introduction plans at sub-national levels and delayed introduction in two districts; short duration for training and general absence of training materials in districts; lack of evidence of using data for action; frequent interruption of power supply in the country and lack of temperature monitoring in the districts; lack of vaccine management guidelines at all levels; non-use of auto-disable (AD) syringes for immunisation services in the country; inadequate support supervision; lack of a written protocol for adverse events following immunisation (AEFI) and inadequate reporting; failure to conduct launch ceremonies at national level and in many districts; and cessation of PBM sentinel surveillance.

A number of recommendations were made in order to address the identified weak areas. The recommendations included the following:

Pre-implementation Planning and Vaccine Introduction Process

1. Provide adequate reference materials to districts and HFs to guide them when they are in doubt
2. Accelerate the completion of the Procedures Manual (Vaccination Manual) that is being developed by MOH
3. Keep reference documents in an accessible place in the HF
4. Accelerate the updating of recording and reporting tools, esp., the child welfare card
5. For future vaccines develop introduction plan based on the national plan to guide implementation of key activities

#### Training

1. Provide regular refresher training and increase duration of training at sub-national levels
2. National level staff and partners should, whenever feasible, monitor and support lower level training to ensure that consistent messages are communicated to staff
3. Provide practical demonstrations during training

#### Vaccine Coverage

1. Follow up on the 2011 Census Report and provide updated target population figures for the subnational levels
2. Retrain districts on RED and DQS and support implementation
  - a. Calculation of vaccine coverage and drop outs,
  - b. Completing and using the monitoring chart
3. Conduct regular supportive supervision to ensure that all DHMTs and HFs are able to implement the RED package, inter alia

#### Cold Chain Management

1. Repair malfunctioning fridges at subnational levels
2. Monitor vaccine fridge temperatures in districts and HFs twice daily including weekends
3. Use freeze watch/freeze tags during vaccine transportation
4. Supply adequate quantities of cylinders of LPG to HFs

#### Vaccine Management, Transport and Logistics

1. Provide vaccine management guidelines to all districts
2. Conduct refresher training on vaccine management at subnational levels and monitor practices closely
3. Ensure that all HFs with expired vaccines hand them over to the appropriate authorities for destruction

#### Waste Management and Injection Safety

1. Provide AD syringes for immunisation services
2. Provide adequate logistics for safe disposal of injection waste
3. Conduct refresher training on injection safety and safe waste disposal
4. Liaise with relevant unit in MOH to ensure regular collection of injection waste

#### Monitoring and Supervision

1. Ensure that all planned supportive supervision visits are conducted and documented at sub-national levels
2. Follow up on identified weaknesses to ensure that corrective action has been taken and document such visits

#### Adverse Events Following Immunisation

1. Develop and provide written AEFI protocol to all HFs
2. Revamp AEFI monitoring and surveillance in collaboration with the National Regulatory Authority
3. Provide regular supplies of AEFI logistics including reporting forms to all HFs
4. Monitor AEFI surveillance and reporting by districts on a regular basis

#### Advocacy and Communication

1. Conduct national and district launches for new vaccines to publicise new vaccines and mobilise communities for immunisation
2. Produce and supply adequate IEC materials to sub-national levels to ensure ongoing communication
3. Train health workers on interpersonal communication and monitor implementation so that mothers are constantly aware of both existing and new life saving vaccines that are available at health facilities

#### Surveillance

1. Liaise with senior management in MOH and partners to find long term solutions to some of the problems that led to cessation of PBM sentinel surveillance
2. Follow up with WHO on request for technical support to revamp PBM and establish Rotavirus sentinel surveillance

#### Sustainability

1. Track information on programme financing as this will facilitate the country to meet GVAP reporting requirements to the World Health Assembly

A work plan has been developed by the National EPI team, with responsibilities assigned and implementation dates set, so that resources can be mobilised where necessary and all the key recommendations can be implemented expeditiously. With this plan, it will also be easy to monitor progress on a regular basis.

## **Background**

An estimated 8.8 million global annual deaths occurred amongst children under 5 years of age in 2008. Out of the deaths, WHO estimated that 476 000 (333 000–529 000) were caused by pneumococcal infections. Disease rates and mortality are higher in developing than in industrialized settings, with the majority of deaths occurring in Africa and Asia<sup>1</sup>. According to WHO estimates of severe illness cases and deaths in children from one month to less than five years of age due to *Streptococcus pneumoniae* in Botswana in 2000, there were 10,540 cases with 894 deaths<sup>2</sup>.

WHO estimates that in 2008, approximately 453 000 (420 000–494 000) rotavirus gastroenteritis (RVGE)-associated child deaths occurred worldwide (updated WHO estimates on global mortality due to RVGE are soon to be published). These fatalities accounted for about 5% of all child deaths and a cause-specific mortality rate of 86 deaths per 100 000 population aged under years<sup>3</sup>. In 2011, WHO estimated that, during 2008, between 57 and 78 (working estimate of 67) child deaths due to rotavirus infection occurred in Botswana<sup>4</sup>.

## **Introduction**

### **Routine Immunization in Botswana**

Routine immunisation coverage has remained relatively high in Botswana. For instance, WHO and UNICEF estimate that pentavalent 3 coverage for 2012 was 96%. However, the country has been facing denominator problems for some time now and this makes it difficult to ascertain the true coverage estimates and monitor progress. Rectification of this long standing problem is even more pertinent now as expensive life-saving vaccines are added to the immunisation programme.

### **New Vaccines Introduction in Botswana**

The Expanded Programme on Immunization (EPI) part of the Child Health Division in the Department of Public Health (DPH) of the Ministry of Health in 2005. The other two units are Integrated Management of Childhood Illness (IMCI) and Child Development. The EPI Programme focuses on provision of immunization services against the EPI target diseases.

The country introduced Monovalent Hepatitis B (HepB) in 1995, followed by pentavalent DTP-HepB-Hib in a fully liquid formulation in 1-dose vial presentation in November 2010, while Pneumococcal 13-valent (PCV13) and Rotarix vaccines, in fully liquid formulations in 1-dose presentations were introduced in July 2012. Regarding injection safety, the country uses disposable syringes to administer vaccinations in routine immunisation.

## **Methods**

### **Objectives of the evaluation**

A post introduction evaluation (PIE) is recommended for all countries that have introduced a new vaccine. The PIE is conducted 6-12 post introduction, to assess the overall impact of the introduction of the new vaccine(s) on a country's national immunization programme. It focuses on a range of programmatic aspects such as:

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<sup>1</sup> Weekly Epidemiological Record, No. 14, 2012, 87, 129–144 <http://www.who.int/wer>

<sup>2</sup> WHO Communication with Botswana, 27 July 2009. Reference: IVB/EPI/HibSPGDB

<sup>3</sup> Weekly Epidemiological Record, No.5, 2013, 2013, 88, 49–64 <http://www.who.int/wer>

<sup>4</sup> WHO Communication with Botswana, 2 June 2011.

- Vaccine storage and wastage,
- Logistics of administering the vaccine, and
- Community receptiveness to the vaccine.

The general objective is to assess the overall impact of the new vaccine introduction on the national immunization programme.

The PIE in Botswana was specifically conducted to:

1. Identify, document and rectify any programmatic and logistical difficulties relating to the introduction of pneumococcal and rotavirus vaccines
2. Evaluate the incremental costs of introducing new vaccines
3. Provide lessons learned for similar experiences in future and for future countries that may introduce new vaccines

### **Design of the evaluation**

The WHO guidelines for performing a PIE were used to assess the overall impact of the introduction of a new vaccine on the national immunization programme in Botswana.

The key elements of the evaluation included:

- Pre-implementation Planning and Vaccine Introduction Process
- Training
- Vaccine Coverage
- Cold Chain Management
- Vaccine Management, Transport and Logistics
- Waste Management and Injection Safety
- Monitoring and Supervision
- Adverse Events Following Immunisation
- Advocacy and Communication
- Surveillance
- Sustainability

The evaluation exercise consisted of:

- Orientation workshop for national evaluators and adaptation of tools
- Interviews with national, district and health facility level staff using a standardized questionnaire
- Visits to the national and district vaccine stores
- Visits to 18 health facilities across the country for observation and record review using standardized questionnaires and checklists
- Debriefing of the ICC

The evaluators were drawn from:

1. AFRO/IST/ESA
2. WHO and UNICEF Country Office staff in Botswana
3. Ministry of Health officials from Botswana

The PIE was co-sponsored by WHO/IST/ESA and UNICEF ESARO.

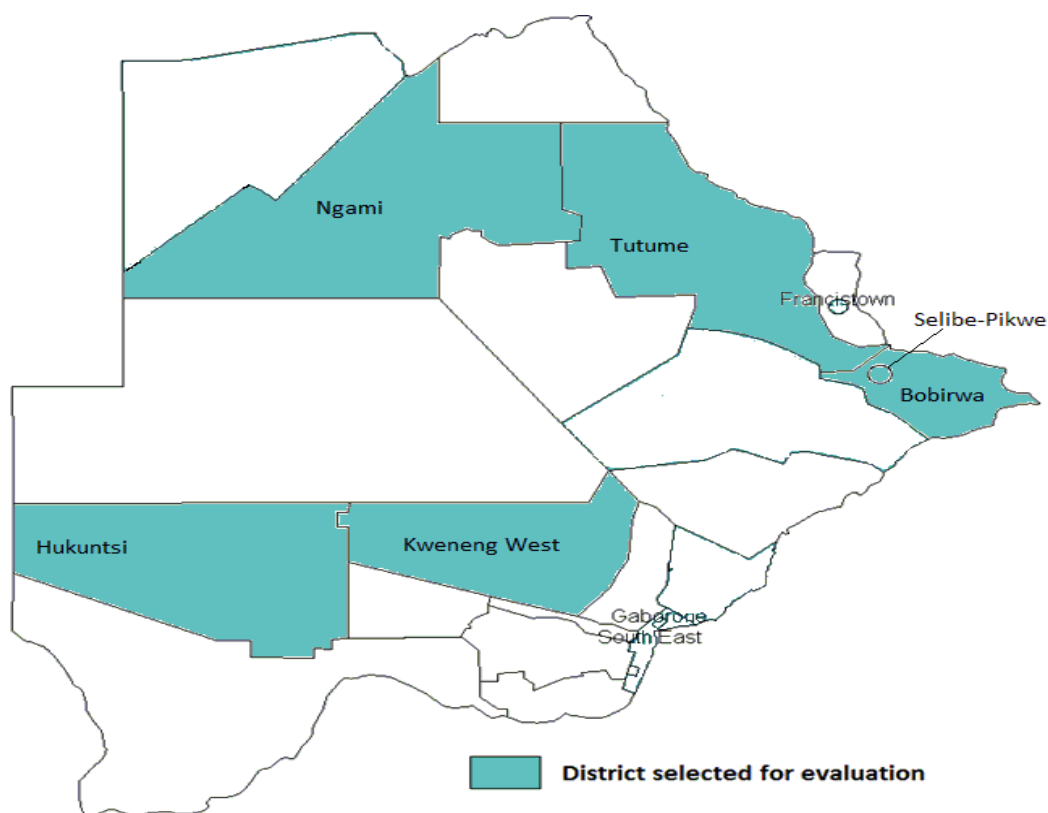
Usually, for a traditional PIE, evaluators would visit 3 provinces, 2 districts in each province and 3 HFs in each district, giving a total of 18 Health Facilities. Botswana has 24 districts but no provinces so the provincial level was not included in the current PIE. As expected, 6 districts were visited including 3 health facilities in each district giving a total of 18 Health Facilities in all. The choice of

the health facilities took into account the following criteria: high performance; medium performance; low performance; and hard to reach.

**Table 1: Sites Visited**

<b>National EPI Offices</b>	
<b>National Vaccine Store</b>	
<b>1. Hukunsi District (low)</b>	<b>4. Kweneng West District (low)</b>
DHMT Hukunsi Primary Hospital Kang Clinic Phuduhudu Health Post	DHMT Letlhakeng Clinic Khudumelapye Clinic Ditshewane Health Post
<b>2. Bobirwa District (medium)</b>	<b>5. Tutume District (medium)</b>
DHMT Mmadinare Primary Hospital Borotsi Clinic Tobane Health Post	DHMT Tutume Primary Hospital Nata Clinic Mosetse Health Post
<b>3. Selibe Pikwe District (high)</b>	<b>6. Ngami District (hard to reach)</b>
DHMT Industrial Clinic Botshabelo Clinic Tapologo Clinic	DHMT Letsholathebe Hospital Shorobe Clinic Toteng Health Post

**Map of selected districts**



## Summary of Findings

### 1. Pre-implementation Planning and Vaccine Introduction Process

#### 1.1 Strengths

##### *National*

Planning for introduction of PCV13 and Rotavirus vaccines was well coordinated and all the key documents requested for were available. The main factors to justify introduction of these vaccines included: local disease burden data available; strong political will; support from the ICC; support from the paediatricians; and support by international partners. All these efforts culminated in near nationwide introduction of PCV13 and Rotavirus vaccines on 3 July 2012.

##### *Kweneng West*

The Pneumococcal (PCV13) and Rotavirus vaccines (RV2) were introduced in Kweneng West district and in all three health facilities in 2012. Although none of the staff interviewed could remember the day and month they reported that Rotavirus was delivered a week earlier. The recording tools; the tally sheet has been updated to include PCV13 and RV2.

##### *Ngami*

An implementation plan was developed while IEC materials and guidelines were distributed on time.

##### *Selibe-Phikwe*

Most of the facility staff interviewed were working at the respective health facilities at the time of the rotavirus and pneumococcal vaccine introduction. They also reported that introduction was in July 2012 and administration of the vaccines started in the same month.

#### 1.2 Weaknesses

##### *National*

At the national level, it was reported that PCV13 introduction was delayed in Kweneng West and Ngami districts due to late arrival of the vaccines.

##### *Kweneng West*

Most of the required key documents, including the Introduction Plan for PCV13 and RV2, were not available at the DHMT and in all three health facilities visited.

##### *Tutume*

A weakness identified was that there was no documented plan with time line to detail the process of introduction and responsibilities for each activity.

### 2. Training

#### 2.1 Strengths

##### *National*

The MOH EPI Unit trained district trainers in two batches in Gaborone and Francistown in May 2012 with technical support from WHO and GSK. The training materials prepared for training of health workers were available during the PIE and these included Guidelines on PCV13 and Rotavirus, PowerPoint presentations, and Leaflets.

##### *Bobirwa*

The training was well conducted and Tobane was the only facility where no nurse was trained

however a health education officer was trained. The general consensus was that the training was conducted well and there was good knowledge of the newly introduced vaccines.

The health workers at the DHMT were well informed on vaccine management and they were also knowledgeable on the side effects and contraindications including ineligibility of the new vaccines. Even the untrained officers had good knowledge.

### ***Hukuntsi***

A training plan was developed by DHMT, and a good number of health workers of different cadres were trained including doctors, nurses and health education assistants. The district was provided with training material in a disc during the Trainer of Trainers (ToT) held in Gaborone. A video clip on opening of the Rotavirus was found to be very useful to the implementers. The training covered important topics for the introduction of the new vaccines. The health workers reported that the training duration (3 days) was adequate and that the training was fully funded by the Ministry of Health

### ***Kweneng West***

Two staff from DHMT were trained as trainers in May 2012 and they later trained 30 Nurses and 30 Health Education Assistants in the district. In sum, each health facility had at least one trained person but the only trained person for Letlhakeng Clinic has left. Training was conducted one month before introduction in the district and between 3 days -3 weeks in health facilities. The district trainers were given memory sticks with reference materials saved in them. It was noted with satisfaction that health care workers had good knowledge about the administration of PCV13 and RV2 and they knew what to tell parents about these vaccines.

### ***Ngami***

The district training targeted different cadres for nurses and HEAs; 2 nurses and 1 HEA were trained per facility by CHN and the training for nurses took two days while that for HEAs took one day prior to introduction of PCV13 and RV2. Sensitization session for doctors was conducted, covering key topics covered, such as, vaccine administration, importance of vaccines, age restriction, schedule and storage. Reference materials were provided to health workers after training.

Training was cascaded to health facilities by the nurses who were earlier trained at district level. At both levels, there was adequate knowledge on vaccine administration and sites, benefits, disease epidemiology and vaccine storage.

### ***Selibe-Pikwe***

District level staff were trained by the national trainers while they in turn trained the facility staff in the district. Approximately 3 staff from each of the facilities were trained. Although there is staff rotation and transfers, most of the trained staff are still at the same facilities. The key topics covered for pneumococcal vaccine included injection site, correct administration of the injection and the vaccination schedule while those for rotavirus vaccine included oral administration, age limitations in the administration and the correct schedule for the 3 doses. Reference materials from the training were given to the staff. In most cases the staff that were trained were able to orient some other staff at the health facilities on new vaccines introduced. Overall the staff were satisfied with the training.

At both the district and health facility level, the health care workers knew the immunization schedule for the rotavirus and pneumococcal vaccines. They were aware of the age restrictions for administering rotavirus vaccine and were able to explain the correct way to administer the rotavirus. The health workers have not had any problems in administering the new vaccines. They also knew the diseases that the rotavirus and pneumococcal vaccines prevented. They provided to the parents before and after vaccination information on the following:- Name of vaccine, diseases it protects

against, benefits to the child and family, vaccine schedule/when to return, normal side effects, what side effects they should return for and reminder to bring vaccination cards.

### *Tutume*

Training was conducted before the introduction of the vaccines. A range of health workers were trained including Doctors, Nurses, and Health Education Assistants. The training materials included a CD that showed the demonstration on vaccine administration. These reference materials were distributed after training.

## **2.2 Weaknesses**

### *Bobirwa*

Respondents felt that the training period was too short and samples of the vaccines were not available during training. Training materials could not be found in any other HF apart from Mmadinare clinic.

The health workers did not know how to calculate coverage rates, dropout rate and wastage rates so they accordingly faced difficulty explaining the importance of these rates. Data management was also a weak aspect of vaccine management.

### *Hukuntsi*

Reference materials such as Rotavirus and Pneumococcal guidelines, schedule and vaccination site were not adequate during training. It was also reported that on-the-job training did not provide sufficient information for those who had not been trained as these people kept seeking clarity and advice during implementation which delayed in provision of services.

### *Kweneng West*

Training materials were not available at the DHMT and health facilities. Additionally, there were no practical demonstrations during the training workshops. As one health worker summed, "We should see what they are and not pictures of them", in reference to vials of PCV13 and RV2.

### *Ngami*

Training for vaccines was combined with other programs, therefore less time was allocated for vaccines and thus there was information overload. Duration of training was said to have been too short. Training of facility level staff was not adequate as on-the-job training was done on one-to-one training as a result of work overload. Trained staff have not all been retained in health facilities especially in hospital due to yearly staff rotation. There was inadequate knowledge on vaccine schedule, age restriction, and interval between doses, vaccine storage and management.

### *Selibe-Phikwe*

Most trained staff felt that there was a need for practical demonstration of the administration of the vaccines and recommended that all staff should be trained where possible. The staff also expressed need for refresher training.

### *Tutume*

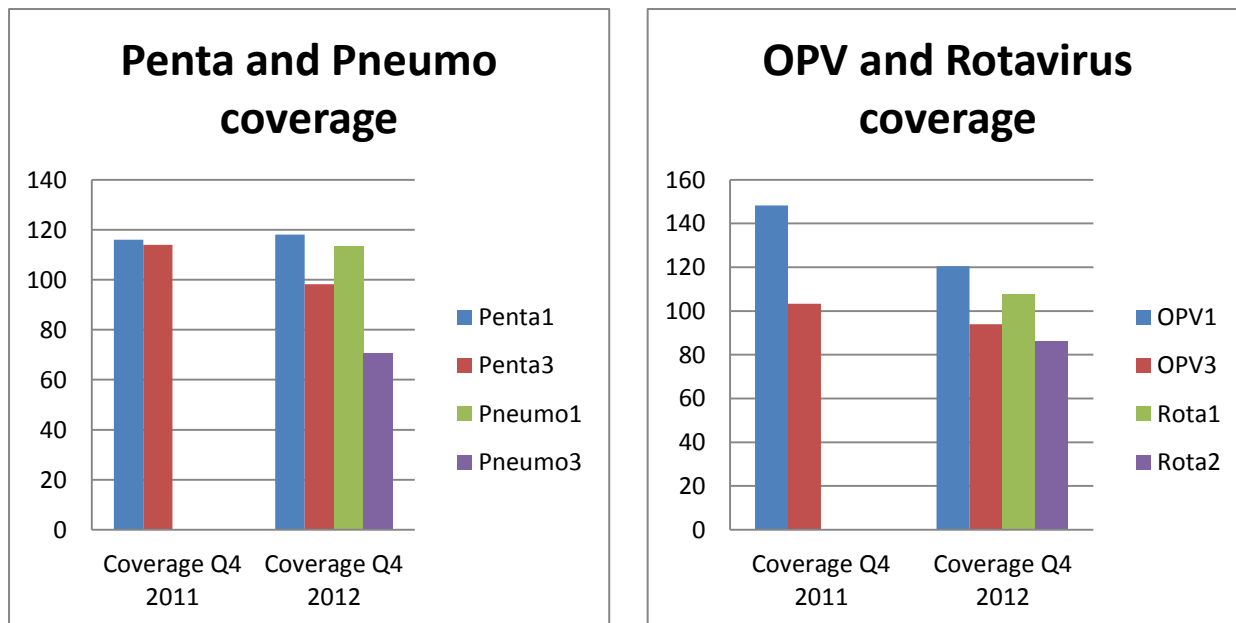
Also the health workers complained about cascade training claiming that critical information is missed at lower levels. Further, training materials were reportedly misplaced. Health workers also complain about the absence of sample vaccines for practical demonstrations during training.

## **3. Vaccine Coverage**

### **3.1 Strengths**

**National**

The database at national level was updated to accommodate PCV13 and Rotavirus before introduction. The other strength is the use of Balanced Score Card (BSC) to monitor immunisation performance on a quarterly basis as this ensures that constant attention is paid to any identified weak areas. Excellent completeness of reporting of data was also noted at national level.



**Bobirwa**

In this aspect the district was outstanding as that they calculate their vaccine coverage for all the vaccines and the reports are all available and accessible. Reports were available at the health facility level too.

**Hukuntsi**

The reporting tools (tally sheet and summary sheet) were updated to include the new vaccines. 93% of health facilities submitted their reports and 93% of the report were complete. Coverages are calculated at DHMT and records are available.

**Kweneng West**

The district database was updated to accommodate PCV13 and Rotavirus. Immunisation services are provided regularly in the district as all health facilities conduct immunisation sessions for 5 days in a week (except on Saturdays and Sundays) and outreach once every month in Khudumelapye and Ditshegwane. Letlhakeng does not have any outreach sites in its catchment area.

**Ngami**

At district level, community health nurses had a data entry spread sheet used to capture data from all health facilities including mobile stops. The district office and health facilities had reporting tools. However, coverage and drop-out rate were not calculated at health facility level.

**Selibe-Phikwe**

At the district level Pneumo 1 was 16.1 % higher than Penta 1. Dropout rate for Pneumo was 20.3 % lower than Penta dropout rate. Tally sheets were updated to accommodate the new vaccines and all the facilities performed immunization sessions for five days per week. The target populations were known in all the facilities and these facilities do submit immunization data to the district level on a monthly basis.

### *Tutume*

In the district, the immunization data base was updated to include the two antigens although this was done after introduction. The vaccination coverage is computed at DHMT level using the number of children vaccinated as a numerator and the target population as denominator and a computer is used for data capturing.

## **3.2 Weaknesses**

### *National*

Timeliness was reported to be 83% at national level for the period under review and this was found to be generally quite low.

### *Bobirwa*

It was difficult and time consuming to locate coverage reports. In general all health workers were poor in calculating coverage rates therefore there was no HF which calculated their coverage rates.

### *Hukuntsi*

Coverage for most of the antigens including Rota and Pneumo were very low. Calculation of drop outs rate and coverage was not done at health facility level. The child welfare card (CWC) card was not updated to include the new vaccines. Immunization performance charts were equally not being used by health facilities to monitor performance on a monthly basis.

### *Kweneng West*

Target populations are problematic in the health facilities. In one facility, it was evident that they were using both Botswana Statistics figure and population headcount. In addition, vaccine coverage and drop-out rates are not calculated at DHMT and HFs. From the information given by the DHMT, however, coverage of PCV13 was lower than that of Penta and Rota lower than that of OPV.

The DHMT had blank monitoring charts to send to HFs but none of the district staff knew how to use these charts. At the health facility level, Khudumelapye had a blank monitoring chart but no charts were found in Ditshegwane Health Post and Letlhakeng Clinic.

### *Ngami*

The coverage and drop-out rate were not calculated by all facilities. Outreach services for mobile stops were not conducted due to transport challenges.

### *Selibe-Phikwe*

All facilities do not have coverage data for 2011 but had some data for 2012 making it difficult to compare the pre and post introduction coverage. Both the pneumococcal and rotavirus vaccine coverage had a negative drop out between October and December 2012 in all facilities. The immunization register and the child health card have not been updated to include new vaccines.

### *Tutume*

A major weakness was that immunisation coverage was not systematically calculated, charted and displayed on the wall to guide decision making at the facilities. The performance chart on the wall at the district office did not show any trends. At the facilities, the record keeping was less than coherent as health workers needed to muddle through files to locate data for previous months and years. Further, health facilities just keep tally sheets without computing coverages.

## **4. Cold Chain Management**

### **4.1 Strengths**

### ***National***

The MOH procured and supplied at least one new vaccine refrigerator to each of the 24 districts prior to introduction of the PCV13 and Rotavirus vaccines. This had been one of the key weaknesses noted during the PIE for pentavalent in September 2011 so it was gratifying to note that it had been expeditiously addressed.

### ***Bobirwa***

The facilities are doing extremely well regarding cold chain management and principles and have not experienced any problems with the introduction of the new vaccines.

### ***Hukuntsi***

The cold chain capacity was adequate to accommodate the new vaccines as the DHMT recently received a new refrigerator with big capacity. The DHMT refrigerators are kept at the hospital where there is a backup generator but other health facilities use gas and they have extra cylinder as back up. Monitoring of refrigerator temperatures is done twice daily even during the weekends and the records showed that the readings were within the recommended range.

### ***Kweneng West***

The DHMT staff recognized that the vaccine storage capacity was not adequate for the two new vaccines and requested for new fridge. All the health facilities visited have functional refrigerators which use both electricity and LPG but they mainly use LPG. A standby generator has been installed at Letlhakeng Clinic which is the main clinic in the district.

### ***Ngami***

There were no changes made on storage to accommodate the new vaccines because storage is adequate at both district and national level. One out of three facilities, Toteng health post, received a new and big refrigerator (Sibir model) to accommodate the new vaccines.

### ***Selibe-Phikwe***

The source of power supply for the cold storage is electricity in all the facilities. No changes have been made at the health facilities on the cold chain since the capacity was enough to accommodate the new vaccines introduced and the vaccines warehouse is located in the same town. There were no new problems identified in the cold chain after the introduction of the pneumococcal and rotavirus vaccines.

### ***Tutume***

At the district and facility level, there was no problem with cold chain capacity at introduction of the vaccines.

## **4.2 Weaknesses**

### ***National***

It was noted that while steps had been taken to increase cold chain capacity, cold chain storage capacity remained generally inadequate. The issue of frequent interruption of electricity supply was also noted as a key constraint in the country.

### ***Bobirwa***

The refrigerator in Borotsi clinic in Bobonong where the DMHT is located was not functional and this led to interruption of immunisation services for 6 months.

### ***Hukuntsi***

Some health facilities reported that they did not have enough ice packs and had no vaccine carrier foam pads. It was also observed that some refrigerators needed to be defrosted. One of the HFs also

reported that they only had one small vaccine carrier which was inadequate for the monthly orders of vaccines.

#### ***Kweneng West***

The district suffers frequent interruption of electricity supply, lasting for many hours on some days. At the district store two malfunctioning fridges were found. Interestingly, the DHMT kept a new fridge unused for 3 months and only started using it at the beginning of June. Fridge temperature monitoring was uniformly weak in the district. The issue of insufficient cylinders was highlighted at Khudumelapye Clinic which is usually supplied with only one cylinder at a time and has to switch the use of one cylinder between the fridge and the stove. Lastly, freeze Watch/Freeze Tag are not used in vaccine transportation.

#### ***Ngami***

The district had inadequate vaccine carriers and the ones available were too small. It was found that OPV was stored in a domestic fridge at the district level.

#### ***Selibe-Phikwe***

There was inadequate space for the introduction of new vaccines district level so they had to change the frequency of ordering vaccines from quarterly to monthly. There have been frequent power interruptions in the last six months mostly lasting 2 to 3 hours per day.

### **5. Vaccine Management, Transport and Logistics**

#### **5.1 Strengths**

##### ***National***

The Central Medical Stores (CMS) has standard operating procedures to guide vaccines and logistics management. The MOH in general, has a well-established system for ordering and distributing vaccines. It was also noted that vaccine wastage monitoring has started in selected districts.

##### ***Bobirwa***

The fridges at the district store are functional, well placed, clean and well managed. The district has also installed a backup power generator at the hospital where the district vaccine store is located. Two HFs had at least a working fridge which was packed nicely and clean.

##### ***Hukuntsi***

The district uses target population method for forecasting vaccine requirements and calculates wastage. The wastage was calculated at the DHMT only. Opened vials were clearly labelled and multi dose vial policy was adhered to and VVM was well understood by all health workers.

##### ***Kweneng West***

The system for ordering and collecting vaccines at the DHMT and in health facilities is in place. Khudumelapye needs to be commended for using OPV near expiry, in school health programme, to avoid wastage. It was noteworthy that no frozen vaccines or vaccines were reported in the district. The DHMT is able to provide transport to health facilities that need this kind of support to reach outreach sites.

##### ***Ngami***

At both the DHMT and health facility level vaccines are ordered by pharmacy from CMS and air lifted from Gaborone to Ngami. Clinics within the area are supplied on weekly basis every Thursday and use their own transport to collect supplies. There was adequate vaccine storage capacity in all facilities that were assessed. There were no vaccines found at VVM stages III and IV, none had expired in facilities, and no freeze sensitive vaccines had been frozen during the period under review. Fridge temperatures are monitored daily in the facilities visited.

### ***Selibe-Phikwe***

The district uses target population, previous month's usage and wastage to forecast vaccine requirements. Vaccines are ordered by the Pharmacy officer at DHMT level and by the EPI focal point at facility level on a monthly basis. In the last six months, there were no vaccines which expired in the facilities and no freeze sensitive vaccines got frozen. The district level calculates vaccine wastage rates and did not report any wastage of vaccines.

### ***Tutume***

Vaccines are transported to the district through the Francistown airport which shortens the time it takes to get the vaccines to the District cold room. In terms of ordering of vaccines, both DHMT and health facilities use target population to determine their vaccine requirements.

## **5.2 Weaknesses**

### ***National level***

It was observed that there had been stock-outs of numerous vaccines at national level during the period under review. The stock-outs affected the following vaccines: Pentavalent (6 months), PCV13 (3 months), Rotavirus (1 month), Measles (1-2 months), OPV (2 months), and Hepatitis B (6 months). The reasons advanced by MOH for these stock-outs included the following: Pentavalent arrived in the country at VVM stage III; delayed procurement of Rotavirus due to tendering issues; administration of PCV13 to children above the age of one; expiration of large quantities of OPV; and the target for Hepatitis B being larger than ordered quantity. Additionally, there were no guidelines on vaccine management at MOH.

### ***Bobirwa***

A domestic fridge, the only functional fridge at Borotsi clinic, could not be used to store vaccines, on instructions from the DHMT. Further, bundling is not practised in the district. Lastly, the district experiences difficulties with transport.

### ***Hukuntsi***

Vaccine management guidelines were not available in the district, stock outs of some antigens were reported while there was less BCG vaccine than diluents in one of the facilities.

### ***Kweneng West***

The few issues of concern included the lack of vaccine management guidelines, stock outs of numerous vaccines for long periods in all facilities visited, bundling not being practised, and inadequate dry storage capacity and location of the district dry store 40 kilometres away from the DHMT and main clinic. Finally the revelation of 136 vials of 20-dose OPV coupled with the absence of vaccine wastage monitoring clearly shows that vaccine management in general is suboptimal.

### ***Ngami***

There was lack of vaccine management guidelines and protocols at the district and HF levels. Forecasting vaccine requirements is based on average monthly consumption as opposed to target coverage. At both levels, vaccine stock-outs were reported, that is, RV2 and Pentavalent vaccines for 2 months and OPV for 1 month. At hospital pharmacy, BCG and DT were expired and removed from the cold room but 750 vials of BCG that were expiring in June 2013 the month of the PIE. In addition, open vials were not labelled at the hospital and Toteng clinic. Finally, injection supplies are not bundled at all.

### ***Selibe-Phikwe***

The district and HFs did not have comprehensive vaccine management guidelines but had some

written information on vaccine management. At both levels pentavalent vaccine vials with VVM in stage 3 were found. This was in addition to stock outs which have been experienced since the introduction of the two new vaccines. Stock outs have been reported for PCV13, BCG, polio and measles diluent. Bundling is not observed in the ordering and delivery of vaccines. An extra 460 Botswana Pula (P460) was required per quarter for transportation of vaccines.

Although all the facilities visited were able to correctly give the formula for vaccine wastage, none was doing vaccine wastage calculations except Industrial Clinic which had the calculations in the computer.

#### *Tutume*

Vaccine forecasting was found to be weak. The ordering system was also uncoordinated resulting in the district being supplied with two consignments of the same vaccines at the same time. This probably led to the overstocking of OPV and Measles vaccines that was observed. However, at the time of evaluation there is stock out for Pneumo, Rota and Penta. There is no bundling of vaccines and injection materials and vaccine wastage rates are not calculated.

## **6. Waste Management and Injection Safety**

### **6.1 Strengths**

#### *National Level*

General policy guidelines on waste management were available at national level as clear and specific guidelines on waste disposal.

#### *Bobirwa*

The HFs stored the injection waste properly and transported this waste to incinerators weekly using council transport.

#### *Hukuntsi*

Safety boxes were used for disposal of syringes and sorting of waste was done very well. Waste is collected and sent for incineration once in one to two weeks.

#### *Kweneng West*

There is a waste management system in place, that is, waste is sorted according to type. The waste is classified into three categories, namely, sharps, clinical waste, and domestic waste and each type is disposed of in a different container or plastic bag.

#### *Ngami*

All health facilities followed the required procedure for waste management and injection safety as clinical waste is disposed in red plastic bags for incineration, sharps are put in sharps containers, while domestic waste is disposed in black plastic bags. Waste collected once a week and sent to hospital for incineration.

#### *Selibe-Phikwe*

Additional safety boxes were ordered at the district level to cater for the increased immunization waste. No new problems have been experienced in waste management since the introduction of PCV13 and RV2.

#### *Tutume*

Sharps are well disposed of in safety boxes.

## **6.2 Weaknesses**

### ***Bobirwa***

Health workers were not following guidelines despite knowing about them. Problems were experienced with waste management, disposal of expired vaccines including those with VVM at stage 3 and 4 as there was no clear understanding of how to dispose expired vaccines. As a result expired vaccines were usually kept in boxes outside the fridges.

### ***Hukuntsi***

There was no waste management policy document at any level. Injection waste is kept in unsecured holding areas prior to collection for incineration and recapping of syringes was observed in one clinic.

### ***Kweneng West***

The country does not use AD syringes in immunisation services but uses disposable syringes instead. The specific issues found in the district include an incinerator that has broken down at Letlhakeng but apparently just has a minor fault, the use of improvised sharps container in Letlhakeng, and generally delayed collection of filled safety boxes and bags for incineration from health facilities.

### ***Ngami***

A waste container in Shorobe clinic was placed in an open space near the entrance of the maternity area and recapped needle were observed in a sharps container at Toteng Clinic during an immunization session.

### ***Tutume***

At some of the health facilities, the environmental health unit delays the collection of injection waste for incineration.

## **7. Monitoring and Supervision**

### **7.1 Strengths**

#### ***National***

There is a plan for supportive supervision at the national level and it is implemented to the extent possible. For example, intensified supportive supervision was conducted to all districts to check on progress with new vaccines during September-October 2012.

#### ***Bobirwa***

All the facilities had been visited by either the community health nurse or other senior government officials from the EPI team. Supervisors assisted in calculating the target populations for the facilities.

#### ***Hukuntsi***

Supervision by DHMT was done monthly taking advantage of monthly ARV clinic to also provide support on other programs such as EPI. The combined visit is good in that it optimises the use of transport in view of the difficulties faced by most of the districts. The national level visited the district twice since the introduction of the new vaccines.

#### ***Kweneng West***

Supportive supervision is conducted regularly by the DHMT and visits have been made after introduction of PCV13 & RV. Written and oral feedback is provided and a detailed Supervisor's Logbook was found at the DHMT Offices. The district pays attention to the weak health facilities through Performance Improvement Committees (Botsogo Pitso) where communities evaluate staff performance and the DHMT takes steps to improve performance. At the health facility level, it was

reported that supportive supervision is conducted and written reports of the visits were available at Khudumelapye Clinic.

#### *Ngami*

The DHMT is visited, on supportive supervision by the National EPI office, at least twice a year. The DHMT office visits the health facilities monthly. Since introduction of Rota and Pneumo, DHMT has visited each health facility at least twice. Programme meetings are conducted at the DHMT every Tuesday with Cluster Heads to discuss various issues and give feedback on performance.

#### *Selibe-Phikwe*

Two supportive supervision visits have been made to the district level by national staff and a supervisory checklist was used. An oral report is given to the district on the outcomes of the supervision. The three facilities included in the PIE have been visited 3 or more times in the last 6 months by the district level. National level staff also visited the 3 facilities twice in the same period. The visits focussed on EPI related issues. The district staff assisted a health facility to repair a faulty fridge and advised on tallying.

#### *Tutume*

A schedule of supervision has been developed at the DHMT. Since the introduction of the new vaccines, supervision of the health facilities has been conducted twice.

### **7.2 Weaknesses**

#### *National*

Inadequate supportive supervision was noted as a weak area at national level, with only 4 priority districts visit per year, mainly due to limited staffing.

#### *Bobirwa*

There were no written documents about the supervisory visits that had been conducted and issues addressed.

#### *Hukuntsi*

Lack of documentation of supportive supervision visits was a major challenge at the DHMT and HF levels as oral feedback was the only form of feedback given to facilities after such visits.

#### *Kweneng West*

While it was stated supervisory visits had been conducted these visits were not documented at Ditshegwane and Letlhakeng health facilities. Additionally it was not clear if there is any follow up on identified issues by the DHMT to ensure that corrective action has indeed been taken.

#### *Ngami*

No reports on supervision were observed and supervision from the national level was reportedly inadequate. In addition, poor feedback on vaccines availability resulting in prolonged stock outs at facility level. Mobile clinics are usually not conducted in the hard to reach areas due to transport problems.

#### *Selibe-Phikwe*

There were no written supervisory reports at the facilities.

#### *Tutume*

The schedule of supervision could not be followed due to logistics challenges. Furthermore, feedback is given orally, limiting the extent to which issues could be followed up.

## **8. Adverse Events Following Immunisation**

### **8.1 Strengths**

#### *National*

Reporting forms for adverse events following immunisation (AEFI) were available at national level.

#### *Bobirwa*

The DHMT staff were aware of the process of reporting AEFI and they have the tool to report these cases.

#### *Kweneng West*

Reporting forms for AEFI are available at the DHMT, Kudhumelapye and Letlhakeng clinics.

#### *Ngami*

Health workers knew how AEFI symptoms are managed and reporting procedure.

#### *Selibe-Phikwe*

Reporting forms are available in all the health facilities.

#### *Tutume*

Reporting forms are available at the health facilities and health workers know what to do in case of AEFI.

### **8.2 Weaknesses**

#### *National*

There was no written protocol for AEFI at national level. In addition to this, it was apparent that AEFI reporting and monitoring was very weak as only 1 case of AEFI had been reported country-wide during the period under review.

#### *Bobirwa*

The main weakness is that there was no system and written protocol for monitoring adverse events following immunization in place.

#### *Hukunsti*

There is no written protocol on management or handling AEFIs at all health facilities visited.

#### *Kweneng West*

The major gap on AEFI monitoring and surveillance is the absence of a written protocol to guide health workers on how to respond to AEFI cases in a timely manner. Ditshegwane Health Post did not have AEFI reporting forms in stock. And of concern, was that the district had not reported any case of AEFI since introduction of the new vaccines probably due to lack of a clear system on AEFI Surveillance.

#### *Ngami*

The AEFI reporting form was available at DHMT but was not found at Shorobe and Toteng health facilities. There were no protocols and guidelines to follow in case of an AEFI.

#### *Selibe-Phikwe*

There was no written protocol for AEFIs at either the district or the health facility level. In addition, none of the health facilities reported any cases of AEFI since PCV13 and RV2 were introduced.

### *Tutume*

There was no written protocol for AEFI.

## **9. Advocacy and Communication**

### **9.1 Strengths**

#### *National*

The MOH held a number of advocacy and sensitisation meetings, in preparation for introduction of the new vaccines, with the Interagency Coordinating Committee, the National Standing Committee on Drugs, the National Paediatrics Committee, and the Drug Regulatory Unit among others. Furthermore multi-media outlets were used to disseminate information, namely, press conference, TV spots, newspapers; and Government officials. Brochures were also prepared and widely distributed. The PCV13 and Rotavirus vaccines were accordingly well accepted.

#### *Hukuntsi*

Social mobilization was done through *Kgotla* meetings. Educational materials were distributed to the health facilities for further distribution. The vaccines were well accepted by the community as demonstrated by the high demand during introduction as even those not eligible for vaccination came to health facilities. Health workers remembered hearing about the vaccines on radio, TV and reading the newspapers. Community was sensitized through health talk. In one health post, *Ipelegeng*, health workers were also requested to spread the message. Caregivers are well informed about the vaccine schedule and the diseases prevented by the vaccine, especial the rotavirus. Caregivers got the message on the new vaccines by health workers and some also remembered hearing about the vaccines on radio.

#### *Kweneng West*

The DHMT conducted advocacy and sensitization meetings at the district level as social mobilisation was done at churches and at *Kgotla* meetings. These efforts were supplemented by the use of multi-media outlets (community groups, public address mobilisers and HEAs) to inform communities, conducting health education sessions held at health facilities and distribution of brochures. Consequently, PCV13 and Rotavirus vaccines were well accepted.

#### *Ngami*

The DHMT mobilized the community leaders and sensitisation were meetings conducted through *Kgotla* meetings. Health talks on vaccines were conducted in health facilities. This was also done at health facility level with caretakers' posters and brochures distributed as additional materials. Acceptance of Rota vaccine was good and it was noted that numbers of diarrhoea cases had reduced since the introduction of the new vaccines. Posters on immunizations and injection site posters were found on walls in the health facilities.

#### *Selibe-Phikwe*

The district organised community groups, leaders and government officials and informed them about the new vaccines. Posters, brochures and flyers were distributed to the health facilities while health facilities held health education sessions with the mothers. The district even conducted a launch at Kagiso clinic. Health facilities had used posters, brochures and health education sessions to provide health education messages. Accordingly, there was no resistance to the newly introduced vaccines at the health facilities.

### **9.2 Weaknesses**

#### *National*

The MOH did not conduct an official launch at national level to herald the introduction of two new

vaccines and mobilise communities for vaccination. Such an event would have symbolized the Botswana Government's high level commitment that had resulted in the decision to avail these life-saving vaccines to the children of Botswana.

### ***Hukunsti***

There was no official launch at district level. Furthermore, educational materials were not sufficient for the community.

### ***Kweneng West***

The district did not conduct any official launch to mobilise the community for immunisation. None of the health facilities held any advocacy and sensitization meetings prior to introduction of PCV13 and RV2 and none had any IEC materials displayed. This probably contributed to the fact that most caregivers were not aware of PCV13 and Rotavirus vaccines.

### ***Ngami***

There was no official launch of the new vaccines. Information was not disseminated through the local media in the district. IEC materials for caregivers were not available in health facilities. Generally caregivers had limited information on both new and old vaccines.

## **10. Surveillance**

### **10.1 Strengths**

The country has suitable facilities in place to facilitate Paediatric Bacterial Meningitis (PBM) & Rotavirus sentinel surveillance.

### **10.2 Weaknesses**

PBM sentinel surveillance sites have not been operational for several years prior to the PIE and Rotavirus sentinel surveillance has not yet been established.

## **11. Sustainability**

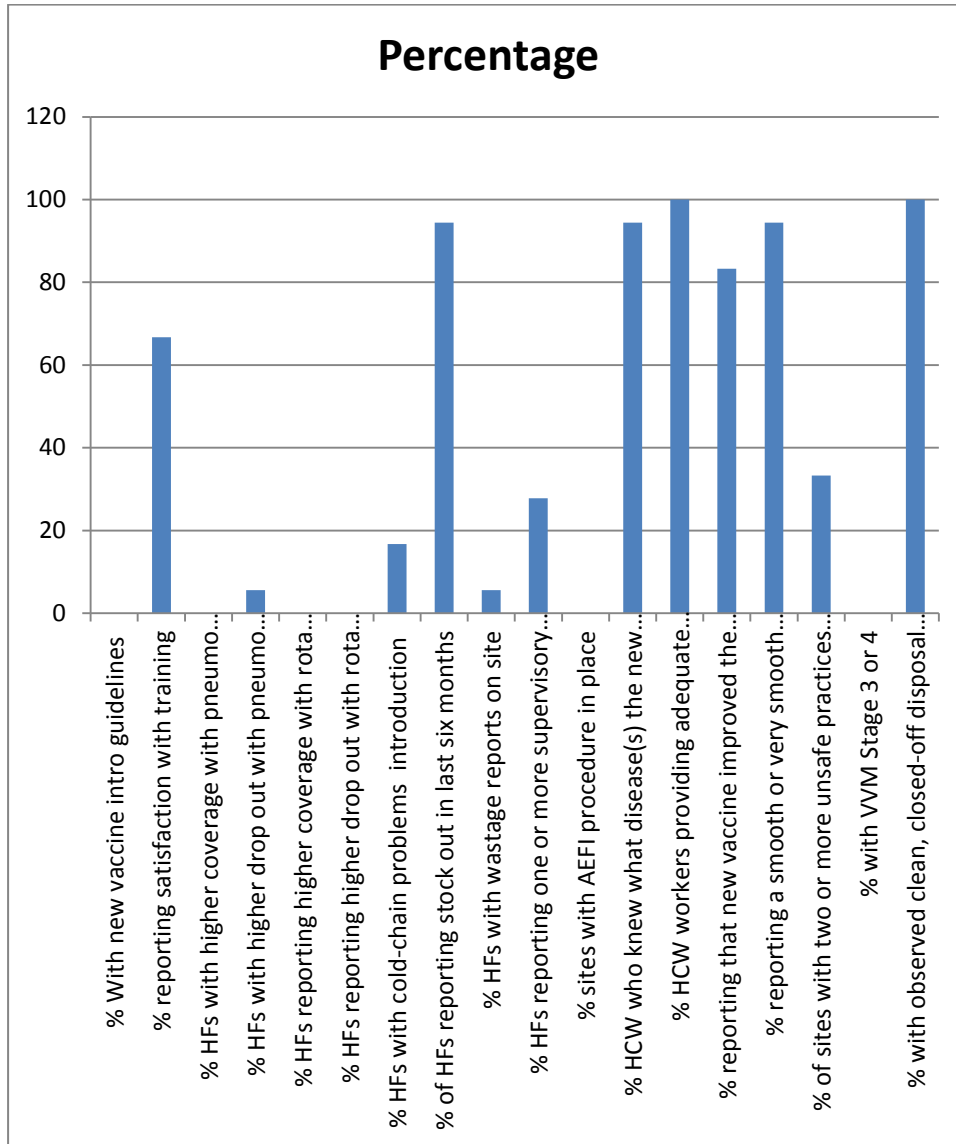
### **11.1 Strengths**

The MOH has established a budget line for vaccines along with drugs and other related products and fully funds vaccines and logistics. It is equally important to note that the comprehensive multi-year plan (cMYP) had been updated to include new vaccines including Human Papilloma Virus (HPV) vaccine.

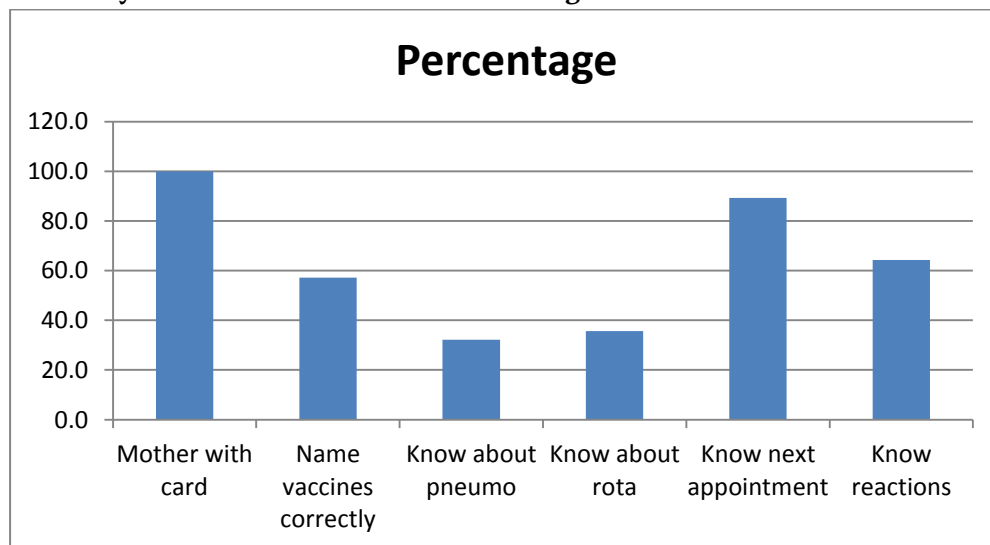
### **11.2 Weaknesses**

A key weakness noted during the PIE was that information on specific expenditure made by the EPI programme was not available.

## Summary of key indicators



## Summary of interviews with mothers/care givers



## **Recommendations**

### **Pre-implementation Planning and Vaccine Introduction Process**

1. Provide adequate reference materials to districts and HF's to guide them when they are in doubt
2. Accelerate the completion of the Procedures Manual (Vaccination Manual) that is being developed by MOH
3. Keep reference documents in an accessible place in the HF
4. Accelerate the updating of recording and reporting tools, esp., the child welfare card
5. For future vaccines develop introduction plan based on the national plan to guide implementation of key activities

### **Training**

1. Provide regular refresher training and increase duration of training at sub-national levels
2. National level staff and partners should, whenever feasible, monitor and support lower level training to ensure that consistent messages are communicated to staff
3. Provide practical demonstrations during training

### **Vaccine Coverage**

1. Follow up on the 2011 Census Report and provide updated target population figures for the subnational levels
2. Retrain districts on RED and DQS and support implementation
  - a. Calculation of vaccine coverage and drop outs,
  - b. Completing and using the monitoring chart
3. Conduct regular supportive supervision to ensure that all DHMTs and HF's are able to implement the RED package, inter alia

### **Cold Chain Management**

1. Repair malfunctioning fridges at subnational levels
2. Monitor vaccine fridge temperatures in districts and HF's twice daily including weekends
3. Use freeze watch/freeze tags during vaccine transportation
4. Supply adequate quantities of cylinders of LPG to HF's

### **Vaccine Management, Transport and Logistics**

1. Provide vaccine management guidelines to all districts
2. Conduct refresher training on vaccine management at subnational levels and monitor practices closely
3. Ensure that all HF's with expired vaccines hand them over to the appropriate authorities for destruction

### **Waste Management and Injection Safety**

1. Provide AD syringes for immunisation services
2. Provide adequate logistics for safe disposal of injection waste
3. Conduct refresher training on injection safety and safe waste disposal
4. Liaise with relevant unit in MOH to ensure regular collection of injection waste

### **Monitoring and Supervision**

1. Ensure that all planned supportive supervision visits are conducted and documented at sub-national levels

2. Follow up on identified weaknesses to ensure that corrective action has been taken and document such visits

### **Adverse Events Following Immunisation**

1. Develop and provide written AEFI protocol to all HFs
2. Revamp AEFI monitoring and surveillance in collaboration with the National Regulatory Authority
3. Provide regular supplies of AEFI logistics including reporting forms to all HFs
4. Monitor AEFI surveillance and reporting by districts on a regular basis

### **Advocacy and Communication**

1. Conduct national and district launches for new vaccines to publicise new vaccines and mobilise communities for immunisation
2. Produce and supply adequate IEC materials to sub-national levels to ensure on-going communication
3. Train health workers on interpersonal communication and monitor implementation so that mothers are constantly aware of both existing and new life saving vaccines that are available at health facilities

### **Surveillance**

1. Liaise with senior management in MOH and partners to find long term solutions to some of the problems that led to cessation of PBM sentinel surveillance
2. Follow up with WHO on request for technical support to revamp PBM and establish Rotavirus sentinel surveillance

### **Sustainability**

1. Track information on programme financing as this will facilitate the country to meet GVAP reporting requirements to the World Health Assembly

### **Best Practices**

1. Use of Balanced Score Card in MOH at national level to monitor immunisation performance at sub-national levels on a quarterly basis, inter alia

### **Comments from Staff for future vaccines**

1. Introduction of 2 new vaccines can be problematic:
  - a. RV with age restrictions while PCV13 was even given to under 5 children
  - b. Need to conduct separate training for each vaccine
2. Address sustainability issues before introduction to ensure that service delivery is not interrupted:
  - a. Mobilise adequate funds and ensure continuous supplies of vaccines
3. Consult stakeholders at all levels on any new intervention (including nurses at HFs)
4. Explore ways of reducing number of injections / combining vaccines
  - a. Combined vaccines easier to administer
5. Train many staff at HFs to mitigate against attrition and frequent staff rotation
6. Intensify communication about new vaccines to health workers and communities
7. Strengthen supportive supervision and take prompt corrective action

## **Lessons Learned**

1. Availability of local evidence of disease burden, strong political will and effective stakeholder engagement are necessary requisites for introduction of new vaccines
2. Adequate planning, mobilisation of sufficient resources and close monitoring are critical for smooth implementation of new vaccines particularly multiple vaccines
3. Communication and social mobilisation are essential so that health workers and communities are well informed and communities mobilised for immunisation services and new vaccines in particular

## Appendices

### Appendix 1: List of Key Indicators

	Indicator	%
<b>PRE-IMPLEMENTATION PLANNING</b>		
	% reporting provision of new vaccine introduction guidelines	<b>0.0% (0/18)</b>
	% reporting satisfaction with training	<b>66.7% (12/18)</b>
<b>VACCINE COVERAGE</b>		
	% health facilities reporting higher coverage with pneumo vaccine (%)	<b>0.0% (0/18)</b>
	% health facilities reporting higher drop out with pneumo vaccine (%)	<b>5.6% (1/18)</b>
	% health facilities reporting higher coverage with rota vaccine (%)	<b>0.0% (0/18)</b>
	% health facilities reporting higher drop out with rota vaccine (%)	<b>0.0% (0/18)</b>
<b>COLD-CHAIN MANAGEMENT</b>		
	% of health facilities observed or reported with cold-chain problems since the new vaccine introduction	<b>16.7% (3/18)</b>
<b>VACCINE MANAGEMENT, TRANSPORT &amp; LOGISTICS</b>		
	% of health facilities reporting vaccine or supply stock out in last six months	<b>94.4% (17/18)</b>
<b>VACCINE WASTAGE</b>		
	% with wastage reports on site	<b>5.6% (1 /18)</b>
<b>MONITORING &amp; SUPERVISION</b>		
	% of sites reporting one or more supervisory site visits in last six months	<b>27.8% (5/18)</b>
<b>ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI)</b>		
	% sites with AEFI procedure in place	<b>0.0% (0/18)</b>
<b>HEATH-CARE WORKER KNOWLEDGE &amp; PRACTICE</b>		
	% HCW who knew what disease(s) the new vaccine prevents	<b>94.4% (17/18)</b>
	% HCW workers providing adequate information to parents –Q66	<b>100% (18/18)</b>
<b>GENERAL IMPRESSIONS</b>		
	% reporting that new vaccine improved the EPI programme-Q68	<b>83.3% (15/18)</b>
	% reporting a smooth or very smooth introduction	<b>94.4% (17/18)</b>
<b>OBSERVATIONS AT VACCINATION SESSION</b>		
	% of sites with two or more unsafe practices observed	<b>33.3% (5/15)</b>
<b>OBSERVATION OF VACCINE STORAGE AREA</b>		
	% with VVM Stage 3 or 4	<b>0.0% (0/18)</b>
<b>WASTE DISPOSAL</b>		
	% with observed clean, closed-off disposal site	<b>100% (1/1)</b>

## Appendix 2: Work Plan for implementation of PIE recommendations

Recommendation	Responsible	Start Date	End Date	Remarks
<b>A. Immediate /Short Term</b>				
<ul style="list-style-type: none"> <li>Provide adequate reference materials to districts and HF's to guide them when they are in doubt</li> </ul>	HPED & CHD	01/08/13	31/12/13	
<ul style="list-style-type: none"> <li>Accelerate the completion of the Procedures Manual (Vaccination Manual) that is being developed by MOH</li> </ul>	CHD	01/04/14	01/07/14	
<ul style="list-style-type: none"> <li>Keep reference documents in an accessible place in the HF</li> </ul>	ALL HF	01/08/13	31/10/13	
<ul style="list-style-type: none"> <li>Follow up on the 2011 Census Report and provide updated target population figures for the subnational levels</li> </ul>	CHD / HEALTH STATS	01/08/13	31/10/13	
<ul style="list-style-type: none"> <li>Provide vaccine management guidelines to all districts</li> </ul>	CHD / WHO Country Office	01/09/13	31/12/13	
<ul style="list-style-type: none"> <li>Ensure that all HF's with expired vaccines hand them over to the appropriate authorities for destruction</li> </ul>	CMS / CHD	01/08/13	30/03/14	
<ul style="list-style-type: none"> <li>Liaise with relevant unit in MOH to ensure regular collection of injection waste</li> </ul>	CHD / ENVIROMENTAL HEALTH	01/08/13	31/11/13	
<ul style="list-style-type: none"> <li>Follow up with WHO on request for technical support to revamp PBM and establish Rotavirus sentinel surveillance</li> </ul>	CHD & WHO Country Office	01/08/13	31/11/13	
<b>B. Medium Term</b>				
<ul style="list-style-type: none"> <li>Accelerate the updating of recording and reporting tools, esp., the child welfare card</li> </ul>	CHD	01/08/13	30/05/14	
<ul style="list-style-type: none"> <li>For future vaccines develop introduction plans at sub-national levels based on the national plan</li> </ul>	CHD	01/08/13	31/03/14	This is essential to guide implementation of key activities at all levels
<ul style="list-style-type: none"> <li>Provide AD syringes for immunization services</li> </ul>	CHD/ NASCOD	01/10/13	31/04/14	
<ul style="list-style-type: none"> <li>Develop and provide written AEFI protocol to all HF's</li> </ul>	CHD / DRU	01/10/13	31/05/14	
<ul style="list-style-type: none"> <li>Revamp AEFI monitoring and surveillance in collaboration with the National Regulatory Authority</li> </ul>	CHD/ DRU	01/01/14	31/05/14	
<ul style="list-style-type: none"> <li>Conduct national and district launches for new vaccines to publicize new vaccines and mobilize communities for immunization</li> </ul>	CHD/HP&ED/ PRO	01/04/2014	31/03/15	Will be done for National HPV vaccine rollout
<ul style="list-style-type: none"> <li>Train health workers on interpersonal communication and monitor implementation</li> </ul>	CHD & HP& ED	01/11/13	01/04/14	This is ensure that mothers are constantly aware of both existing and new life saving vaccines that are available at health

				facilities
<ul style="list-style-type: none"> <li>• Liaise with senior management in MOH and partners to find long term solutions to some of the problems that led to cessation of PBM sentinel surveillance</li> </ul>	CHD/ NHL / CLINICAL SERVICES	01/09/13	31/02/14	
<b>C. Long Term / Continuous</b>				
<ul style="list-style-type: none"> <li>• Provide regular refresher training and increase duration of training at sub-national levels and monitor practices closely</li> </ul>	CHD /DHMT	01/04/14	31/03/15	Focus on vaccine management, injection safety and waste management at subnational levels
<ul style="list-style-type: none"> <li>• National level staff and partners should, whenever feasible, monitor and support lower level training</li> </ul>	CHD/ WHO country office	01/04/14	31/03/15	This is to ensure that consistent messages are communicated to staff
<ul style="list-style-type: none"> <li>• Provide practical demonstrations during training</li> </ul>	CHD /WHO country office	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Repair malfunctioning fridges at subnational levels</li> </ul>	DCS/ Bio Medics	01/12/13	31/03/15	
<ul style="list-style-type: none"> <li>• Monitor vaccine fridge temperatures in districts and HF's twice daily including weekends</li> </ul>	CHD/DHMT's / HF's	01/ 04/ 14	31/03/15	
<ul style="list-style-type: none"> <li>• Use freeze watch/freeze tags during vaccine transportation</li> </ul>	CHD/ DCS Bio Medics	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Supply adequate quantities of cylinders of LPG to HF's</li> </ul>	DCS / DHMT's	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Provide adequate logistics for safe disposal of injection waste</li> </ul>	Environmental Health / MoH	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Produce and supply adequate IEC materials to sub-national levels to ensure ongoing communication</li> </ul>	HP&ED / CHD	01/10/13	31/03/15	
<ul style="list-style-type: none"> <li>• Retrain districts on RED and DQS and support implementation</li> </ul>	CHD /WHO / HP&ED	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Provide regular supplies of AEFI logistics including reporting forms to all HF's</li> </ul>	CHD/ DRU / DCS	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Monitor AEFI surveillance and reporting by districts on a regular basis</li> </ul>	CHD/ DRU / DCS	01/04/14	31/03/15	
<ul style="list-style-type: none"> <li>• Track information on programme financing as this will facilitate the country to meet GVAP reporting requirements to the World Health Assembly</li> </ul>	CHD / Corporate Services / Health Development Policy Planning, M& E	01/12/13	31/03/15	
<ul style="list-style-type: none"> <li>• Ensure that all planned supportive supervision visits are conducted and documented at sub-national levels</li> </ul>	CHD/ DCS / DHMT's	01/04/2014	31/03/15	
<ul style="list-style-type: none"> <li>• Conduct regular supportive supervision</li> </ul>	CHD	01/04/2014	31/03/15	Ensure that all DHMTs and HF's are able to implement the RED package, among others
<ul style="list-style-type: none"> <li>• Follow up on identified weaknesses to ensure that corrective action has been taken and document such visits</li> </ul>	CHD	01/04/2014	31/03/15	

### **Appendix 3: Itinerary**

#### **Saturday 15 June**

- Arrival of IST/ESA Team

#### **Sunday 16 June**

- Preparatory meeting for Facilitators
- Arrival of participants

#### **Monday 17 June**

- Courtesy call on WHO Representative
- Introduction to PIE Tool and Group Work
- Adaptation of the questionnaires

#### **Tuesday 18 June**

- Adaptation of the questionnaires
- Finalisation of Teams and Logistics
- Departure of all teams for field work

#### **Wednesday 19 – Friday 21 June**

- Field visits to Districts and Health Facilities
- Daily team meetings to discuss observations

#### **Saturday 22 June – Sunday 23 June**

- Departure of teams for Gaborone

#### **Monday 24 – Thursday 27 June**

- Interview at national level and visit to CMS
- Data compilation and analysis by groups
- General debriefing by groups
- Preparation of narrative reports by teams
- Preparation of ICC presentation

#### **Friday 28 June**

- Debriefing of the Ministry of Health and Partners

#### **Saturday 29 June**

- Departure of IST/ESA Team

## **Appendix 4: List of Evaluators and Areas visited**

### **National EPI Offices and Central Medical Stores**

1. Mutale Mumba
2. Amos Petu
3. Kennedy Chitala
4. Mapeu Gaolaolwe

### **Districts and Health Facilities**

#### **Team 1: Hukuntsi District**

1. Mapeu Gaolaolwe
2. Fredrick Mooketsane

#### **Team 2: Bobirwa District**

1. Lebapotswe Bahumi Tlale
2. Elinah Mbangwa

#### **Team 3: Selibe Pikwe District**

1. Marina Seobakeng
2. Kentse Marope
3. Kennedy Chitala

#### **Team 4: Kweneng West District**

1. Gakebotlwaele Alice Dinyao
2. William Magiso
3. Mutale Mumba

#### **Team 5: Tutume District**

1. Opanyang Mosweu
2. Moitshepi Galeemelwe
3. Amos Petu

#### **Team 6: Ngami District**

1. Ndibo Monyatsi
2. Lenkwetse Bolaane
3. Lucy Maribe

## Appendix 5: List of Officials met at national level

### 1. Dr. Eugene Nyarko, WHO Representative

## Appendix 6: List of health facilities visited and staff interviewed

Level	Office /Health Facility	Name of Staff	Designation
<b>National</b>	National EPI Office	Ndibo Monyatsi Marinah Seobakeng Mapeu Gaolaolwe	EPI Manager National Surveillance Officer EPI Logistician
	Central Medical Stores	Mabel Mbewe Lebalang Madubeko Botsang Keodirele	Principal Pharmacy Technician Principal Pharmacy Technician Principal Pharmacy Technician
<b>Hukuntsi District</b>	DHMT	Isiah Magoba Dr. Adrian Moyo	Principal Pharmacy Technician Chief Medical Officer
	Hukuntsi Primary Hospital	Modire Kwati Francinah Titus	Nursing Officer II Senior Nursing Officer
	Kang Clinic	Tshegofatso Mafoko Kelebile Pego	Principal Registered Nurse Principal Registered Nurse
	Phuduhudu Health Post	Tebogo Radipudi	Nursing Officer I
<b>Bobirwa District</b>	DHMT	Motshidisi Mphothwe Bushi Marobela	Community Health Nurse Principal Pharmacist
	Mmadinare Primary Hospital	Matlhodi Poonyane Kabo Jobe	Principal Registered Nurse Principal Registered Nurse
	Borotsi Clinic	Walter Kalanke Given Molalazi	Principal Registered Nurse Registered Nurse
	Tobane Health Post	Pheko Chigger Osego Olebogeng	Principal Registered Nurse Health Education Assistant
<b>Selibe Pike District</b>	DHMT	B. Masunda P. M. Keretsetse T. Gabonamong	Principal Registered Nurse Chief Health Officer Principal technical Officer
	Industrial Clinic	D.O. Lekula Kabelo Gabanapelo Regina Macha	Principal Registered Nurse Senior Registered Nurse Senior Health Education Assistant
	Botshabelo Clinic	Wame Nkawere Monei Shamana O. Koloi	Principal Registered Nurse Nursing Officer II Health Education Assistant
	Tapologo Clinic	Olga Mongadi Keolebale Masilo Thotho Choene	Senior Registered Nurse Senior Health Education Assistant Chief Registered Nurse
<b>Kweneng West District</b>	DHMT	K. Rreotsile	Principal Pharmacy Technician
	Lethakeng Clinic	K. Rreotsile G. Raniosesane	Principal Pharmacy Technician Principal Registered Nurse
	Khudumelapye Clinic	Patricia Wakgotla	Principal Registered Nurse
	Ditshewane Health Post	Thebeyame Bikitshane Lesong Leswadula Pesalema Nkaletsa	Registered Nurse Principal Registered Nurse Health Education Assistant
<b>Tutume District</b>	Tutume DHMT	Baleseng Tshenyego	Community Health Nurse
	Tutume Primary Hospital	Helda Mutsu Baleseng Mackenze	Nurse/Midwife Nursing officer II
	Nata Health clinic	Motshidisi Sehularo	Registered Nurse
	Mosetse Health Post	Obonye Selefho Kootlole	Registered nurse
<b>Ngami District</b>	DHMT	Senwelo Mosarwana Fatima Sinkala Motlalepula Thaga	Principal Registered Nurse Pharmacist Pharmacy Technician
	Letsholathebe Hospital	Beauty Keetetswe	Senior Registered Nurse
	Shorobe Clinic	Lawrence Kesentseng Mahehi Mokenane	Principal Registered Nurse Senior Health Education Assistant
	Toteng Health Post	Otsile Tiny Moeng	Registered Nurse

