

# **ADDRESSING INEQUITIES TO STRENGTHEN IMMUNIZATION IN PNG**

**Papua New Guinea**



**UNICEF - December 2015**

## Table of contents

### Acknowledgements

### Executive summary

1. Background .....	7
2. Methodology .....	8
3. Findings from inequities and bottleneck analysis .....	9
3.1 Inequities in immunization in Papua New Guinea.....	9
3.2 Inequities in vaccination coverage .....	12
3.3 Coverage determinants / identification of bottlenecks.....	16
3.4 Bottlenecks/barriers to immunization .....	18
3.5 Mapping the most deprived populations in East Sepik Province.....	20
3.6 Enabling environment... ..	20
3.7 Human resources ... ..	20
3.8 Health system and service delivery .....	21
3.9 Health care financing ... ..	21
3.10 Demand ... ..	22
3.11 Vaccine preventable diseases outbreaks.....	22
3.12 Strengths and good practices .....	22
4. Addressing the inequities and bottlenecks in East Sepik Province.....	23
5. Achievements and improvements in East Sepik Province .....	25
6. Results sharing and advocacy meeting in East Sepik Province .....	30
7. Equity Strategies and mainstreaming equity in policies and vaccination plans.....	31
8. References .....	34
9. Annexes .....	34

## Glossary

1. AEFI: Adverse Events Following Immunization
2. AMS: Area Medical Store
3. BCG: Baccille de Calmette et Guerin (Tuberculosis Vaccine)
4. CCE: Cold Chain Equipment
5. CHS: Church Health Services
6. CHW: Community Health Worker
7. cMYP: Comprehensive Multi-Year Immunization Plan
8. DA: District Administrator
9. DDA: District Development Authority
10. DHM: District Health Manager
11. DHS-2006: Demography and Health Survey 2006
12. DOE: Department of Education
13. DTP3: Diphtheria-Tetanus-Pertussis vaccine, 3rd dose
14. EPI: Expanded Program on Immunization
15. EVM: Effective Vaccine Management
16. FHS: Family Health Service
17. HD: Health District
18. HEO: Health Extension Officer
19. HF: Health Facility
20. Hep B: Hepatitis B
21. HR: Human Resources
22. HSIP: Health System Integrated Program
23. HSS: Health System Strengthening
24. HW: Health Worker
25. ICC: Interagency Coordination Committee
26. IPV: Inactivated Polio Vaccine
27. LLG: Local Level Government
28. MoRES: Monitoring Results for Equity System
29. MP: Member of Parliament
30. MPA: Minimum Priority Activities
31. NCD: National Capital District (Capital province)
32. NDoH: National Department of Health
33. NHIS: National Health Information System
34. NNT: Neonatal Tetanus
35. NO: Nursing Officer
36. OIC: Officer In Charge of health facility
37. OPV: Oral Polio Vaccine
38. PCV13: Pneumococcal Vaccine
39. PHA: Provincial Health Advisor
40. PHD: Provincial Health Division

41. PHI: Provincial Health Information
42. PHO: Provincial Health Office
43. PNG: Papua New Guinea
44. PVS: Provincial Vaccines Store
45. RCA: Rapid Coverage Assessment
46. RED: Reaching Every District
47. RED/REC: Reaching Every District to Reaching Every Child
48. REC: Reaching Every Community
49. RI: Routine Immunization
50. SHC: Sub Health Center
51. SIREP: Special Integrated Routine EPI strengthening Programme
52. TT: Tetanus Toxoid
53. UN: United Nations
54. VHV: Village Health Volunteer = CBD: Community Based Distributors
55. VVM: Vaccine Vial Monitor

## **Acknowledgements:**

This report was produced with valuable inputs from the National Department of Health (Family Health Division, EPI Unit and PHD East Sepik province) of Papua New Guinea, UNICEF Country Office PNG, WHO Country Office PNG, and UNICEF's Regional Office for East Asia and Pacific as well as UNICEF HQ.

## Executive summary

PNG has the highest under 5 years mortality rate in the Pacific region (75/1,000 live births). In the process of “narrowing the gaps to achieve the MDGs”, an equity analysis performed in 2012 showed that half of PNG’s total 82,000 under 5 years deaths occurred in 5 provinces out of 22. East Sepik Province is amongst the five with a high under-five mortality rate. The routine immunization coverage in PNG has remained static for more than 20 years. From 2013 to 2014, vaccination coverage for Pentavalent3 and OPV3 decreased from 68% to 62% and 58% to 53% respectively. In 2014, very low coverage was noted in 8 provinces namely East Sepik (38%), West Sepik (32%), Gulf (33%), Hela (19%), Madang (28%), Morobe (35%), Southern Highlands (42%) and Western province (49%). Data of immunization coverage in East Sepik province indicates that three out of six districts recorded Pentavalent 3 coverage below 30% during the last three years (2012-2014), 14%, 22% and 27% respectively for Angoram, Ambunti and Wosera Gawi districts in 2014. The entire province recorded Pentavalent 3 coverage of 38%, which is amongst the lowest in the country.

These large coverage discrepancies within provinces and districts highlight large and persistent inequities in immunization coverage in the country. An assessment was conducted in Angoram and Wosera Gawi districts in the East Sepik province to identify the coverage inequities, the barriers/bottlenecks to immunization and recommend strategies to sustainably address them.

The main findings from the field assessment are shown below:

From January to July 2015, the Pentavalent 3 coverage was 7% for Angoram and 22% in Wosera Gawi, keeping about 4,852 children under-one year (3,061 in Angoram and 1,971 in Wosera Gawi) highly exposed to vaccines preventable diseases. For the same period, a Pentavalent 3 coverage of 0% was noted in 6 out of 9 health catchment areas in Angoram and 2 out of 6 in Wosera Gawi. Additional findings are presented below.

Determinants	Findings
<b>Essential Commodities</b>	<ul style="list-style-type: none"> <li>✓ Frequent vaccines stock out</li> <li>✓ No functional CCE in 6 out of 15 HF, expired vaccines, showing very poor CC &amp; vaccines management capacities</li> </ul>
<b>Human Resources</b>	<ul style="list-style-type: none"> <li>✓ More than 70% health workers are CHW with few skills in managing RI interventions</li> <li>✓ 5 out of 15 HFs managed by CHWs</li> <li>✓ More than 80% total HW not trained or refreshed comfortable on RI management</li> </ul>
<b>Accessibility<sup>1</sup></b>	<ul style="list-style-type: none"> <li>✓ Lack of funds for implementation at provincial, district and HF levels</li> <li>✓ 10 out of 15 HF not providing any vaccination services, 3 HF totally closed for the last 3 to 4 years and 5 HF applying only fixed strategy (no outreach at all)</li> <li>✓ +80% villages only reachable through outreach activities mostly by river, therefore high costs of fuel.</li> <li>✓ PCV13 vaccine introduced in 2014 but not use at all in the 2 districts</li> </ul>
<b>Utilization <sup>2</sup></b>	<ul style="list-style-type: none"> <li>✓ Ranging from 0-99% (Jan-Jun. 2015), 0% in 8 HF, 4 HF above 80%</li> <li>✓ Very poor recording system</li> </ul>
<b>Adequate and effective coverage<sup>3</sup></b>	<ul style="list-style-type: none"> <li>✓ Ranging from 0% to 10% - only 2 HF with temperature monitoring charts</li> <li>✓ No supportive supervision during the last 24 months - no monitoring for action (no review meeting at all levels)</li> <li>✓ Very poor reporting and no analysis of available data at the district and provincial levels - no feedback at all</li> </ul>

<sup>1</sup> **Accessibility:** Physical access to immunization services.

<sup>2</sup> **Utilization:** First contact of multi-contact services.

<sup>3</sup> **Adequate coverage:** Continuity and completion of the service.

In PNG, as shown by DHS-2006, the main factors for the inequities in immunization coverage are mothers' education level and the fact that 87% of the population live in remote rural areas. In addition, mostly in Angoram and Wosera Gawi districts in East Sepik Province, geographical remoteness and difficult terrain make it difficult to access health services.

1. In East Sepik province 52% (7536 out of 14657) of under 1 year children (Ambunti/Drekikier, Angoram and Wosera Gawi) are the most under-served and affected by inequities in vaccination services
2. Very difficult geographical accessibility:
  - In the 2 districts: 90% of the target population is reachable only by outreach activities<sup>4</sup>
  - In Angoram, almost all HFs and villages are reachable only by river
3. More than 33% of HF (5 out of 15) were not providing vaccination services during the last 3 to 4 years
4. The few HF conducting vaccination services were not implementing outreach activities at all
  - In the 2 districts, more than 22% - 1,200 children under 1 year were not reached at all by vaccination services

After the inequities and bottleneck analysis, the following relevant and cost-efficient corrective actions were implemented in both districts and at provincial level:

1. Improve the replenishment of vaccines, the vaccines stock management and distribution
2. Repairing & maintaining existing CCE and use of 7 days cold boxes by HF without a functional fridge
3. Refresher training on key actions during supervision and review meetings to keep improving HW skills
4. Re-start the implementation of immunization activities in HF where it was interrupted
5. Ensure fixed strategy at least weekly in all the HF with functional fridges
6. Ensure regularity of outreach activities (mobile and patrol) in all the villages
7. Integrated organization of fixed and outreach activities, comprehensive costing and budgeting
8. Conduct EPI supportive supervision of districts HFs to keep improving health workers skills and ensure the implementation of the recommendations in a timely manner
9. Hold review meetings at district level for active feedback and follow up for the implementation

This implementation mainly aimed at showing that performances could be improved in almost all the districts with little and effective technical and financial support.

After 3 months of implementation of the above corrective actions, from September to November 2015, the following main improvements were noticed:

1. Implementation re-started in the 67% (10 out of 15 HFs) of the HFs where it had been interrupted including the 3 HFs of Angoram which had been closed for 3 to 4 years
2. Outreach activities re-started in all the 5 HFs where it had been interrupted
3. Improvement of timeliness from 25% to 37% in Angoram, 7% to 23% in Wosera Gawi
4. Effective use of PCV13 vaccine in all the HFs in the 2 districts as from September 2015 in Angoram and October 2015 in Wosera Gawi

Based on the monthly monitoring and data analysis from health facilities reports:

5. Important coverage improvement for all antigens between July and November 2015, Pentavalent 3 coverage went from 7% to 34% in Angoram and from 22% to 67% in Wosera Gawi
6. Important coverage improvement at provincial level for all antigens, Pentavalent 3 coverage went from 20% to 30% between July and October 2015

The major contributing factors for this improvement were:

1. Technical support by UNICEF for vaccines and cold chain management, outreach, supportive supervision, on site refresher trainings during supportive supervision and review meetings, data analysis, feedback and follow up of the implementation of recommendations for supervision and review

---

<sup>4</sup> **Outreach activities:** For the implementation of Immunization activities, health workers have to visit the remote villages (more than 5 km or 1 hour walking distance from the HF) to vaccinate the target population, otherwise their will not be vaccinated because not able to come to the health facilities.

- meetings
- 2. Little financial support for outreach activities, supportive supervision and review meetings
- 3. Commitment of majority of OICs to achieve good results and mostly those of church health facilities.

Given the above achievements and to sustainably address inequities and strengthen the immunization programme in 2016 and beyond, the following strategies/activities are suggested:

In the East Sepik Province

1. Scale up the methodology (bottleneck analysis of the low immunization coverage followed by implementation of the relevant corrective actions) in all the 6 districts of the East Sepik Province to strengthen SIREP implementation

In the whole country

2. Introduce the equity work in other 7 low-performing provinces progressively
3. Ensure that supportive activities are put in place at national, provincial and district levels
4. Reinforce the role of NDoH: supportive supervision of provinces and review meetings with the provinces
5. Improve the cold chain capacity and the vaccines and cold chain management
6. Advocacy for more financial support in the provinces
7. Advocacy for more accountability and commitment of HW to achieve high results
8. Improve the demand for immunization and enabling environment

## 1. Background

For UNICEF, in reference to children, equity means: “All children have an equal opportunity to realize their rights, to survive, develop and reach their full potential, without discrimination, bias or favoritism, with the most disadvantaged receiving the extra care and support needed.” (UNICEF, 2010).

Equity, in the context of health refers to different populations or social groups having equal opportunity to access and benefit from health services.

The Global Vaccine Action Plan requires that the benefits of immunization should also be more equitably extended to all children: Achieving this objective will mean that every eligible individual is immunized with all appropriate vaccines regardless of geographic location, age, gender, disability, educational level, socioeconomic level, ethnic group or work condition. Thereby reaching under-served populations and reducing disparities in immunization both within and between countries (WHO 2013).

The story is quite different as concerned immunization; in 2013 over 22 million children worldwide were not fully immunized. Evidence from DHS and MICS surveys in many countries highlights large disparities in immunization coverage rates between children in different social and economic groups. Poverty is usually the main underlying factor, with children in the poorest households often having half of the immunization coverage rates of their counterparts in wealthier households. However poverty may not be the only factor. Cultural and ethnic affiliation, gender and where the child lives also influence access to immunization services.

Protecting children in the most marginalized populations with immunization must be the priority for all national immunization programmes because these are “high risk” populations where disease burdens are concentrated. Equity in immunization is achievable when health centre services prioritise these communities as part of the wider provision of immunization services (UNICEF: “REC An Operational Guide for National Immunization Programmes”)

Papua New Guinea (PNG) and its 600 associated islands is a Country of the South Pacific region administratively divided into 22 provinces and 89 health districts scattered in four geographical regions; Southern Region, Highlands Region, Momase region and Islands Region.

Each of the provinces is further divided into districts, local level government (LLGs) areas and council wards. About 830 languages (Lewis.P, 2009) are spoken in the country. PNG's population reached 7.3 million in 2015 according to the 2011 National Census. About 87% of population live in remote rural areas. The annual EPI target population (under 1 year infants) was estimated at 234,015 in 2015.

The routine immunization coverage in PNG has remained static over years leading to accumulation of children susceptible to vaccine-preventable diseases.

From 2013 to 2014 the vaccination coverage decreased from 68% to 62% for Pentavalent3 and from 58% to 53% for OPV3. Measles coverage was 60% in 2013 and 65% in 2014, for TT2+, 51% in 2013 and 54% in 2014. The total number of unvaccinated children for Pentavalent3 was 110,051 in 2014. Subnational data for 2013 and 2014 showed that many districts in several provinces still have high number of un-immunized children. Among the low-performing provinces in 2014, East Sepik, West Sepik, Hela, Madang, Gulf and Morobe were at the bottom of the list. All the 4 provinces of the Momase region (East Sepik, West Sepik, Madang and Morobe) are included.

These large coverage discrepancies within provinces and districts definitely recall the attention on huge and persisting inequities to bring the vaccination services to children and pregnant women.

New vaccines are also being introduced in PNG (PCV-13, Measles-rubella and IPV), and the country is also struggling to achieve the Maternal and Neonatal Tetanus Elimination (less than 1 Neonatal Tetanus case per 1000 Life Birth in each district), while also maintaining its Polio free status achieved in 2000. Thus there is a great need for routine immunization strengthening in the country to reach all the expected vaccination targets.

It is in this context that UNICEF provided support to conduct inequities and bottlenecks analysis and recommend strategies to sustainably address these inequities.

This fact-finding analysis was carried out from July 27 to September 10, 2015 in the two health districts of East Sepik Province namely Angoram and Wosera Gawi, and then the main identified corrective actions were implemented from September to December 2015 with UNICEF support.

## 2. Methodology

An assessment of the low immunization coverage (inequities and bottleneck analysis) was carried out in Papua New Guinea to identify bottlenecks/barriers to immunization as well as the relevant corrective actions to address them. The assessment was based on various data sources.

First of all, in order to have an overview of the situation in the country, a desk review was conducted based on the following documents: DHS-2006, cMYP 2011-2015<sup>5</sup>, EPI External review 2013, GAVI Joint Assessment 2012. Stakeholders interviews were conducted at national (04), provincial (09), district (05) and health facility (17) levels.

### Choice of province and districts:

To get information on the service delivery level, data was collected in 15 health facilities of 2 health districts in East Sepik Province: Angoram and Wosera Gawi districts.

The East Sepik province was chosen because of existing multiple factors including vulnerability:

1. East Sepik is among the 6 poorest performing provinces with vaccination coverage below 40% for more than 3 years (38% for pentavalent 3 and ranked 17<sup>th</sup> out of 22 provinces in 2014),
2. This province is also one of the provinces with the highest under 5 year mortality rate (one of the five provinces where half the number of under 5 years deaths occur)
3. East Sepik is one of 4 provinces of the Momase region. The Momase region has the lowest vaccination coverage in the country compared to 3 other geographical regions. Education indicators are also low in this region (DHS-2006).
4. UNICEF is supporting East Sepik province in a number of health related areas.

---

<sup>5</sup> cMYP: Comprehensive Multi-Year Plan



Within the province, the choice of the 2 districts, Angoram and Wosera Gawi was linked to the following criteria:

1. Low performing districts with vaccination coverage less than 30% for more than 3 years (pentavalent 3 in 2014: 14% and 27% respectively), thus large number of unvaccinated children.
2. Significant target population: the Angoram and Wosera Gawi districts account for 36% (5,211 out of 14,657) of the target population of the East Sepik province
3. Both districts are situated in remote rural areas. According to DHS-2006, vaccination coverage is very low in remote rural area
4. Accessibility for the analysis and mostly for the follow-up of the implementation of corrective actions. One of the poorest performing districts (Ambunti/Drekikier) was difficult to reach during the period of assessment (June – December).

The analysis was carried out from July 27 to September 10, 2015 and data were collected for the period of January 2014 to June 2015 on the following areas: Enabling environment, Supply, Demand and Quality and the ten determinants of MoRES. In addition, the revised Tanahashi<sup>6</sup> method was used as framework for bottlenecks identification.

During field visits, information and data were collected at provincial, district and health facilities levels through interviews and observation. This work was conducted by the Provincial Health Office (FHS Coordinator and EPI Officer) and UNICEF.

Given the challenging geographical access to the HFs, a meeting was held with the HFs in each district, 4th August in Angoram and 26th August in Wosera Gawi.

Data analysis was performed based on the vaccination coverage and the coverage determinants for 2015 compared to those of 2014.

After data analysis, districts (DHM) and the HFs (OICs) were supported to identify and to plan the relevant, realistic and cost/efficient actions to address identified bottlenecks. This was done by adapting the SIREP work plan to include corrective actions. Furthermore, SIREP work plan and budget were finalized to address gaps during the four months period of September to December 2015.

During this 4 months period, the major actions included to the SIREP work plan were: provincial EPI supportive supervision including HFs visit, review meetings at district level with all the HFs, technical support by the provincial team for review meetings, data analysis at provincial level, feedback and overall coaching and mentorship by a UNICEF EPI Consultant with monthly trips for field work both at provincial and district levels.

### **3. Findings from inequities and bottlenecks analysis**

#### **3.1 Inequities in immunization in PNG**

In PNG, Immunization administrative coverage for Penta3 was estimated in 2014 at 62%.

Recent documents providing information on inequities in immunization in PNG were not available. The last Demographic and Health Survey (DHS) was carried out in 2006 is actually the sole available. However, it provides enough information on inequities in immunization in the country except on wealth. It provides information on the vaccination coverage of 12-23 months of age children both for those fully vaccinated and those who received DPT3. It indicates that the coverage for fully immunized infants has increased from 39% in 1996 to 52% in 2006.

---

<sup>6</sup> **Tanahashi method (WHO, 1978):** Method used to identify bottlenecks/barriers to immunization or any other priority health intervention at service delivery level. In the reviewed Tanahashi method, 6 key determinants are used (availability of essential commodities, availability of human resources, accessibility, utilization, adequate coverage and effective coverage). A bottleneck is the loss of system efficiency.

Table 1 shows the details on vaccination coverage by the mother and the child background characteristics.

**Table 1:** Inequities in immunization in PNG by population characteristics in 2006

Population characteristics	Groups	Fully vaccinated	Received DPT3
<b>Sex</b>	Male	49,7%	64,6%
	Female	55,1%	69,3%
<b>Birth order</b>	1st	54,8%	69,0%
	2to3	56,2%	72,0%
	4to5	50,3%	63,0%
	6+	40,0%	59,0%
<b>Mother's Educational level</b>	No education	37,7%	52,6%
	Grades 1 - 5	53,7%	67,2%
	Grades 6	55,2%	70,3%
	Grades 7+	63,6%	78,6%
<b>Place of residence</b>	Urban	63,8%	81,9%
	Rural	50,2%	66,0%
<b>Region</b>	Southern	61,3%	72,7%
	Highlands	50,8%	66,9%
	Momase	42,4%	55,4%
	Islands	59,4%	77,8%

Source : DHS 2006 – PNG

Vaccination coverage diverges by sex of the child; birth order, place of residence, region and mother's education.

- ✓ The coverage is higher for female children (55%) as compared to male children (50%). (Female children slightly have better coverage than male children)
- ✓ Vaccination coverage is higher for children born to mothers with grade 7 or higher levels of education (64%) than children born to mothers with no education (38%). The figures show a gradual increase of the coverage with the educational level of the mother.
- ✓ Almost 55% of first-order births and 56% of children of birth order 2-3 have completely been immunized as compared to 40% of children of birth order 6 or higher.
- ✓ Children in urban areas also have better coverage (63.8% fully immunized and 81.9% for DPT3) than those of rural areas (50.2% fully immunized and 66% for DPT3). They can access vaccination facilities more easily.
- ✓ Vaccination coverage is comparatively low (42%) for children of mothers living in Momase region as compared to the other regions. This figure is also below the national average of 52%.

Unfortunately, information analyzing the relationship between income and vaccination coverage was not available. This analysis was not taken into account in the DHS-2006.

In the other hand, no document was found providing data on vaccination coverage by province or by district apart from the administrative coverage.

Although no other reliable documents were available to appreciate to what extent the situation has deteriorated or improved, we tend to believe that it has deteriorated because, there is no evidence that sustainable actions have been carried out to address these inequities since 2006. In addition, the example of the stagnating and almost decreasing low performance of 2014 at the national level and in some districts like Angoram confirms this assumption.

### 3.1.1 Location and Geography - Accessibility:

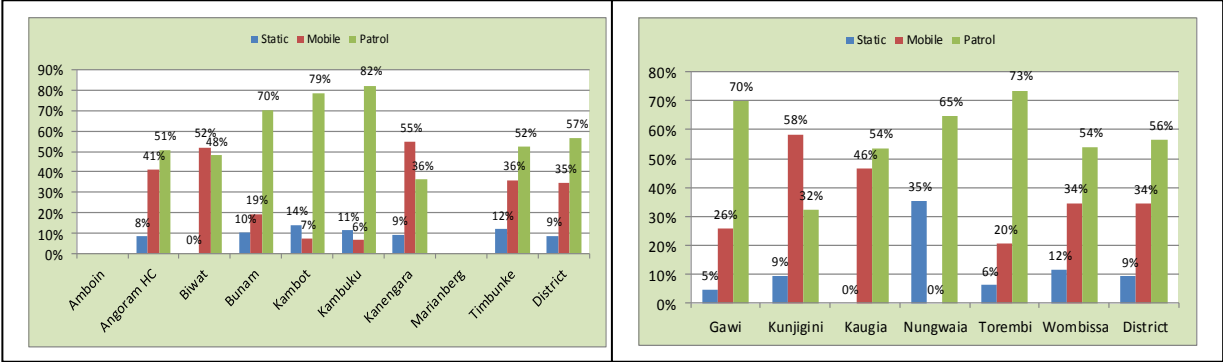
PNG is one of the largest nations in the South Pacific. The country's geographical features are dominated by its 600 associated islands, extensive mountain ranges, rainforests and complex river systems. About 50% of the total surface area is mountainous, and as a result many areas of the country are still inaccessible by road. About 87% of the population live in remote rural areas.

In the East Sepik Province, the accessibility for outreach activities is very challenging. Most of the villages in some districts (Angoram, Ambunti/Drekikier, ...) are reachable only by river. In the dry season, the water level

usually decreases, thus those villages become unreachable or only accessible on foot. Some few villages are reachable by road but the roads are in poor condition.

As stated above, one of the major bottlenecks is the challenging accessibility to immunization services. This can be shown by the proportion of the target population and villages covered by different immunization strategies. Over 90% of children are reached through outreach services (mobile and patrol) in this two districts while at the national level, this proportion is estimated approximately at 30% (cMYP 2011\_2015).

In such geographical accessibility conditions, it is essential to have enough HR and financial support to be able to reach all the population.

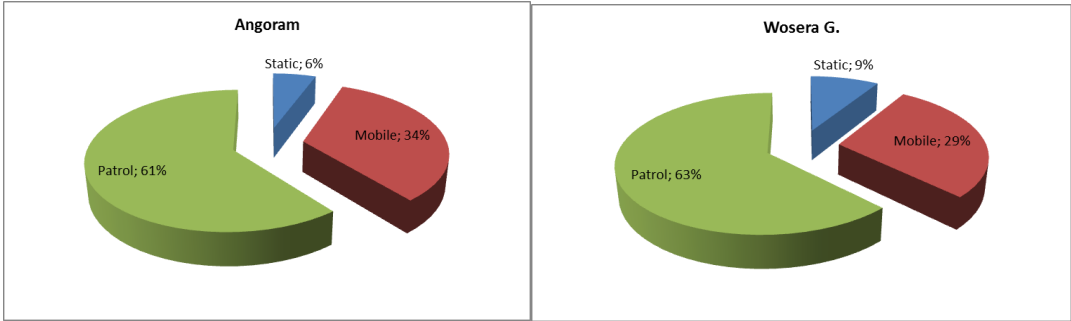


Angoram district

Wosera Gawi district

Figures 1 & 2: EPI target population by immunization strategy for the two districts, 2015

Figures regarding the distribution of villages by immunization strategy are the same as shown on the graphs below.



Figures 3 & 4: Proportion of villages by immunization strategy for the two districts, 2015

3.1.2 Education in PNG:

According to DHS-2006, not all children in PNG have the opportunity to go to school. Furthermore, even if they go to school, not all of them will be able to complete grade 7 or higher level of education. Almost 40% of the population aged 5 years and above have no education or have not completed grade 1. The same proportion of the population have completed grades 1 to 6 while 20% have completed grade 7 or higher level of education. However, the proportion of household population with no education has declined from 46% in 1996 to 40% in 2006.

The proportion of the urban population who have completed grade 7 or higher level of education is almost 3 times that of the rural population. This may be one of the reasons why children in urban areas have better coverage (63.8% fully immunized and 81.9% for DPT3) than those of rural areas (50.2% fully immunized and 66% for DPT3) (Table 1).

At the regional level, there is a high proportion of population with some education in the Islands region (75%) and Southern region (71%), while lower proportions were recorded in the Momase region with (58%) and the Highlands region (51%). This lower proportions of population with some education in the Momase region may be

one of the factor for the lower vaccination coverage (42%) for children of mothers living in Momase region compared to the other regions.

23% of males aged 5 years and older had completed grade 7 or higher levels of education while 35% had no education or had not completed grade 1 at the time of the survey (DHS-2006). For females, these proportions are 17% and 45% respectively. The situation is worst for females. Moreover, the median duration of schooling for males is approximately 2 years longer than for females.

Further more, as stated in different reports including the UNICEF annual report (2012) and National Education Plan (NEP-2015-19), the reasons why the gaps persist in PNG are: parents could not afford the education related cost mainly the Tuition Fees preventing majority of children going to school, girls were not given priority compared to boys, they were expected to tend to household chores and were an asset to the family in exchange for monetary value during bride price ceremonies when married off, adolescent Children were expected earn for the family. So after few years of schooling drop out was a great phenomenon.

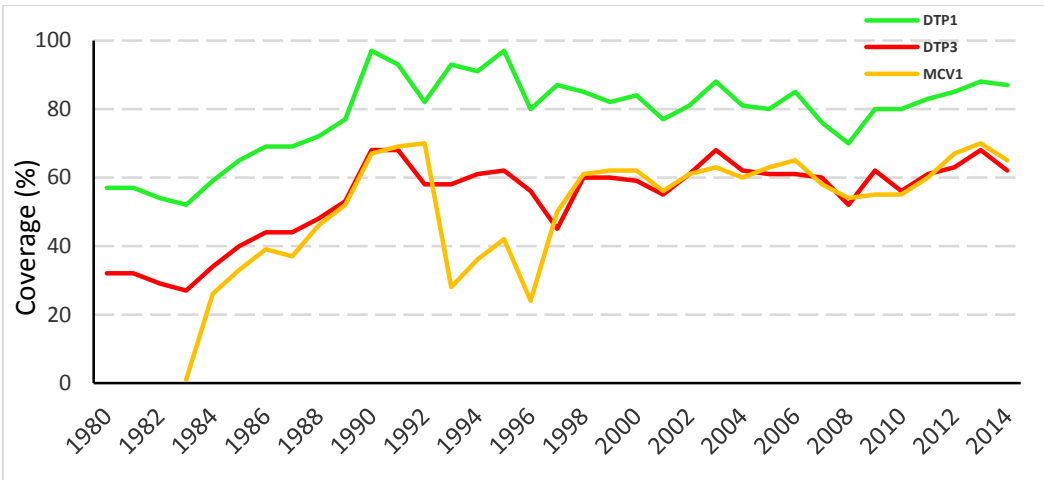
Corresponding reforms in governance has been introduced and critical financial resources provided, to enable efficient and effective delivery of basic education, resulting in general improvement in education access, retention and quality. Although there has not always been measured and sustained progress (National Education Plan 2015- 2019) the overall gross enrolment rate for basic education improved to 96 per cent in 2014, compared to 71 per cent in 2000. The recent introduction of Tuition Fee Free (TFF) policy in 2012 has greatly addressed this issue with the aim of increasing access to education for all. TFF has contributed to increased enrolment, particularly in basic education, with almost 2 million children enrolled in 2014 compared with about 1 million a decade before.

Programmes have been designed to address these issues. As supported by UNICEF, the school readiness component of every child through Early Childhood Care and Education (ECCE) will seek to set a strong foundation to ensure a child especially ready for school, be retained and complete their basic education. Teachers training and support on this with regards to Child Friendly Schools are being strengthened through Teachers colleges and piloting at the school level for DOE to upscale.

Community Based Education Advocates (CBEAs) is another initiative supported by UNICEF to have a spokesperson in communities to speak on behalf of and advocate for the education of all and its importance more so for girls. More programme initiatives will be designed based on findings from two studies currently conducted by the University of Goroka for DOE and UNICEF on Girls retention rates and Behaviour Management with a focus on School Related Gender Based Violence (SRGBV) in schools which are contributing factors girls do not continue or complete their basic education.

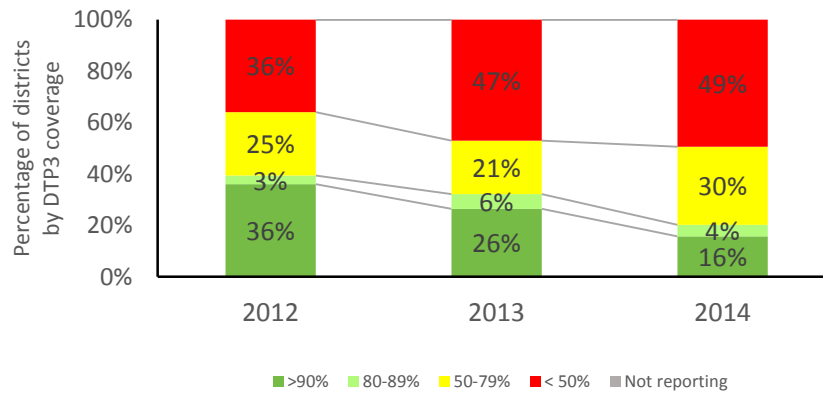
**3.2 Vaccination coverage inequities**

**3.2.1 Vaccination coverage at national level**



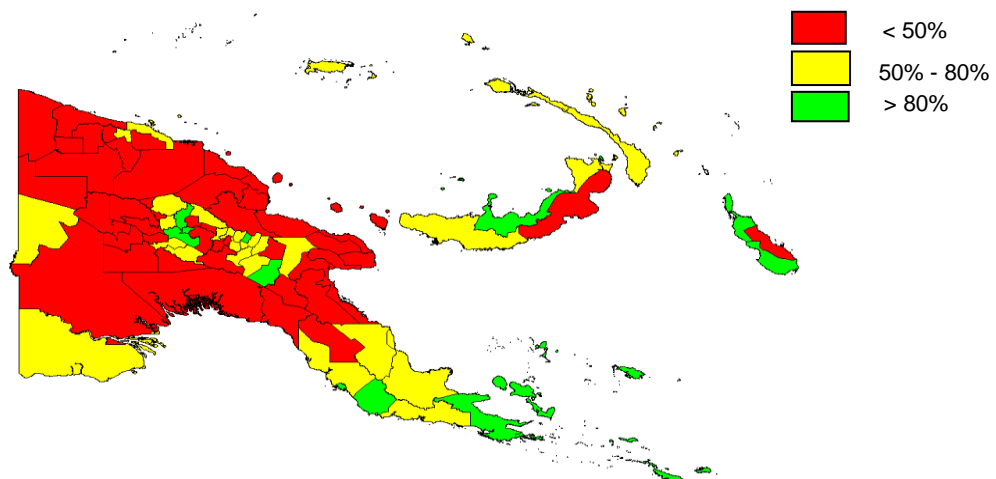
**Figure 5: WHO/UNICEF coverage estimates for Papua New Guinea, 1980-2014**

Coverage increased from 1980 and reached 60% in the years 1990 but has stagnated over the last 25 years.



**Figure 6:** Percentage of districts by category of DTP3 coverage, Papua New Guinea, 2012-2014

Figure 6 shows that, EPI performance in PNG are not only low but the situation is getting worse, because the number of districts with 90% DTP3 coverage or above has significantly decreased from 36% to 16% between 2012 and 2014 while the percentage of those with less than 50% coverage has significantly increased from 36% to 49% in the same period.

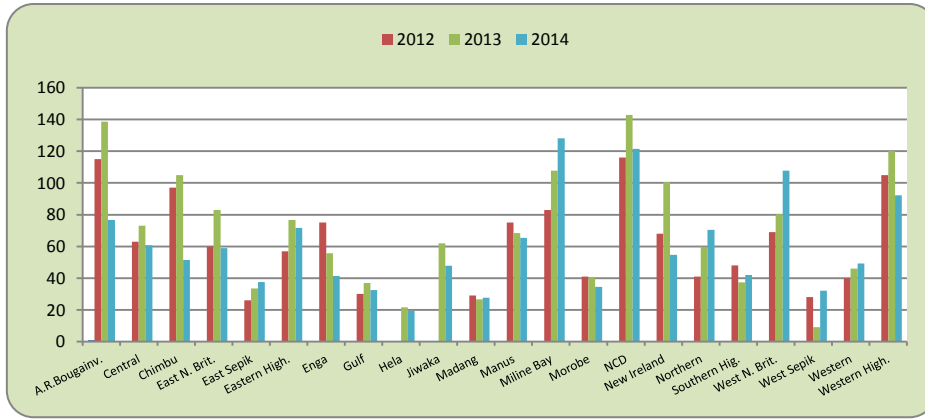


**Figure 7:** DTP-HepB-Hib -3 coverage map per district, 2014

The 2014 map showing almost all the districts in red color (DTP3 coverage below 50%) is in line with the two previous figures.

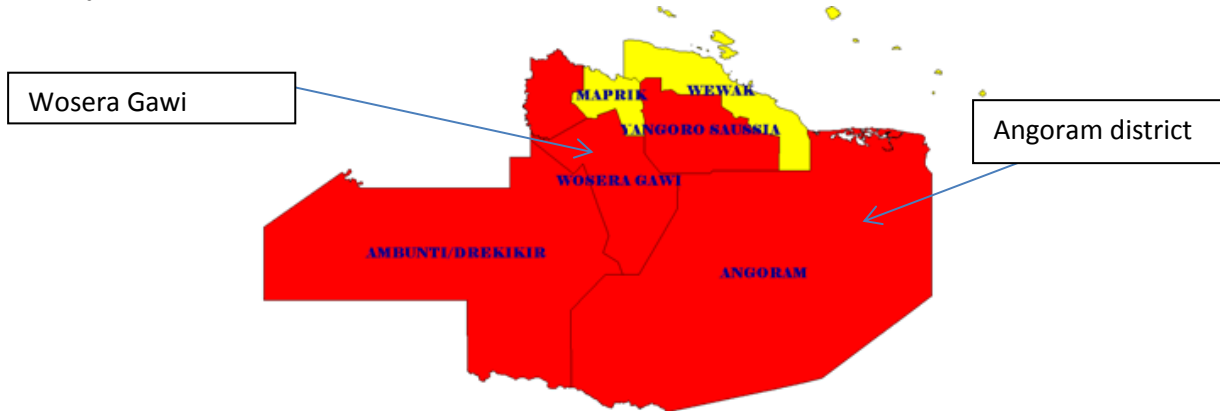
### 3.2.2 Pentavalent 3 at provincial level, East Sepik province, 2012 to 2014

- ✓ As shown on the graph in figure 8 below, administrative vaccination coverage varies according to provinces ranging from less than 40% for 2 years in 8 provinces to 80% and above in 4 provinces namely Milne Bay, NCD, West New Britain and Western Highland. The population of these 8 provinces, especially children, are more vulnerable to outbreaks of vaccine preventable diseases than those in the 4 provinces where coverage is 80% or higher.
- ✓ These low performing provinces are: East Sepik, West Sepik, Hela, Madang, Gulf and Morobe, Southern Highlands and Western province
- ✓ Furthermore, analyses at district level within the country and within the provinces show the same important inequities as those on figure 5.
- ✓ In 6 provinces (AR Bougainville, Chimbu, Milne Bay, NCD, West New Britain and Western Highlands) the vaccination coverage is often above 100%. This raises the issue of the quality of available data. The data quality may be very poor and the population may also be under-estimated in some health districts.



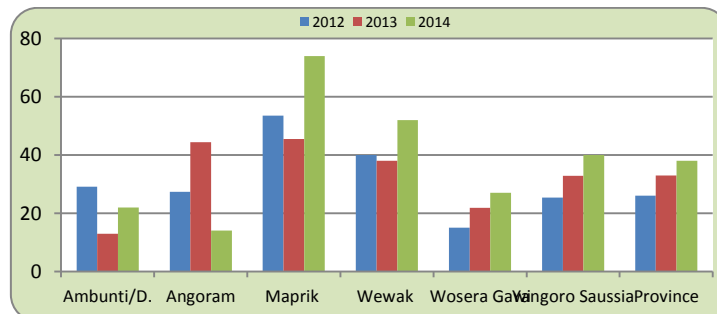
**3.2.3 Figure 8: Pentavalent 3 coverage at national level by province, 2012 – 2014**  
(data received from WHO)

Figure 8 above shows a lot of disparities in the coverage per provinces. East Sepik, West Sepik, Gulf, Hela, Madang, Morobe, Southern Highlands, Western province are identified as very low-performing provinces. East Sepik Province is among these 8 poor performing provinces with a coverage of 38% for Pentavalent 3 in 2014.



**Figure 9: Map of East Sepik Province with 2014 Pentavalent 3 coverage per district (NDoH – WHO)**

Pentavalent 3 coverage is less than 50% in 4 districts out of the 6 in East Sepik Province and none of them had a coverage of 80% or above.



**Figure 10: Pentavalent 3 coverage in East Sepik province, 2012 to 2014**

In 4 districts out of 6 in East Sepik Province as well as at provincial level, the Pentavalent 3 coverage was less than 40% in 3 years (2012 to 2014). There was a total number of unvaccinated infants of 9,148 for Pentavalent 3 in East Sepik Province in 2014. Angoram, Ambunti/Drekikier and Wosera Gawi were the

lowest performing health districts and accounted for 66% of unvaccinated children in East Sepik province in 2014, while Angoram and Wosera Gawi accounted for 47% of unvaccinated children in the province. For the two other districts, only one (Maprik) obtained a coverage above 60% in 2014. These two districts are the most accessible of all.

### 3.2.4 Immunization data at district level in 2015<sup>7</sup>

The total population of Angoram and Wosera Gawi districts in 2015 is 102,844 and 71,742 respectively. The target population of under 1 year infants is respectively 3,291 and 2,296 and the number of health facilities is 9 in Angoram and 6 in Wosera Gawi.

The vaccination coverage for all antigens in Angoram and Wosera Gawi health districts was calculated by catchment area for the period of January to July 2015. Data were collected from child health daily summaries of HFs as reports are directly send to provincial level. Health facilities do not retain copies of the reports. In addition, reports are seldom available at the provincial level due to poor record keeping or that reports are not consistently sent by HFs.

The details are shown on tables 2 and 3 below.

**Tables 2 and 3:** Vaccination coverage, all antigens in Angoram and Wosera Gawi districts, January to July 2015

Health facility	Target population 0- 11 mths	vaccination coverage					Drop out rate	REC categ.
		BCG	Hep B	Penta 3	OPV3	Measles		
Amboin	123	0%	0%	0%	0%	0%		Cat 4
Angoram HC	384	27%	31%	9%	11%	26%	69%	Cat 4
Biwat	216	7%	9%	0%	0%	1%	100%	Cat 4
Bunam	102	0%	0%	0%	0%	0%		Cat 4
Kambot	149	86%	25%	28%	29%	68%	55%	Cat 4
Kambuku	97	0%	0%	0%	0%	0%		Cat 4
Kanengara	102	108%	9%	38%	41%	139%	59%	Cat 2
Marianberg	239	2%	0%	0%	0%	1%	100%	Cat 4
Timbunke	233	0%	0%	0%	0%	0%		Cat 4
<b>Total</b>	<b>1645</b>	<b>22%</b>	<b>11%</b>	<b>7%</b>	<b>8%</b>	<b>21%</b>	<b>62%</b>	<b>Cat 4</b>

Health facility	Target population 0- 11 mths	vaccination coverage					Drop out rate (Penta)	REC Categ.
		BCG	Hep B	Penta 3	OPV3	Measles		
Gawi	298	0%	0%	10,1%	0%	0%	87%	Categ 4
Kunjigini	280	180%	12%	91%	60%	76%	55%	Categ 2
Kaugia	255	10%	2%	0,8%	0,4%	1%	94%	Categ 4
Wombissa	181	0%	0%	0,0%	0%	0%		Categ 4
Nungwaia	145	0%	0%	0,0%	0%	0%		Categ 4
Torembe	180	0%	0%	5,0%	9%	23%	93%	Categ 4
<b>District</b>	<b>1339</b>	<b>40%</b>	<b>3%</b>	<b>22,1%</b>	<b>14%</b>	<b>19%</b>	<b>69%</b>	<b>Categ 4</b>

#### Angoram district

#### Wosera Gawi district

As shown on the above tables:

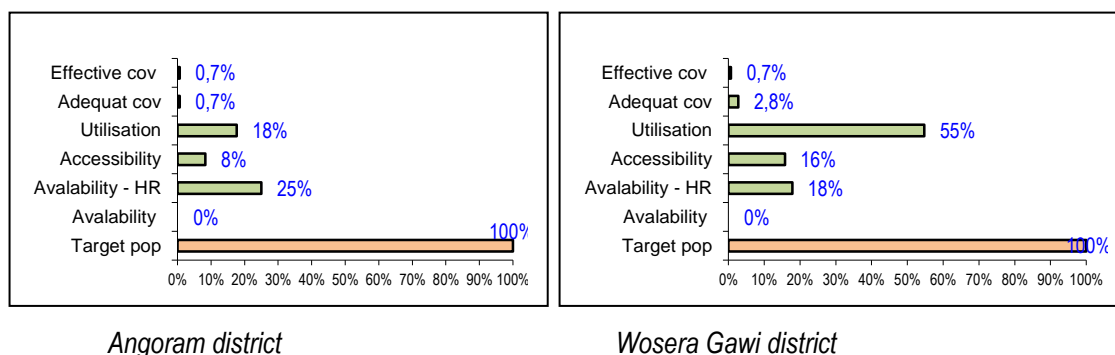
- ✓ The performances which include all antigens are very low. The EPI situation is really critical in these 2 districts. The Pentavalent 3 coverage at district the level is 7% in Angoram and 22% in Wosera Gawi.
- ✓ In the Angoram district, none of the catchment areas has a coverage of 40% or above, while in Wosera Gawi, apart from Kunjingini with 91%, none of the catchment areas has a coverage of 40% or above.
- ✓ This coverage is 0% for 6 out of 9 catchment areas for Angoram and 0% in 2 out of 6 catchment areas for Wosera Gawi. The highest coverage noted in Kanengara is 38% for Angoram and 91% in Kunjingini for Wosera Gawi.
- ✓ The coverage is also very low for all other antigens.
- ✓ A great difference is noted between Penta3 coverage and OPV3 coverage in all the HF of both districts and between BCG and HepB as well. This is due to the poor vaccines management which leads to frequent vaccines stockout in the HFs
- ✓ During the last 6 months, no vaccination at all was carried out in 5 HFs (Amboin, Bunam, Kambuku, Marianberg and Timbunke).
- ✓ Regarding the RED category<sup>8</sup>, both districts were category 4, which is considered the worst category. All catchment areas were category 4 except one in each district, namely Kambot in Angoram and Kunjingini in Wosera Gawi which were category 2. The category 4 rating is due to interruption of immunization activities in some HF and the irregularity of outreach activities in others.

<sup>7</sup> Administrative data used with important limitation because of the very low completeness of monthly reports (November 2015 : 63% in Wosera Gawi and 58% in Angoram).

<sup>8</sup> RED: Reaching Every District approach aims to improve the organization of immunization services, maximise the use of available resources and guarantee sustainable and equitable immunization coverage. It focuses on planning, managing and monitoring health services that, if carried out appropriately, will improve immunization coverage and impact. In RED approach, according to DPT1 coverage and DPT drop-out rate, districts are classified in 4 different categories, category 1 (the best) to category 4 (the worst).

### 3.3 Identification and causal analysis of barriers to immunization

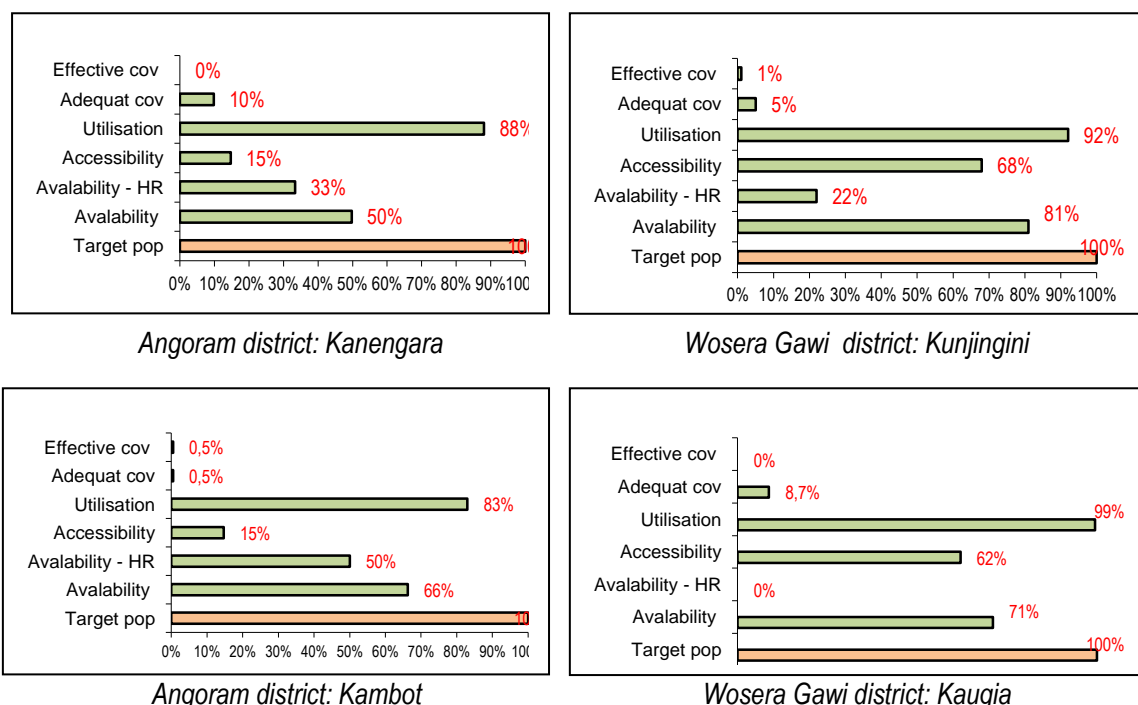
To identify the bottlenecks/barriers to immunization, the revised Tanahashi method was used to estimate the key coverage determinants at service delivery level (in all the Health Facilities) in both health districts for the January – June 2015 period. In this method, 6 coverage determinants were used to analyze issues relating to supply, accessibility, utilization, adequate and effective coverage aspects of health service delivery and identify constraints or bottlenecks in the health system for corrective action. A bottleneck is a loss of system efficiency. The following documents were used where available: vaccination registers, stock record forms, catchment maps and temperature charts. Key coverage determinants are shown in the following graphs.



Figures 11 & 12: Coverage determinants graphs for the 2 districts, Jan. – Jun. 2015

The above graphs show that the bottlenecks exist at all level because all the coverage determinants are very low in the 2 districts. This means that the whole health system is currently very poor regarding immunization implementation.

**Note :** The graphs for all the HFs are presented in Annexes, but the best are shown below.



Figures 13, 14, 15 & 16: Best coverage determinants graphs in the 2 districts, Jan. – Jun. 2015

Coverage determinants are very low in the 2 districts and the causal analysis and comments are summarized in the table below:



**Table 4: Causal analysis for low Coverage determinants**

Determinants	Current situation in East Sepik Province end June 2015
<b>Availability and management of Immunization essential commodities</b>	Stock out of vaccines and commodities for months or years in 8 out of 9 HF in Angoram and 4 out of 6 HF in Wosera Gawi
	Expired vaccines were found in the refrigerators in 3 out of 15
	Vaccines and commodities stocks record forms not available in almost all the HF
	Lack of functional cold chain equipment in 44% of HF (4 out of 9) in Angoram district and 33% (2 out of 6) in Wosera Gawi district: not functioning or lack of power
	Temperature chart used for the refrigerators only in 11% (1 out of 9 HF) in Angoram (Kambot) and 17% (1 out of 6 HF) in Wosera Gawi (Kunjingini)
<b>Availability of Human Resources</b>	69% of health workers in Angoram and 75% in Wosera Gawi are Community Health Workers, with insufficient qualification for the effective management of Routine immunization interventions
	22% (2 out of 9) of OICs in Angoram and 50% (3 out of 6) of OICs in Wosera Gawi are CHW
	16% and 21% of the total number of health workers are trained on EPI respectively in the Angoram and Wosera Gawi districts (according to OICs)
	However, in 7 out of 9 HF (Angoram) and 4 out of 6 HF (Wosera Gawi) at least 1 of the health workers is trained
<b>Accessibility (physical access to immunization services)</b>	33% of HF in the Angoram district (3 out of 9) were closed for at least 2 years (some for 4 years) due to either the harassment of Health workers by the local population or HR problem
	89% of HF in Angoram district (8 out of 9) were not implementing immunization activities at all due to HR problems (OIC out of duty station) or lack of cold chain or vaccines stock out
	56% of HF in Angoram (5 out of 9) had not been implementing immunization activities for 6 months to 4 years and 33% of them (3 out of 9) for at least 3 years
	33% of HF in Wosera Gawi district (2 out of 6) were not implementing immunization activities at all for 2 - 3 years due to lack of cold chain or vaccines stock out
	Even in the few catchment areas implementing immunization activities, no outreach activities or very few on a quarterly basis
	Only 9% of the target population covered by fixed strategy <sup>9</sup> in both Angoram and Wosera Gawi district. It could be better if some of the villages situated 5 km (or 1 hour walk) from the HF were not covered by mobile strategy because of lack of roads or bad road condition, or only by river which incurred high costs for mothers who opted for non-attendance.
	35% of the target population covered by mobile strategy in Angoram and 34% in Wosera Gawi district. In the fixed strategy, mothers bring children to health facilities during immunization sessions, whereas in the mobile strategy, health workers move to remote villages (5 km or above from the health facility), carry out immunization and come back the same day.
57% of the target population covered by patrol strategy in Angoram and 56% in Wosera Gawi district. In the patrol strategy, health workers move to very remote villages, carry out immunization, overnight and come back the next day because their return on the same day is impossible.	
<b>Utilization (first contact for multi contact services)</b>	Only 18% of the target population in Angoram district utilized their respective HF within 6 months (Jan. to Jun. 2015). From 0% in 6 HF to 83% and 88% in the best HF, Kambot and Kanengara respectively

<sup>9</sup> In the **fixed strategy**, mothers bring children to health facilities during immunization sessions whereas in the **mobile strategy**, health workers move to remote villages (5 km or above from the health facility), carry out immunization activities and come back the same day. In the **patrol strategy**, health workers move to very remote or hard-to-reach villages, carry out immunization, overnight and come back the next day because their return on the same day is impossible.

	Only 55% of the target population in Wosera Gawi district utilized their respective HF within 6 months (Jan. to Jun. 2015). From 0% in 2 HF to 92% and 99% in the best HFs, namely respectively Kunjingini and Kaugia
<b>Adequate coverage (Continuity/completion)</b>	0,7 % of adequate coverage in Angoram district, from 0% in 6 HF to 9,8% in the best HF (Kanengara)
	2,8 % of adequate coverage in Wosera Gawi district, from 0% in 4 HF to 5% and 8,7% in the best HFs, respectively Kunjingini and Kaugia
<b>Effective coverage (quality/impact)</b>	Nil in almost all the HFs in both districts

### 3.4 Bottlenecks/barriers to immunization

In PNG, as shown by DHS-2006, the main factors for the inequities in immunization program are mothers' education level and the remote rural residence where 87% of the population is. In addition, mostly in Angoram and Wosera Gawi districts in East Sepik Province, geographical inequities to access health services is serious issue.

As presented below, a barriers analysis was conducted in four areas (Enabling Environment, Supply, Demand and Quality of care) and 10 determinants. Table 5 summarizes the main system barriers in immunization as identified in the 2 districts.

**Table 5:** Main system barriers to immunization

**Note:** The full table which includes the actions suggested to address the bottlenecks is presented in the annexes

Determinants	N°	Bottlenecks identified	Level			Causal analysis
			Prov	HD	HF	
<b>A. Enabling Environment</b>						
1. Social Norms	1	Unfavorable environment for staff in Angoram district		√	√	Frequent harassment and threats of health workers by the local population in Angoram district.
2. Legislation/Policy	2	Very weak linkage between central and provincial	√	√		Human and financial resources managed by provincial administrative authorities and not by NDoH
3. Budget/Expenditure	3	Lack of funds and delay in the disbursement of Government funds for district and health facilities	√	√		There is no advocacy by provincial and district health teams to receive funds from Provincial and District Administrators and Members of Parliament for EPI activities
			√	√		Lack of funds for the implementation at district level (supervision and review meeting) and health facility level (outreach activities)
			√	√		Financial support from Government received annually but very late disbursement (2nd quarter May & June) and this delays work plan implementation
4. Management/Coordination	4	Poor management and coordination at all levels		√		No office for the 2 health districts
			√			EPI Work plan (including population figure) not available at provincial level
			√			Very often, no vehicle available for EPI field work (supervision)
				√		Generator available in Angoram health facility for more than 2 years but not working (needed for cold chain equipment)
<b>B. Supply</b>						
5. Availability of Essential Commodities/Inputs	5	Insufficient cold chain equipment at district and HF levels		√	√	No cold chain for the district level, all HF get vaccines directly from provincial vaccines store (no control by district and additional cost for the HF)
					√	Lack of cold chain equipment in 44% of HF (4 out of 9) in Angoram district and 33% (2 out of 6) in Wosera Gawi district : not functional or lack of power
	6	Poor management of vaccines and other immunization commodities	√			Frequent vaccines stock out at provincial level (No BCG, HepB, Measles, TT, OPV since 1 month) (date : August 6, 2015)
				√		Vaccines stock out in 8 health facilities out of 9 (except in Kanengara) for months and years in some of the HFs in Angoram district, 4 out of 6 HFs in Wosera Gawi district
			√	√		Expired vaccines noted at Provincial store (2000 doses of OPV) and in visited HF (Marienberg 760 doses of Measles vaccine and 100 doses of OPV, Kambot: 1750 doses of OPV July 2015, 40 doses of Measles June 2015, Kunjingini fridge belonging to Torembi HF: OPV 100 vials/1000 doses, Polupou SHC: OPV 71 vials/710 doses, Measles 23vials/230 doses and TT 4 vials/40 doses)
			√	√		No reporting on the vaccines wastage in routine immunization (no information on the monthly report concerning the quantity of vaccines used for each of the antigens to allow the calculation of wastage rate)
		√		No temperature chart and refrigerators's temperature not recorded in 89% (8 out of 9 HF in Angoram district) and (5 out of 6 HF in Wosera Gawi district)		
6. Access to Adequately Staffed Services, Facilities, Information	7	Insufficient number of qualified health workers at both district and health facility levels		√		Insufficiency staff at district level, only one or two staff (Nursing Officer for Angoram and Health Extension Officer for Wosera Gawi) to coordinate the implementation of almost 10 priority health programs
			√	√		Angoram : 22% (2 out of 9) of OICs are CHW Wosera Gawi : 50% (3 out of 6) of OICs are CHW
				√		Wosera Gawi : 33% (2 out of 6) of health facilities with less than 4 HW and 75% of all HW are CHW
				√		Angoram : 33% (3 out of 9) of health facilities with less than 4 HW and 69% of all HW are CHW
	8	Immunization activities poorly implemented and interrupted for months or years in 73% of the HF (11 out of 15)		√	√	33% (3 out of 9) of HF regularly closed - HW are away from their duty station in Angoram health district (Amboin, Bunam, Kambuku)
			√	√	√	Very poor accountability of health workers towards achieving high coverage of children with vaccination
				√	√	No vaccination in 8 out of 9 HFs in Angoram for : more than 2 months (Angoram, Biwat, Kambot), more than 6 months (Marienberg) and more than 2 or 4 years for 3 others (Amboin, Bunam, Kambuku, Timbunke) and in 3 out of 6 HFs in Wosera Gawi district for 4 years in Nungwaia (2011 – 2015), Wombissa (2013 – 2015) and few months for Gawi (fridge not working)
				√	√	No implementation of outreach activities for months or for years in 7 out of 9 catchment areas (Angoram) and 4 out of 6 (Wosera Gawi)
		√	√	Inappropriate frequency of static strategy: quarterly in Torembi (Wosera Gawi) and many other HFs, monthly and 2 monthly for many others HF (except Kunjingini, Kaugia and Gawi where it is daily, Angoram and Kanengara weekly)		
		√	√	Most children immunized during static, mobile and patrol sessions are over 1 year (for example in Torembi (Wosera Gawi district) during the session of 31st March 2015, 72% of children vaccinated were over 1 year)		
		√	√	No catch up of left-out and drop out children following vaccination sessions (fixed, mobile and patrol);		
		√	√	PCV13 vaccine introduced in the country in 2014 not used at all in the 2 districts till August 2015 but also in 3 others districts of East Sepik province (Ambunti/Drekikier, Maprik and Wewak)		
<b>C. Demand</b>						
7. Financial Access	9	Some practices increase the low financial access to vaccination services			√	Charging of user fees to run operation cost of health facilities (Child health book at K5 in all the HF of East Sepik) because NDoH do not provide and the HFs get it in bookshop
8. Social and Cultural Practices and Beliefs	10	Very low community involvement in EPI activities	√	√	√	Health Committees not well functional all over the 2 districts
					√	CBD/MHV active in some catchment areas but insufficiently used in the implementation of EPI activities (for example for catch up of left-out and dropout)
9. Timing & Continuity of Use	11	Lack of "monitoring for action" for more than 2	√			No review meeting held at provincial level
				√		No review meetings held at district level
	12	Poor data management at all levels	√	√		No data analysis and no feedback at both provincial and district levels
√			√	√	Immunization monitoring chart not found anywhere at district and HF levels	
		√	√	√	No EPI monthly reports received at district level, all the HFs send their reports directly to provincial level	
<b>D. Quality</b>						
10. Quality of Care	13	Lack of supportive supervision at all levels for more than 2 years	√	√		Supportive supervision not implemented at both central, provincial and district levels for more than 2 years
			√	√		Insufficient funds for supervision
			√	√	√	Poor data quality at all level (report of poor quality, no register and only tally sheets used in some HF, data inconsistency)

### 3.5 Mapping the most deprived populations in East Sepik Province

In East Sepik province almost all children under-one are under-served for immunization. This situation is worse in three districts where the coverage was very low in 2014: Angoram (14%), Ambunti/Drekikier (22%) and Wosera Gawi (27%). The target population of under 1 year infants for the 3 districts affected by inequities is 48% of the entire province. More than 30% of health facilities in Angoram (Amboin, Bunam and Kambuku) and 2 out of 6 in Wosera Gawi (Nungwaia and Wombissa) completely stopped immunization activities in the last 3 years due to lack of cold chain equipment, lack of power, insufficient qualified human resources, harassment of health workers by local populations or the fact that some health workers were out of their duty stations and not performing. Children leaving in the catchments under these health facilities were the most under-served and exposed to coverage inequities. In addition, even those health facilities conducting vaccination services rarely combined all needed delivery strategies – basically stagnant on the fix vaccination site at the health facility level (no outreach activities at all).

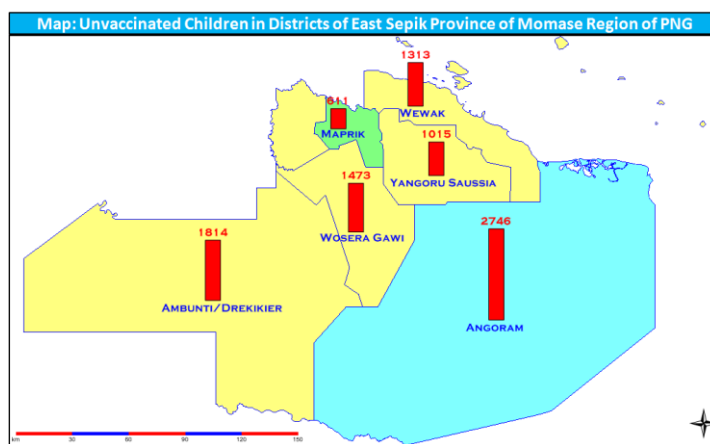


Figure 17: Mapping of under-served children of under 1 year in East Sepik province, PNG, 2014

Figure 17 shows the 3 districts with a great number of unvaccinated under 1 year children in 2014 in East Sepik province: Angoram, Ambunti/Drekikier and Wosera Gawi, accounting for 66% (6,033 out of 9,087) of the total number of unvaccinated children in the province. Angoram and Wosera Gawi districts account for 46% (4,219 out of 9,087).

### 3.6 Enabling Environment :

PNG faces challenges in law and order. Clashes between tribes often result in violence which has the potential to prevent access to services by the communities. Gender-based violence is also prominent and can prevent equitable access to health (EPI review 2013).

In Angoram district, there is frequent harassment and threats of health workers by the population, thus, they are scared to stay in their duty station. Because of this, some health facilities were closed for more than 3 years (Bunam and Kambuku). In addition, Amboin HF has been closed for more than 4 years (since June 2011) because the OIC is out of his duty station (stays at Wewak). For more than 15 years, Angoram HF is partially functioning (only daily out patient) because of harassment as well as the absence of power, water and sanitation.

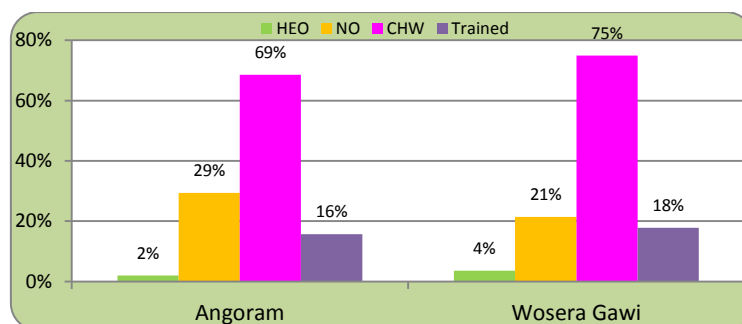
### 3.7 Human resources

Human resources are one of the most important bottlenecks for immunization.

The nurse-to-population ratio is estimated at 1 for 2271 and the doctor-to-population ratio is estimated at 1 for 19,399, the majority of doctors being in Port Moresby (Capital City). An additional 600 nurses, 600 community health workers and 100 midwives are estimated to be needed to fill vacant posts, but current production rates are insufficient to fill the gaps. Churches are important providers of care, especially in rural areas, where they provide up to 80% of health services. Church health facilities share many of the problems of public facilities, but appear to

perform better in a number of areas. Papua New Guinea trains most of their health workforce and the churches run five of the seven nursing schools and all of the community health worker training schools (cMYP 2011\_2015). This HR crisis affects the districts within the country and within East Sepik Province as well but not at the same level. Some districts are more provided with HR than others and Angoram and Wosera Gawi districts are among the worst.

None of the 2 districts is managed by a medical doctor. Angoram district is managed by a Nursing Officer. 60% (5 out of 9) of health facilities have less than 4 HW in Angoram and 33% (2 out of 6) in Wosera Gawi. The following figure shows the situation in both health districts.



**Figure 18:** Human resources in Angoram and Wosera Gawi health districts, August 2015

The majority of health workers are Community Health Workers in both districts (69% in Angoram and 75% for Wosera Gawi). In addition, only 16% and 18% of health workers are trained on EPI respectively in Angoram and Wosera Gawi districts (according to OICs). However, in 7 out of 9 HF (Angoram) and 4 out of 6 HF (Wosera Gawi), at least 1 of the health worker is trained.

### 3.8 Health System and Service Delivery

The health system in the country has undergone several changes and the Law delegates the management of the health service delivery as well as the financial power to the provincial, district and local level governments. The NDoH's main role is advisory. Because of this decentralised system, there is a management disconnect between NDoH and the provincial level. In addition, a nationwide health human resource insufficiency currently exists at various levels in the country.

In East Sepik Province, and especially in both Angoram and Wosera Gawi health districts, management is very weak and almost absent.

The district team is made up of the DHM alone. There is no suitable office for the district. At Angoram, there is a single small empty room for this purpose and nothing at all at Wosera Gawi. There is a total lack of coordination, no coordination meetings, no health programme review meetings, no supervision and no feedback to the HFs on their respective performances. The DHM is not aware of the performances of his district because there is no data analysis and furthermore, all the reports are directly sent to the provincial level.

On the other hand, a cMYP was developed in 2010 for the period 2011-2015 and is available.

In addition, the current work plan, SIREP and SIREP Plus was developed in the country in June 2015 for all the districts in the 22 provinces and is being implemented in the 6 provinces of the Southern Region and some provinces of the Momase region. Although it is based on some bottlenecks identified in the country, the following weaknesses are to be considered: work plans developed in the districts by health facility not finalized, not compiled per district and not workable (still with many errors and missing data), supportive activities at district and provincial levels not included (supportive supervision, review meetings), follow up for vaccines and cold chain management not taken into account.

### 3.9 Health care financing / financial access to health services

In PNG, the majority of health services are provided both by the Government and church health services. Church health services are also funded by the Government.

In principle, health services are free in PNG. In most provinces however, a fee is charged for outpatient visits to run the operation cost of the health facilities. Also, the Child Health books which are used to record the immunization services are charged to mothers at K5 all over the East Sepik Province because NDoH does not provide them and the HF's buy them get it in bookshops. This is likely to reduce population's financial access to vaccination services.

### **3.10 Demand: knowledge and acceptance of immunization**

As per our discussion with the OICs, the attendance to immunization sessions either for fixed, mobile or patrol strategies when organized is acceptable. So the level of acceptance of Routine Immunization may be slightly good especially in rural areas.

One of the rumors concerns the TT vaccine which spread especially during immunization campaigns. Some populations believed that it aimed to sterilize women.

However, in some areas, there is frequent harassment and threats of health workers by the local population. This is very noticeable in Angoram district where 3 HF (Angoram, Bunam and Kambuku) were closed for years and no activities implemented.

### **3.11 Vaccine-preventable diseases outbreaks**

Papua New Guinea remains susceptible to outbreaks of vaccine-preventable diseases due to suboptimal immunization coverage. Efforts are required to strengthen the EPI disease surveillance systems. (cMYP 2011\_2015).

The very low vaccination coverage in PNG leads to very frequent occurrence of cases and outbreaks of vaccine-preventable diseases. Outbreaks of pertussis have occurred recently in 2012 (2013 EPI review). In 2013 and 2014, a Measles outbreak occurred in PNG with a total of 2,153 cases in 21 out of 22 provinces (EPI Unit – NdoH). 29% (625) of these cases involved under 1 year infants. East Sepik Province was also affected with a total of 48 cases. This number may be under-estimated because daily, weekly or monthly reports are unavailable, neither at health facility, district nor provincial level. The affected districts in East Sepik Province were Wewak, Angoram, Ambunty-Drekikier and Wosera Gawi. We have not been able to find a reliable report providing detailed figures per district for East Sepik province.

Furthermore, vaccine preventable disease surveillance is not effective in the field. No guidelines nor case definitions are available. The DHM and most of the OICs are unaware of disease surveillance.

For the current year (2015), cases of whooping cough were reported in Angoram and Wosera Gawi districts from May to October. Amboin, Angoram and Biwat in Angoram district recorded a total of 143 cases and 1 death. In Wosera Gawi district, cases were reported in Gawi catchment area.

### **3.12 Strengths and Good practices**

The following strengths were identified:

- ✓ The country procures 100% of traditional vaccines, and makes a high co-financing contribution to GAVI for purchasing pentavalent vaccine
- ✓ One vehicle is available for Angoram district
- ✓ 3 boats are available for 3 HF's: Amboin, Bunam and Jangit in Angoram district
- ✓ 5 vehicles (ambulances) are available for 5 HF's out of 6 in Wosera Gawi district (except for Torembi)

This shows efforts made by the government to ensure the availability of vaccines. Unfortunately, due to poor management and lack of follow up, these vaccines are still not available in the HF's to be used to immunized children and stock-out occur in several HF's while in some other HF's some vaccines are expired. Furthermore, vehicles are available in some districts but no supervision is conducted.

Good practices were identified during field work:

1. Immunization monitoring charts printed (2010 – 2011) by the central level and provided to the HF's, ready to be displayed and updated every month. These charts were found in 4 HF's (Gawi, Kanengara,

Kunjingini and Nungwaia), but not used although it was displayed on the wall in Kunjingini and Nungwaia HFs.

2. Good Health map of the catchment area available and pasted in Kunjingini, Kanengara, Kaugia, Biwat and Torembi
3. Self-made register used for immunization in Timbunke HF when child health registers not provided
4. Financial contribution by some HFs for the implementation from September to December 2015:
  - Biwat: purchase of a deep freezer for ice making (K1,169) and a generator (K1,990), total K3,159
  - Nungwaia: Purchase of a refrigerator (although it's not a recommended fridge, it is used for ice packs making)
  - Kanengara: K915 (fuel K175, empty drum for fuel K200, 1 driver and 2 Volunteers K540)
  - Kunjingini: purchased a freezer (ice packs making) in November 2015 (K1,600)
5. Financial contribution by LLG: Purchase of a deep-freezer for ice-making in Torembi
6. Some HFs used their funds to get fuel to start the outreach while waiting for fund disbursement at provincial level (Biwat, Kanengara, Timbunke, Nungwaia, Kunjingini and Kaugia)
7. In Kambot HF, very good use of temperature charts and all the used temperature charts are well stored and easily accessible
8. Very good utilization rate in 4 HFs: Kaugia (99%), Kunjingini (92%), Kanengara (88%) and Kambot (83%), all the 4 HFs are ran by church
9. Best adequate coverage rate in Kanengara (9.8%).
10. Good incinerator newly built: Kunjingini SHC, Kaugia, Biwat
11. **Kunjingini**: Good system to catch up with left-out children in the villages: asking mothers to inform the missing mothers to come either to the next village or to the health center. Before each session, a list of expected children is prepared to identify the missing children easily. Names of missing children given to the VHV for them to look for the mothers and sensitize them to come to the next clinic.

#### 4. Addressing inequities in vaccination services in East Sepik Province (August - December 2015)

Given the critical situation disclosed by the inequities and bottlenecks analysis in the East Sepik Province, to address the main identified bottlenecks, it was recommended:

To directly provide support during the last 4 months (September to December 2015) for the implementation of basic immunization activities at the service delivery level and basic supportive activities at provincial and district levels. Support was provided to the districts and the HFs to review the 2015 SIREP work plan taking into account the suggested corrective actions.

This four months work plan mainly aimed at showing that performances could be improved in almost all the districts with little and effective technical and financial support.

The main outputs for this implementation after 3 months are summarized in the table below.

**Table 6:** Actions to address the bottlenecks and reduce inequities in vaccination services and outputs

Determinants	Identified inequities	Actions in the districts/province	Outputs
<b>Essential Commodities</b>	Poor management of vaccines and other immunization commodities	Improve the replenishment of vaccines, the vaccines stock management and distribution at all levels – systematic stock recording	All 15 HF's are now managing in a better way to get their needed vaccines for RI and vaccines are available in all of them All the HF's with functional refrigerators use temperature charts and vaccines stock record forms
	Insufficient cold chain equipment at district and HF level	Repairing & maintaining existing CCE (as far as possible) – use of 7 days cold boxes by HF without a functional fridge – on-site capacity building of HF during supervisions	
<b>Human Resources</b>	Insufficiency of qualified health workers at both district and health facility levels and majority of HW not trained or refreshed on EPI management	Refresher training on key actions during supervision and review meetings (appropriate forecasting of vaccine needs, data recording and analysis, reporting, use of immunization monitoring chart, use of temperature chart...) to keep improving HW skills and confidence in carrying up interventions	HW more comfortable to takeover the immunization activities in their respective catchment areas
<b>Access, Utilization, adequate and effective coverage</b>	Many children kept out of reach of vaccination services due to poorly implemented Immunization activities and interrupted for months or years (in 11 out of 15 HF) in Angoram and Wosera Gawi districts.	Re start the implementation of immunization activities in HF where it was interrupted	All HF's vaccinating on fixed strategy and outreach as well reaching almost all reachable villages through mobile or patrol
		Ensure fixed strategy at least weekly in all the HF with functional fridges	
		Ensure regularity of outreach activities (mobile and patrol) in all the villages	
		Integrated organization of fix and outreach activities – comprehensive costing and budgeting (fuel, allowances) – funds disbursement to support planned activities	Budget available and funds disbursement on a monthly basis
<b>Supportive supervision</b>	Lack of Supportive supervision at all level for many years	Conduct EPI two monthly supportive supervision of HF's (3 for Angoram district and 2 for Wosera Gawi district)	100% implemented. 13 HF's visited out of 15. 7 out of 9 in Angoram, 6 out of 6 in Wosera Gawi
<b>Monitoring for action and data management</b>	Lack of monitoring for action and poor data management for many years at all levels	Hold review meeting at district level for active feedback and to keep improving HW skills and confidence in carrying up interventions	100% implementation (5 meetings out of 5 planned). Angoram: 3 meetings held, Wosera Gawi: 2.
		Draw, display and update regularly the immunization monitoring chart	7 out of 15 HF's (47%) drew and displayed the immunization monitoring chart by end November 2015 (5 in Angoram & 2 in Wosera Gawi)
<b>Financial support</b>	Poor mobilization of funds to support vaccination services (from the available government channels)	Hold a result sharing and advocacy meeting at provincial level in East Sepik Province	Meeting held on 10th December 2015 at Wewak, chaired by Provincial Administrator with participation of NDoH, UNICEF, WHO, 2 LLGs Managers, 5 DHM of East Sepik and 5 best HF's

The table below provides details cost for the implementation from September to December 2015.



**Table 7: Financial support provided for the implementation:**

Level/Sources	Angoram	Wosera Gawi	Total	%
Health facility level (outreach)	112,199	45,564	<b>157,763</b>	82%
District level (review meeting)	18,750	5,322	<b>24,072</b>	12%
Provincial level (supportive supervision)	6,480	4,760	<b>11,240</b>	6%
<b>Total UNICEF</b>	<b>137,429</b>	<b>55,646</b>	<b>193,075</b>	<b>92%</b>
<b>PHO East Sepik</b>			<b>16,687</b>	<b>8%</b>
<b>Total</b>	<b>137,429</b>	<b>55,646</b>	<b>209,762</b>	

## 5. Achievements and improvements in East Sepik province

The implementation from September to November 2015 in both districts contributed to the improvement as follow:

1. Implementation re-started in the 67% (10 out of 15 HFs) of HFs where it was interrupted including the 3 HFs of Angoram which had been closed for 3 to 4 years
2. Outreach activities re-started in all the 5 HFs where they had been interrupted
3. Improvement of timeliness<sup>10</sup> from 25% to 37% in Angoram and from 7% to 23% in Wosera Gawi
4. Copies of monthly reports are sent to the district by all the HFs (before, the reports were sent directly and only to the province)
5. Improvement of data analysis at provincial level: monthly data compiling and analysis with feedback to the districts and HFs during review meetings
6. Effective use of PCV13 vaccine in all the HFs in the 2 districts as from September 2015 in Angoram and October 2015 in Wosera Gawi, as shown by monthly data
7. Important coverage improvement for all antigens between July and November 2015, Pentavalent 3 coverage from 7% to 34% in Angoram, from 22% to 67% in Wosera Gawi
8. Important coverage improvement at provincial level for all antigens, Pentavalent 3 coverage from 20% to 30% between July and October 2015
9. Supportive supervision:
  - 3 supportive supervisions in Angoram district (7 HFs visited out of 9) and 2 in Wosera Gawi district (all the 6 HFs visited)
10. Monitoring for action:
  - ✓ 3 review meetings held in Angoram district with the 9 HFs & 2 in Wosera Gawi
  - ✓ Immunization monitoring charts used in 47% HFs (7 out of 15 against none before the implementation) after refresher training during review meetings & supportive supervision

Major contributing factors for the improvement:

1. Technical support for:
  - ✓ Vaccines and commodities replenishment and cold chain management allow the availability of vaccines in all the HFs
  - ✓ Planning, implementation and monitoring the outreach activities
  - ✓ Regular follow-up for the implementation through supervision and communication (phone call & SMS) for continuous support to the HFs
  - ✓ On site refresher trainings during supportive supervision and review meetings
  - ✓ Data analysis and feedback
  - ✓ Follow up of the implementation of recommendations for both supervision and review meetings

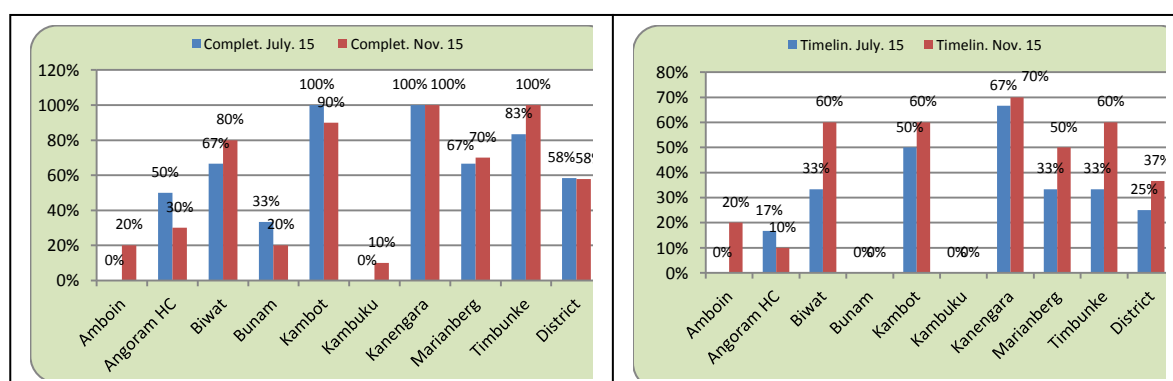
<sup>10</sup> **Timeliness:** Percentage of monthly reports received on time for a given period

2. Financial support provided for outreach activities, provincial supportive supervision and review meetings at district level (table 7).
3. Commitment of majority of OICs, mostly those of church health facilities, to achieve good results.

However, little or no improvement was noted after 3 months of implementation for the following:

1. Despite improvement in Wosera Gawi district, the completeness<sup>11</sup> of monthly reports is still very low in the 2 districts (63% in Wosera Gawi and 58% in Angoram) and the reason is that NHI Officers at provincial level send some reports to the national level without retaining a copy at the provincial level.
2. After 3 months of coaching and mentorship, both provincial and districts teams are not yet able to perform good data analysis, especially using desktop and provide good feedback because of their weak initial capacity. The coaching and mentorship should continue for several months.

### Performances in Angoram district:



Completeness of monthly reports - July & November 2015

Timeliness of monthly reports - July & November 2015

#### Completeness of monthly reports:

- ✓ Completeness of 58% in November 2015 against 58% in July 2015 (reports received at provincial level)
- ✓ Highest completeness: 100% in Kanengara HF in July and November 2015, 100% in Kambot in July but 90% in November. 83% and 100% in Timbunke HF respectively in July and November 2015.

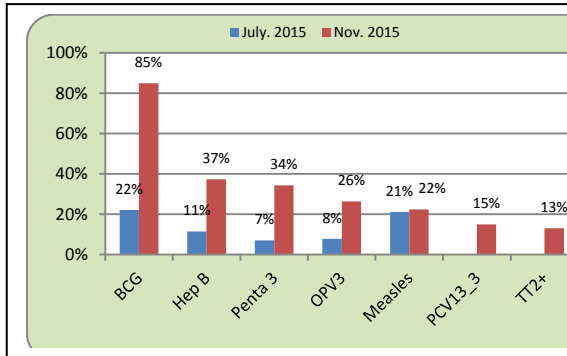
#### Timeliness of monthly reports:

- ✓ Timeliness of 37% in Nov. 2015 against 25% in July 2015 (reports received at provincial level)
- ✓ Highest timeliness: 67% from Kanengara HF in July and 70% in Nov. 2015, Kambot 60% in Nov. against 50% in July 2015. Biwat and Timbunke HFs: 60% in Nov. against 33% in July 2015.

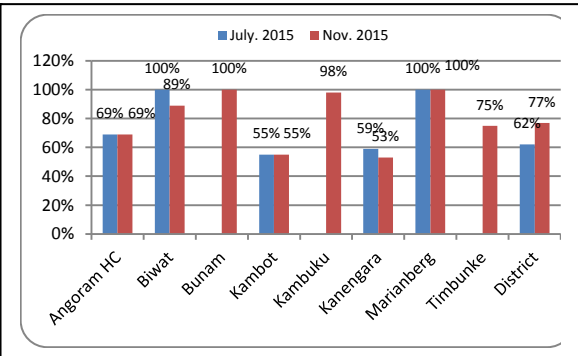
#### Remark:

- ✓ It is important to note that the monthly reports used were the NHIS reports which include all programs. Until August 2015, these reports were found only at provincial level because all the HFs used to send them directly there.
- ✓ As from September 2015, HFs started sending the reports to district level and in November 2015, both districts received the reports of almost all the HFs.

<sup>11</sup> **Completeness:** Percentage of monthly reports received for a given period



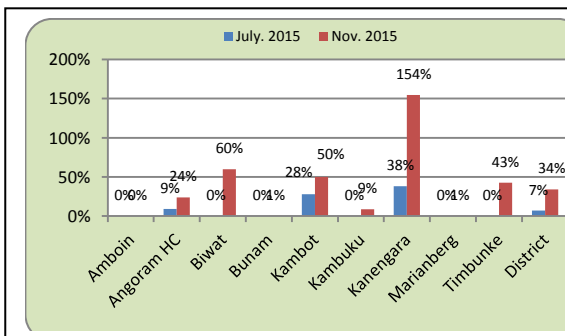
Vaccination coverage all antigens - July & Oct. 2015



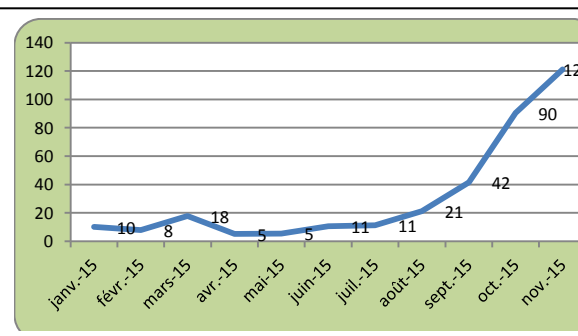
Dropout rate Pentavalent1/Pentavalent 3 - July & Oct. 2015

- ✓ Vaccination coverage still very low for all antigens, except BCG (85%)
- ✓ 0% of coverage in 3 HF for many antigens in Nov. against 4 in July (Amboin, Bunam and Marienberg)
- ✓ Gradual improvement noted for all antigens but not for Measles. Because of MR introduction, Measles vaccine was no longer provided and MR was not yet used
- ✓ PCV13 coverage of 15% in November 2015 against 0% in July 2015 (vaccine not in use until August 2015 before equity work)

- ✓ Drop-out rate Penta 1/ Penta 3 very high, 77% for the entire district in November against 62% in July 2015,
- ✓ Highest dropout rate (100%) in Marienberg and Bunam, Kambuku (98%),
- ✓ Decrease noted in Kanengara and Biwat



Vaccination coverage Pentavalent 3 - July & Nov. 2015

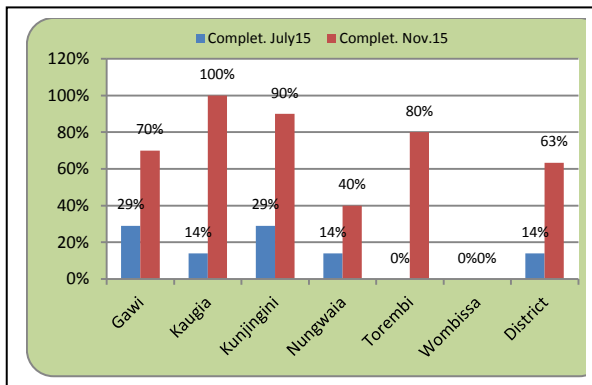


Trend of monthly coverage Penta 3 – Jan. - Nov. 2015

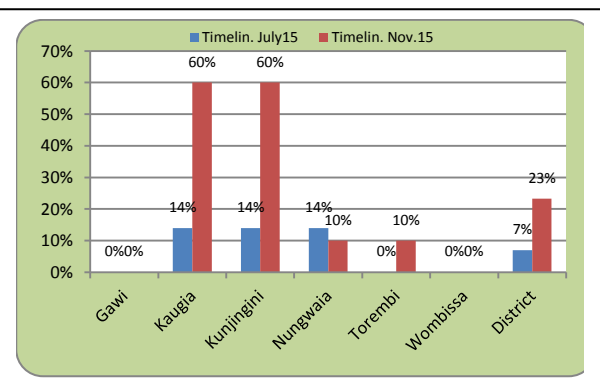
- ✓ Despite the low performance at district level, improvement noted with Pentavalent3 coverage moving from 7% in July to 15% in September, 22% in October and 34% in November 2015,
- ✓ 0% in 3 HFs in Nov. (Amboin, Bunam and Marienberg) against 6 HFs out of 9 in July 2015
- ✓ Highest coverage in Kanengara (154%). More than 100% because the population of Amboin where the HF is closed for more than 4 years are getting health care in this HF

- ✓ Stagnation of coverage from Jan. to July 2015
- ✓ Gradual and important improvement of monthly Pentavalent 3 coverage as from August 2015 with the implementation

## Performances in Wosera Gawi district:



Completeness of monthly reports - July & November 2015



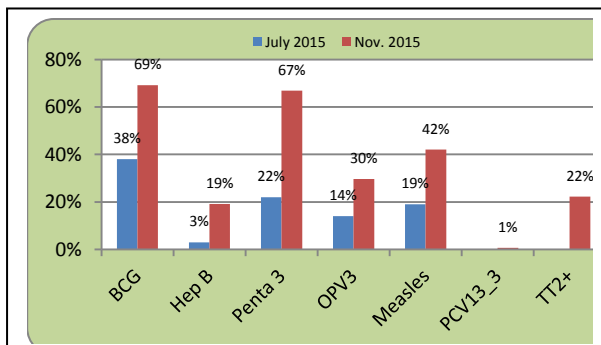
Timeliness of monthly reports - July & November 2015

### Completeness of monthly reports:

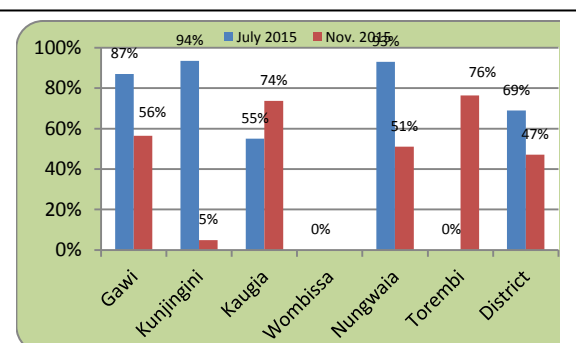
- ✓ Completeness of 63% in Nov. 2015 against 14% in July 2015 (reports received at provincial level)
- ✓ Highest completeness in Nov. 2015: Kaugia and Kunjingini with 100% and 90% respectively
- ✓ Improvement in all the HFs except Wombissa
- ✓ No report received from Wombissa, no immunization activity conducted till September 2015

### Timeliness of monthly reports:

- ✓ Timeliness of 23% in Nov. 2015 against 7% in July 2015 (reports received at provincial level)
- ✓ Highest timeliness in Nov. 2015: Kaugia and Kunjingini with 60% each
- ✓ Improvement in 3 out of 6 HFs (Kaugia, Kunjingini and Torembi)
- ✓ Decrease of timeliness in Nungwaia
- ✓ No report received from Wombissa and none received on time from Gawi



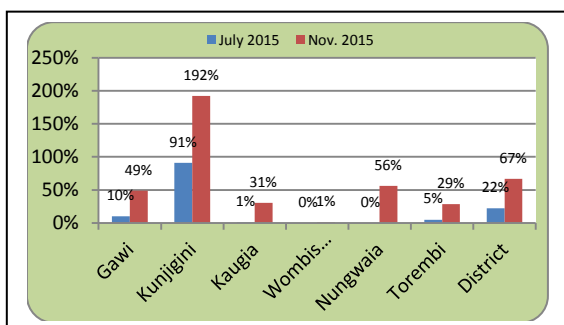
Vaccination coverage all antigens - July & Nov. 2015



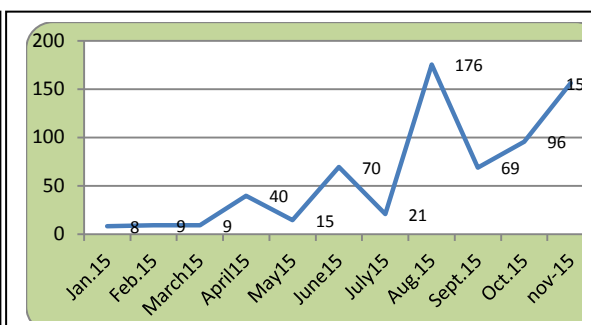
Dropout rate Pent 1 / Pent 3 - July & Nov. 2015

- ✓ Important improvement of vaccination coverage in November compared to July 2015 for all the antigens
- ✓ Important improvement for Pentavalent 3 coverage: 22% in July to 67% in November.
- ✓ Very high contribution of Kunjingini HF to the improvement
- ✓ Important differences between BCG and HepB and between Penta3 and OPV3, mostly due to vaccines stock out

- ✓ Drop-out rate Pent 1 / Pent 3 very high, 47% in Nov. for the entire Wosera Gawi district against 69% in July 2015
- ✓ Little improvement noted at district level and very important improvement in Kunjingini HF
- ✓ Best dropout rate (5%) in Kunjingini HF
- ✓ Higher dropout rate in Torembi 76%, Kaugia (74% in Nov. against 55% in July) and Gawi (56% in Nov. against 87% in July)



Vaccination coverage Pentavalent 3 - July & Nov. 2015

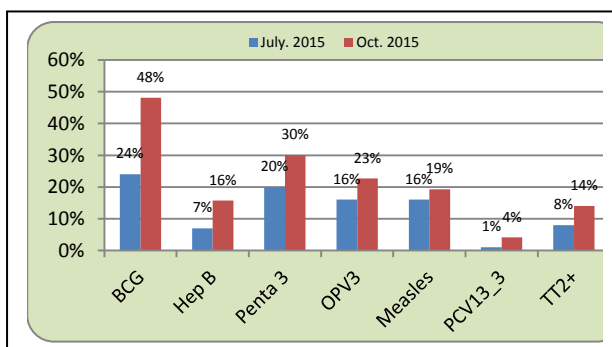


Trend of monthly Penta3 coverage – Jan. to Nov. 2015

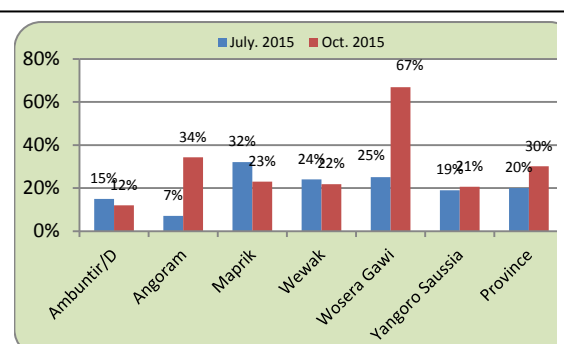
- ✓ Important improvement of vaccination coverage in November compared to July, reaching over 67%
- ✓ Improvement noted also in 5 HFs (Kunjingini, Gawi, Kaugia, Nungwaia and Torembi)
- ✓ Highest coverage in Kunjingini in July (91%) and in November (192%)
- ✓ Kunjingini HF receives also population from neighbouring catchment (Wombissa), Maprik and Yangaru Sausia districts
- ✓ Still 0% in Wombissa HF in Nov.

- ✓ Stagnation of the coverage from Jan. to March 2015, little increase in April and June
- ✓ And then with equity work, important gradual improvement noted as from August 2015
- ✓ Best contribution to this improvement is from Kunjingini HF

### Vaccination coverage at provincial level:



Vaccination coverage all antigens - July & Oct. 2015



Vaccination coverage Pentavalent 3 - July & Oct. 2015

- ✓ Important improvement of vaccination coverage noted in October compared to July 2015 for all the antigens

- ✓ Important improvement of pentavalent 3 coverage in October compared to July 2015, (from 20% to 30%)
- ✓ Most important improvement noted in the 2 districts targeted by equity work, Angoram and Wosera Gawi
- ✓ In 3 other districts, decrease of coverage noted (Ambuntir/Drekikier, Maprik and Wewak) in October compared to July 2015

## 6. Results sharing and advocacy meeting in East Sepik Province

A result sharing and advocacy meeting was held in Wewak, East Sepik province on 10th December 2015 to share observations and achievements from the four-month equity initiative in Angoram and Wosera Gawi districts, and map out a way forward with the stakeholders to address key bottlenecks that affect immunization coverage. The meeting provided an opportunity to advocate for more and consistent government funding for immunization program in the province.

The meeting gave an opportunity to disseminate results of the Nutrition survey that was conducted in November – December 2014 in the province with UNICEF's support.

The objectives of the meeting were:

- 1- Dissemination of the results:
  - a. To share the findings of the inequities and bottlenecks analysis conducted in the East Sepik Province
  - b. To share the achievements of four-months implementation of reviewed SIREP work plans
  - c. To discuss with all the stakeholders and make recommendations for the way forward in 2016 and beyond
- 2- Advocate for more financial support from Government budget for immunization at provincial, district and health facility levels.

The meeting was chaired by the Provincial Administrator of East Sepik Province with active participation by the Deputy PA, Advisory and Technical services.

NDoH was represented by 3 Officers, UNICEF (5) including HQ, WHO (1), 2 LLGs Managers, Save the Children (1), 5 DHM of East Sepik Province and 5 best Health Facilities.

However, no MPs or DAs attended the meeting. Out of 9 LLGs invited, only 2 from Wosera Gawi attended; no LLGs from Angoram attended.

Findings from the inequities & bottlenecks analysis, the implementation of SIREP work plan from September to November 2015 in Angoram and Wosera Gawi districts and key achievements were presented. The following summarizes key issues discussed:

- ✓ Global context of EPI with focus on the importance of equity in immunization and the RED strategy in the implementation and strengthening of EPI program. In the context of PNG with the very low vaccination coverage, inequities and bottlenecks analysis is very important to strengthen EPI program.
- ✓ The persistent lack of funds to support the implementation of immunization interventions at provincial, district and health facilities level and how to ensure that enough funds are available in a timely manner from Government,
- ✓ How immunization could be sustainably funded in the province using available funds for the upcoming years
- ✓ The lack of cold chain in all the districts and how the Province could purchase cold chain equipment through the UNICEF channel with the support of NDoH
- ✓ How to scale up the equity work in East Sepik Province and in the other provinces of the country

The following statements were made:

- ✓ Funding allocated from Government budget to health sector annually is about 35 % of the Provincial budget but the funds do not reach the districts and the health facilities
- ✓ Very important delayed disbursement of funds from the Government budget every year
- ✓ Missed use of available funds such as Minimum Priority Activities (MPA) funds by the LLGs
- ✓ There is a lack of coordination meetings with sectoral managers prior to District Development Authority (DDA) meetings
- ✓ No quarterly review meetings to monitor the progress in the province (PHO) for the last 6 or 7 years.
- ✓ Shortage of manpower especially in the government run health facilities

The recommendations of the meeting are presented in the annexes.

## 7. Equity strategy and mainstreaming equity in policies and immunization plans

### 7.1 Equity strategy

To address inequities and strengthen the immunization program in 2016 and beyond, the following strategies/activities are suggested:

#### In East Sepik Province

#### 1. Scale up the methodology (bottlenecks analysis of the low immunization coverage follow by implementation of the relevant corrective actions) in all the 6 districts of East Sepik Province:

- ✓ **Inequities and bottlenecks analysis and SIREP work plans review:** UNICEF will provide technical guidance and coaching to the province towards the equity steps in the 4 remaining districts, then review and finalize SIREP micro plans by adding supportive activities such as supportive supervision and review meetings at district and provincial level as well as finalizing the SIREP and SIREP plus micro plans to reach a workable budget.
- ✓ **Technical support for the implementation of SIREP and SIREP plus:** UNICEF in collaboration with WHO will support NDoH in providing technical guidance to the province for supervision, mentorship and coaching of the districts during the implementation of SIREP plus (introduction of MR and IPV) and SIREP (Routine immunization). UNICEF and NDoH should participate in the first supervisions for coaching and mentorship. UNICEF technical support during review meetings, both at provincial and district levels should regularly track the progress around the equity in immunization, ensuring that all the villages are reached by vaccination activities including the most vulnerable populations (remote and difficult-to-reach villages), workforce and vaccines are available in all the catchment areas, supportive supervision and review meetings are conducted by provincial and district teams.
- ✓ **Advocacy for more financial resources from the Government budget in East Sepik province:** the provincial team should advocate for more financial resources to support the implementation of SIREP and SIREP plus at the provincial, district and service delivery levels. For this purpose, provincial follow up meetings will be organized following the meeting of 10<sup>th</sup> December 2015 to ensure the implementation of the recommendations. For these meetings, the participation of the MPs and DAs should be ensured. Continuous assistance will also be provided for this advocacy by NDoH in collaboration with UNICEF and WHO.
- ✓ **Financial support for the implementation of SIREP and SIREP plus:** From GAVI HSS in 2016 - 2017, UNICEF should provide financial support for the implementation of SIREP and SIREP plus and especially for technical guidance, coaching by UNICEF EPI specialist, supervision and review meetings at district and provincial level as well as for filling the gaps in outreach activities.

#### In the whole country

#### 2. Introducing the methodology (bottlenecks analysis of the low immunization coverage follow by implementation of the relevant corrective actions) progressively in the other 7 provinces supported by UNICEF:

- ✓ In 2016, UNICEF in collaboration with WHO will support NDoH in providing technical guidance to introduce the equity work in the other 4 low-performing provinces supported by UNICEF (Chimbu, Gulf, Jiwaka and Werstern Highlands). For this purpose, the same steps as in the above point 1 should be followed.
- ✓ In 2017, UNICEF shall use the same process to introduce the equity work in 3 remaining low-performing provinces supported by UNICEF (Eastern Highlands, West Sepik and Western Province).

#### 3. Ensure that supportive activities are put in place at central, provincial and district levels

Requirements:

- ✓ Ensure regular immunization sessions in all the HFs (static), on a daily or at least weekly basis for the HFs with functional cold chain equipment, on a monthly basis for HFs without functional cold chain

- equipment.
- ✓ Outreach activities should be conducted without any disruption in all the catchment areas on a quarterly, bi-monthly or monthly basis depending on the importance of the target population. During the planning, ensure that outreach activities cover all villages for each of the catchment areas including the hard-to-reach communities.
- ✓ **Supportive supervision** should be regularly organized on a quarterly basis for central and provincial level, bi-monthly basis for district level
- ✓ **Monitoring for action:** Review meetings should be regularly organized on a quarterly basis for provincial level with the districts and 2 monthly basis for district level with the HFs. Prior to these review meetings, data analysis should be performed taken into account all EPI indicators and during the meetings, a feedback should be provided on the performances. In addition, Immunization monitoring charts should be pasted in all the HFs and regularly updated.

For this purpose, the following strategies should be used in 2016 and during the upcoming years:

- ✓ NDoH work together with the Provincial EPI Officer and the PVS Officer to ensure the availability of vaccines and other commodities and supply all HFs
- ✓ UNICEF in collaboration with WHO will support NDoH to:
  - Provide technical guidance to provinces implementing SIREP to advocate to provincial Administrative Authorities for more financial support from the Government
  - Participate and coordinate the first 2 supervisions and first 2 review meetings for better coaching and mentorship.
  - Provide updated check list for the EPI supervision at the provincial and district level
  - Provide updated software for EPI data analysis for provincial and district level and ensure the coaching and mentorship for its monthly use for at least a quarter. Prior to this, ensure that copies of monthly reports are sent to district level by all the HFs latest on the 7<sup>th</sup> of the following month
- ✓ For the low performing provinces where equity work is introduced, UNICEF will provide financial support to cover the gap in 2016 for implementation including outreach activities, supportive supervision and review meetings at the provincial and district levels.

#### 4. Reinforce the role of NDoH:

UNICEF and WHO will keep advocating at the higher level to reinforce the linkage between NDoH and provincial level with quarterly coordination/review meetings twice yearly to be able to monitor the progress, ensure guidance and capacity building for provincial teams

#### 5. Improvement of the cold chain capacity, vaccines and cold chain management:

The renewal of the cold chain equipment in the country has started with a first procurement of about US\$1 million of equipment using the UNICEF procurement services.

- ✓ UNICEF and WHO will continue to advocate with Government to complete the upgrading of CC equipment. Through this effort, HFs, especially those without functional refrigerators, will have adequate cold chain equipment. Currently 44% of HFs (4 out of 9) in Angoram district and 33% (2 out of 6) in Wosera Gawi district do not have functioning cold chain equipment. Twenty one Direct Drive Solar refrigerators are needed for East Sepik province.
- ✓ Train HWs at provincial and district level on cold chain and vaccine management, insisting on routine preventive cold chain maintenance for which a plan and budget should be developed.
- ✓ Computerized remote temperature monitoring (national and provincial cold rooms) and 30-day temperature recorders to be rolled out in all the HFs
- ✓ National EPI Unit (NDoH) to ensure that the recommendations of cEVM\_2011 are implemented
- ✓ UNICEF will support the cEVM\_2016 scheduled in the 1<sup>st</sup> quarter 2016
- ✓ EPI supervision should include the cold chain and vaccine management component at provincial and district levels. This should be considered in the checklist.

#### 6. Advocacy for more financial support in the provinces where equity work is introduced

For ownership and sustainability, UNICEF in collaboration with NDoH will support the Provinces to:



- ✓ Continuously advocate at high level of Administrative Authorities for more financial support from Government at all levels.
  - The work plans should be funded by Government with feasible mechanism of early disbursement (before the end of the first quarter) of funds.
  - Annual realistic budget estimate of Routine Immunization should be developed, (by November) and widely shared by provinces and districts.
  - For budget allocation, prioritize the districts and catchment areas with higher number of under-served/unvaccinated children
- ✓ Work closely with Provincial Administrative Authorities to make LLGs accountable for children immunization outcomes in their respective areas, especially for the funding of the EPI program.

#### **7. Advocacy for more accountability and commitment of HW to achieve high results**

- ✓ Administrative Authorities at the provincial and district levels, NDoH and PHD to work together to ensure that health workers remain in their respective duty stations, carry out their duties with commitment and achieve high results regarding immunization and other priority health programs.
- ✓ For this purpose, the annual work plan should set realistic objectives to be achieved at all levels which should be evaluated at the end of the year. In addition, incentive measures based on the results achieved should be used.

#### **8. Improvement of the mothers' educational level**

Regarding the mothers' low education level, to contribute to reduce the gap, education and health programmes in UNICEF PNG will jointly implement in 2016 and beyond the parental education programme.

- ✓ Mother and children living in difficult circumstances can achieve outcomes similar to more privileged peers if provided effective early years support through better parental care.
- ✓ Education annual work plan of 2016 has proposed parenting education & community engagement tools and protocol for the health and education facility centers. Immediate outcome of the parental education programme can include the issues related to right to vaccination and regular health check-ups starting from the beginning of the pregnancy.

#### **9. Improvement of the demand for immunization and Enabling environment:**

Taking into account the low immunization coverage of children from mothers with low educational level and for those residing in remote rural areas,

- ✓ UNICEF should support NDoH and PHD to develop community-based communication strategies to ensure appropriate information is conveyed to mothers in a format this is both understandable and can provide confidence to mothers about the importance of vaccinating their children

Given the harassment and threats of health workers by local populations in number of communities, NDoH should support PHD:

- ✓ To conduct field investigation regarding the harassment and threats of health workers by local population in order to identify both the causis and the appropriate corrective actions
- ✓ For continuous follow-up and advocacy for the implementation of the identified corrective actions in collaboration with provincial and district Administrative Authorities.

### **7.2 Mainstreaming equity in policies and vaccination plans**

The final review of inequities to vaccination services as well as the strategies to address them and the outputs achieved in the two enrolled districts in East Sepik province will provide insights for guiding the rollout of the interventions to all the districts in this province while also providing guidance for strengthening routine immunization in the rest of the country within the up-coming years. The findings from this equity analysis will surely contribute to develop a better cMYP-EPI 2016-2020 for a sustainable RI strengthening in the country.

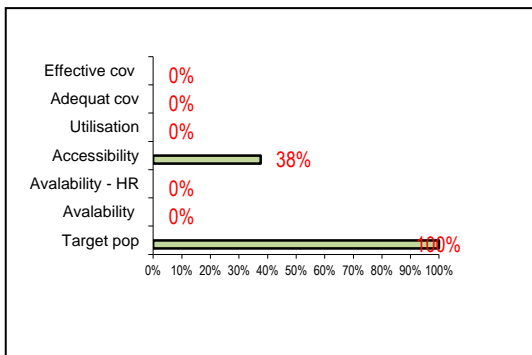
## 8. References

1. Global Vaccine Action Plan (GVAP) 2010 - 2020
2. UNICEF: REC an operational Guide for National Immunization Programs
3. DHS 2006 - PNG
4. PNG cMYP 2010 - 2015
5. GAVI Joint Assessment 2012
6. EPI External review 2013

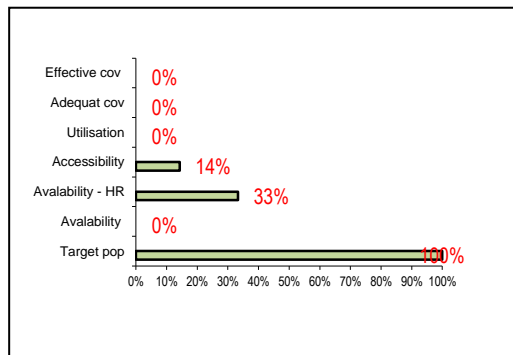
## 9. Annexes

### 1. Coverage determinants graphs for HFs

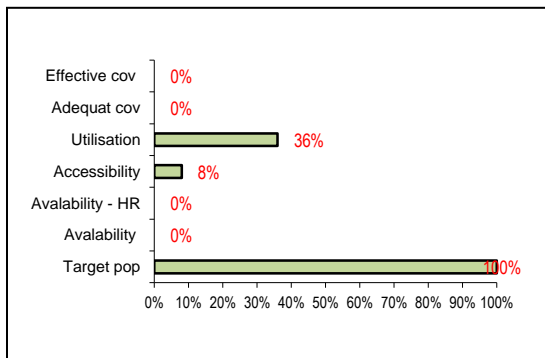
The graphs for each of the 9 HFs of Angoram district are shown below.



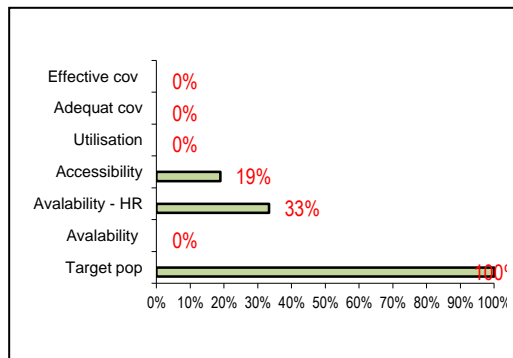
**Amboin**



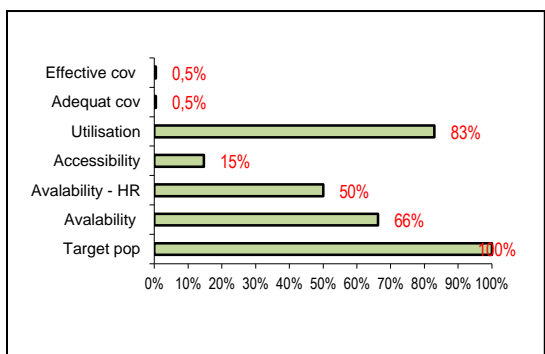
**Angoram**



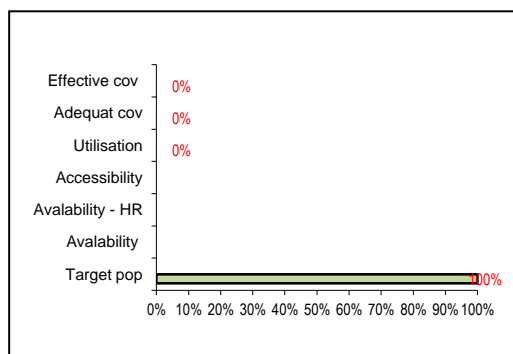
**Biwat**



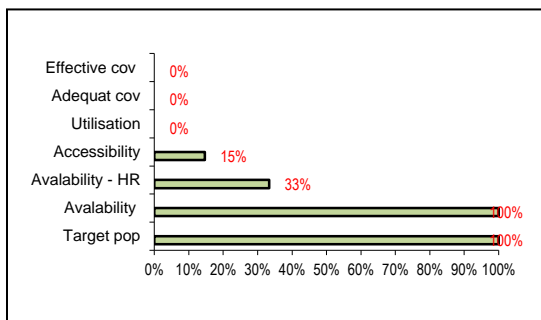
**Bunam**



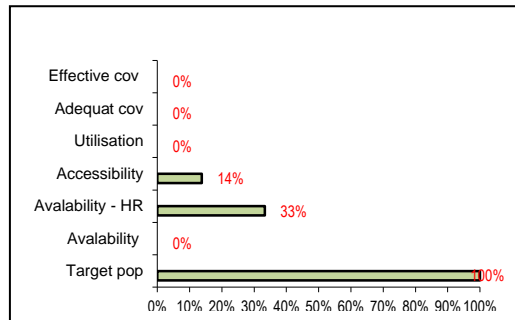
**Kambot**



**Kambuku**

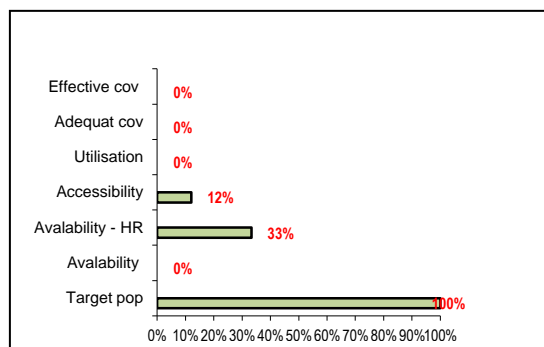


**Kanengara**

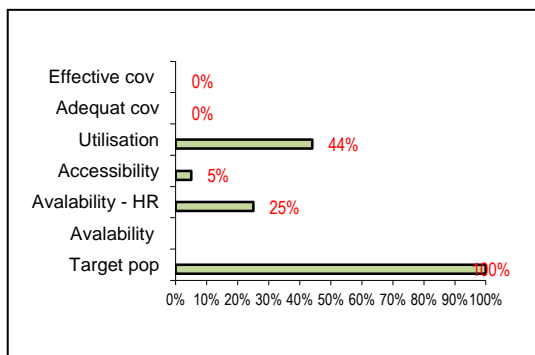


**Marienberg**

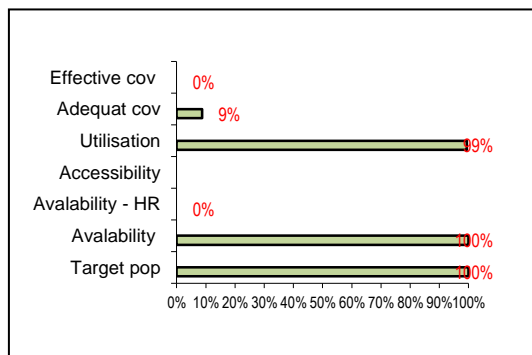
**Timbunke**



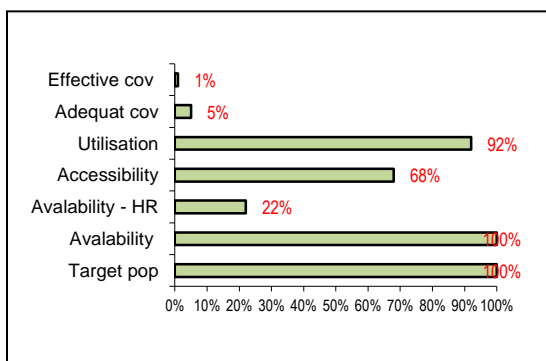
The graphs for each of the 6 HFs of Wosera Gawi district are shown below.



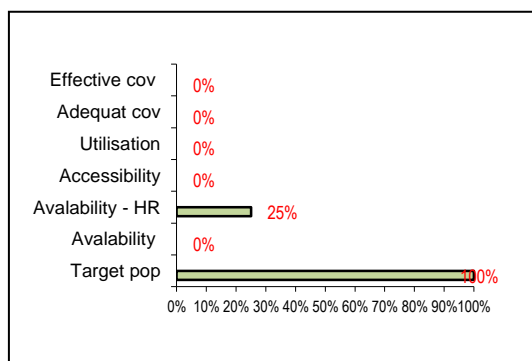
**Gawi**



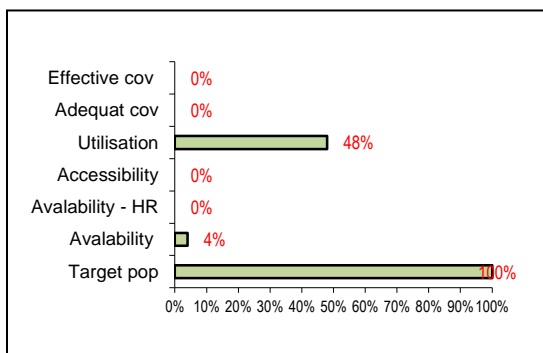
**Kaugia**



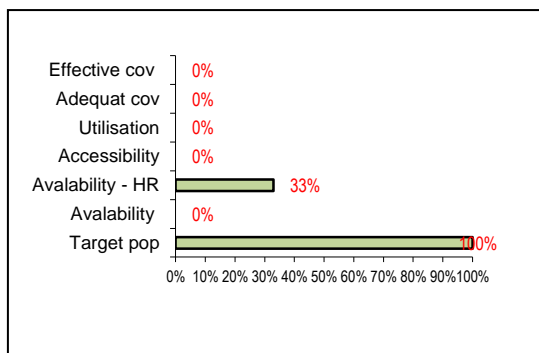
**Kunjingini**



**Nungwaia**



**Torembi**



**Wombissa**

## 2. Data inconsistency in Kambot HF in June 2015

During the provincial supervision in Angoram district in August 2015, Kambot SHC is one of the HFs which was visited and data inconsistency was one of the weaknesses identified concerning June 2015 as shown below.

	Penta 3		OPV3		Measles 9	
	Under 1 year	Over 1 year	Under 1 year	Over 1 year	Under 1 year	Over 1 year
Monthly report	0	155	0	153	21	139
Tally sheet	0	155	0	153	21	139
Child health register	0	18	0	17	2	28

### 3. Main system barriers to immunization and the actions suggested to address the bottlenecks

Determinants	N°	Bottlenecks identified	Level			Causal analysis	Actions suggested to address the bottlenecks and improve the implementation of EPI
			Prov	HD	HF		
<b>A. Enabling Environment</b>							
1. Social Norms	1	Unfavorable environment for staff in Angoram district		√	√	Frequent harassment and threats of health workers by the local population in Angoram district.	/
	2. Legislation/Policy	2	Very weak linkage between central and provincial levels due to decentralization	√	√	Human and financial resources managed by provincial administrative authorities and not by NDoH	/
√				√	No enough support from central level	Central level to provide support through quarterly supportive supervision and coordination/review meetings	
3. Budget/Expenditure	3	Lack of funds and delay in the disbursement of Government funds for district and health facilities	√	√	There is no advocacy by provincial and district health teams to receive funds from Provincial and District Administrators and Members of Parliament for EPI activities	Finalize summary of SIREP workplan as reviewed in August 2015 with UNICEF support and submit to the Administrative Authorities to advocate for financial support	
			√	√	Lack of funds for the implementation at district level (supervision and review meeting) and health facility level (outreach activities)		
			√	√	Financial support from Government received annually but very late disbursement (2nd quarter May & June) and this delays work plan implementation	/	
4. Management/Coordination	4	Poor management and coordination at all levels	√	√	No coordination meeting neither at provincial level nor district level for more than 2 years	Hold regular quarterly coordination meetings at provincial and district levels	
				√	No office for the 2 health districts	Advocate to Central level, Provincial and district Administration to provide suitable office for the district	
			√		EPI Work plan (including population figure) not available at provincial level	Ensure the availability of the work plan and all EPI management tools	
			√		Very weak collaboration between FHS/EPI and Disease control for surveillance and NHIS for data analysis	Ensure integrated data analysis and sharing among priority health programs at provincial level	
			√		Very often, no vehicle available for EPI field work (supervision)	Develop a schedule for main activities to be conducted by FHS on a monthly basis for a better use of the vehicle	
			√		Generator available in Angoram health facility for more than 2 years but not working (needed for cold chain equipment)	Fixe and use the generator to improve cold chain management	
<b>B. Supply</b>							
5. Availability of Essential Commodities/Inputs	5	Insufficient cold chain equipment at district and HF levels		√	√	No cold chain for the district level, all HF get vaccines directly from provincial vaccines store (no control by district and additional cost for the HF)	Provide cold chain at district level and organise vaccines and commodities supply from the district for all HF
					√	Lack of cold chain equipment in 44% of HF (4 out of 9) in Angoram district and 33% (2 out of 6) in Wosera Gawi district : not functional or lack of power	Fix all the refrigerators which are out of order
					√	Lack of cold boxes in some HF without functional refrigerators	Provide enough cold boxes to HF without refrigerators (namely : Amboin, Bunam, Kambuku, Marianberg, Nungwaia and Wombissa) to allow them start implementation
			√	√	1 direct solar refrigerator received but not installed in Kambot SHC for more than a year	Central level to provide support for installation of the direct solar refrigerator in Kambot SHC	
	6	Poor management of vaccines and other immunization commodities	√			Frequent vaccines stock out at provincial level (No BCG, HepB, Measles, TT, OPV since 1 month) (date : August 6, 2015)	Ensure regular vaccines and commodities supply at provincial level
					√	Vaccines stock out in 8 health facilities out of 9 (except in Kanengara) for months and years in some of the HFs in Angoram district, 4 out of 6 HFs in Wosera Gawi district	DHM : Provide support to 4 HF to carry the vaccines from Wewak using district vehicle (Angoram, Biwat, Kambot and Marianberg) EPIO : Provide support to 4 HF to carry the vaccines from Wewak (Amboin, Kambuku, Kanengara and Timbunke) EPIO : Negotiate a partnership with Samaritan Aviation for vaccines and commodities supply for difficult access HF
			√		√	Expired vaccines noted at Provincial store (2000 doses of OPV) and in visited HF (Marienberg 760 doses of Measles vaccine and 100 doses of OPV, Kambot: 1750 doses of OPV July 2015, 40 doses of Measles June 2015, Kunjingini fridge belonging to Torembi HF: OPV 100 vials/1000 doses, Polupou SHC: OPV 71 vials/710 doses, Meales 23vials/230 doses and TT 4 vials/40 doses)	Use and regularly update vaccines and commodities stock record forms Return excess vaccines to higher level for distribution
				√	√	No reporting on the vaccines wastage in routine immunization (no information on the monthly report concerning the quantity of vaccines used for each of the antigens to allow the calculation of wastage rate)	Central level (NDoH) to include the vaccines quantity used for all antigens in the monthly report
					√	No temperature chart and refrigerators's temperature not recorded in 89% (8 out of 9 HF in Angoram district) and (5 out of 6 HF in Wosera Gawi district)	Use the temperature chart for each refrigerator adequately (record twice daily the temperature)

Determinants	N°	Bottlenecks identified	Level			Causal analysis	Proposed actions to address the bottleneck and improve the implementation of EPI	
			Pro	HD	HF			
6. Access to Adequately Staffed Services, Facilities, Information	7	Insufficient number of qualified health workers at both district and health facility levels			√	Insufficiency staff at district level, only one or two staff (Nursing Officer for Angoram and Health Extension Officer for Wosera Gawi) to coordinate the implementation of almost 10 priority health programs	Advocate to Central level and Provincial Administration to provide more staff	
				√	√	Angoram : 22% (2 out of 9) of OICs are CHW Wosera Gawi : 50% (3 out of 6) of OICs are CHW	/	
					√	Wosera Gawi : 33% (2 out of 6) of health facilities with less than 4 HW and 75% of all HW are CHW Angoram : 33% (3 out of 9) of health facilities with less than 4 HW and 69% of all HW are CHW	/	
					√	33% (3 out of 9) of HF regularly closed - HW are away from their duty station in Angoram health district (Amboin, Bunam, Kambuku)	The 3 OIC should stay at their duty station	
			√	√	√	Very poor accountability of health workers towards achieving high coverage of children with vaccination	/	
	8	Immunization activities poorly implemented and interrupted for months or years in 73% of the HF (11 out of 15)		√	√	No vaccination in 8 out of 9 HFs in Angoram for : more than 2 months (Angoram, Biwat, Kambot), more than 6 months (Marienberg) and more than 2 or 4 years for 3 others (Amboin, Bunam, Kambuku, Timbunke) and in 3 out of 6 HFs in Wosera Gawi district for 4 years in Nungwaia (2011 – 2015), Wombissa (2013 – 2015) and few months for Gawi (fridge not working)	Start the implementation of SIREP work plan as reviewed during the 4th August meeting in Angoram immediately (Static, Mobile and Patrol)	
				√	√	No implementation of outreach activities for months or for years in 7 out of 9 catchment areas (Angoram) and 4 out of 6 (Wosera Gawi)	Ensure the implementation of outreach activities (Mobile and Patrol)	
				√	√	Inappropriate frequency of static strategy: quarterly in Torembi (Wosera Gawi) and many other HFs, monthly and 2 monthly for many others HF (except Kunjingini, Kaugia and Gawi where it is daily, Angoram and Kanengara weekly)	Ensure a better frequency of immunization sessions in all the HFs (static strategy) : daily or at least weekly for HFs with a refrigerator and monthly for the HFs without cold chain equipment	
					√	Vaccinated children not recorded per antigen or registers badly filled (ticked instead of date of vaccination : mostly in Torembi, slightly at Kambot) or some registers not found (Angoram HF)	Provide Child Health registers and temperature chart to all the HF Use Child Health registers and make sure all vaccinated children are recorded (name, birth day, date of vaccination) including during outreach activities (mobile and patrol)	
					√	Most children immunized during static, mobile and patrol sessions are over 1 year (for example in Torembi (Wosera Gawi district) during the session of 31st March 2015, 72% of children vaccinated were over 1 year)	As from September 2015, start prioritising the under one year infants for all the immunization sessions and sensitize the mothers accordingly	
					√	No catch up of left-out and drop out children following vaccination sessions (fixed, mobile and patrol);	Ensure catch up of left-out and drop out children through community members (the VH is one of the opportunities wherever they are active in the villages)	
					√	PCV13 vaccine introduced in the country in 2014 not used at all in the 2 districts till August 2015 but also in 3 others districts of East Sepik province (Ambunti/Drekikier, Maprik and Wewak)	As from September 2015, start using PCV13 vaccine in all the HFs of Angoram and Wosera Gawi districts	
	<b>C. Demand</b>							
	7. Financial Access	9	Some practices increase the low financial access to vaccination services			√	Charging of user fees to run operation cost of health facilities (Child health book at K5 in all the HF of East Sepik) because NDoH do not provide and the HFs get it in bookshop	Provide enough child health books in all the HFs (NDoH)
8. Social and Cultural Practices and Beliefs	10	Very low community involvement in EPI activities	√	√	√	Health Committees not well functional all over the 2 districts CBD/MHV active in some catchment areas but insufficiently used in the implementation of EPI activities (for example for catch up of left-out and dropout)	/	
9. Timing & Continuity of Use	11	Lack of "monitoring for action" for more than 2 years			√	No review meeting held at provincial level	Hold quarterly EPI review meeting with all the health districts	
					√	No review meetings held at district level	Hold monthly EPI review meeting in August, October and early December 2015 with all the HF and then, as from January 2016, on a quarterly basis (Province support)	
	12	Poor data management at all levels		√	√	No data analysis and no feedback at both provincial and district levels	Perform monthly analysis based on EPI monthly reports (Province & district), data software to be provided Provide monthly feedback to all the HF (district) and to all the health districts (Province) using the analysis done	
				√	√	Immunization monitoring chart not found anywhere at district and HF levels	Draw, paste and regularly update the immunization monitoring chart at district level and in all the HF	
				√	√	No EPI monthly reports received at district level, all the HFs send their reports directly to provincial level	Send the EPI monthly report to the district and also keep a copy at HF level latest on the 5th of the following month Produce the district EPI monthly report by compiling the reports received and send it to provincial level latest on the 10th of the following month	
				√		NHS Officers always send some reports to central level without keeping copy at provincial level	Ensure that copies of all reports received are kept and available at provincial level to improve the completeness	
<b>D. Quality</b>								
10. Quality of Care	13	Lack of supportive supervision at all levels for more than 2 years	√	√		Supportive supervision not implemented at both central, provincial and district levels for more than 2 years	Organise provincial monthly supervision in Angoram and Wosera Gawi districts on August, October and November 2015 and then on a quarterly basis as from January 2016	
			√	√		Insufficient funds for supervision	Support provincial monthly supervision for the last 4 months 2015 in Angoram and Wosera Gawi districts (UNICEF)	
			√	√	√	Poor data quality at all level (report of poor quality, no register and only tally sheets used in some HF, data inconsistency)	Conduct DQS in the districts & HF to identify weaknesses and relevant actions to improve data quality	

4. Recommendations of the results sharing and advocacy meeting held at Wewak, December 10, 2015

Bottlenecks/Constraints	Recommendations/corrective measures	Responsible person/Officer in-Charge	Dateline
<b>Immunization</b>			
<b>Financial support to EPI activities (SIREP) particularly outreach, supervision and monitoring for action:</b>  ✓ Lack of funds for the implementation of immunization interventions (outreach, supervision and review meetings) <ul style="list-style-type: none"> <li>○ Inability to access funds</li> <li>○ Delayed disbursement of available funds</li> </ul>	1. Provincial government with the support of NDoH should organise advocacy meeting with the MPs to gain support for immunization programme 2. Put in-place a mechanism to ensure that at least 20% (about PGK500,000) from the DSIP funds in each district is allocated and readily accessible by the provincial or district health office to support immunization programme 3. To access provincial/district funds including the funds from the treasury on a timely manner to support EPI 4. LLGs and Districts should support immunization programme in their respective areas 5. LLGs to be accountable for the outcome of immunization in their respective areas and provide yearly adequate financial support using MPA funds 6. Pursue the review and refinement of the micro-plan budget for 2016 (separate cost for transport, purchase of boats, motor and vehicle, specify the funding source). 7. DSIP funds to be used and co-ordinated well in the districts.	D/PA – ATS FH Division  D/PA – ATS FH Division  D/PA – ATS FH Division  D/PA – ATS DA-LLGs  D/PA-ATS DA - LLGs  EPI Officer NDoH-UNICEF  D/PA – ATS DA	Feb-Marc 2016  Feb-Marc 2016  Continuous  Continuous  Continuous  Jan - Feb 2016  Continuous
<b>Vaccines and cold chain management:</b> ✓ Lack of or non-functional cold chain equipment and other gadgets ✓ Stock-out of vaccines/supplies	8. Update cold chain equipment (CCE) inventory in the province and provide list of CCE requirements and costings. 9. Purchase approved CCE through UNICEF procurement system using DSIP provincial funding to upgrade CCE 10. Conduct additional cold chain maintenance and repair training and provide tool kits	EPI Officer Health facilities branch/EPI Unit/ D/PAATS UNICEF  EPI Unit UNICEF	Decemb. 2015  Feb-June 2016  Feb-Apr. 2016
<b>Human Resources:</b> ✓ Lack of skilled staff on EPI ✓ Lack of health workforce at HF level and especially in Government HF	11. Conduct basic EPI training to health workers in the province; 12. Recruitment and filling in of vacant positions as soon as possible	EPI Unit UNICEF  D/PA – ATS	Feb-Jun. 2016  March 2016
<b>Safety and security of staff (enabling environment):</b> ✓ HF are closed due to	14. Meeting with the community leaders to	D/PA-ATS	Jan-June

<p>law and order problem or staff not conducting outreach clinics in these areas</p> <p>✓ Harassment and threats of health workers by local population in some communities</p>	<p>resolve problems and allow health staff to at least conduct outreach activities</p>	<p>DAs - LLGs</p>	<p>2016</p>
<p><b>Supportive activities:</b> Lack of coordination meetings, supportive supervision and review meetings at national, provincial and district level for several years</p>	<p>15. Conduct supportive supervision at national, provincial and district levels</p> <p>16. Hold quarterly coordination and review meetings at provincial and district level to track progress</p>	<p>Family Health Division, EPI Unit PHO - DHM</p> <p>PHO - DHM</p>	<p>Continuous</p> <p>Continuous</p>
<p><b>Coordination at district administration level:</b> Lack of coordination meetings with sectoral managers prior to District Development Authority (DDA) meetings</p>	<p>18. Hold regular consultative meetings with the health managers prior to DDA meetings to discuss funding assistance for EPI and other priority programmes.</p>	<p>DAs - LLGs &amp; DHM</p>	<p>Continuous</p>
<p><b>Way forward after the results sharing and advocacy meeting</b></p>	<p>19. Ensure an active follow-up of the recommendations implementation</p> <p>20. Hold follow-up meeting after 3 months on the status of the recommendations implementation</p>	<p>PHD</p> <p>D/PA-ATS</p>	<p>Continuous</p> <p>March 2016</p>