

11. Annexes

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11.1 Health Facility survey methodology

11.1.1 Sampling of health facilities

The survey purposively sampled geographic areas, with a mix of purposive and random sampling within those areas, as recommended in the WHO Operational Package. Table A1 below summarises the adaptation of the WHO Methods to PNG.

Table A1: Adaptation of WHO methods to PNG context

WHO package methods	Suggested PNG sampling
Choose five geographical areas <ul style="list-style-type: none"> • One in <u>largest</u> or capital city • One in <u>lowest income</u> generating area • Three randomly selected 	Choose two provinces from each of PNG's four regions: total of eight provinces.
Public sector* facility survey selection Six health facilities per geographical area <ul style="list-style-type: none"> • One <u>main/biggest</u> public hospital • One primary/rural HF or <u>lowest</u> level HF • Four middle level public HF, randomly selected <p><i>*Private sector tools will not be used in this survey</i></p>	In each province sample six HCs, and five-ten APs <ul style="list-style-type: none"> • One main/biggest public hospital • Five HFs selected at random, but ensuring: <ul style="list-style-type: none"> ○ at least one with larger outpatient numbers ○ at least one listed as 'remote' <p>At rural HFs, an additional one or two supervised Aid Posts will be assessed either through staff interviewed, or the AP visited, if feasible.</p>
Central/regional/district warehouses Total for country: Five warehouses. Per geographical area: One warehouse.	Central/regional/district warehouses <ul style="list-style-type: none"> • Four Area Medical stores • Four provincial medicines transit stores
Patient survey sampling <i>Retrospective (survey 7 and 9) over previous 12 months</i> <ul style="list-style-type: none"> • 30 patients from general outpatient list with <ul style="list-style-type: none"> ○ any diagnosis ○ selected diseases: diarrhoea, pneumonia <p><i>Prospective (survey 6)</i> Interview 30 patients leaving after treatment</p> <ul style="list-style-type: none"> • The prescribed medicines, how well labeled, how well instructed etc. • Out of pocket costs <p>Availability of standard treatment guidelines</p> <ul style="list-style-type: none"> • Survey 8 	Patient survey <ul style="list-style-type: none"> • <i>Retrospective</i>: include review of: <ul style="list-style-type: none"> ○ Childhood pneumonia ○ Malaria ○ Childbirth care • <i>Prospective</i>: Ten patients per rural health facility, including hospital. <p>Standard treatment guidelines</p> <ul style="list-style-type: none"> • Presence of any of past two editions of child health, O&G, adult, STI Standard Treatment Guidelines. • Presence of national formulary or other essential medicines list information.

Purposive sampling criteria at the province level (noting criteria overlap) comprise:

- Two provinces from each of PNG's eight ecological regions, which provide contrasts in the primary mode of transport access, distribution methods, and socio-cultural makeup.
- At least one province per region with a higher proportion of districts classified as most disadvantaged
- At least one province per region where distribution problems have been noted
- Inclusion of provinces that are development priorities due to population health need and a commitment to governance reform.

Mixed purposive sampling and random selection within each province:

- The largest hospital (usually the government provincial hospital)
- Five further health facilities chosen at random, ensuring that:
 - At least one higher volume (typically > 15,000 outpatients per year)
 - At least one designated as 'remote' in distribution planning
- At each rural health facility, one or two Aid Posts within that facility's catchment area will be sampled, either through:
 - Direct visit, if within four hours travel, or
 - Staff interviews

The final sample included 12 hospitals, 40 Health Centres/Sub Centres, 50 Aid Posts (12 interviewed but not visited), four Area Medical Stores (AMS) and four Provincial Transit Store (PTS). The WHO Operational Package, which is powered to provide 95 per cent confidence in the results for the majority of indicators, recommends at least 30 health facilities. In each province, a set of alternate sites were pre-selected, using an extension of the above criteria; to be used if unexpected security or weather events required a last minute change in plan.

11.1.2 Survey instruments

The WHO Operational Package instruments comprise a set of standard forms, downloadable at http://www.who.int/medicines/publications/WHO_TCM_2007.2/en/ (accessed 13th May, 2013). Standard forms are documented in Annex 7, pages 124 – 147 of this document.

These forms are structured to permit binary or numeric responses, so as to generate quantitative measures. These are based on:

- direct observation of medicine storage rooms, clinical areas, stock records and clinic registers, relating to a selected set of tracer medicines;
- structured interviews with health facility staff responsible for medical supplies management and patient care;
- review of treatment records for designated tracer medical conditions; and
- interviews with patients who have completed their clinical consultation on the day of the survey.

The surveys comprised of a limited set of open qualitative questions, in four areas: supplies availability, stores management procedures, recording of health information on medical supplies, and the rational use of medicines. This provided additional information on health worker and patient opinions, and was also used in sites where direct observation of records is constrained. Data from these questions will be analysed separately.

To include assessment, at stakeholder request, of facility readiness for emergency obstetric and newborn care (EmONC), a limited set of questions on EmONC equipment and its usage will also be addressed through observation and interview. These are also structured forms with binary or quantitative responses permitted, derived from Module 3 (Essential Drugs, Equipment and Supplies) and Module 5 (EmONC Signal Functions and Other Essential Services) of the EmONC Needs Assessment Tool from the WHO-accredited program at Columbia University, Averting Maternal Death and Disability, which is an acknowledged global standard.

To include assessment, at stakeholder request, of at least one health outcome measure, health facility records were reviewed to validate the facility's reporting on case-fatality rates from childhood pneumonia over the previous three months. This is already reported by all facilities as part of the National Health Information System, and the standard form of the indicator in that system will be adopted for this survey.

The WHO Operational Package calls for identification of a list of tracer medicines from a nationally accepted list of essential medicines, as well as a tracer of medical conditions to be reviewed in treatment records. In both tracer medicines and tracer medical conditions, based on advice from the Technical Review Committee, the survey focuses on clinical care of childhood pneumonia, pregnancy and childbirth, family planning, malaria and other serious infections. The medicines also aim to include some used in preventive medicine as well as curative medicine. The table below shows tracer medicines and the tracer conditions chose for this survey.

Table A2: Tracer medicines

<i>Medicines</i>
1. Artemether-lumefantrine oral preparations
2. Medroxyprogesterone depot injection 150mg/mL
3. Oxytocin 10 IU ampoules
4. Gentamicin injection 80mg/2mL
5. Chloramphenicol 1g injection
6. Cotrimoxazole 400/80mg tablet
7. Amoxycillin 250mg or 500mg tablet
8. Misoprostol 200mcg tablets
9. Oral Rehydration salts
10. Zinc 20mg tablet
11. Ampicillin 1g injection
12. Magnesium sulphate injection 50%
13. Artesunate suppository 200mg
14. Vitamin A – 200,000 IU capsule
15. Sodium chloride 0.9%, 1L
16. Ferrous Sulphate 200mg + Folic Acid, 0.4mg Tablets

Table A3: Tracer medical conditions

1. Non-antibiotic diarrhoea in children under five years
2. Outpatient pneumonia in children under five years
3. Inpatient pneumonia, including deaths, in children under five years
4. Non-pneumonia acute respiratory infection in any age
5. Uncomplicated malaria, in any age
6. Facility-based childbirth care.

The choice of tracer medicines was also designed to allow comparison of direct distribution “100% kits” system (medicines 5 to 16), with vertical programs distribution (medicine 1), and with the traditional ‘pull’ system (medicines 2 to 4). At least three of medicines 5 to 16 may also be distributed through the traditional ‘pull’ system, however the distribution origin can be identified because the single-source supplier for the direct distribution system gives clearly identifiable branding, which has not previously been supplied into PNG. Medicines 2 to 4, while not currently part of the direct distribution “100% kits” system, are included in the next round of future procurement for direct distribution, thus their inclusion will provide a baseline measure for future surveys.

11.1.3 Survey process

The Burnet Institute research team was responsible for the finalization of the survey instrument and led the training of data collectors. One co-investigator from the Pharmacy Department of UPNG was recruited, and mobilized data collectors, from the student body. Both Burnet Institute and UPNG

academic co-investigator provided field supervision of survey quality during implementation. The principal investigator provided overall technical coordination of survey operations.

61 pharmacy students, and five pharmacy staff from UPNG, worked as data collectors to undertake the surveys in different level health facilities in the four regions of PNG. Data collectors were fully trained and briefed before carrying out the surveys to ensure reliability and accuracy of information. The survey was piloted in health facilities in Port Moresby. Data collectors worked in teams of two or three persons, to allow cross-validation of observations. The survey was undertaken between 6th and 22nd June, 2013. Students surveyed their home provinces where feasible, to accommodate for language and cultural sensitivities. Data collectors received full coverage of all travel expenses, and a small daily fee, used as basis for a professional contract related to the data collection responsibilities. Additional opportunities for research capacity development will be provided by ensuring all students receive progress information on the data cleaning and analysis process and inviting some students to take an active, but advisory, role in data analysis and interpretation.

Given the difficult logistics within PNG, the Australian Government Health and HIV Implementation Services Provider provided support with transport, insurance and security arrangements for all survey supervisors and data collectors, a role they have played for a wide variety of large and small missions within PNG in the past. Resources were sufficient to enable a well-coordinated set of travel, using the most rapid and secure mix of air, water or road transport available. Provisions were made for overnight stays and security escorts where this was warranted. Insurance was provided for the duration of field work, and all data collectors were provided phone access to a logistical support team based in Port Moresby. Contingency training was provided to data collectors, including communication protocols and emergency plans. Data collectors signed letters from the NDoH and UPNG, authorising them permission to conduct the survey.

Health facility staff for interview were chosen by the health facility management and, where possible, included one with medical supplies management responsibility and one with relevant clinical care responsibility in each site. All personal information collected was de-identified, and all participants were provided with information regarding the scope and rationale for the project. Because the scope of the survey did not go beyond the bounds of their normal professional responsibilities, such as may be required during a supervisory visit, it was assumed that health facility staff would not experience research-associated discomfort.

Expectation for feedback and facilitation was limited to that which lies within normal professional capacity and survey findings would have no role in any individual's performance management. All staff members were proficient in English.

Client participants included women and men of low, middle and high socio-economic status in PNG, who have accessed the service. Clients were invited to participate in the project through face to face invitation and information provided based on a standard script. All clients were provided verbal consent and were free to discontinue interviews at any time. Client information is not identifiable, and no names or addresses were recorded.

11.2 Detailed findings and data tables from the health facility survey

11.2.1 *Introductory note on interpretation of detailed survey findings*

Please refer to the Annex above for survey methods, and to the main evaluation report for contextualization and interpretation of findings. Abbreviations are listed in the main report.

The following points on methodology, limitations and assumptions should be noted when interpreting data tables and findings:

- **Generic medicine:** The authors' knowledge of well-known generic manufacturers was initially used to classify a medicine as generic or brand. If it was unknown, then a generic medicine was defined as one where the main name on the container is the name of the medicine rather than a created name e.g. "Oxytocin" as opposed to "Devoxy", the latter being the brand name. The classification of a medicine as a generic or branded medicine in some cases may have been misclassified given the vast number of manufacturers found, and inadequate information (e.g. from internet) to be able to distinguish between them.
- **Stock-outs:** defined as when there was no stock of medicines. This is the inverse of medicine availability e.g. 10% stock-out is the same as 90% availability.
- **Months of no stock/(%) survey time with no stock:** Stock-out data was calculated only where there was a record of no stock of the medicine. Medicine stock-out (%) is an estimate of the proportion of the reported health facility stock record time period where particular medicines were not in stock; with estimates weighted by stock report period duration. Stock-out duration data from Aid Post health facilities not visited were included in the estimates of stock-out proportions. Note that data varied according to if the information was collected by using records or by interview – often the latter. With interview data, recent stock-outs, defined as recalling stock-outs in the last three- five- months of 2013 was often asked. If the staff clearly recalled stock-outs in the last 12 months, this was recorded. Given the lack of records, these estimates are subject to significant recall bias. The period of stock-outs (survey 2) was also confusing to some surveyors. Many surveys had conflicting information, recording that a medicine was available (in survey 1) but then recorded in survey 2 that there was a stock-out of that medicine in the last three months. The analysis therefore provided duration of stock-outs only if the medicine was not available. In this regard AMS/PTS data was potentially more accurate as data was from the order forms (medical store issue voucher or MSIV) were used to screen for stock-outs in 2013 (about six months).
- **Number of tablets per course:** when a range was given, the median value was entered. Where the medicine was not used, it was coded as 9999 in the database and used for the analysis of whether a medicine was used or not.
- **Availability:** There are 2 strengths collected in the survey for Amoxicillin (250mg/500mg). This data was merged in the analysis. Oxytocin 10 IU was the strength on the survey for data collection, however sometimes only the 5 IU strength was available – for which the latter was not always counted but noted it was available. Availability of oxytocin was also merged for the analysis. Similarly, Vitamin A had 100,000 or 200,000 IU strengths and data was also merged for analysis. Where a count was not provided, this was counted as not available. There were also a few instances where the keys to access the medicines were not available or medicines were still in unopened boxes and not counted. This was also considered to be not available.
- **Use of tracer medicines:** Medicine availability was assessed across the 16 tracer medicines for health and sub centre facilities and a reduced set of five key tracer medicines for hospitals. The proportion of medicines available at a health facility was the number of key tracer medicines with stock counts greater than zero. Availability estimates across health facility type, region and province were weighted (i.e. analysis weights) to reflect the

different number of medicines assessed at hospitals. A similar approach was taken in estimating proportions of expired, generic and IDA medicines at facilities; however for these parameters aggregated estimates were also weighted to take account of the number of key tracer medicines that were available at the particular health facility.

- **Medicines expired:** The number of medicines expired at the AMS/PTS was low because the data collections had coincided exactly with a national stocktake where expired medicines had been removed from the shelves. WHO methodology excludes collection of data on expired stocks that have been separated from the normal stock. Similarly some HFs recorded that some of the medicines would expire in the next few months following the time of the survey, so percentage of medicines expired may be underestimated.
- **Treatment according to treatment guidelines:** Responses to the questions regarding the treatment of childhood diarrhoea/respiratory tract infection, upper respiratory tract infection, malaria and post-partum haemorrhage (PPH) was also unclear as most of the responses were from staff interviews and the surveys only recorded the names of medicines used to prevent (not treatment) of PPH and the context in which they were used were unclear.
- **Timing in relation to supplies deliveries:** The surveys were administered within 82 days from the time of the last known delivery (round 3 date) for all HFs except for APs which were surveyed, on average, about ~6.6 months after the last known delivery date (round 2 date). There was a wide mix of durations between the last delivery and the time of the survey, such that it is felt the timing of the survey is unlikely to affect regional means and medians for medicines availability.

Table A3: Timing differences relation to supplies delivery by HF type

Time differences - Median days (range)	Hospital (n=7)	HC/SC (n=27)	APs (n=33)	TOTAL
Survey and last known delivery	89 (62-119)	74 (9-124)	199 (68-523)	82 (9-124)

- **International comparisons:** Data was compared to WHO Regional Report (2011¹ - called "WPRO Report" in this annex) where available. If not, then data was compared to level 2 data from 2004² (called "WHO (2004)" in this report), which related more to African than Pacific Island Countries and therefore could be less comparable. National availability of medicines from other Pacific island countries was requested through the *Drug Information Exchange for Pacific Island Countries network for regional comparisons*.
- **Use of medians:** Median values were generally used to better estimate numbers due to the large variation in numbers/responses.
- Given the purposeful nature of the sampling, **95% confidence intervals** can rarely be used to determine statistically significant differences in means, but have been examined to gain insight into the spread of standard error in our measures (and their presentation in this report is restricted to a few examples where this is helpful to display). Calculation of means, especially in relation to medicines availability, has been weighted according to variety of medicines sampled at different levels in the health system.

¹ Western Pacific Region Synthesis Report of Pharmaceutical Country Profiles 2011 (DRAFT): Countries were China (3 provinces), Fiji, Malaysia, Mongolia, Philippines, Vietnam

² WHO Using indicators to measure country pharmaceutical situations Fact Book on WHO Level I and Level II monitoring indicators WHO/TCM/2006.2 – countries were **Cambodia, Cameroon, Ethiopia, Kenya, Lao, Mali, Nepal Rwanda, Senegal, Tanzania, Uganda**

Table A4: Summary of recruited sites by geographical area and facility type.

Geographical area	Number of sites					
	Hospital	Health Centre	Sub Centre	Aid Post*	Area Medical Store	Provincial Transit Store
SOUTHERN						
Western	3	4	1	6		1
Milne Bay	1	4		5		1
MOMASE						
Madang	1	5	1	8		1
West Sepik	1	4	1	4		
ISLANDS						
East New Britain	2	3	2	7	1	
North Solomons	1	5	1	12		1
HIGHLANDS						
Enga	3	2	2	4		
Western Highlands	1	3	2	4	1	
OTHER						
Lae					1	
Port Moresby					1	
TOTAL	13	30	10	50	4	4

*Includes APS that were visited and non-visited (but interviewed; n=12).

This provided a good mix of facility sizes, as planned in the methodology. Among 20 HFs (19%) who reported the number of patients seen daily at the HFs, a median of 35 (range 10-70) and 15 patients (range 2-35) were seen at HC/SC and APs respectively.

11.2.2 Staffing for medicines prescription and management

Not surprisingly, among the 17 doctors recorded as prescribing at the time of the visit, they were distributed among hospitals and HC/SC. Nurses and HEO were distributed mainly among HC/SC while CHW and VHW were found mainly at APs. The same staff were often the most senior prescribers (Table A6), with only 54% of the most senior prescribers having received some rational medicines use/clinical training update in the last 3 years.

Table A5 shows that beyond the hospital setting, within the HC/SC setting, most of the prescribing was undertaken by nurses (41%) and CHWs (28%), and at APs 81% of prescribing was done by CHWs.

Table A5: Distribution of health staff who were prescribing medicines at Health Facilities
(%) Indicates proportion of HFs with this prescriber

HFs type	Doctor n=17	Pharmacist or Pharm Tech n=103	HEO n=23	Nurse n=49	CHW n=68	VHW n=4	Untrained staff n=1
Hospital n=27	n=9 (33%)	n=0 (0%)	n=7 (26%)	n=9 (33%)	n=2 (8%)	n=0 (0%)	n=0 (0%)
HC/SC n=82	n=8 (10%)	n=0 (0%)	n=16 (20%)	n=34 (41%)	n=23 (28%)	n=1 (1%)	n=0 (0%)
APs n=53	n=0 (0%)	n=0 (0%)	n=0 (0%)	n=6 (11%)	n=43 (81%)	n=3 (6%)	n=1 (2%)

Table A6: Most senior prescriber by Health Facility type

HF type	Doctor	Nurse	HCO	CHW	VHW	Other
Hospital	90%	-	10%	-	-	
HC/SC	19%	42%	30%	9%	-	
APs	-	16%	-	78%	4%	2%

The small number of pharmacist and pharmacy technicians (n=15) recorded in the surveys could be found dispensing in HC/SCs and hospitals (Table 7)

Table A7: Distribution of health staff who were dispensing medicines at Health facilities

(%) Indicates proportion of HFs with this distributor

HF type	Doctor n=2	Pharmacist n=7	Pharm Tech n=8	HCO n=8	Nurse n=37	CHW n=62	VHW n=4	Untrained staff n=1
Hospital n=13	n=2 (15%)	n=3 (23%)	n=5 (39%)	n=1 (7%)	n=2 (16%)	n=0 (0%)	n=0 (0%)	n=0 (0%)
HC/SC n=64	n=0 (0%)	n=4 (6%)	n=3 (5%)	n=7 (11%)	n=28 (44%)	n=21 (33%)	n=1 (1%)	n=0 (0%)
APs n=51	n=0 (0%)	n=0 (0%)	n=0 (0%)	n=0 (0%)	n=7 (13%)	n=41 (80%)	n=3 (6%)	n=1 (1%)

42% of Health facilities had dispensed expired medicines to patients in the last 12 months because they did not have enough non-expired stock to treat their patients. This was similar across facility types.

Table A8: Proportion of facilities dispensing expired medicines in last 12 months

HF type	% dispensing expired medicines in last 12 months
Hospital (n=11)	45%
HC/SC (n=39)	41%
APs (n=45)	42%
TOTAL (median)	42%

11.2.3 Stock available, expired, stock-out and comparisons with 100% kit medicines

Overall availability

The overall availability of 16 tracer medicines in PNG was 64%. This is higher than a regional WHO/HAI pricing survey, which reported an average and median availability of less than 35%³ and higher than the NHIS which reported 47% availability (2010) at HFs. The figure is however comparable to East Timor (2011) which reported an average availability of 60.4% (range 54.2-66.6%) for 24 selected medicines⁴ and Solomon Islands with 64% (average across 80 HFs using 30 tracer medicines) but lower than Tonga which reported 92% availability among 15 medicines in 10 HFs (40% hospitals). These results are similar to median availability of 70% in a study in 2009, measuring 37 medicines in 55 HFs in PNG⁵.

The medicines with the highest availability were ORS (96%), cotrimoxazole tablets (90%), amoxycillin tablets (89%), iron/folic acid tablet (83%) and artesunate suppository (79%). Lowest availability was for gentamicin injection (37%) and misoprostol tablets (44%). ACT had reasonable availability at 70%. Availability across all regions was comparable (60-65%) being lowest in Madang (56%), Western (58%), and WHP (59%) and Bouganville (61%).

Availability was highest in hospitals (92%) and lowest in APs (48%). Availability was similar among government managed and church managed facilities (where known) – 69.0% vs 74.7% respectively. Approximately 10% (7.4-12.6% by region) of medicines had some expired stock on the shelves at the time of the survey with higher expiration rates among church run facilities compared to government run HFs (12.3% vs 7.1%).

78.5% of medicines at HFs were generics with 63.6% being from IDA, (and thus supplied through the 100% kits program) – with similar rates among church and government run HFs for both indicators.

Where medicines were not stocked, the average stock-out rate (based on a sites stock record period; approximately three months) overall was 51.4% i.e. overall, among stock-out medicines, these medicines were not available for approximately 45 days over a three month period. There were lower stock-out rates at church run facilities compared to government manages HFs (34.8% vs 58.9%). Stock-out rates were similar among kit and 'pull' system medicines (49.1% vs 57.9%).

APs are only supplied eight medicines (mainly oral medicines) through the kits (amoxicillin, artesunate supp, cotrimoxazole, iron/folic, ORS, vitamin A and Zinc). However, some injectable medicines were found at APs in our survey – 61% of APs had chloramphenicol, medroxyprogesterone 44%, oxytocin 28%, saline infusion 17%, ampicillin 14%, magnesium sulphate 9%, and gentamicin 8%.

100% Kit medicines

Availability was higher among 100% kit medicines (68.8%) compared to 'pull' system medicines (46.0%) and comparable to the one vertical program medicine measured (ACT) which had a 70% availability. Availability was similar across regions (range 63.2%-76.3%; Momase-Highlands) with similar availability of kit medicines at hospitals and HC/SC (~79%) but lower at APs (54.2%). Kit medicines had similar expiry rates to the national rate (8.9% vs 10.0%) but lower compared to 'pull' medicines (8.9% vs 12.6%) and smaller proportions were IDA compared to all medicines (53.8% vs

³ Western Pacific Region Synthesis Report of Pharmaceutical Country Profiles 2011 (DRAFT): Countries were China (3 provinces), Fiji, Malaysia, Mongolia, Philippines, Vietnam.

⁴ <http://www.pharmascholars.com/admin1/files/23002.pdf>

⁵ Inder et al. Papua New Guinea: Modeling costs and efficiency of primary health care services in Papua New Guinea <http://www.buseco.monash.edu.au/centres/che/pubs/researchpaper70.pdf>

63.6%), however kit medicines were less likely to be generic (57.3% vs 78.5%) suggesting some kits medicines had been replaced by 'pull' system medicines during the time of the survey.

Overall availability of 16 medicines at APs was 48%, however the adjusted mean availability was 79% for the seven kit medicines⁶ supplied to APs. Of these medicines 8% were expired, 68% were generic, 66% were IDA stock, and 37% of the survey time period with no stock (i.e. 33 days of 90 days had no stock when there was no stock).

The survey data showed that kit medicines had

- Greater availability vs 'pull' (but similar to vertical program)
- Less expired medicines vs other supply system
- More generic medicines vs 'pull'
- Similar periods of stock-outs vs other systems

Table A9: Comparison of availability, expiry and stock by distribution method

	% of selected medicines available	% of selected medicines expired	% of selected medicines generic	% of selected medicines IDA stock	% survey period with no stock
Kit medicine (n=12), total at all HFs	69%	9%	57%	54%	49%
AP kit medicine (n=7) at APs	79%	8%	68%	66%	37%
'pull' system medicine (n=3)	46%	13%	18%	3%	58%

The one vertical program medicine (ACT) availability was measured differently – as the proportion of health facilities with availability. As noted in Table A11 below, it was found in 70% of health facilities.

Proportion of HFs with *all* tracer medicine

The above availability estimates are based on the HF as the unit of analysis i.e. at a HF, how many of the tracer medicines were available. Another perspective is the proportion of all HFs that has all the relevant medicines.

Excluding APs, only 17% of all HFs had all 16 medicines (38.5% of hospitals having all 16 medicines, 10% of all HC/SCs). If we examine availability of the 12 kit medicine⁷ only, this increases to 30.2% overall had all 12 medicines (46.2% of hospitals, 25% of all HC/SCs). APs are only delivered 7 of the 16 surveyed medicines through the kits - with 29% of APs surveyed having all 7 medicines.

Table A10: Proportion of facilities with all relevant medicines (relevant numbers shaded)

	% Hospitals	% HC/SC	% APs	TOTAL
All 16 tracer medicines	38.5%	10.0%	NA	17.0%
All 12 kit medicines for HC/SC/Hospital	46.2%	25.0%	NA	30.2%
All 7 kit medicines for APs	61.5%	45.0%	29.0%	40.7%

⁶ Amoxicillin tab, Artesunate suppository, Cotrimoxazole tab, ferrous/folic, ORS, Vitamin A and Zinc

⁷ All drugs excluding the three 'pull' system medicines and ACT.

Table A11: Tracer medicines (16) availability at HF, median stock counts, median treatment course and median cost (note, table continues over three pages)

	ENB	B'ville	ISLANDS	Milne Bay	Western	SOUTHERN	Enga	WHP	HIGHLANDS	Madang	West Sepik	MOMASE	HOSP ⁸	HC/SC	AP ⁹	NATIONAL
Amoxycillin¹⁰	100%	77%	89%	70%	92%	83%	100%	78%	89%	100%	88%	95%	100%	97%	76%	89%
units (median)	5750	1000	2000	2500	5000	4000	25,000	5000	6500	6250	3200	5000	30,600	6000	1845	4000
number/course (median)	15	15	15	15	15	15	15	9	14	15	15	15	15	15	15	15
Cost (median)	0.5	2	2	0	0	0	2	0	2	1.5	0	0	2	0	0	0
% IDA	93%	70%	83%	86%	75%	79%	67%	71%	69%	93%	71%	86%	39%	82%	97%	80%
Ampicillin INJ	62%	31%	46%	40%	46%	43%	67%	67%	67%	57%	43%	52%	82%	77%	14%	51%
units (median)	63	0	0	0	0	0	400	400	400	200	0	112	1250	400	0	17
(mean)	478	556	517	233	468	362	677	772	723	498	136	371	1879	610	13	490
number/course (mean)	2	0	1	1	0	0	0	0	4	2	1	1	1	3	0	2
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	88%	100%	92%	100%	80%	89%	50%	100%	75%	100%	100%	100%	67%	93%	100%	89%
ACT*	77%	85%	81%	100%	58%	77%	67%	22%	44%	57%	200%	72%	92%	79%	53%	70%
units (median)	1200	720	804	1620	1460	1620	720	0	0	156	1368	994	5200	1800	37	720
(mean)	9171	4735	6953	5159	3279	4133	4072	180	2126	2214	2471	2307	12,279	4632	568	4099
number/course (mean)	9	6	7	14	5	9	4	6	5	8	11	9	8	10	5	8
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% IDA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Artesun Supp	85%	85%	85%	90%	55%	71%	89%	100%	94%	69%	57%	65%	92%	79%	53%	79%
units (median)	39	36	36	36	36	36	168	100	138	66	6	42	372	96	30	42
number/course (mean)	0	1	0	1	0	0	1	2	1	2	1	1	1	2	0	1
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Chloram INJ	100%	46%	74%	60%	83%	73%	89%	67%	78%	57%	100%	73%	75%	87%	61%	74%
units (median)	123	0	54	38	49	48	300	100	125	50	129	60	1410	135	10	79
number/course (mean)	4	1	2	3	1	2	0	6	3	3	13	7	2	6	1	3
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	50%	17%	40%	50%	40%	44%	38%	67%	50%	88%	13%	50%	56%	59%	22%	45%
Cotrimx tab	93%	92%	93%	80%	77%	78%	100%	89%	94%	93%	100%	95%	100%	90%	87%	90%
units (median)	4775	1000	3000	1500	1125	1125	4100	2000	2400	2000	2910	2000	24,100	4100	1000	2000
number/course (median)	20	10	20	20	20	20	9	14	13	20	19	20	20	20	20	20
Cost (median)	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0

⁸ Hospitals: counted only for 5 medicines – Amoxicillin, ACT, Medroxyprogesterone, cotrimoxazole and misoprostol.

⁹ AP only receive non-injectable medicines in the kits i.e. Amoxicillin, Artesunate supp, Cotrimoxazole, fe/folic, ORS, Vitamin A and Zinc.

¹⁰ Either 250mg or 500mg

	ENB	B'ville	ISLANDS	Milne Bay	Western	SOUTHERN	Enga	WHP	HIGHLANDS	Madang	West Sepik	MOMASE	HOSP ⁸	HC/SC	AP ⁹	NATIONAL
% IDA	62%	33%	48%	50%	50%	50%	56%	75%	65%	62%	25%	48%	38%	46%	64%	52%
Fe/folic	86%	85%	85%	80%	92%	87%	100%	89%	94%	79%	50%	68%	77%	79%	89%	83%
units (median)	1500	1400	1400	2000	900	1625	8000	4600	7125	2000	25	1000	11,000	4000	1000	2000
number/course (median)	12	11	12	14	7	14	1	7	4	14	1	6	14	7	7	7
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% IDA	100%	73%	87%	88%	58%	70%	56%	88%	71%	100%	100%	100%	60%	81%	88%	81%
Gentamicin INJ	54%	17%	36%	33%	37%	35%	67%	44%	56%	17%	38%	25%	83%	51%	8%	37%
units (median)	1	0	0	0	0	0	50	0	38	0	0	0	760	9	0	0
(mean)	125	177	149	69	291	197	274	199	236	10	82	40	899	99	2	154
number/course (mean)	1	0	0	4	0	2	0	3	2	0	2	1	1	2	0	1
cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	0%	0%	0%	0%	25%	14%	33%	0%	20%	50%	0%	20%	10%	11%	33%	13%
Mag sulf INJ	46%	50%	48%	40%	50%	45%	67%	67%	67%	31%	50%	38%	83%	74%	9%	49%
units (median)	0	20	0	0	2	0	120	60	100	0	20	0	359	80	0	2
(mean)	85	395	219	74	443	284	224	248	236	43	54	48	823	209	2	198
number/course (mean)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	83%	100%	91%	100%	83%	90%	100%	100%	100%	100%	100%	100%	90%	100%	67%	95%
Medroxyprogest	57%	92%	74%	70%	70%	70%	44%	44%	44%	36%	63%	45%	92%	64%	44%	60%
units (median)	22	25	25	19	18	19	0	0	0	0	34	0	654	27	0	21
(mean)	154	222	188	79	412	246	390	300	345	139	3815	1475	3265	186	58	564
number/course (mean)	1	1	1	1	0	0	0	1	0	0	1	0	1	1	0	1
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Misoprostol	46%	50%	48%	50%	30%	40%	44%	44%	44%	38%	50%	43%	100%	67%	3%	44%
units (median)	0	350	0	200	0	0	0	0	0	0	40	0	2543	700	0	0
(mean)	954	569	786	858	340	599	1253	1555	1404	548	673	595	3434	821	14	827
number/course (mean)	1	1	1	1	0	0	1	2	2	0	1	0	1	1	0	1
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	83%	80%	82%	60%	67%	63%	50%	100%	75%	60%	75%	67%	55%	83%	0%	72%
ORS	100%	100%	100%	90%	100%	95%	100%	100%	100%	79%	100%	86%	83%	97%	97%	96%
units (median)	466	1000	470	500	300	450	600	1000	950	414	950	800	3300	1080	378	600
number/course (median)	2	1	1	2	2	2	1	4	2	2	1	2	1	3	2	2
Cost (median)	0	0	0	0	0	0	0	2	1	1	0	0	0.4	0	0	0
% IDA	79%	77%	78%	100%	75%	86%	89%	100%	94%	100%	38%	74%	70%	84%	84%	82%

Annexes to Year One Evaluation Report

Medical Supplies Impact Evaluation

	ENB	B'ville	ISLANDS	Milne Bay	Western	SOUTHERN	Enga	WHP	HIGHLANDS	Madang	West Sepik	MOMASE	HOSP ⁸	HC/SC	AP ⁹	NATIONAL
Oxytocin INJ¹¹	55%	45%	50%	60%	54%	57%	75%	56%	65%	17%	88%	45%	82%	68%	28%	54%
units (median)	13	5	8	6	15	8	16	3	7	0	185	0	500	40	0	6
(mean)	134	110	122	36	127	87	153	122	136	45	204	112	548	100	6	113
number/course (mean)	4	2	3	1	0	1	0	1	0	0	1	1	2	2	1	1
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	0%	20%	9%	0%	33%	17%	17%	0%	9%	50%	0%	11%	0%	20%	0%	12%
Saline INJ	62%	55%	58%	50%	58%	55%	78%	56%	67%	42%	75%	55%	67%	94%	17%	58%
units (median)	10	1	7	1	9	1	18	10	18	0	37	2	286	32	0	8
(mean)	161	178	169	25	85	59	96	27	62	9	151	69	483	78	1	94
number/course (mean)	1	0	1	1	1	1	0	46	23	0	1	0	0	1	10	5
Cost (median)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% IDA	38%	83%	57%	80%	71%	75%	86%	100%	92%	60%	50%	55%	50%	77%	50%	69%
Vitamin A¹²	92%	62%	77%	80%	67%	73%	89%	78%	83%	57%	75%	64%	83%	77%	68%	74%
units (median)	1000	500	500	1000	750	1000	2500	1500	2000	500	950	900	6000	1740	500	1000
number/course (mean)	1	2	2	1	0	1	0	2	1	1	4	21	2	2	1	1
Cost (median)	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
% IDA	100%	100%	100%	88%	75%	81%	75%	100%	87%	100%	33%	71%	90%	73%	100%	86%
Zinc	86%	77%	81%	80%	58%	68%	89%	89%	89%	55%	43%	50%	75%	78%	68%	73%
units (median)	600	600	600	600	600	600	1000	1700	1450	300	0	200	4300	1900	600	600
number/course (mean)	1	0	0	2	1	1	3	2	3	2	1	2	2	2	1	1
cost	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% IDA	100%	100%	100%	100%	100%	100%	75%	100%	88%	100%	100%	100%	100%	93%	100%	97%

Note: totals below present availability as proportion (%) of the 16 tracer medicines, as a weighted consolidation of the HF measures displayed above.

TOTAL: % of tracer medicines available (average;95%CI)	69% (58-81)	61% (50-71)	65% (57-73)	72% (60-84)	58% (43-72)	64% (54-74)	73% (61-85)	59% (38-80)	65% (52-78)	56% (45-66)	68% (50-87)	60% (51-70)	92% (85-99)	75% (69-82)	48% (44-53)	64% (59-68)
TOTAL: % of tracer medicines that were IDA (average;95%CI)	65.7% (58.7-72.7)	59.2% (44.9-73.4)	62.7% (55.1-70.3)	63.6% (57.2-69.9)	63.4% (47.8-79.0)	63.5% (54.9-72.0)	54.3% (33.5-75.1)	77.3% (65.5-89.0)	66.3% (53.5-79.0)	78.2% (67.0-89.3)	40.0% (24.0-56.0)	62.8% (50.7-74.9)	26.7% (11.5-41.8)	65.1% (58.6-71.7)	68.7% (62.0-75.4)	63.6% (58.7-68.6)

*ACT= Artemisinin Combination Therapy (Artemether/Lumefantrine).

¹¹ 5 or 10 IU

¹² 100,000 or 200,000IU

Table A12: Availability, as % of tracer medicines, by geographical area, supply chain and management

	% available (95% CI)	% expired (95%CI)	% generic (95%CI)	% IDA stock (95%CI)	% survey period with no stock ¹³ (95%CI)
Geographical area					
Western	58% (43-72)	8.6% (2.6-14.5)	80.2% (74.4-86.0)	63.4% (47.8-79.0)	63.7% (39.8-87.7)
Milne Bay	72% (60-84)	6.5% (2.1-11.0)	74.8% (70.1-79.4)	63.6% (57.2-69.9)	40.7% (5.0-76.4)
Southern	64% (54-74)	7.6% (3.8-11.4)	77.4% (73.6-81.3)	63.5% (54.9-72.0)	55.9% (35.8-75.9)
Madang	56% (45-66)	3.7% (0.2-7.2)	79.0% (68.9-89.1)	78.2% (67.0-89.3)	60.0% (37.6-82.3)
West Sepik	68% (50-87)	23.2% (8.3-38.1)	72.5% (63.6-81.4)	40.0% (24.0-56.0)	60.8% (27.9-93.8)
Momase	60% (51-70)	12.6% (5.0-20.1)	76.4% (69.3-83.5)	62.8% (50.7-74.9)	60.3% (42.1-78.6)
East New Britain	69% (58-81)	13.6% (7.6-19.6)	82.6% (78.5-87.2)	65.7% (58.7-72.7)	55.3% (19.2-91.4)
Bougainville	61% (50-71)	10.0% (3.5-16.8)	79.2% (75.3-83.0)	59.2% (44.9-73.4)	50.2% (38.2-62.2)
Islands	65% (57-73)	11.4 % (6.8-16.1)	81.2 (78.2-84.1)	62.7% (55.1-70.3)	51.5% (37.9-65.1)
Enga	73% (61-85)	10.6% (2.9-18.4)	74.1% (61.2-87.0)	54.3% (33.5-75.1)	42.6% (22.3-63.0)
WHP	59% (38-80)	3.8% (0.0 – 8.0%)	83.0% (77.8-88.1)	77.3% (65.5-89.0)	18.1% (0.4-35.8)
Highlands	65% (52-78)	7.4% (2.7-12.0)	78.7% (71.7-85.7)	66.3% (53.5-79.0)	33.1% (18.0-48.3)
TOTAL	64% (59-68)	10.0% (7.3%-12.7%)	78.5% (75.3-81.6)	63.6% (58.7-68.6)	51.4% (42.9-59.9)
Govt run facilities					
HOSP	74.2% (55.0-93.4)	15.7% (9.8-21.6)	56.9% (40.3-74.5)	25.5% (9.4-41.7)	29.1% (0.0-73.7)
HC/SC	86.8% (81.2-92.3)	4.5% (1.7-7.2)	78.1% (75.6-80.6)	71.4% (65.6-77.3)	45.2% (24.7-65.7)
APs	52.0% (45.4-58.6)	7.8% (3.9-11.6)	83.0% (78.6-87.3)	66.4% (55.8-77.1)	63.3% (45.2-81.3)
Total (average)	69.0% (62.0-76.0)	7.1% (4.7-9.4)	77.4% (73.4-81.3)	64.2% (57.4-71.0)	58.9% (45.5-72.3)
Church run facilities					
HOSP (n=2)	90.0% (70.1-110)	11.1% (0.0-30.9)	88.9% (69.1-109)	33.3% (0.0-92.8)	8.5% (NA as n=1)
HC/SC	80.6% (69.2-91.9)	11.6% (4.7-18.6)	77.3% (73.0-81.7)	59.7% (47.3-72.0)	18.8% (2.3-35.2)
APs	58.3% (47.4-69.2)	13.4% (3.2-23.7)	78.9% (71.3-86.5)	62.0% (55.2-68.8)	46.4% (25.5-67.5)
Total (average)	74.7% (65.7-83.6)	12.3% (6.8-17.8)	78.2% (74.5-81.8)	59.4% (50.7-68.0)	34.8% (20.8-48.8)

¹³ Commonly HFs were asked about stock-outs in the last 3 months so this value is usually the % of 3 months with no stock

Availability of medroxyprogesterone	56% (non-faith based availability =72%)				
Medicines supplied only by 'pull' system*					
HOSP	77% (58-96)	3.4% (0.0 – 9.8)	25.6% (12.3-39.0)	2.6% (0.0-7.7)	25.5% (NA as n=1)
HC/SC	57% (47-67)	11.8% (3.4-20.1)	25.0% (17.6-32.4)	5.8% (0.6-11.1)	40.6% (21.4-59.8)
APs	25% (16-33)	19.6% (6.2-32.9)	7.0% (2.6-11.5)	0.9% (0.0-2.6)	65.6% (50.3-80.8)
Total (average)	46.2% (39-54)	12.6% (6.3-18.9)	17.6% (12.0-22.1)	3.3% (0.7-5.8)	57.9% (45.8-70.0)
Medicines supplied by 'push' (in kits) and 'pull' system^					
HOSP (12 meds)	77.6% (61-94)	9.5% (4.1-14.9)	60.3% (43.4-77.1)	51.3% (33.6-69.0)	25.6% (-10.2-61.4)
HC/SC (12 meds)	80.0% (73-87)	6.1% (1.5-10.7)	66.0% (60.1-72.0)	64.0% (54.9-73.0)	28.8% (13.4-44.2)
APs (12 meds)	54.2% (50-59)	12.1% (6.8-17.4)	47.1% (43.2-51.1)	44.1% (38.9-49.2)	55.3% (44.9-65.6)
APs (7 medicines supplied in AP kits)	79%	8%	68%	66%	37%
Western	62.8% (47.9-77.8)	7.6% (2.0-13.3)	51.9% (40.1-63.8)	44.2% (30.4-58.1)	59.5% (30.3-88.8)
Milne Bay	67.5% (52.0-83.0)	3.8% (0.0-8.2)	55.8% (42.1-69.6)	56.7% (43.2-70.1)	34.3% (3.5-65.1)
Southern	64.9% (54.2-75.5)	5.9% (2.2-9.7)	53.6% (44.8-62.4)	49.6% (39.7-59.5)	50.5% (28.9-72.1)
Madang	60.7% (50.0-71.5)	2.8% (0.0-6.7)	50.0% (39.7-60.3)	54.2% (41.4-66.9)	52.2% (27.2-77.2)
West Sepik	67.6% (48.1-87.4)	27.8% (5.4-50.1)	55.2% (40.2-70.2)	38.5% (17.8-59.3)	65.2% (26.4-104)
Momase	63.2% (53.5-73.0)	12.8% (2.5-23.0)	51.9% (43.5-60.3)	48.5% (37.2-59.7)	58.0% (37.3-78.8)
East New Britain	77.4% (66.9-87.9)	7.8% (3.4-12.1)	66.1% (57.8-74.3)	63.1% (50.0-76.2)	49.0% (19.8-78.1)
Bougainville	64.7% (52.7-76.8)	13.8% (5.3-22.4)	54.5% (44.1-64.9)	49.4% (34.8-63.9)	50.4% (37.9-62.9)
Islands	71.3% (63.1-79.5)	10.8% (5.8-15.8)	60.5% (53.7-67.3)	56.5% (46.5-66.4)	50.0% (38.2-61.9)
Enga	84.3% (73.4-95.1)	6.4% (0.0-14.6)	67.6% (60.6-74.6)	59.3% (41.3-77.2)	41.2% (22.8-59.5)
WHP	69.2% (48.5-89.8)	4.8% (0.0-9.9)	60.0% (41.2-78.8)	63.3% (43.9-82.8)	17.5% (0.6-34.4)
Highlands	76.3% (64.1-88.6)	5.7% (0.8-10.6)	63.6% (53.2-73.9)	61.4% (48.4-74.4)	31.7% (17.8-45.7)
Total (average)	68.8% (64-74)	8.9% (5.8-12.1)	57.3% (53.1-61.6)	53.8% (48.3-59.3)	49.1% (40.5-57.6)

*pull'=gentamicin, medroxyprogesterone, oxytocin; ^ assumes kit medicines can also be supplied through 'pull' system

What did facilities do when there were stock-outs?

Overall 51% of all respondents had purchased medicines in the last 12 months as a result of a stock-outs, with most hospitals (90%) taking this option.

Table A13: Medicines purchased in last 12 months due to stock-outs

HF type	% HF who purchased medicine in the past 12 months
Hospital (n=10)	90%
HC/SC (n=42)	52%
APs (n=37)	41%
TOTAL	51%

When further asked what actions HF would take when they had a stock-outs, obtaining stock from another HF was most common (75%), followed by ordering from AMS (52%) then local procurement (35%). 60% of hospitals procured locally when they ran out of stocks (compared to 90% previously reported) and 90% of APs would obtain stock from another HF while HC/SC would mainly (70%) order from the AMS. Other options (n=3) included sending a patient with a prescription to obtain the medicines privately.

Table A14: Actions taken when there are stock-outs by Health Facilities¹⁴

HF type	% HF obtaining stock from another HF (N=88)	% HF who order from AMS (N=88)	% HF Buy from local market (N=88)
Hospital	44% ¹⁵	100%	60%
HC/SC	60%	70%	35%
APs	90%	19%	19%
TOTAL	75%	52%	35%

Medicines commonly out of stock

Among 87 respondents, medicines reported as most commonly out of stock were antibiotics (72%; majority (78%) being amoxicillin), analgesics (16%; such as paracetamol, aspirin) and antimalarials (9%, such as artemether, chloroquine (2/8=25%) and Primaquine). Two percent reported common stock-outs of contraceptives (medroxyprogesterone injection and oral pill).

11.2.4 Delivery dates and timing

An analysis of available delivery dates from the third party logistics provider indicated a median delivery time of ~180 days between deliveries for hospitals and HC/SCs. Only one date (Round 2) was provided for APs so time difference was not able to be calculated at the time of reporting.

Table A15: Times for deliveries (days)

Time differences - Median days (range)	Hospital (n=7)	HC/SC (n=27)	APs (n=33)	TOTAL
Between Round 3 and 1 deliveries	178 (152-211)	180 (116-309)	NA	180 (116-309)

¹⁴ HF could choose to take multiple concurrent actions

¹⁵ Only 9 hospital responded to this question

To examine delivery times in the 'pull' system, it was noted that the following AMS supplies the following provinces below.

1. Lae AMS supplies Morobe, Eastern Highlands, Madang, Oro and Manus provinces.
2. Hagen AMS supplies Simbu, Hagen, Jiwaka (WHP), Southern Highlands, Hela and Wabag provinces
3. Badili AMS supplies Western, Gulf, Central and Milne Bay provinces.

In the table below, one would expect if there was high availability in the AMS, then the provinces they service would also have reasonable availability. For the 'pull' system medicines (gentamicin, medroxyprogesterone and oxytocin), despite medium to high availability of these medicines at Lae AMS (except perhaps for gentamicin) and Hagen AMS, there was low availability of 'pull' medicines in the provinces they service that was surveyed, suggesting that distribution delays may be occurring. Badili and Rabaul AMS and the provinces they service have similar rates of availability, suggesting that constraints on availability relate firstly to stock held in the AMS, independent of distribution efficiency.

Table A16: Availability of medicines at AMS and the provinces¹⁶ they service

Availability of tracer medicines used in sensitivity analysis at AMS	Availability in Province of three 'pull' system medicines
Lae - 92%	Madang – 21%
Hagen - 75%	WHP/Enga – 43%/59%
Badili - 67%	Western/Milne Bay – 43%/53%
Rabaul – 58%	Islands (ENB/B'ville) – 49%

11.2.5 Stock availability at Medical Stores

Table A17: Availability of Stocks at Area Medical Store or Provincial Transit

High availability (available in $\geq 75\%$ AMSs)	Low-Medium availability (available in $\leq 50\%$ AMSs)	No availability
<ul style="list-style-type: none"> • Amoxicillin capsules • Cotrimoxazole tablets • Fe/folic tablets • ORS powder • Saline injection • Oxytocin injection • Medroxyprogesterone injection • Gentamicin injection 	<ul style="list-style-type: none"> • Chloramphenicol injection • Magnesium sulphate injection • ACT 	<ul style="list-style-type: none"> • Ampicillin injection • Artesunate suppository • Misoprostol tablet* • Zinc tablets • Vitamin A

*should be available

Three medicines listed as not available at AMSs (ampicillin, vitamin A and zinc) are not normally procured through NDoH but supplied through the kits. ACT availability at AMS/PTS depends on the province. The table below shows that median availability of the 16 tracer medicines among the 8 medical stores was 56%, with greater median availability at AMS (63%) than at PTS (50%). These figures are skewed by the zero availability of the three medicines mentioned above. Sensitivity analysis (removing data for ampicillin, vitamin A, zinc and artesunate suppositories – the latter supplied only through the kits) reveals slightly higher availability overall among medical stores (63% vs 56%) with 88% availability at AMSs but only 50% at PTSs.

¹⁶ Provinces in survey and AMS that service them: **Kokopo/Rabual AMS** - ENB, Bougainville; **Hagen AMS**- Enga, WHP; **Lae AMS**- Madang; **Badili AMS**- Western, Milne Bay. West Sepik is supplied by Wewak AMS which was not surveyed.

The overall average availability across the eight medical stores was 61%, but 73% at AMSs only – lower than the WHO 2004 report¹⁷ which had an average >80% for basket of essential medicines at public sector warehouses - although the WHO data mainly related to African countries rather than Pacific countries. The average availability at AMSs was 73%, which is higher than 44% reported in 2012 among four AMSs¹⁸.

Table A18: Availability of medicines among medical stores

	AMS (n=4)	PTS (n=4)	Total (n=8)
Amoxicillin tab	75%	50%	63%
Ampicillin INJ	0%	25%	13%
Artesunate Supp	0%	25%	13%
Chloramphenicol INJ	50%	50%	50%
Cotrimoxazole tab	100%	50%	75%
Fe/folic tab	100%	25%	63%
Magnesium sulf INJ	50%	50%	50%
Misoprostol tab	0%	0%	0%
ORS	100%	100%	100%
Saline 1L	75%	100%	88%
Vitamin A	0%	0%	0%
Zinc tab	0%	25%	13%
Oxytocin INJ*	100%	50%	75%
Medroxyprog INJ*	100%	50%	75%
Gent INJ*	100%	25%	63%
ACT tab^	25%	50%	38%
Median	63%	50%	56%
Mean	55%	42%	48%
Sensitivity analysis			
Median	88%	50%	63%
Mean	73%	50%	61%

ACT= Artemisinin Combination Therapy (Artemether/Lumefantrine); * 'pull' system, ^ vertical program

¹⁷ WHO Using indicators to measure country pharmaceutical situations Fact Book on WHO Level I and Level II monitoring indicators WHO/TCM/2006.2 – countries were **Cambodia, Cameroon, Ethiopia, Kenya, Lao, Mali, Nepal Rwanda, Senagal, Tanzania, Uganda**

¹⁸ Specialist Procurement Adviser Report 2012; 56% consolidated stock-out at 4 AMSs (2012).

Table A19: Availability of medicines by count and supplier

	Area Medical Store				Provincial Transit Store			
	Badili	Lae	Hagen	Rabaul	Alotau	Daru	Buka	Madang
Amox250mg or 500mg¹⁹								
No. units	460,000	6,001,000 ²⁰	48,400	0	20,000	0	4800	0
Any expired	No	No	No	-	No	-	No	-
% IDA	0	0	0	-	0	-	0	-
mths no stock	1	0	0	4	-	6	2	-
Generic drug	Yes	Yes	Yes	-	Yes	-	Yes	-
Ampicillin INJ								
No. units	0	0	0	0	0	0	0	1150
Any expired	-	-	-	-	-	-	-	No
% IDA	-	-	-	-	-	-	-	100%
mths no stock	12	5	0	0	-	6	6	-
Generic drug	-	-	-	-	-	-	-	Yes
Artesun Supp								
No. units	0	0	0	0	0	0	30	0
Any expired	-	-	-	-	-	-	No	-
% IDA	-	-	-	-	-	-	100%	-
mths no stock	-	0	0	0	-	6	0	-
Generic drug	-	-	-	-	-	-	Yes	-
Chloramp INJ								
No. units	0	30,540	47,000	0	7000	0	0	2000
Any expired	-	No	No	-	Yes	-	-	Yes
% IDA	-	0	0	-	0	-	-	0
mths no stock	3	2	0	3	-	6	6	-
Generic drug	-	Yes	Yes	-	Yes	-	-	Yes
Cotrimx tab								
No. units	1,260,000	5,600,026	2,440,000	2,293,700	0	0	7700	5800
Any expired	No	No	No	No	-	-	No	Yes
% IDA	0	0	0	0	-	-	0	0
mths no stock	-	0	0	0	-	6	0	-
Generic drug	Yes	Yes	Yes	Yes	-	-	Yes	Yes
Fe/folic								
No. units	60,000	131,000	1,026,000	486,000	0	0	4000	0
Any expired	No	No	No	No	-	-	NO	-
% IDA	0	0	0	0	-	-	0	-
mths no stock	1	2	0	0	-	3	5	-
Generic drug	Yes	Yes	Yes	Yes	-	-	Yes	-
MgSO4 INJ²¹								
No. units	15,095	32,000	0	0	0	0	90	230
Any expired	No	No	-	-	-	-		No
% IDA	0	0	-	-	-	-	100%	100%
mths no stock	0	5	-	0	-	0	0	-
Generic drug	No	Yes	-	-	-	-	Yes	Yes

¹⁹ Stock counts for 250mg or 500mg but not both. All data for 500mg except for Buka PTS. NCPC=generic²⁰ Lae AMS explains discrepancy by their active follow-up of previously undelivered purchase orders, something other AMS may not do. Lae AMS are also holding stock of Madang AMS and taking over their orders since Madang AMS cease to operate as an AMS in Mid-2012.²¹ IDA from manufacturer "GLAND"

	Area Medical Store				Provincial Transit Store			
	Badili	Lae	Hagen	Rabaul	Alotau	Daru	Buka	Madang
Misopros tab								
No. units	0	0	0	0	0	0	0	0
Any expired	-	-	-	-	-	-	-	-
% IDA	-	-	-	-	-	-	-	-
mths no stock	6	5	3	5	-	0	0	-
Generic drug	-	-	-	-	-	-	-	-
ORS²²								
No. units	19,200	598,800	69,100 ²³	32,403	5400	7200	4800 ²⁴	19,200
Any expired	No	No	No	No	No	No	No	No
% IDA	0	0	0	0	0	0	0	0
mths no stock	0	0	0	0	-	0	0	-
Generic drug	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Saline 1L injection²⁵								
No. units	0	5280	426	1404	2348	270	6336	696
Any expired	-	No	No	No	No	No	No	No
% IDA	-	0	0	0	0	0	0	100%
mths no stock	1	0	0	0	-	0	0	-
Generic drug	-	No	No	Yes	No	No	Yes	Yes
Vit A (100/200,000 IU)								
No. units	0	0	0	0	0	0	0	0
Any expired	-	-	-	-	-	-	-	-
% IDA	-	-	-	-	-	-	-	-
mths no stock	3	5	0	6	-	5	0	-
Generic drug	-	-	-	-	-	-	-	-
Zinc tab								
No. units	0	0	0	0	0	0	2100	0
Any expired	-	-	-	-	-	-	No	-
% IDA	-	-	-	-	-	-	100%	-
mths no stock	-	5	0	-	-	0	0	-
Generic drug	-	-	-	-	-	-	Yes	-
Oxytocin 10 IU INJ*								
No. units	232,505	1600	13,960	0 ²⁶ (available)	0	0	1010	10,800
Any expired	No	No	No	-	-	-	No	No
% IDA	NA – not delivered in kits							
mths no stock	0	0	0	-	-	1	0	-
Generic drug	No	Yes	No	-	-	-	Yes	No
Medroxyprog INJ*								
No. units	174,700	71,000	79,500	21,250	0	0	2480	4050
Any expired	No	No	No	No	-	-	No	No
% IDA	NA – not delivered in kits							
mths no stock	0	0	0	0	-	0	0	-
Generic drug	No	No	No	No	-	-	No	No

²² Shijianzhuang=generic²³ Half of ORS stock will expire in 2 months²⁴ ORS will all expire next month²⁵ Braun=brand, Baxter=generic. Saline from kits is labelled as IDA (from manufacturer "Albert David") – was not found in medical stores.²⁶ Oxytocin 5 IU was available but not counted

	Area Medical Store				Provincial Transit Store			
	Badili	Lae	Hagen	Rabaul	Alotau	Daru	Buka	Madang
Gent INJ*								
No. units	220	18,878	17,900	38,600	0	0	0	402
Any expired	No	No	No	No	-	-	-	No
% IDA	NA – not delivered in kits							
mths no stock	0	0	0	0	-	6	6	-
Generic drug	Yes	Yes	Yes	Yes	-	-	-	Yes
ACT ^								
No. units	0 ²⁷	542,520 ²⁸	0	0	0	6240	78,846	0
Any expired	-	No	-	-	-	No	No	-
% IDA	NA – not delivered in kits							
mths no stock	-	0	0	0	-	2	0	-
Generic drug	-	Yes	-	-	-	Yes	Yes	-
% total availability²⁹	67%	92%	75%	58%	33%	25%	75%	67%

ACT= Artemisinin Combination Therapy (Artemether/Lumefantrine) * 'pull' system, ^ vertical program

	Any expired	IDA stock	Months with no stock over past 6 months	Generic drug
AMSS	0%	0%	median: 0 mean: 0.5 (8% of time period)	71%
PTS	11%	22%	median: 1.8 (30% of time period) mean: 1.8	81%
Total (median)	6%	11%	1.2 months (20% of period)	76%

None of the available stock at AMSSs was expired and 11% (3/27) of available stock at PTSs was expired. It is notable that all or some of the ORS in two PTSs was going to expire in the next two months following the survey. It is also important to recognise that AMS surveys were undertaken at a time when national stocktakes were being done so expired medicines may have been removed from the shelves shortly prior to the survey.

None of the available medicine in AMSSs was IDA stock while 22% (6/27) in PTSs was from IDA/Kits. Of note, the excess IV fluids found at the Medical Stores were not from the kits but from the 'pull' system.

Among medicine where there was a stock-out in the last 6 months, AMSSs recorded that 8% (15 days) of that time had no medicine while PTSs recorded 30% (54 days) with no stocks.

Most of the medicines at AMSSs (71%, 25/35) and PTSs (81%, 22/27) were generic medicines.

11.2.6 Patient understanding, prescriptions, costs and perspectives

The survey accessed 487 patients who were interviewed about the medicines they were prescribed and their opinion regarding access to medicines. Overall 51% were female, and 35% were children five years old or younger.

²⁷ ACT is stored at Gordon's storage facility and not at Badili AMS. ACTs only sent to Lae and Badili stores

²⁸ Lae AMS collected ACT supplies from PTS due to shortages.

²⁹ Based on medicines used in the sensitivity analysis

Table A20: Patient experiences of prescriptions and opinions on medicines access

	N	% female	% ≤5yrs	Median # medicines prescribed	% generic	% injection	% medicines prescribed given to patients	% labelled correctly	% know how to take ALL medicines	Total cost for treatment (average, range)	Access to medicine in last 3mth (%)	Travel time to facility (mins) ³⁰ Mean, median	Cost to travel in PGK (average, range)
Hospital	87	57%	26%	2	66%	4%	98%	85%	96%	4.9 (0-60)	better: 41% worse: 13% same: 46%	56 mins 30 mins	3.2 (0-90)
HC/SC	297	49%	38%	2	54%	9%	95%	36%	88%	2.5 (0-35)	better: 40% worse: 9% same: 50%	68 mins 30 mins	0.8 (0-24)
AP	103	52%	36%	2	58%	11%	98%	46%	85%	2.0 (0-9)	better: 35% worse: 18% same: 48%	28 mins 15 mins	0.1 (0-4)
TOTAL	487	51%	35%	2	57%	8%	96%	47%	89%	2.6	better: 39% worse: 12% same: 49%	57 mins 30 mins	1.1

³⁰ Excludes 10 patients that took days to travel to a HF

The median number of medicines prescribed per consultation was two items, of which the majority (96%) was dispensed/administered to the patient- 57% of medicines were generically prescribed and 8% were an injection. Compared to the regional WPRO Report³¹:

- the percentage of prescribed medicines dispensed to a patient was the same (96%);
- fewer injections were prescribed in PNG (8% vs 20%); and
- fewer medicines were prescribed by generic name (57% vs 80%).

Among 1088 prescribed items, 27% were for analgesics, 36% were antibiotics, 5% anthelmintic and 14% anti-malarial. If we combined all anti-infective agents (excluding medicines for malaria), 45% of prescriptions were for anti-infectives – which was comparable to the regional mean percentage of patients receiving antibiotics of 53%.

Although 89% of patients understood how to take their medicines at the time of the interview (comparable to WHO 2004³² data of 80-89%), the labeling of their medicines was poor, with only 47% of medicines all labeled with a name, dose and duration of therapy. Labeling standards were much lower than the WPRO regional study, in which 94% of medicines in public health facilities were adequately labeled.

Encouragingly, 39% of patients reported that access to medicines in the last three months had been better.

Ten patients (2%) travelled more than 24 hours to get to a HF (n=7 taking 2 days). Excluding them from the analysis, patients reported an average of 57 minutes (median 30 mins) to reach a HF – slightly longer to reach a HC/SC (68 mins) and less to a AP (28 mins). Accessibility is defined by WHO as being able to reach a HF within one hour of walking so HFs surveyed were generally accessible. In the WHO Report (2004) only 30% of surveyed WPRO countries had medium to high access to essential medicines. It is important to note that our survey was of patients who had already visited HFs, so may be biased towards those with easier access.

Regarding the costs for receiving treatment, 43% of items were supplied free of charge - with APs more likely to charge for medicines (49% free drugs at HC/SC, 42% at hospitals and 29% free medicine at APs). In Enga, some non-government facilities charged an annual service fee of between 30-60 Kina rather than an individual cost per medicine.

Cost of treatment was approximately three Kina (four kina including transport), higher at hospitals (eight Kina including transport). WHO defines affordability as the cost of medicines not exceeding one day of wages for the lowest paid government worker. As a government worker salary is likely to be higher than the general population accessing services, the author based the daily wage of ten Kina (based on monthly salary for average citizen as 300 Kina) as the benchmark. Based on this, the cost of treatment at the hospital was reaching the threshold for affordability, especially as the costs of laboratory tests or other ancillary items has not been included.

³¹ Western Pacific Region Synthesis Report of Pharmaceutical Country Profiles 2011 (DRAFT): Countries were China (3 provinces), Fiji, Malaysia, Mongolia, Philippines, Vietnam

³² WHO Using indicators to measure country pharmaceutical situations Fact Book on WHO Level I and Level II monitoring indicators WHO/TCM/2006.2 – countries were Cambodia, Cameroon, Ethiopia, Kenya, Lao, Mali, Nepal Rwanda, Senagal, Tanzania, Uganda

11.2.7 Appropriateness of medicines in 100% kits

Most facilities reported not always using all the medicines in the 100% kits with varying (and small numbers) of reports specifying any particular medicine. These are summarised below. Among total respondents, medicines commonly not used due to a lack of training were artesunate suppository (16%), zinc tablets (10%), ampicillin injection (6%) and misoprostol tablets (6%). Those reporting low usage due to the disease not being present was mainly reported for zinc tablets (9%), artesunate suppository (7%), and whitfield's ointment. Other reason for not using a medicine related to artesunate suppository (8%) and primaquine (3%) and quinine (3%) with artesunate suppository being an embarrassing form of administering a drug (especially as up to four suppositories may be needed). Artesunate suppositories and Zinc tablet therefore represent the most common drugs not used in the kits.

Table A21: Medicines in 100% kits reported as not being used on some occasions by some facilities

Hospital (n=12)	HC/SC (n=57)	APs (n=43)
Reason = "Staff not trained"		
Most commonly reported³³: Ampicillin injection Artesunate suppository Others Ampicillin injections Aquatabs (chlorine tabs) Artesunate suppository Cefaclor tab Chlorphenamine tab Glutaraldehyde Antibiotic ointment Panadol 100mg Permethrin lotion Zinc sulphate	Most commonly reported: Ampicillin injection Artesunate suppository Atenolol tablet Carbamazepine tablet Hydrochlorothiazide tablet Magnesium sulphate injection Misoprostol tablet Sodium bicarbonate injection Zinc tablets Others 50% glucose injection Adrenaline Injection Atropine injection Aminophylline Injection Ampicillin Injection Artemether Suppository Artemether-Lumefantrine Atenolol Bisacodyl Calamine Lotion Carbamazepine Cefaclor Tab Hydrochlorothiazide Hydrocortisone Injection Magnesium Sulphate injection Metoclopramide Misoprostol Morphine Sulphate Potassium Chloride Sodium Bicarbonate injection Zinc Tabs	Most commonly reported: Artesunate suppository Aquatabs Bisacodyl tablet Chlorpheniramine tablet Zinc tablets Others Artemether-Lumefantrine Aquatabs Silver sulfadiazine Aluminium Hydroxide Amoxicillin dispersable 125mg tab Ampicillin injection Artesunate suppository Betamethasone cream Bisacodyl Calamine lotion Catgut Absorbable suture Chlorphenamine 4mg BP Frusemide Hydrochlorothiazide Antibiotic ointment Oxytocin Phenytoin Plaster of Paris Silver Sulfadiazine Potassium tablets Vitamin A Zinc tabs
Reason = "Disease not present"		
Most commonly reported: No bias towards any one drug Others Aquatabs	Most commonly reported: Ciprofloxacin tablet Hydrochlorothiazide tablet Magnesium sulphate injection	Most commonly reported: Artesunate suppository Benzoic acid 6% + Salicylic acid 3% cream Misoprostol Plaster of paris

³³ Among multiple sites

Artesunate Supp Benzioc acid 3% cream Antibiotic ointment Primaquine Quinine injection/caps Vitamin A 200,000 caps	Others Aquatab Atenolol Bisacodyl Calamine lotion Chlorpromazine Ciprofloxacin 250mg Glutaraldehyde Hydrochlorothiazide IV fluids Magnesium sulphate injection Potassium chloride tabs 600mg Sodium bicarbonate injection Zinc tablets	Zinc tablets Others Artesunate suppository Benzoic acid 6% + Salicylic acid 3% cream Chloramphenicol ear drops Chlorpromazine Benzylpenicillin injection Medroxyprogesterone injection Misoprostol tab ORS Plaster of paris Primaquine Promethazine Quinine Vitmain K injection Zinc tabs
Reason = "Other"		
Most commonly reported (reason given) : Amoxicillin 125mg dispersible tab (Prefer syrup) Magnesium sulphate injection (Not commonly used) Others Amoxcillin 125mg dispersible Amoxicillin 250mg Aspirin Chloramphenicol Suspension Chlorine tabs (Aqua tabs) Chloroquine tablet Chlorpheniramine 4mg tab Ergometrine injection Magnesium sulphate injection ORS Paracetamol 100mg Permethrin lotion Primaquine Quinine sulphate 300mg tabs Silver sulfadiazine cream Sodium bicarbonate injection Zinc tabs	Most commonly reported (reason given): Ampicillin injection (Use benzylpen. Injection instead) Artesunate suppository (Embarrassed to use) Chloramphenicol syrup (Don't know how to use) IV fluids (Too much stock) Magnesium sulphate injection (For doctor use only) Misoprostol tabs (Not trained) Sodium bicarbonate injection (Not used/no training) Others 10% Glucose Intravenous Infusions Aminophylline injection Amoxicillin 125 mg tabs Amoxicillin 250mg tab Amoxicillin injections Ampicillin injection Artemether injection Artemether-Lumafantrine Artesunate suppository Atenolol Benzyl Benzoate Bisacodyl Chloramphenamine 4mg Chloramphenicol suspension Chloroquine tab Cimetidine tab Ciprofloxacin Codeine phosphate Furosemide 20mg Injection BP Gentamicin injection Indomethicin tabs IV fluids Ketamine	Most commonly reported (reason given): Artesunate suppository (Not needed, patient don't like, only tablets given) Fansidar (Not on treatment protocol, refer patients) Ergometrine (No delivery equipment, mothers deliver at home) Primaquine (No test kit, patients allergic) Vitamin A (No immunisation, mother don't come for delivery as CHW is male.) Zinc (Use ORS first, no patient present need for use) Others Amoxicillin 125mg suspension Aqua tabs Artesunate suppository Betamethasone valerate cream Bisacodyl Clotrimazole Diazepam Ergometrine Fansidar Gentamicin Injection Indocid tablet Misoprostol Morphine Antibiotic ointment ORS Permethrin Lotion Phenobarbitone Plaster of paris Primaquine Quinine sulphate Umbilical cord clamp Vitamin A Zinc tablets

	Magnesium sulphate injections Medroxyprogesterone depot injection Misoprostol Morphine Primaquine Quinine injection Ringer lactate injection Salbutamol respirator Potassium tablet Sodium Bicarbonate injection Sulfadoxine and pyrimethamine tablet Tetracycline Whitfield's Ointment	
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Most facilities reported antibiotics (eg. oral amoxicillin and benzylpenicillin injection) and analgesics (aspirin and paracetamol) as the most medicines that run out the quickest. This was similar to those reported as commonly out of stock above.

Table A22: Medicines reported as running out too quickly*

Hospital	HC/SC	APs
Amoxicillin tablet 10%	Amoxicillin tablet 17%	Amoxicillin tablet 18%
Benzylpenicillin injection 8%	Paracetamol tablet 14%	Paracetamol tablet 17%
Paracetamol tablet 8%	Cotrimoxazole tablet 11%	Cotrimoxazole tablet 10%
Cotrimoxazole tablet 6%	Benzylpenicillin injection 7%	Aspirin 8%
	Aspirin 6%	Benzylpenicillin injection 8%
	Chloramphenicol injection 6%	

* listed only if there was >5% of total respondents reporting any medicine

Below are the medicines that are stocked at HFs that were reported as not used – representing potential medicines for wastage. Among the below, availability was high for ACT (70%), artesunate suppository (79%), Chloramphenicol injection (74%), Vitamin A (74%) and zinc (73%). HFs themselves report managing unused medicines by transferring them to a higher facility e.g. a hospital, or to the AMS.

Table A23: Medicines reported as not used at some point by some HFs

Hospital	HC/SC	APs
Ampicillin injection	Ampicillin injection	Ampicillin injection
Artesunate suppository	Artemether-Lumefantrine	Artemether-Lumefantrine
Vitamin A	Artesunate suppository	Artesunate suppository
Zinc	Chloramphenicol injection	Chloramphenicol injection
	Gentamicin injection	Gentamicin injection
	Magnesium sulphate injection	Magnesium sulphate injection
	Medroxyprogesterone depot injection	Medroxyprogesterone depot injection
	Misoprostol	Misoprostol
	Oxytocin injection	Oxytocin injection
	Sodium Chloride solution	Sodium Chloride solution
	Vitamin A	Vitamin A
	Zinc	Zinc

Note: Analysis where the HF had stock of items. 100% kit medicines designated by*. Artemether-Lumefantrine supplied by vertical 'push' program.

11.2.8 Availability of Standard Treatment Guidelines and Essential Medicine List

Overall 58% of facilities had all the surveyed STGs /EMLs/National Formulary of which 58% were the latest editions. Availability was low compare to WPRO report which indicated a copy of the STGs was present in approximately 82% of public health facilities but having the latest edition was comparable with WPRO report in 2007 reporting 69% of the countries globally had updated the EML within the past five years. Overall 94% reported the guidelines were very useful and essential for them to have.

Table A24: Availability Of Treatment Guidelines And Medical/Dental Catalogue

	Hospital (N=13)		HC/SC (N=41)		AP (n=50)		
Guidelines (latest year)	% avail	% latest edition	% avail	% latest edition	% avail	% latest edition	TOTAL (median) (1) % Available (2) % Latest edn
Adult STG (GREEN) (6 th Edn, 2012 ³⁴)	85%	73%	90%	43%	70%	14%	85% 43%
Sexually transmitted infections (STI) (PURPLE) (2010)	46%	67%	58%	8%	8%	0%	46% 8%
Obstetrics and gynecology (RED) (6 th edn, 2010)	85%	55%	95%	59%	60%	13%	85% 55%
National Medicines Formulary (1 st Edn, 2012)	38%	100%	27%	83%	2%	NA	27% 92%
Others	61%	25% AMH ³⁵	56% Family Planning	43% (2000-2003) 38% (≥2008)	36% Family Planning	78% (2000)	56% 38%
Children (BLUE ³⁶) (9 th edn 2011)	77%	60%	93%	66%	92%	33%	92% 60%
Medical and Dental Catalogue (10 th edn, 2012)	38%	80%	46%	58%	2%	0%	38% 58%
TOTAL (median)	61%	67%	58%	58%	34%	14%	58% 58%

³⁴ 5th edition=2003

³⁵ Australian Medicines Handbook 2011

³⁶ 7th edition=2000, 8th edition=2005

11.2.9 Emergency Obstetric and Neonatal Care (EMONC) preparedness

Among 86 responses, 52% of sites were assessed through observation of EMONC equipment at the HC/SC and APs and the balance of findings were obtained by interview.

HF's were also assessed by the number of births they managed:

- Among 76 responses (38 HC/SCs, 33 APs, 5 rural hospitals), 89% of HC/SC reported ≥ 1 childbirths in the last three months (50% with ≥ 31 childbirths).
- Among APs, 48% had delivered ≥ 1 childbirths in the last three months (45% with 1-30 births and 3% delivering more than ≥ 31 childbirths).

Overall only 6% of APs had the necessary equipment and 42% reported having the skills to perform EMONC. This was higher in HC/SC where 58% of HC/SC had the available equipment and 67% reported having the skills to practice EMONC. Among HC/SCs the equipment most lacking was related to blood transfusion (79% not available) followed by the lack of medicines (steroids and general anaesthetic medicines). Note that under current classifications in the EML, ketamine can only be ordered by doctors/HEO and anaesthetic technical officers (ATO). Since 70% of HEOs in the survey were at HC/SCs, extending the use of ketamine to HC/SC would seem feasible under the current systems.

Skills reported as lacking among HC/SCs related to caesarean section (18% had this skill), blood transfusion (36% had this skill) and giving medicines for HIV during delivery (48% had this skill). Among APs, currently the highest level of skills were related to active management of third stage labour (72% had this skill) and removal of the placenta (67% had this skill).

The table below lists readiness observed and reported in HF's, for both equipment and skills. This data will be consolidated with that collected by NDOH and UNFPA at the provincial hospital level.

Table A25: EMONC preparedness at health facility (% responding yes)

	HC/SC (n=39)	AP (n=36)
Equipment availability		
General anaesthetic medicines (ketamine or halothane)		
Available and used	41%	-
Available <u>not</u> used	18%	-
Not available	41%	-
Steroids for use in premature labour		
Available and used	38%	0%
Available <u>not</u> used	15%	3%
Not available	46%	97%
Disinfection solution to ensure a clean delivery area		
Available and used	92%	28%
Available <u>not</u> used	3%	6%
Not available	5%	67%
Light source		
Available and used	82%	31%
Available <u>not</u> used	-	6%
Not available	18%	64%
Vacuum extractor		
Available and used	36%	0%
Available <u>not</u> used	44%	6%
Not available	21%	94%
Newborn resuscitation pack, including bag and mask		
Available and used	44%	0%
Available <u>not</u> used	31%	6%
Not available	26%	94%
Equipment to perform blood transfusion		
Available and used	15%	-
Available <u>not</u> used	5%	-
Not available	79%	-
TOTAL (median)		
Available and used	41%	0%
Available <u>not</u> used	17%	6%
Not available	26%	94%

	HC/SC (n=39)	AP (n=36)
Skills/functions – in last 3 months		
Active management of third stage of labour		
Can do and have done	82%	39%
Can do but have NOT done	15%	33%
Cannot do	3%	28%
Manual removal of the placenta		
Can do and have done	49%	25%
Can do but have NOT done	41%	42%
Cannot do	10%	33%
Removal of 'retained products of conception'		
Can do and have done	59%	6%
Can do but have NOT done	26%	36%
Cannot do	15%	58%
Assist a vaginal delivery with vacuum extractor or forceps		
Can do and have done	41%	3%
Can do but have NOT done	28%	36%
Cannot do	31%	61%
Newborn resuscitation using a bag and mask		
Can do and have done	41%	6%
Can do but have NOT done	44%	44%
Cannot do	15%	50%
Giving antiretroviral treatment during labour		
Can do and have done	15%	3%
Can do but have NOT done	33%	11%
Cannot do	51%	86%
Blood transfusion		
Can do and have done	21%	-
Can do but have NOT done	15%	-
Cannot do	64%	-
Cesarean section operation		
Can do and have done	13%	-
Can do but have NOT done	5%	-
Cannot do	82%	-
Surgical method of permanent contraception (tubal ligation or vasectomy)		
Can do and have done	15%	0%
Can do but have NOT done	15%	8%
Cannot do	69%	92%
TOTAL (median)		
Can do and have done	41%	6%
Can do but have NOT done	26%	36%
Cannot do	31%	58%

11.2.10 Case fatality rates for pneumonia in children under five years of age

This measurement was designed to match the NHIS indicator, which meant it was only measured in HFs that admitted children with pneumonia and does not capture community pneumonia mortality. Overall record keeping at HC/SC was insufficient to properly verify this measurement at that level.

52 HFs reported the number of children (under five years of age) admitted as inpatients with pneumonia (range 0-494; median 2, mean 18) and the number that died (range 0-12) giving an overall average CFR of 4.0% (0-50%).

Among the five hospitals, the overall average case fatality rate (CFR) was 15.4% (range 0-50%; median 2.3%). The average CFR for HC/SC was 2.2% (range 0-37.5%; median 0%) and for APs was 3.3% (range 0-50%; median 0%). The overall average case fatality rate by region was Southern (11.5%), Islands (4.3%), Highlands (2.6%) and Momase (0.7%). CFR was summarised below.

Table A26: Case fatality rates (N=52)

	SOUTHERN				MOMSAE				ISLANDS			
	Western		Milne Bay		Madang		West Sepik		ENB		North Solomons	
	HC/SC	AP	HC/SC	AP	HC/SC	AP	HC/SC	AP	HC/SC	AP	HC/SC	AP
CFR (median %)	37.5	8	0	2.8	0	0	1.1	0	0	0	0	0
Range	37.5	8	0	0-50	0-5	0-2.9	0-2.2	0	0	0-0.8	0-0.8	0.8.3
Mean	37.5	8	0	13.9	1	0.5	1.1	0	0	0.3	0.3	1.4

	HIGHLANDS			
	Enga		WHP	
	HC/SC	AP	HC/SC	AP
CFR (median %)	0	0	0	3.9
Range	0	0	0	0-7
Mean	0	0	0	3.6

This is higher than the rate of reported in the 2011 NDOH Child Mortality and Morbidity Report³⁷ of 5.6% for 2010 and 6.1% for 2011, however our estimates are based on interviews, and low denominators which will likely result in overestimations in rates.

11.2.11 Use of medicines in line with Standard Treatment Guidelines

Among 87 HFs reporting against these questions, only 15% reported having treatment records (17% of HC/SCs, 14% of APs and 11% of hospitals, which could validate usage data. Medicines tabulated below were extracted from these mainly qualitative answers to the question of what was commonly used to treat the relevant disease. The small number (23% of total) of quantitative responses was used to validate these responses. As many surveys collected only the names of the medicines, the context in which they are used is uncertain such as the severity or presence of other diseases and often more than one medicine would be used any one condition.

Diarrhoeal disease

Among the total interviews/reports, overall, ORS was commonly reported as one of the medicines used to treat diarrhoea in children under five years of age (80%), followed by albendazole (62%), an antibiotic (54%) and Tinidazole (33%). Zinc was mentioned only in 20% of responses. For international comparison: our ORS prescribing rates (80%) were similar to the WHO 2004 Report, which reported 80-95% (low-middle income countries) and similar to regional WPRO report of 79%;

³⁷ Papua New Guinea Annual Report on Child Morbidity and Mortality 2011, The Child Health Advisory Committee, PNG National Department of Health, May 2012

and our reported use of an antispasmodic/anti-diarrhoeal, at 10%, was higher than that reported by WHO (2004) for 0-5% (low-middle income country).

Acute respiratory tract infection (pneumonia) in children

Among acute respiratory tract infections (RTI) in children under five years of age, overall 77% reported using the recommended treatment with amoxicillin and 55% reported using an injectable antibiotic (mainly benzylpenicillin). It should be noted that injected penicillin is listed in standard treatment guidelines as part of first line treatment for severe pneumonia. Our Amoxycillin (first line medicine) prescribing rates (77%) were lower than the WHO 2004 report, which reported 85-90% (middle/low income countries).

Upper respiratory tract infection in any age

Among treatment for simple upper respiratory tract infections (URTI) in any age, overall 75% reported using an antibiotic, which WHO would view as inappropriate usage.

Malaria

In the treatment of malaria, overall artemisinin combination therapy (ACT) or artemether injection for severe infections was prescribed (75%). Older medicines such as chloroquine and sulfadoxine/pyrimethamine (SP) were still being prescribed. Anecdotally, chloroquine was reported to be prescribed when ACT was not available or when there was a negative result on the rapid diagnostic test (RDT) being used.

The tables below list treatments provided and a comparison table from WHO studies.

Table A27: Treatments reported for common conditions - % reporting the medicine.³⁸

	HOSP (n=12)	HC/SC (n=40)	AP (n=50)	TOTAL (median)
Non-bloody diarrhoea in <5 years old				
ORS	77%	80%	86%	80%
Zinc	23%	23%	14%	23%
Antibiotic(s)	46%	58%	54%	54%
Antispasmodic/anti-diarrhoeal	0%	13%	10%	10%
Tinidazole	23%	33%	60%	33%
Albendazole	62%	58%	74%	62%
RTI in <5 years old				
Amoxycillin	77%	73%	82%	77%
Alternative antibiotic reported	69%	68%	82%	69%
Injectable antibiotic ³⁹	54%	55%	58%	55%
URTI – any age				
Any antibiotic	69%	75%	80%	75%
Malaria - Adult				
ACT	75%	85%	65%	75%
Other than ACT	25%	Total - 40% Primaquine 25% Chloroquine 18% SP ⁴⁰ 18% Quinine 8% Amodiaquine ⁴¹ 3%	Total - 57% Chloroquine 49% SP 27% Primaquine 24% Quinine 16% Amodiaquine 6% Referral only 6%	49%
Child birth				
Ergometrine/oxytocin to PREVENT PPH	77%	73%	60%	73%
Misoprostol to PREVENT PPH	31%	30%	20%	30%
Any (ergometrine or oxytocin or misoprostol) to TREAT PPH ⁴²	NA	10%	18%	14%

RTI=acute Respiratory Tract Infection in children. Standard treatment include: (1) Treatment of non-bloody diarrhoea in those under 5 years: ORS plus Zinc 10-20mg daily for up to 14 days. No antibiotics given (2) ARTI under 5 years: oral Amoxycillin for up to 7 days (3) Mild pneumonia: Amoxycillin 500mg three times a day for 5-7 days; Moderate pneumonia: benzyl penicillin 1.2g (2MU) every 4-6 hours then oral amoxycillin when improved (4) Malaria: ACT (5) Childbirth: Prevention PPH: oxytocin 10 IU IM/ergometrine 200mcg IM/Misoprostol 600mcg after delivery. Treatment PPH: Oxytocin 10IU/ergometrine 200mcg IM/Misoprostol 600mcg

³⁸ HF's can report the use of BOTH ACT and non-ACT treatments at the same time so % will not add to 100%

³⁹ Mainly benzylpenicillin ("crystalline penicillin")

⁴⁰ SP=sulfadoxine/pyrimethamine (Fansidar™)

⁴¹ Camoquine™ (Amodiaquine) was reported use only in children

⁴² Most answers from interview, which asked about PREVENTION of PPH only, not treatment. Only 19% of answers (n=20) were from quantitative data.

11.2.12 Storage and handling of medicines at health facilities

Overall storage at HF was inadequate with only ~60% of all HF having all the optimal storage and handling condition for medicines. Conditions became poorer with the remoteness of the HF with hospitals having better conditions compared to APs (~80% vs ~50%). Monitoring of cold storage temperatures (19%), poor stock management (FEFO-54% and systematic method of storing medicines -57%) and active methods to cool the storage areas (57%) needed the most attention.

Table A28: Proportion (%) of HF with good storage and handling of medicines at health facilities

N = 100	Storeroom (% YES)				Dispensing area (% YES)				TOTAL (median)
	Hosp	HC/SC	AP	Total Store (median)	Hosp	HC/SC	AP	Total Disp (median)	
There is a method in place to control temperature (e.g. roof and ceiling with space between them in hot climates, air conditioners, fans)	75%	54%	42%	54%	92%	57%	54%	57%	57%
There are windows that can be opened or there are air vents.	100%	80%	75%	80%	92%	90%	88%	90%	90%
Direct sunlight cannot enter the area (e.g. window panes are painted or there are curtains/blinds to protect against the sun).	75%	63%	52%	63%	69%	63%	51%	63%	63%
Area is free from moisture (eg. leaking ceiling, roof, drains, taps)	75%	83%	74%	75%	85%	85%	78%	85%	85%
There is a cold storage in the facility. % type: Electricity (E) Gas (G) Solar (S)	92% E:91% G:9%	76% E:37% G:47% S:17%	0% -	76% E:64% G:28% S:17%	69% E:89% G:11%	51% E:52% G:29% S:19%	0% -	51% E:71% G:20% S:19%	51% E67% G:24% S:19%
There is a regularly filled temperature chart for the cold storage	17%	45%	2%	17%	27%	19%	0%	19%	19%
Medicines are not stored directly on the floor.	42%	41%	62%	42%	69%	41%	58%	58%	58%
100% Kit (IDA) medicines are stored in a systematic way (e.g. alphabetical, pharmacological or in boxes with contents clearly labeled for quick access).	67%	59%	36%	42%	85%	41%	23%	57%	57%
Non 100% Kit medicines are stored in a systematic way (e.g. alphabetical, pharmacological or in boxes with contents clearly labeled for quick access).	75%	63%	42%	42%	92%	40%	29%	57%	57%
Medicines are stored first-expiry-first out (FEFO).	83%	73%	48%	73%	100%	54%	34%	54%	54%
Medicines are stored separately to non-medicinal products (such as cleaning items, chemicals, etc)	92%	80%	75%	80%	100%	88%	76%	88%	88%
There is no evidence of pests in the area.	50%	54%	60%	54%	69%	51%	65%	65%	65%
Tablets/capsules are not manipulated by naked hand.	NA	NA	NA	NA	75%	48%	51%	51%	-
TOTAL (median)	75%	63%	50%	59%	85%	51%	51%	57%	57%

The results of our survey (57%) were lower than WHO Report (2004⁴³), which reported 75-83% of public health facilities (in low to middle income country) with a satisfactory score for storage conditions and handling.

Surveyors were asked to inspect medicines from open containers at HFs and comment on their quality – both of the medicine and the packaging. Overall instances of poorer quality drugs were more often reported among non-kit medicines compared to medicines from the 100% kits (26% vs. 11%). Quality of medicines is also affected by deficiencies in storage and handling at various levels, discussed in other sections, and may not always relate to quality of manufacture.

Table A29: Proportion of quality problems (%) among those responding to medicine quality questions

N = 95	100% kit medicines				Non-100% kit medicines				TOTAL
	Hosp	HC/SC	AP	Total (kit)	Hosp	HC/SC	AP	Total (non-kit)	
Medicines discoloured?	15%	8%	11%	11%	31%	23%	42%	32%	22%
Medicines broken/crumbled?	8%	21%	9%	14%	23%	30%	25%	26%	20%
Containers broken/cracked?	8%	5%	4%	5%	15%	13%	17%	15%	10%
TOTAL (median)	8%	8%	9%	11%	23%	23%	25%	26%	20%

Note: differences between hospital and other levels were not regarded as significant, in our sample.

11.2.13 Storage and handling of medicines at medical stores

Overall storage conditions at medical stores, like at HFs, were also inadequate, with only 53% having proper storage conditions. Storage was better at the AMSs compared to the PTSs in relation to controlling the ambient internal temperature and having a systematic means of organising and managing the stocks e.g. FEFO. Although most medical stores had a refrigerator only 25% monitored the temperature on a daily basis. Medicines hygiene needs improving with only 13% of warehouses storing all medicines off the floor and 25% that were pest free.

The results of our survey (53%) were lower than WHO report (2004⁴⁴), which reported the % of maximum storage conditions and handling score to 86-89% (low to middle income country) for warehouses.

Full results are provided in the table below

⁴³ WHO Using indicators to measure country pharmaceutical situations Fact Book on WHO Level I and Level II monitoring indicators WHO/TCM/2006.2 – countries were **Cambodia, Cameroon, Ethiopia, Kenya, Lao, Mali, Nepal Rwanda, Senagal, Tanzania, Uganda**

⁴⁴ WHO Using indicators to measure country pharmaceutical situations Fact Book on WHO Level I and Level II monitoring indicators WHO/TCM/2006.2 – countries were **Cambodia, Cameroon, Ethiopia, Kenya, Lao, Mali, Nepal Rwanda, Senagal, Tanzania, Uganda**

Table A30: Storage and handling of medicines at medical stores (N=8)

	Area Medical Store				% AMS	Provincial Transit Store				% PTS	% total (average)
	Badili	Lae	Hagen	Rabaul		Alotau	Daru	Buka	Madang		
There is a method in place to control temperature (e.g. air conditioners, fans)	Y	Y	Y	Y	100%	N	N	N	N	0%	50%
Windows that can be opened or have air vents.	Y	Y	Y	Y	100%	N	Y	Y	Y	75%	88%
Direct sunlight cannot enter the area (e.g. there are curtains/blinds to protect against the sun).	Y	Y	Y	Y	100%	Y	N	Y	Y	75%	88%
Area is free from moisture (eg. leaking ceiling, roof, drains, taps)	Y	Y	N	Y	75%	Y	N	Y	N	50%	63%
There is a cold storage in the facility. And if yes, was it Electricity, Gas or Solar fridge.	Y Electric	Y Electric	Y Electric + generator	Y Electric	100%	N	Y Electric	Y Electric	Y Electric	75%	88%
There is a regularly filled temperature chart for the cold storage	N	Y	N	N	25%	N	Y	N	N	25%	25%
All medicines are stored off the floor eg. with pallets	N	N	Y	N	25%	N	N	N	N	0%	13%
Medicines are stored in a systematic way (e.g. alphabetical, pharmacological or in boxes with contents clearly labelled for quick access).	Y	N	Y	Y	75%	N	N	N	Y	25%	50%
Medicines are stored first-expiry-first out (FEFO).	Y	Y	N	Y	75%	N	N	N	Y	25%	50%
Medicines are stored separately to non-medicinal products (such as cleaning items, chemicals, etc)	N	Y	Y	N	50%	N	N	Y	N	25%	38%
There is no evidence of pests in the area.	N	N	N	Y	25%	N	N	Y	N	25%	25%
TOTAL (average)	64%	73%	64%	73%	68%	18%	27%	55%	45%	36%	53%

11.2.14 Perspectives of medical stores staff on medical supplies management

Medical stores staff were interviewed during the survey for opinions on medical supplies management. Results of comments and suggestions they made in key areas of the supply chain are summarized below:

Distribution of medical supplies

Timely delivery was noted as a key area for improvement. Most reported the need for reliable, predictable contractors whose performance is constantly reviewed and who are paid in a timely fashion by NDoH so that services are not delayed. Managers in Enga suggested re-consideration of the cost and feasibility benefits of earlier systems where HFs pick up supplies from the provincial capital and more use is made of AMS vehicles. Suggestions from AMS Lae proposed two separate levels of contracts: firstly regional contracts for distribution from AMS to provincial capital; and secondly provincial contracts for delivery from provincial capital to HFs using local knowledge/distributors⁴⁵. This is qualified by various opinions that the current 'pull' system third party logistics arrangements needs improvement. It was suggested that any 'pull' system third party logistics company should report to AMS (for transparency in cost and delivery performance). Such an

⁴⁵ Use of local contractors also has issues with other comments citing including lack of suitable infrastructure (eg. storage space) and equipment to deliver goods

arrangement was reported from Lae AMS that regularly monitors contractors to ensure stocks are not held at their depots for too long.

Managers commented on the HF level, suggesting that orders from HFs should be based on sound evidence of actual usage and documented stock levels. Several recommendations proposed that at the provincial level, hospital trained pharmacists, should be employed to oversee stocks and supplies at HFs, rather than relying on clinical staff who will have less interests in medical logistics. A stronger network of PTS, with expert pharmacy-trained staffing, was seen as a key recommendation by stores and other stakeholders and is reflected in the main report.

Sectoral coordination was a common theme reported by managers including suggestions that: roles of all health programs should be outlined and coordinated so programs can support each other; and transport resources be shared among different programs. There were comments on the need for multiple supply chains to increase coordination between stakeholders; and support for the idea that there be involvement of district/provincial/medical stores staff in the delivery schedule and content of 'push' system kits.

Management at medical stores

Infrastructure was seen as a pressing need (as noted elsewhere in our evaluation) with suggestions to increase and improve storage space; and improve functioning communication technologies such as telephone lines and internet. The previously installed electronic system for inter stores transfers allowed staff to see other medical stores stocks but is no longer working. An improved and robust eLMIS would be greatly welcomed.

A number of recommendations related to human resources, including: more trained staff with more staff being pharmacists, noting that Madang PTS only has six staff and Alotau PTS has effectively just one staff member, while Buka PTS is managed by a former MCH nurse. There were a number of requests for more training opportunities for staff in supplies management. It was noted that the Mt Hagen AMS has a HPLC machine for medicine testing but needs trained staffed and laboratory supplies to use it.

Improvements at HF level

Several medical stores staff noted the urgent need for medicines management training at the HF level. A specific suggestion was that officers from medical stores should accompany medical supplies deliveries to make reports on stocks and teach health workers how to make proper orders using the catalogue/EML. The need for supervisory visits by pharmacists was demonstrated by non-compliance with standard operating procedures seen anecdotally by stores staff and confirmed in our evaluation. Several staff noted that the 'pull' system can only work with better training at HF and sufficient staff to manage stocks, and place correct orders. At both HF and medical stores levels, this requires an increase in the numbers of pharmacists in the system.

Lack of detail and transparency in stock records, or simply lack of records, is seen as a critical problem meaning that supplies cannot easily meet the needs of HFs both in quantity and item. At present APs are not well incorporated in the 'pull' system, with orders either omitted or not well integrated into the orders of their supervising HC. Change is needed so that more accurate supply can cover both the HCs and the APs it supervises. Lack of reach of the 'pull' system to the AP was noted as a constraint.

As at stores, infrastructure was seen by staff as inadequate in most HFs, both in space and storage conditions.

Communications

Stores staff called for repair or replacement of non-functional radios, especially so a PTS can communicate with AMS. Some sites, such as Rabaul, reported that landline telephones were not working, requiring them to rely on mobile phones. It was noted in WHP that the use of 'Closed User Group' (using mobile phones) communications systems enabled tracking of orders. Several suggested consideration of supplying mobile phones to all staff.

A number of staff expressed frustration with difficult communications back to Badili AMS, although many noted that MSPD could be reached and was often responsive in helping solve supply issues. As noted elsewhere, medical stores staff felt they would benefit from more information on 'push' and vertical program delivery schedules. A suggestion was made for quarterly meetings between staff at AMS, MSPD, hospitals and district/provincial managers.

Handling of 100% kits in redistribution at PTS or AMS

Unwanted supplies from kits were reported by stores staff as usually being sent to a hospital or medical stores, a procedure that complies with program intentions. It was reported that MSPD had advised Madang PTS that kits should be sent to Lae AMS or Madang Hospital but lack of storage at the hospital and insufficient transport options at the PTS has meant this has proven difficult. PTS can also hold stock that is excess to a hospital's storage capacity, one example being in Alotau, Milne Bay Province.

Time to process order forms

Ten order forms received from HFs at the medical stores in Lae, Mt Hagen, Rabaul and Buka were screened to calculate the time to process an order. For Badili AMS, 18 orders were screened. Other medical stores were transit stores and did not process orders except for Buka. The time to process an order was calculated as the number days between (1) the date the order was written (2) the closest time to the dispatch time. Badili took over four times the average time (average time of 20 days) of the other AMS to process an order.

Table A31: Median time (days) to process an order

Area Medical Store				Provincial Transit Store
Badili	Lae	Hagen	Rabaul ⁴⁶	Buka ⁴⁷
86	26	11	24	7

Comparison across different AMS and PTS

The table below provides a summarized consolidation of both observations and staff opinions across the different stores visited in the evaluation.

⁴⁶ Located in Kokopo., but still called Rabaul AMS.

⁴⁷ Buka PTS is processing orders unlike other PTSs

Table A32: Observations and consolidated interview findings on management processes and supports across 8 Medical Stores.

Most AMS were in the process or had just completed a stocktake at the time of the visit. Quarter 1 management reports for Badili and Lae AMS received.

	Area Medical Store				Provincial Transit Store			
	Badili	Lae	Hagen	Rabaul ⁴⁸	Alotau	Daru	Buka	Madang
Frequency of regular stock counts	Section 1,3 and 5 drug ⁴⁹ in Jan and Feb 2013. No use of stock cards or any other formal documented system. Rely on a couple of AMS staff to know what is the store at any one time	Quarterly. No use of stockcards however to record movement of items between stocktake (except for RH commodities after UNFPA training).	Only at the request of NDoH (usu. For section 1 and 5 drugs) or ad hoc. Has list of items of 'current concerns'. Uses VEN system ⁵⁰	Only at the request of NDoH.	Not by store manager. However hospital staff randomly come to store and check when they need stock. OIC for store works in separate office to store and visits stores about twice a week.	Once every quarter.	Monthly for TB and RH commodities. Others less often due to lack of staff.	Fortnightly until Oct2012 when LAE AMS took over processing orders.
Security arrangements	Private security company (JBSS) through NDoH – apparently checking staff/cars leaving and entering AMS for theft	JBSS. 6 guards at night and 4 during day. Happy with service.	Not confident with services. Issues with RH commodities. Past attempted break in reported.	New in last 3 week. Previous stocks gone missing. OIC wants staff bags to be checked.	None.	Adequate. To date no instances of stocks going missing.	None. Facility staff free to enter when OIC not present with drug diversion occurring.	3 guards at night and 2 during day. No incidence of missing stock.
Management of expired stock	Expired stock burnt at public dump.	Collects expired items from Hagen, Madang and Wewak AMS (total 24 pallets). Disposal by burning in public space.	Expiry book from 2005-2013. Yearly report to NDoH (about 1 mil Kina/year expired). Excess stock from low ordering due to parallel system.	First-in-first-out (FIFO). Expired stock due to short shelf life on receipt	Difficulties in expired stock disposal. Stocks from 2011 still present. Recently a 20ft container was supplied to them for drug disposal.	No expired stock at present. Items can sit in store for 4-5 months however	Mainly fluids. Manage procurement to avoid excess, expiring stock. Facility need to have good records when ordering.	Inter- [medical] store transfer (ITS). FIFO. Supply items with longer shelf life.
Layout allows for efficient supply chain management	Overstocked and poorly managed. Requested land title of old store at Konedobu be checked and new warehouse built there.	Well organised, FIFO used but needs more space. Pallets widely used.	Pallets allows tracking of items. Less leakage and temperature. fluctuations than before. Need more space as service 50% of PNG population.	Not enough space so medicines stored outside. Current store is not owned by govt. so refurbishment is not possible	Current layout does not promote efficient supplies management.	Current layout does not promote efficient supplies management. Store is in poor condition.	No. inadequate space and some items stored very high up and hard to access as no lifting equipment.	Store was 'written off' in 2010. In poor structural condition.
Staff amenities	Adequate but requested upgrade	Has toilets and staff room, latter run down.	Need office for senior staff, QA lab, staff room and staff transport.	No tea room and toilets locked – latter reported to owner	No washroom, toilet.	No toilet/ bathroom /office space	Toilets/showers but no staff room.	Inadequate office equipment, computer communications poor.

⁴⁸ Located in Kokopo., but still called Rabaul AMS.

⁴⁹ Sections of Medical/Dental Catalogue (1=Drugs, 3=antivenom, 5=sundries)

⁵⁰ Priority classification for medicines V=Vital, E=essential, N=non-essential

	Area Medical Store				Provincial Transit Store			
	Badili	Lae	Hagen	Rabaul ⁴⁸	Alotau	Daru	Buka	Madang
Dispatch of goods from medical store efficient?	Inefficiencies reported and observed. Significant delays in processing orders. Reports LD Logistics as 'satisfactory but sometimes there is delays. LD should have bigger warehouse and increase fleet of vehicles'.	Manager confirms proof of delivery to some HFs (those where OIC does not sign for the delivery) and monitors stocks held at LD Logistics office by visiting their office weekly to ensure timely supply. Uses "master ledger" to track orders from receipt to delivery.	LD logistics said to be unsatisfactory (eg. to Simbu), with some medicines still at LD store. Suggested more involvement of District/Province worker and felt old system of supplies being picked up from Provincial capital by HFs (or delivery by Prov. Logistics Officer for remote sites) was better.	Yes. By contractor and currently reported as satisfied.	Good. Uses HC ambulance and truck to distribute. However, most items in store has been there a long time, potentially forgotten about.	No. Requested more timely and consistent telephone support from Badili AMS.	LD logistics good. Delivery time is good as goods already packed.	By LD logistics. Reported as not efficient and not delivered direct to facility.
Staffing observations (note that these often reflected opinions of stores staff interviewed during the visit and not all could be verified)	29 staff. Regular attendance is noted as difficult with some management actions being taken to attempt to improve this.	26 staff although need more as they are carrying the work of Madang medical store, with Madang staff not available to work in Lae. Maintains staff attendance records. Workload measured as each person moving 67kg of goods daily from the store	Good as transport supplied.	Regular attendance sometimes difficult as most live in villages where commute is 2-3 hours. Request for accommodation for workers.	Only 2 staff. One sick and other casual but lives in village so not punctual. Essential OIC is the only staff.	Store is managed by one staff member whp is also the District Logistic Officer.	Not enough and not reliable/punctual. No cleaner. Driver helps store manager.	7 staff. Good attendance unless staff live in village.
Sufficient equipment to move stock	2 forklifts, 1 Hilux and 2 trucks. Needs more.	Adequate. 2 trucks, 4 hydraulic/fork lifts, 3 hand trolleys, 10 shopping trolleys. Equipment services regularly.	Two forklifts but one broken. Working trolleys and handfork (1 of 4 working) needed.	Most equipment lost when store burnt down and not replaced.	Insufficient. Only one manual trolley. Forklift has been at repair workshop for 1 year now awaiting a spare part.	None. Need shopping trolleys and hand trucks.	No trolleys, forklifts, ladders etc. Borrow shopping trolleys.	Need more forklifts (manual and hydraulic)
Clean and tidy (see survey 13)	Generally insufficiently clean, tidy and organized for the volume of supplies.	Well organised and neat store.	Rats a problem.	Not sufficiently clean and tidy. inadequate space to manage supplies.	Disorganised and not sufficiently clean and tidy	Nil fans, shelf, personnel and inadequate storage. Store needs replacing.	Not sufficiently clean and tidy, hampered by absence of cleaner. Up to staff.	In process of transferring duties to AMS Lae so store is in disarray.

	Area Medical Store				Provincial Transit Store			
	Badili	Lae	Hagen	Rabaul ⁴⁸	Alotau	Daru	Buka	Madang
Training and staff development in recent past.	UNFPA training for Manager in April 2013 recently. Otherwise nothing recent	Manager attended "senior management training" in April 2013 with UNFPA and started using stockcards for RHC. Otherwise no recent training for staff.	Need training and incentives (eg SOP) for impending changes and boost morale. Need computer. Staff accommodation ideal but not realistic. Vehicles/funds for supervisory visits.	Management training for OIC and logistics staff and computer skills for administrative staff.	Last training in Nov 2012 ('distribution of medical supplies'). SOPs produced in 2009. Staff turnover frequently	Needed.	None to date but one is scheduled in July for stores training in stock management	3 staff to soon attend 1-week Public Service Induction course. Nothing recent otherwise
Safe and healthy workplace?	Adequate.	Yes.	Just bought safety gear.	Not safe overall. Poor structurally. Top floor would not be able to bear excessive loads.	Disorganisation may compromise safety, for example cannot walk between boxes.	Disorganisation may compromise safety, see notes above.	No. Very dusty, boxes stored very high, very hot.	No. new warehouse requested

11.3 Other data collection tools

11.3.1 Discussion Guide for National Consultation meetings

Introduction

An introduction to the team and overall evaluation was provided. The discussions cover three areas: 1) procurement, 2) distribution and management, and 3) evaluation indicators useful to measure the current situation and future progress.

Procurement of medical supplies

Key discussion questions:

- What have been significant changes in procurement of medical supplies in the past two to three years – in the informant's experience?
 - What are the most important issues that must continue to be considered?
- What comments can the informant/s make from their *own experience and observations* specifically on topics of:
 - How procurement is planned;
 - Changes in procurement practices due to the recent procurement reform;
 - How forecasting is done;
 - Sources of financing;
 - How to achieve value for money;
 - How quality of medicines is assured;
 - Efficiency in procurement and shipment to PNG;
 - Recent "100% health centre kits" program;
 - Storage and Distribution to the health facilities and aid posts,
 - Supply chain of other vertical programmes (such as those from Global Fund, reproductive health etc); and
 - Coordination between various partners procuring supplies.

Distribution and management of medical supplies within PNG

Key discussion questions:

- What have been significant changes in *distribution* of medical supplies, and the *management* of medical supplies in stores and health facilities, over the past two to three years – in the informant's experience?
 - What are the most important issues that must continue to be considered?
- What comments can the informant/s make from their *own experience and observations* specifically on distribution strategies currently in force:
 - The recent distribution of '40%' and '100%' health centre kits, that represent a 'push' system;
 - The current 'pull' system involving Area Medical Stores, Provincial Transit stores, Hospitals and Health Centres;
 - The different approaches taken by disease-specific programs such as those for HIV ; and (supplying ARTs), malaria, TB, family planning, condoms.
- What comments can the informant/s make from their *own experience and observations* specifically on supply management issues, such as:
 - Current and planned changes in how supplies are stored centrally and in the provinces, including computerised inventory control;
 - Communications and coordination between hospitals, health centres and medical stores; and
 - Coordination in rural areas between health centres and aid posts.

Benchmarks and evaluation indicators

Note that the team has been asked to develop a set of indicators across both procurement and distribution/management that will be useful to track progress over the next four to eight years.

Key discussion questions:

- What suggestions can the informant/s make regarding useful measurement indicators in medical supplies *procurement* that could track progress and change over the next few years? Where are these indicators at right now?
- What suggestions can the informant/s make regarding useful measurement indicators in medical supplies *distribution and management* that could track progress and change over the next few years? Where are these indicators at right now?
- Are there other suggestions of programs or people for the team to consider?

11.3.2 Health Manager (Provincial and District) Focus Group Discussion Guide

Facilitators were from the core evaluation team with additional support from staff of UPNG Department of Pharmacy who had supported the HF survey.

Day 1: 16.30pm (30 - 45 minutes)

- Briefing (5 minutes)
- Written anonymous survey (30 minutes) – see below
- Short wrap-up in plenary to preview the longer discussion on Day 2 (5 minutes)

Day 2: 14.45 pm (2 hours)

- Review of briefing (3 minutes)
- Division into three or four groups (10 minutes), as:
 - Provincial and church managers;
 - Either one group or two groups depending on number of UPNG facilitators
 - If two groups, suggest split church and PHOs separately
 - District managers
 - Two equal groups, encouraging mixing of district managers from different provinces
- Discussion using questions, and facilitator probes (as below), with recording by facilitator or nominated scribe (90 minutes)
- Aid Post listing update by Charles Kendall (15 minutes)
- Wrap-up and next steps, in plenary (5 minutes).

A standardized script was used by facilitators to provide a briefing prior to discussion.

This discussion has been organised to understand the experience of health managers at provincial and district levels with **ordering and receiving** medical supplies, and the **quality and usage** of essential medicines in your areas of responsibility.

We are especially interested in:

1. Any **changes** you have noted in the area of **medical supplies in the past three years**;
2. How AMS, provincial transit stores, hospitals, health centres and aid posts **communicate and coordinate for ordering or managing medical supplies**;
3. Your views on the **100% (IDA) kits**, including those that are reported as **not delivered** to health facilities;
4. **Challenges** involving transport, information systems, storage, communication ;
5. Interactions between **vertical programs** (like malaria, HIV medicines etc...) and other medical supply chains; and
6. Any other comments or suggestions you may have on the future of medical supplies in PNG.

Focus group questions with Provincial/Church or District Health Managers

1. Do you see any significant changes in medical supplies in the past three years, or has it stayed roughly the same?
2. Can you comment on the **100% (IDA) kits** ('push' system") supplied direct to Health Centres and Aid Posts
Probes if needed may include:
 - Do you know in advance **when** the kit will be sent to you?
 - Medical supplies are received in **good conditions**?
 - **Quality** of medicines?
 - Communication is good between the distributor and the Health facility?
 - To your knowledge, do facilities have **sufficient storage** to accommodate the kit?
 - How do you **reallocate kits** that are sent to the province because of failed deliveries or reluctance from facilities to keep all the stock received (i.e. IV Fluids)
 - Is there a process (formal or informal) in which you **re-distribute** stocks?
 - What problems have you had with this system and how did you resolve these issues?
3. Comment on the ORDERING and DISTRIBUTION of goods **between the AMS and the health facilities** in the government 'pull' system..
Probes if needed may include:
 - **How long** does it take to receive an order from the AMS?
 - Do you **receive all** of the items that you order?
 - How is the **communication with AMS** when you have issue with the order? How responsive are they?
 - If an item is **out of stock at the AMS**, do they send it when is available? If they do not, do you have funds to supplement your stocks through **local procurement**?
 - How is the order transported? (Through LD Logistics?)
 - How do facilities **report their requirements**, to AMS when placing an order, using information such as
 - **Average monthly consumption**
 - **Stock on hand** to place an order?
 - How could this system of ordering and distribution be **improved**? What other problems have you encountered and **how did you solve** these problems?
4. Can you comment on role e.g. Distribution of supplies, from the **Provincial Transit Store (PTS) and the health facility**?
Probes if needed, may include:
 - Transport of goods, is it reliable?
 - How is the communication between the PTS and the Health Facility?
 - What problems have you had with this system and how did you resolve these issues?
5. Can you suggest what could support **improved stock management** at the Health Facility Level?
Probes if needed may include:
 - Supervision?
 - Infrastructure?
 - Communications?
 - Do you have any suggestions for improvements in medical supplies management at the provincial store or the area medical store?
 - Do you have any suggestions for improvements in medical supplies management at the health centre or aid post?
6. What **other suggestions** do you have for improving the quality and availability of medical supplies in PNG?

11.3.3 Health Managers' Written Survey

You do not need to put your name on this survey. Please give us an honest opinion.

1. Please tick/circle below your management role:

Regional	Provincial	District
Government	Church	Other non-government

Please note your position title (if you wish): _____

2. (a) What **significant positive changes, if any**, have you seen in the procurement and distribution of medical supplies in your area? Please give specific comments if you can. (b) In your experience, what are the key remaining problems with medical supplies?
3. What is your experience of **communications and coordination for medical supplies ordering and supply** between responsible government agencies working in medical supplies, for example between Area Medical Stores, Provincial Transit Stores, and different levels of health facility? Please give specific comments if you can. If possible, could you comment on how **communications and coordination** could be improved between
- Provincial transit store (PTS) and Area Medical Store (AMS)
 - Between any two AMS (eg. "inter-store transfers")
 - AMS/Provincial Transit store and Medical Supplies Procurement & Distribution (MSPD)
 - Between AMS/PTS and the health facilities
 - The Provincial office and the health facilities
4. Can you comment on the **availability, quality and distribution of** essential medicines in different programs such as the:
- Vertical programs for malaria, HIV, TB or reproductive health medicines and commodities
 - 100% Health Centre Kits ('push' system)
 - Standard government 'pull' system of orders and distribution
- Please give specific comments on **strengths and/or weaknesses** for each program if you can.
5. Do you have any general **suggestions** for improving the procurement and/or distribution of medical supplies?
6. Can you suggest **one indicator** (other than stock-out rates) that would be very important to monitor to assess whether the situation for medical supplies is improving or not?
7. In your opinion, what are some of the key challenges with systematically monitoring the medical supply procurement and distribution system?

Thank you for your time.

11.4 Qualitative analysis – synthesis of findings

11.4.1 Findings from health managers survey and discussions

This Section presents the feedback, perceptions and attitudes reported in focus group discussions (FGDs) and surveys that are most relevant to the research questions. When reading this section, several overarching points should be held in mind:

- Most health managers, particularly at district level, had relatively less involvement in ‘push’ system operations and this distance from active involvement in the kits program meant some comments clearly presented second-hand reports rather than direct experience. There is some contrast in the overall opinions of managers in this section, when compared to those expressed by HF staff when interviewed during the HF survey (see Section 11.4.2). However, the exercise generated a rich and detailed set of opinions on past difficulties and areas for future experience, which is why it is presented in some length in this annex.
- It often proved difficult to accurately discriminate which program (‘pull’, ‘push 100% kits’ or ‘push’ 40% kits’) was being addressed by comments in either FGDs or written surveys, with some comments referencing ‘kit delivery’ or similar terminology sometimes applying to transport by LD Logistics in the ‘pull’ system and sometimes to services by a contractor within the ‘push’ system. This was despite the best attempts of the written survey structure, and discussion moderators, as this had been identified as a risk early in the methodology.

For this analysis, data collection teams conducted 16 FGDs; and administered 130 written surveys of health managers from District, Provincial and Church levels of governance, across the four regions. This was done in workshops held in Port Moresby (Southern, Islands and Momase) or Goroka (Highlands). The data analysis program NVIVO¹ was used for data storage, management and retrieval. After reviewing the data, the research team used NVIVO to develop a coding frame, which was broadly aligned with the Evaluation Plan Year 1 (see Annex 11.5). The coding frame was structured by the following thematic areas: Multi-year planning and forecasting; Quality control and regulation; Availability and procurement; Communication; Distribution, warehousing and inventory control; Monitoring and evaluation; Access and utilisation (including rational use of medicines); Transparency, governance and anti-corruption; and Health facility survey findings. The coding frame was then used to categorise and analyse all qualitative data.

Multi-year planning and forecasting

Many participants highlighted the need for the supply of medicines to be matched to the level of health facility and to the prescribing and dispensing level of the health worker. Frequent comments reported perceptions that there was often a shortage of commonly used drugs such as antibiotics, antimalarials and analgesics but an oversupply of items such as IV fluids. *“Supplies need to be improved so that they are matched with needs of individual health facilities and aid posts, this would stop wastage.” (FGD, District, Islands)*

A few participants spoke of the quality of medicines and the need for certified suppliers to ensure good quality control, recognizing that use of accredited suppliers was one mechanism to improve quality.

Many participants also reported that there needed to be more consultation with the district health managers as to which medicines were most needed and in what quantities they were required. Provincial managers also wanted to be more closely involved in the decision making processes around medical supplies e.g. the delivery schedule of the kits contents and developing a communication link between distributors, health centres and the central government. Participants also stated that proper training and

¹ See: <http://www.qsrinternational.com/>

implementation of standard operating procedures were required for proper procurement and ordering of supplies.

Quality control and regulation

- Staffing

Throughout surveys and FGDs, human resource issues were a commonly raised theme, even though there were no specific questions about it. The lack of skilled workforce in the health sector is a widely acknowledged systems issue in PNG; so it was not surprising that it was raised uniformly across all groups. A variety of staffing and training issues were raised, with weaknesses at all levels of the health system acknowledged. The majority of comments highlighted the need for a larger number of qualified staff at the provincial, district and health facility level – especially pharmacists: *“Pharmacist positions should be created in each province; with the aim of training health centre OICs and monitor medical supplies. These Pharmacists would also liaise with the PTO, AMS and PHO.”* (FGD, Church, Islands)

This insufficient staff capacity has led to a greater burden being placed on existing staff, leading to mismanagement of stock and a lack of supervision: *“Often health workers are either too busy or not trained to do proper stocktake and stock rotations.”* (Survey, Church, Southern)

Some participants suggested that staff working in the AMSs and PTSs should be trained as well, to increase their productivity and efficiency: *“The management at the AMS in East New Britain must be improved through the secondment of a store manager, which is still outstanding. There is a need to consolidate all ordering and storage of medical supplies.”* (Survey, Province, Islands)

Even though participants from all regions raised human resource issues, there was a larger volume noted from Momase, with lack of training on standard operating procedures (SOPs) and an insufficient quantity of staff listed as main issues for the region: *“At the facility level, human resource development is a must – to properly store and manage drugs as well as other medical store issues.”* (Survey, Province, Momase) Moreover, constructive comments from all levels of governance (i.e. district, provincial or church) were raised, although district level participants provided a higher volume of comments.

- Guidelines

There was a general consensus from participants that SOPs were required across all health facilities for proper stock management and control. SOP training was seemingly conducted intermittently, meaning that there was a lack of knowledge amongst newer staff members. Refresher courses regarding SOPs were also requested, as new medicines were being procured and distributed without any training being implemented: *“No proper training for staff on the usage of drugs.”* (Survey, Church, Momase)

SOPs were requested for proper consumption rates of medicines so that correct quantities of supplies could be ordered. The use of stock cards or stock recording procedures was mentioned as an important part of proper stock management. Many health facilities were not receiving the updated standard treatment guidelines (STG) or medical and dental catalogue, so they were unaware of new treatment procedures and the correct use of new medicines: *“Broader distribution of STGs, especially to non-government organisations that are distributing commodities not in compliance with national guidelines.”* (FGD, District, Momase)

An electronic system for reporting medicine use and ordering was also suggested for improved recording and faster communications between health levels: *“There should be a computerised system so you can*

see the information required straight away. Information can also be fed into the system for proper stock management using a computerised system.” (FGD, District, Southern)

- Storage, facility space and disposal

The disposal of medicines was mentioned as a problem, especially where there were no incinerators available to dispose of expired medicines safely. Managers reported that health care workers were disposing of medicines usually by digging a pit in the ground or by burning the waste.

It was reported that there was an oversupply of certain medicines distributed in the 100% kits and health facilities had insufficient storage space to accommodate the supplies properly. Bulk items such as IV fluids were mentioned as a particular problem especially at the aid post level: *“Storage space for medical supplies is too small. They don’t know where to store all the drugs.” (FGD, District, Highlands)*. In some cases, medicines were reported as left outside the health facility, as there was not enough space to store the supplies properly, creating risks of potential degradation and theft. There were reports that if medicines were sent to HFs close to their expiry date by a ‘pull’ system store (see below), this added to the disposal burden. *‘There is problem of disposing expired drugs, given that there are no incinerators.’ (FGD, Church, Highlands)*

Participants also mentioned that in some cases contractors were not storing or delivering the medicines properly; such as leaving the medicines outside subject to the sun and rain. The contractors were seemingly not informed about proper medicine storage and handling requirements. Standard operating procedure training was requested, as participants wanted proper training on stock management and storage requirements.

Availability and procurement

- ‘Pull’ system

Participants mainly commented that the availability of medicines and supplies in the ‘pull’ system was poor. Orders from the AMS to the health facilities were reported as often being sent in reduced quantities leading to stock-outs of common and life-saving medicines. The AMS also reportedly sent out excess medicines that the health facility did not order and close to expiring, using the health facility as a *“dumping ground” (FGD, District, Southern)*. Nil stock was often reported on basic order items for many months with no follow up or communication regarding the requested items. There was also mention of a lack of standard procedures for stock management and control, as well as staff management issues, especially at Badili AMS.

There were very few comments regarding good availability from the government ‘pull’ system. Many respondents used this topic to comment again on their perception of a lack of adequate quantities of most needed medicines, including antibiotics, analgesics and basic medical supplies: *“...what we need are the vital (essential) needed drugs at the right quantity and not so much of the drugs that we don’t often use.” (Survey, District, Islands)* Some reported that medicines that were in excess or close to expiring at the AMS were sent out to health facilities. However some participants also mentioned that the health facility staff themselves often ordered incorrect quantities of medicines, leading to stock-outs or oversupply: *‘The actual procurement process is not addressing the real concerns of the health facility. Quantities are always wrong.’ (FGD, District, Southern)*

There were a few comments stating that some managers felt the ‘old’ government distribution system had operated better compared to the current system, recalling funds being allocated to the health facilities to collect their orders from the AMS instead of relying on private contractors to deliver their supplies. *“Sometimes the kits are left at the health centre and need to arrange a vehicle or a boat to*

deliver to the aid post. A note was written to the aid post nurse to arrange to pick up supplies but she did not have money to pay.” (FGD, District, Highlands). In one case this was couched as a recommendation for a different application of external funding: “Australian Aid should give money to facilities to arrange pick up of drugs from the AMS. Non-medical people don’t know importance of morphine or other drugs.” (FGD, District, Momase)

- ‘Push’ system

Common comments related to managers’ perceptions of how appropriate some items in the 100% kits were for a certain health facility level. The perception of over-supply of intravenous fluids, reported by others such as HF staff, was also reflected among many managers comments. Managers also reported that some medicines in the Medical and Dental catalogue such as magnesium sulphate injection, zinc tablets and artesunate suppository (delivered in the kits) may not be used because staff lacked adequate training. Some respondents reported concern that certain categories of medicine, such as category B and C² could not be used because there were no doctors at the facility: *“Many medicines in the kit were found to be category B and C while personnel at the facility are of lower qualification and cannot use such medicines.” (FGD, Province, Highlands). Respondents did not recognize that this had been done at NDOH/WHO suggestion, with the intention of that these medicines could have their usage authorized remotely by a medical officer through radio or telephone.*

- Vertical programs

Many managers perceived that the medicines that were supplied through the vertical programs of Malaria, HIV, TB and RPH were generally more available compared to the standard ‘pull’ system. However, there were differences in opinions on availability of each commodity from some regions: There is a *“lack of RDT and Mala-1 in all aid posts in the district. There is insufficient stock, most facilities do not have antimalarials despite our malaria situation.” (Survey, District, Momase)*

- Local costs

Managers noted that when health facilities run out of medicines, the health facility or the patient has to bear the cost for purchasing extra medicines from private pharmacies. This was noted as an expensive exercise, with health facilities using patient user fees to cover the costs of purchasing extra medicines. *“Enga doesn’t buy drugs, but the patients have to go and buy the drugs which is very expensive.” (FGD, District, Highlands)*

Participants were wary of the current user fees being abolished; worried this would mean that health facilities would not have enough funds to purchase extra supplies: *“The problem is when we do not have patient fees; we will not have the money to pay.” (FGD, District, Highlands)* Buying extra supplies was also reported as only feasible for health facilities that were located in areas where they could access a private pharmacy, noting that for more remote regions this was not possible.

Some participants stated a lack of funds for fuel for transportation from the aid post to collect medical supplies from the health centre. Health facility operational funds were also being used to collect and distribute supplies due to delayed or failed deliveries from the private contractors.

²Category B and C drugs in 100% kits include: atenolol tab, antibiotic ointment, beclomethasone inhaler, carbamazepine tab, chloramphenicol eye drops, chlorhexidine 5% solution, ciprofloxacin tab, diazepam tab (note diazepam injection = Cat. A), erythromycin tab, hydrochlorothiazide tab, metoclopramide tab, hydrocortisone inj, **misoprostol**, quinine (inj and tab), morphine inj, potassium inj, prednisolone tab, Ringers lactate inf, salbutamol resp solution.

Communication

Communication between health facilities was reported to be generally working well. This was demonstrated through comments around sharing of medicines if one health facility had run out of supplies: *“When there’s stock-outs, they use alternate medicines or close clinics for emergencies only. The health facilities contact each other for sharing of drugs if they have run out.”* (FGD, District, Momase). Some participants noted that communication between the AMS and PTS was reasonable.

There were many reports from managers regarding issues with communication in the distribution process in the ‘pull’ system. It was generally noted that there was a lack of communication between the AMS, LD Logistics and the health facility as to when the health facility’s order was going to arrive with the ‘pull’ system of ordering and distribution. Managers perceived a general lack of communication between health facilities and the AMS regarding their orders as the distribution of the medicines was through a private contractor LD logistics. Some participants stated that there was limited consultation between LD logistics and the district health manager’s office, leading to supplies not reaching the more remote health facilities. Some also reported their perception that some AMS seemingly had no contact with LD logistics about the different health facility’s orders, and were unaware if they were delivered or delayed. *‘There is no communication. Our bimonthly MSIVs have not been processed for one and a half years.’* (Survey, Church, Southern) *‘It is very difficult because you do not deal directly with AMS so you do not know what is happening, you do not know if you did not get stock because they forgot, or it was stolen or if they do not have stock, so you do not know if you are going to get it or when.’* (DHM FGD Islands). *‘The other problem is you do not know when the stock will come, it does not come so you re-order and then it comes and you have too much stock or no stock.’* (DHM FGD Islands)

Many managers also expressed opinions on communication issues around the distribution of 100% kits. Managers noted that the PHO is supposed to be notified of the 100% kit deliveries, but some felt that this did not always occur (although it is noted that other analysis in our evaluation suggests high rates of PHO notification). Managers also reported information not being passed down by the PHO to the lower levels. Some participants reported being unaware when the kits would be delivered, and consequent difficulties in knowing if a delivery had been successful.

Some managers reported that when delivery of the kits was proving difficult, there could have been better communications between central managers, delivery contractors and local health managers and staff. Local health authorities mentioned that their knowledge of the geographic terrain and whether APs are open or closed could be used more effectively, especially as the situation changed frequently. Some participants also stated that they were unaware of 100% kits contents and better knowledge of this could have helped their local planning. It is noted that other evidence shows that 100% kit contents were widely consulted during program development, and that printed summaries of contents were distributed along with kits, so this may represent difficulties in local communications rather than with the kits program. There were a range of suggestions to the effect that provincial and district managers, and perhaps also hospitals and provincial AMSs as a group, could be more involved in future discussion on ‘push’ system details including kit contents, timing and distribution mechanisms.

Communication devices were reported as lacking with participants noting that they used their own personal phone for work purposes, whilst some facilities did not have phone coverage. Managers perceived the VHF radio communication system as limited by many clinics not having working devices. There was mention of a new Closed Unit Group (CUG) system of communication, by some managers, but suggested it had not yet been fully implemented.

Some participants stated a general concern that ‘push’ programs and other vertical programs had the potential to weaken the government ‘pull’ system, worried that an interim parallel system may distract from efforts to strengthen the current ‘pull’ system *‘There has been lack of communication among*

stakeholders of vertical programs. As a result duplications of ARVs and other drugs for vertical programs has occurred with similar drugs being supplied by Clinton Foundation, WHO and NDoH and the mining companies and Oil search for example.’ (FGD, Church, Highlands)

Distribution, warehousing and inventory control

The majority of opinions regarding the distribution of medical supplies were non-specific comments regarding perceived weaknesses with distribution systems, such as lack of appropriate communication (discussed above), medicines delivered to the wrong addresses, and long waiting times for deliveries. Other themes included receipt of expired or difficult-to-use medicines (as above) and facilities remaining without appropriate medicine supply, especially at the AP level. In relation to this last theme, it is important to note that in the ‘pull’ system APs do not generally directly receive supplies – being reliant on local HC supply – and also the other evidence in our evaluation of the effective ‘push’ system penetration to this level. A few participants reported a general perception that the distribution system was in fact working well; with some reporting medicines being delivered on time, and to the doorstep of the health facility – phrasing that suggests the informants may have been referring to ‘push’ system operations.

Participants suggested that the roles and responsibilities be properly identified between the different supply chains, for example clarifying who was responsible for covering the cost for delivery to the aid posts. Some participants suggested using partnership models of funding to support the timely delivery of supplies: *“Cost sharing arrangements with provinces so if contractors can’t deliver, provinces can step in and support.” (Survey, Province, Momase)* *“Look at options of partnering with provinces to take on the responsibilities – provinces know their localities better.” (Survey, Province, Momase)*

- ‘Push’ system

When asked specifically about the ‘push’ system, the majority of participants reported that the provision of the kits was appreciated, and also made suggestions for improvement, including comments on communication noted above. Other comments relevant to the ‘push’ system sought an increase in frequency of delivery, an opinion echoed by some HF staff. Managers also noted, as do contractor records, the difficulty in delivering to correct addresses, especially for APs, when they are wrongly listed or if external events have led to their closure, sometimes with minimal warning. One particular aspect of coordination mentioned by some managers related to HFs independently ordering from the AMS through the ‘pull’ system, with the risk that if the 100% kit arrived at a similar time this could lead to a temporary excess of stock.

Some participants reported that private distribution contractors worked effectively. This was evidenced by reports of 100% kits supplementing lack of deliveries from the ‘pull’ system, kits being delivered to rural health facilities: *“Supplies in general are now reaching the rural health facilities via the kit deliveries, despite minor hiccups.” (Survey, Province, Islands)*

- ‘Pull’ system

When asked specifically about the ‘pull’ system, participants reported a range of frustrations, including extremely lengthy waiting periods after order medicines from the AMS (in some cases up to 18 months); packages delivered to the wrong addresses; inadequate communication; damaged medicines being delivered. A number of managers expressed opinions amounting to a general distrust for the efficacy of the entire medical supply system, with some provincial managers feeling marginalised: *“The Provincial Health Office (PHO) from the start must be part of the team, particularly in the distribution of drugs from the AMS to the PTS and then down to the health centres and aid post level. Currently the PHO is not part of the team and that is why medical supplies are still not reaching the aid post level.” (Survey, Provincial Manager, Islands).* *“No communication between the AMS and contractors so they don’t know where the deliveries are going.” (FGD, District, Momase)*

The few participants that reported the 'pull' system was working well commented on good communication in their province or district and coordination of distribution processes. Some managers, as noted above, questioned whether the current system involving private contractors managing the distribution in the 'pull' system was an improvement over the previous approach.

- Vertical system

There were relatively few comments from managers regarding distribution in the vertical programs of malaria, TB, HIV/AIDS and reproductive health, with most comments on weaknesses mentioning communication or delay in delivery. Those that reported the distribution of the vertical programs as working well, attributed this to the medicines being supplied to the PTS, which are then distributed to the rural facilities in a timely manner.

Monitoring and evaluation

From written surveys and FGDs, participants were asked to comment on monitoring and evaluation systems, specifically about indicators that should be measured to ensure the effectiveness of the medical supplies system. Even though many health facilities complete NHIS monthly reporting forms, the data collected is not seen as being reported back to health facility, provincial or district staff; and many participants felt that the data was not being used to inform broader procurement systems. Many comments outlined the lack of accountability within the medical supplies system, which is strongly linked to a weak monitoring and evaluation framework: *"Agreeing on specific indicators to monitor systematically should be the starting point. In the interim, there should be someone to assist in 'kick-starting' the process. Systematic evaluation processes should be implemented."* (Survey, Province, Islands)

As the comment above illustrates, many participants feel there is a need for stronger monitoring and evaluation systems; starting from the procurement process through to the distribution of medicines. Managers envisioned better communication between AMS and provincial/district level staff; training of health facility staff in data collection and management; and the establishment of information systems including the development of a useful database for medicine stock levels. Comments delineate a strong need for an evidence based approach to the medical supply system, which would utilise data to inform gaps and highlight blockages within the system. Whilst many participants agreed that stock-out levels were the best indicator to measure effectiveness, the following indicators were also suggested as being useful for such a system:

- Percentage of medicines supplied vs. total medicines requested
- Amount of expired medicines on facility shelves
- Medicine usage rate vs. supply levels per facility
- Number of orders received by health facilities
- Monitoring of disease patterns based on geographical regions
- Monitoring of distribution (deliveries and processes)
- Outpatient numbers

Participants from all regions and governance levels provided comments regarding the need to strengthen monitoring and evaluation systems. Notably, district level participants advocated for more stringent monitoring and evaluation of the distribution process, especially for the performance management of contractors: *"Both the LD logistics and 40% and 100% kits have had bad delivery services. How the contractors have been paid is questionable. Agencies responsible should aggressively monitor their contractors, as it's currently not service oriented."* (FGD, District, Islands)

Access and utilisation (including rational use of medicines)

Availability of basic medicines and medical supplies was reported as a major issue for many participants. The main issues were the insufficient supply of essential medicines to treat common health problems,

whilst there was an oversupply of other non-essential items. This oversupply was an issue especially at smaller facilities leading to storage problems and issues around proper disposal of expired medicines. Participants noted that health facilities or patients were using their own funds to purchase medicines from private pharmacies if there was no stock available. This was not always possible for more remote locations. Frustration was expressed at the lack of adequate supplies and quantities of supplies ordered from the AMS were often reduced: *"Most health facilities currently have nothing on the shelf. Aid posts are closed as no supplies and community leaders are asking why the aid posts are closing? And we say it's because there are no drugs and it's beyond our control."* (FGD, District, Momase)

However, some participants expressed that there was an improvement in the availability of medicine supplies at health facilities since the introduction of the kit system: *"The 100% kits have been noted as supplementing the routine 'pull' system ordering, supplementary AusAID donation of drugs has sustained our supplies in our health facility."* (Survey, Church, Highlands)

Managers also reported that medicine usage did not match national standards, a finding corroborated by other evidence in our evaluation. For instance, managers mentioned staff not knowing how to use misoprostol or zinc; despite these being included in the kits. It was commonly reported that some contents of the kits were not well recognized by HF staff. Some managers felt that the prescribing categories in the Medical and Dental Catalogue were seen as too restrictive as most health care workers were capable of administering a wider range of medicines than what was indicated.

Transparency, governance and anti-corruption

Managers related a variety of concerns in this area and described a number of incidents, which often seemed to be secondary reports rather than their direct experience, and apply to a range of programs over recent years. Many reported incidents related to supplies not being delivered to the more remotely located health facilities, or being left in inappropriate locations such as by the side of the road or outside private homes. This meant the medicines were then subject to the risk of theft or damage due to improper storage conditions. It is noted that the management arrangements for 100% kits program requires contractors to actively follow-up any irregularities and evidence provided to this evaluation suggests that there is satisfactory compliance in this regard. In addition, where such reports could have applied to 100% kit medicines, further investigation has failed to verify misuse of delivery funds in this particular program.

Some managers noted that although the 100% kit medicines have been branded 'GoPNG-Not for resale,' there have been occasional reports of these medicines being sold on the streets or in unauthorized shops at some stage after delivery. As noted in the annex below, there were two instances from the HF survey where staff recounted similar stories, however this evaluation has not found evidence to verify these accounts. Is it notable that previous medical supply assessments have also reported irregular re-sale of medicines from different sources, including the government 'pull' system. Antibiotics, especially amoxicillin and analgesics, from all sources, were reported as common medicines that were likely to be resold illegally. Informants viewed current monitoring, law enforcement or punishment as inadequate, although in West New Britain province, one district health manager reported that four health workers were on suspension after being found to be illegally selling medicines on the streets: *"General antibiotics are being sold on the street by anyone. There's a great overuse of antibiotics. People take medicines from health centre or AMS or aid post to sell to people on the street. Four officers are on suspension in WNB for doing this."* (FGD, District, Islands)

There were also reports that the distributor for the government 'pull' system, which informants identified as LD Logistics, were also not always delivering medicines to the health facilities, with reports of medicines being either left out on the street or being kept at private houses: *"Sometimes they are left where they can be stolen or damaged. Or we have to pay to get them back."* (FGD, District, Islands). *"They*

drop the medicines anywhere. Then people are missing the drugs selling the drugs on the street. Sometimes the District Health Managers have to give money to get people to take the drugs to the health facility as the contractors don't take the supplies there.” (FGD, District, Highlands)

It was also mentioned that health care workers were also subject to taking medicines from the health facilities either to supply to their family for their own use or to sell on the street: *“Health care workers supply to their wantoks who use it for themselves of sell on street.” (FGD, District, Highlands)*

Many managers viewed accountability within NDoH, or other authorities as a productive area for improvement; citing that strengthening systems to discipline or terminate those who did not perform their respective duties accordingly would be one of the most useful ways forward.

11.4.2 Findings from health facility staff interviews during survey, focused on 'push' system

These data were derived from open text questions at different points in 110 HF surveys, thus captured the same sample as the overall survey. Exact questions are available in the section on tools (below); they were constructed to be non-leading in nature and sought opinions on medical supplies in general as well as the recent 'push' system distribution of essential medicines and medical supplies kits.

Overall viewpoint

The great majority of health workers interviewed during HF visits commented that the 'push' system of delivery of the 100% kits (and in some cases the earlier 40% kits) straight to the health facility represented a significant boost to their capacity, especially noted from AP staff. The overwhelming majority were positive about the 'push' program of kits, frequently mentioning that the supplement to their supplies compensated for delays or missing orders from an AMS in the 'pull' system.

Key areas of 'push' system impact

HF comments document their perceptions of the main changes that the 'push' system of essential medicines kit system in a variety of areas:

Access and equity

AP staff in particular experienced this as a new level of support, with many noting they had not experienced this level of supply stocks previously. Many, from both HC and AP levels, linked this to expanded capacity to improved provision of services, especially in rural or difficult areas. This is discussed further in the equity-oriented review of the qualitative data below.

Health facility functioning

Many comments noted the impact of the 'push' system on HF capacity, reporting it as a good complement to the AMS 'pull' system, with the kits addressing some deficiencies in that system so as to ensure they had a more complete set of medical supplies to address their catchment area's health needs. Almost all noted increased stock levels and supply lasting longer as illustrated by a range of quotes:

- *"Lots of medication available, especially the necessary ones. So happy about the program."*(AP, Highlands)
- *"It helps a lot with stock outs. When medicines ordered from AMS are N/S the kits help the HC keep going"* (HC, Islands)
- *"...when there is a delay in their order from area medical store. The availability of these kits in the healthy facility keeps the health centre in operation"* (HC, Momase).
- *"Major boost to overcoming shortages. Much less stock outs, reduced cancellation of surgical lists. Used to need to purchase privately from Hagen, but now not needed for about 1 year."* (District Hospital, Highlands)
- *"These medicines are readily available for the best treatment of patients and which overcome the chances of giving incomplete doses"* (AP, Islands)

As noted in the district hospital comment above, many HF staff noted the impact in enhanced ability to treat patients, especially at the aid post level; *"Since the start of this program, more patients are admitted at the aid post, instead of the health centre at Yampu or the hospital."* (AP, Highlands). In some cases, additional medicines were noted to increase staff capacity to provide new services: *"Officer learnt new knowledge of unfamiliar drugs from catalogue"* (AP, Southern), *"Good to see usage of zinc for diarrhoea [at peripheral levels]"* (Hospital, Highlands). *"...IDA supplements the supply from AMS. Gave workers exposure to new drugs."* (AP, Southern).

Other specific service impacts were occasionally noted, for example: *"Treatment of malaria has improved"* (AP, Momase, referencing the vertical program), *"Supplies of codeine helped in pain where*

previosuly there was none in stock.” (District hospital, Southern), “Helps improve the health of the community, for example some fungal infections are not often seen as before” (AP, Islands).

Quality perceptions

Many HF staff perceived the 100% kit medicines as of higher quality than the norm, with a number citing the standardized labeling and presentation helping to indicate a good quality product: *“More high quality drugs with more medical equipment. All 100% kits are used.” (AP, Momase). “I really like the 100% kit (IDA) because it is more effective than any other manufactures as I’ve heard from some of my friends who got IDA medicine when they were sick got healed immediately. Therefore, they must continue on to supply it because it is high quality compared to other non-100% kit” (AP, Highlands). “Nice-better quality medicines. IDA seems to work better-keep them in the back and use for serious patients.” (HC, Highlands). “IDA quality better - packaging and tablet/susp noticeably better” (Provincial hospital, Highlands).*

Cost savings for facilities and community

As noted in the main evaluation report, private purchase of medicines was a common practice in HFs at times of stock-out. A reduction in stock-outs, supplementing the medicines received in the ‘pull’ system, helped reduce this need: *“helps improve and cure lots of diseases. Reduce cost of buying medicines.” (AP, Southern), “...before the arrival of the kits they usually experience drug shortages so they have to buy at local markets. However, since the introduction of the kits it saves them money and provides the required treatment” (SC, Islands).* The Highlands district hospital, quoted above, also noted this benefit. Other comments also noted that reduced need to privately purchase medicines during stock-outs also meant reduced cost to community members, because private purchase costs were generally passed onto the patient. Reducing need for referral was also reported as having a community cost savings benefit, as in: *“Very helpful and supportive. Reduced the patient cost to refer them to the HC in Arawa” (AP, Islands)*

Community impacts

A number of HF staff noted a positive impact on improved community trust and confidence in health services from the ‘push’ system; *“Biggest change is filling the gap when medicines run out due to delays and difficulties in getting supplies from Hagen. Community trust noticeable since started.” (AP, Highlands).* This was related to increased patient usage of services, with HF staff hypothesizing this as due to both increased availability or perceived better quality of medicines: *“Since kits started tally sheets are showing more patients because they hear more powerful medicines are here.” (AP, Highlands).* Other staff at HC and hospital levels, as well as at APs suggested that expanded services meant fewer referrals, with savings in community time and cost.

Suggestions for improvement

The HF staff were also asked to make suggestions for improvement for the 100% kits program in 2014 or other part of the medical supplies system. These improvements were viewed as potential additions to a highly-valued program that almost all informants felt should continue.

Increasing monitoring and security were suggested by some health workers as a way to reduce the incomplete and failed deliveries, and ensure correct location. Certain health facilities also noted that their delivery was delayed or irregular, and they ran out of supplies (and could not replenish through the ‘pull’ system) before the next delivery of kits arrived. One HC and a number of APs reported not receiving kits and were unsure whether this was because they were not listed in databases or for other reasons. Two facilities (in Sandaun) reported that poor contractor arrangements with airlines delayed shipment. There were two instances (one in Southern and one in Islands regions) where HF staff reported stories of medicines being sold or dispensed at unauthorized locations at some stage after delivery, however this evaluation has not found evidence to verify these events.

Whilst appreciative of the 100% kits, many health staff spoke of the need for greater quantities of essential items such as antibiotics, analgesics and decreased quantities of items that were not used as often such as IV saline solution, sodium bicarbonate (as reported elsewhere in this evaluation). Health staff also noted that certain medicines distributed to the health centre and aid post were not appropriate for the staff qualification level of prescribing and dispensing. It is noted that there were some medicines supplied, on NDOH/WHO advice, to lower levels with the intention that their use could be remotely authorized by radio or telephone by a medical officer. The transport and handling of the kits was also raised by some staff as an issue, reporting some cases where they felt contractors did not transport or store the medicines appropriately, with boxes delivered wet or damaged to the health facility, or shipments broken up for more convenient transport with the risk of unattended supplies being stolen or damaged. Comparison with other data, including contractor delivery reports (as analyzed in the main report), suggests these were less common events, although quantification is difficult. There were also some comments regarding the need for vertical program medicines such as Mala-1 and reproductive health supplies.

A summary of improvements listed included the following:

- 1 Quantities and contents of the kits need to be appropriate for the given health facility. This could include more or less of some medicines, depending on need: *"Increase the quantity of salbutamol inhaler, 2ml ad 5 ml syringes, benzyl penicillin, gloves, gauze. Reduce quantities betamethasone cream, neomycin cream, SSD cream, ORS. Include amoxicillin injection, gauze roll and buscopan injection."*
- 2 Delivery processes should be improved, especially at the aid post level: *"Improve the timing of the delivery. At least three times in regular intervals to ensure there must be enough supply to allow the aid post to continue to run."*
- 3 The need for training of staff on the usage of the medicines in the 100% kits: *"We want a representative to come and advise us on how to use the IDA medicines."*
- 4 The need for stronger monitoring and evaluation systems: *"There should be a stationed monitoring and evaluation officer/logistics officer, who would actually monitor the items and report to NDOH or the donor so they would know what's happening at the facility/aid post level."*

In summary, whilst overwhelmingly positive, the feedback provided by health facility staff also included some suggestions for improvement. There is a strong correlation between the balance of opinions recorded in this evaluation's HF survey, and those found on analysis of comments recorded by the 'push' program's transport providers at the time of delivery of a kit (as presented in the main body of the report).

Review of qualitative data disaggregated for poverty and remoteness

Qualitative findings from interviews during the HF survey were disaggregated by whether the HF was in a 'high-poverty' district based on the World Bank ranking referenced in the main report, and also by whether they were coded as "Remote", in the contractor's distribution database. The thematic analysis performed above was repeated with the disaggregated groups, focusing on the availability of medical supplies, 100% kit delivery effectiveness and changes since the introduction of the 100% kits.

As above, both the poverty and non-poverty groups highly valued the 100% kit delivery program, with the majority of comments reporting that the availability of medical supplies was greater since the introduction of the 100% kits. These included comments from from 'high-poverty' districts such as *"Lots of medication available especially the necessary ones. So happy about the program."* (Opral Aid Post, Western Highlands, high poverty district). However there was a similar weight of opinion from 'non-high-poverty' districts, which also valued increased availability to the same degree: *"Very delighted and happy for the kits as it helps a lot since AMS has delayed delivery of supplies to the HC. Kits supplement the drugs that they received and therefore helps patients and staff. Very grateful. Very good initiative, helped in a*

big way.” (Gaubin Health Centre, Madang, low poverty district). Overall, the qualitative data suggests that it was small, more peripheral facilities that attached highest value to the ‘push’ system, regardless of whether they were in a ‘high-poverty’ district or not. This also applied to comments on community benefit, including cost savings, which were seen equally in both ‘high-poverty’ and ‘non-high-poverty’ districts: “(The 100% kits) saves money as they usually buy stock-out drugs. These medicines are readily available for the best treatment of patients and which overcome the chances of giving incomplete doses.” (Hurui Health Centre, Bougainville, low poverty district)

The delivery of the 100% kits straight to the door step of the health facility was greatly valued by many staff, again in both areas, for example: *“Very happy that IDA will be very helpful since there is no transport, no delivery of drugs. Alternative is she has to collect and carry herself,” (Kawi Aid Post, Western Highlands, High Poverty district)* and *“direct delivery to Aid Post which is good rather than picking up stocks from health centres and sub centres.” (Yambil Aid Post, West Sepik, low poverty district)*. Similarly, the occasional reports of incomplete or missed delivery (discussed above) occurred in both ‘high-poverty’ districts and ‘non-high-poverty districts’.

Overall, the majority of health facility staff from ‘high-poverty’ districts credited the ‘push’ program of 100% kits with making a significant difference to their service capacity, as the following selection of quotes illustrate:

- *“More happy and seen a lot of changes. Always availability of medication thus treating my patient a satisfying job. Very much appreciate IDA process.” (Opral Aid Post, Western Highlands, high poverty district)*
- *“It is very helpful in the health facility and thus boosts the moral of the health staff in terms of work and helping the patient with the available 100 kits. The main change is that now there are plenty of medicines in stock.” (Hartzfeld Haven Health Centre, Madang, high poverty district)*
- *“The 100% kits delivery process is too good. Previously we had a problem with the AMS. They don't deliver our supplies on time due to the transportation problem so we (Abidal health workers) go to the AMS to collect our supplies... Great improvement in the medical supplies (more high quality drugs). Great improvement in the drugs delivery. The transports were provided and the drugs were delivered on time.” (Adiba Sub Centre, Western, high poverty district)*
- *“I really like 100% kit (IDA) because when we run out of stock, that's when IDA suppliers come in which helps us to give to the patients while waiting for the order to come. IDA is very helpful and also effective. Very helpful. Now they have enough stock...” (Aviamp Sub centre, Western Highlands, low poverty district)*

When comparing qualitative themes between HFs coded as ‘Remote’ or not, there was again little distinction between the two groups. Both types of HF highly valued the ‘push’ distribution, largely because both types of HF had experienced frequent stock-outs and disrupted supply in the past:

- *“Drugs should be delivered directly to the AP, as they can [in the past] sit for months at the HC. The 100% kit delivered in Feb were delivered to the aid post doorstep so it was good.” (Wando Aid Post, Western, remote).*
- *“Since the IDA 100% kits program started, the medical supplies were delivered on time. And also the contractors bring the medical supplies to our health centre regardless of the transport problem.” (Adiba Health Centre, Western, non-remote)*

Both remote and non-remote HFs reported the increase in availability that is the dominant theme above:

- *“Since the delivery of the kits there are no medicine shortages in the Health Centre compared to the past.” (Walium Health Centre, Madang, remote).*

- *“Helpful because it has stopped a number of diseases, and helped treat many diseases.” (Sipuru Health Centre, Bougainville, non-remote)*
- *“Medical supplies are now available to treat the whole community.” (Koro Aid Post, Bougainville, non-remote)*

11.5 Year One Evaluation Plan

11.5.1 Evaluation Purpose & Objectives

The first phase of an eight-year impact evaluation of the Government of Papua New Guinea (GoPNG) and development partner assistance in implementing medical supply reforms will focus on reforms in improving quality-assurance and outsourcing the procurement, distribution and warehousing of medical supplies and equipment. The overall impact evaluation is to inform senior management decision-making in the National Department of Health (NDoH), provinces and districts, development partners on ongoing support to these reforms. The evaluation will provide recommendations on how medical supply reforms can be improved and lessons learnt for application in other decentralised settings and sectors in PNG and the Pacific.

The objectives of the evaluation are (in order of priority):

PNG Health and HIV Sector	1. To verify the efficiency, sustainability and achievement of, or progress towards, the expected intermediate and end-of-program outcomes of the PNG sector-wide medical supply reforms and their contribution toward health service delivery outcomes in PNG
Development Partners and Pacific Countries	2. To generate knowledge and lessons learnt for developing countries and development partners on how direct service delivery reforms can be sustainably implemented in PNG (and similar Pacific and/or decentralised settings), with a focus on poverty, equity and maternal and child health targeting.

11.5.2 Evaluation Scope

The impact evaluation provides an evidence base to evaluate performance against the PNG National Health Plan (NHP) 2011-2020 Key Result Area 3 (Strengthen Health Systems – Medical Supplies). The NHP identifies the following strategies to implement medical supply reforms:

- Improve the capacity of the procurement and distribution systems within the health sector;
- Outsource logistics management and operations for the drug supply chain;
- Implement 100% kit system for rural facilities until 2015;
- Build the capacity of provinces and districts to implement the 'pull'/demand systems for medical supplies;
- Rationalise the number of area medical stores and build the capacity of the provincial transit stores;
- Provide the provinces with delegated authority from the Pharmaceuticals Board to investigate and prosecute corruption in relation to medical supplies.

The plan addresses the significant changes in medical supplies in the past three years including:

- A number of reviews of procurement and distribution, both of the general government system, and of the 'vertical' programs for malaria, tuberculosis, HIV, family planning and other reproductive health commodities;
- NDoH has developed a Medical Supplies Reform Plan, gearing up in 2013, including work on:
 - Procurement and supply management governance;
 - Vital and essential medical supplies availability and a multi-year procurement planning;
 - Logistics Management Information System (mSupply), improvement to logistic and distribution arrangements, and Area Medical Stores refurbishments;
 - Medical supply kits and vertical supply chains;

- Quality assurance, policies, and Standard Operating Procedures;
 - Staff development / capacity-building, communications and engagement;
- Work to strengthen the NDoH supply chain ('pull' system) through improving medical stores management and appointing a third-party logistics company to distribute medicines;
- A new approach to 'push' systems of medical supply kits which comprise standard consignments of supplies delivered directly to health facilities including:
 - "40%⁵³ Health Centre (HC) kits" procured by NDoH and distributed by Australian AID from 2011-12; and,
 - "100% HC/Aid Post kits" procured by Australian Government from an international quality-assured supplier and distributed from 2012 to now, working with WHO and others on kit contents;
- Work by NDoH, with partner support, to improve tendering processes including a current international competitive tender for a new round of kits to be procured for 2014.

The evaluation considers all significant contributions towards achieving the NHP aims in the Key Result Area noted above, as well as additional strategies and performance targets of the NHP. Regular assessments in this area will provide real-time information to PNG decision-makers, and inform the Independent Annual Sector Review Group (IASRG) missions.

The proxy indicator for improved medical supply performance noted in the NHP aims for a decrease from 53 per cent in 2010 to 15 per cent in 2015 in essential medical supply stock-outs nationally. However, many stakeholders perceive this indicator as insufficient to track progress. As other current options for medical supplies monitoring and evaluation (M&E) are limited and this represents an area of major investment by the GoPNG and development partners, the Australian Government is supporting a multi-year impact evaluation.

The scope of the impact evaluation is focused on the performance of all major functions required to effectively procure and deliver essential medical supplies to health facilities (in particular 100 per cent medical supply kits) and the impact on health service delivery and population outcomes.

11.5.3 Evaluation Questions

The evaluation will address high- and intermediate-level evaluation questions focused on each function required to bring about the impact required (program theory of change). The evaluation questions will be further refined during the development of the Evaluation Plan and are categorised against evaluation criteria (relevance, effectiveness, efficiency, impact, sustainability).

High-level Evaluation Questions

- Did the suite of interventions to reform the medical supply system improve the health status of women and children in PNG, especially in high poverty districts? If not, where did the program theory break down?
- What was the contribution or causality between the suite of interventions to improve maternal and child health outcomes relative to other interventions?
- Which interventions made the greatest difference and why?
- How did political economy issues support or hinder progress? What program / policy interventions were the most successful and why?
- Which target groups (such as women or children; those with diseases of poverty) and locations (such as high poverty and remote areas) benefited more than others? Why?

⁵³ The terms "40%" and "100%" refer to notional proportions of standardized annual quantities of basic medical supplies for health facilities in PNG and help identify different phases of recent 'push' systems. They are not intended to meet all health facility requirements and other supplies from the 'pull' system are required. These terms have now become convenient program labels for two consecutive 'push' programs for kit distribution.

- What were the negative and unintended impacts which resulted from the suite of interventions?
- Did interventions make effective use of time and resources to achieve the outcomes?
- Are the development gains likely to be sustainable or not easily reversed?
- What lessons can be applied in PNG, Pacific and other decentralised settings?

Detailed Evaluation Questions

Detailed evaluation questions were revised through discussions early in Year One activities, with the final version presented below. The right-hand column shows where questions have been addressed in the Year One Evaluation Report, noting that some questions are not fully addressed in this first year, either because a change has not yet been implemented or because measurement over several years is needed.

Table 1: Detailed evaluation questions

R = Relevance; E1 = Effectiveness; E2 = Efficiency; S = Sustainability; I = Impact

System level	Detailed questions	Relevant section's in Year One Report
Multi-year planning and forecasting	<ul style="list-style-type: none"> • Are there multi-year procurement plans, if so, are they based on accurate forecasting, quantification, adequately costed, and reflecting PNG's vital and essential medicine needs? (R) • Is procurement planning utilised and linked to procurement and tender processes? (E1) • Has the frequency of individual (and 'emergency' or 'supplementary') procurements changed? If so why? (E2) • Have overall costs of medical supplies procurement changed from year to year? If so, why? (E2) • To what extent has technical assistance and policy engagement affected change? (E1) • Can the current national information systems, including the National Health Information System, provide sufficient monitoring information for planning? If not, what are feasible improvements? (R, E2) • Are improvements in procurement planning being sustained? Why? (S) 	<ul style="list-style-type: none"> • 3.1 • 3.1, 3.2 • 3.1 • 3.1 • 3.1, 9.1 (partially in year one) • 3.1, 5.1, 9.2 • 3.2, 9.1
Budgeting and expenditure	<ul style="list-style-type: none"> • Are annual budget submissions, appropriations and expenditures linked to improved procurement planning, and are they efficient (see below)? (E1) <ul style="list-style-type: none"> ○ Were annual budget appropriations for medical supplies predictable over the evaluation period? (S) ○ Are warrants for medical supplies budget released on time? (E2) ○ Are medical supply expenditures fully acquitted and audited? (E2) • To what extent has technical assistance and policy influence at a whole-of-government level affected change? (E1) 	<ul style="list-style-type: none"> • 3.1 (partially in year one) • 9.1 (partially in year one)
Quality control and regulation	<ul style="list-style-type: none"> • Are PNG's essential medicines lists (EML), medicines catalogue, and standard treatment guidelines (STGs) being revised to reflect current health needs and to discriminate 'vital' and 'essential' medicines? Is this process sustainable? (E1, S) • How appropriate are medical supply kits quantities and contents? (R) • Have reforms increased the capacity of PNG to conduct or contract quality testing of medical supplies, including of private sector/commercial pharmacies? (E1) • Has the quality of medical supplies in the public sector improved as a result of reforms? (E1) 	<ul style="list-style-type: none"> • 3.3. 9.1 • 3.3, 5.2 • 3.3 • 3.3 (partially in year one)

System level	Detailed questions	Relevant section's in Year One Report
Procurement and tendering	<ul style="list-style-type: none"> Has the proportion of medical supply procurements through internationally competitive bidding (ICB) or limited tender and/or compliant with national standards and values changed year on year? If so, why? (E2) Has ICB demonstrated better value for money? (E2) Has the proportion of medical supply procurements through quality-assured suppliers, and those meeting good manufacturer practice (GMP) changed? If so, why? (E2) If procurement practices are improving, how likely are they to be maintained? What is needed to institutionalise improvements? (S) 	<ul style="list-style-type: none"> 3.2 3.1.3 3.2 (partially in year one) Not addressed in year one
Distribution, warehousing and inventory control	<ul style="list-style-type: none"> Has the the timeliness and availability of medical supplies at facility levels changed? Why? (R, E1, E2) What changes have resulted from recent changes in of medical supply distribution from AMS to facilities? How has it affected costs of storage and distribution? (E1, E2) For example: <ul style="list-style-type: none"> How have third-party logistics and provincial/district and facility-level stakeholders coordinated (E1, E2)? How well have deliveries reached remote facilities? Why? (E2) What changes have resulted from recent 'push' kit distributions? What aspects could have been improved in efficiency and effectiveness? (E1, E2) For example: <ul style="list-style-type: none"> Have national, provincial, district and facility-level stakeholders been adequately consulted and involved in the distribution process? (E2) How well have deliveries reached remote facilities? Why? (E2) Have stock-cards from medical supply kits adequately informed forecasting for future procurements? (E2) What changes have resulted from recent vertical disease-specific program distributions? What changes have taken place in area and province level medical stores, especially in organisation, governance and operating procedures? If there are improvements, is there sufficient capacity to maintain these? (E2, S) <ul style="list-style-type: none"> Has mSupply® (or other centralised, computerised inventory system) improved the accuracy of medical supply needs and is there sufficient capacity to maintain the system? (E2, S) 	<ul style="list-style-type: none"> 4.1, 5.1 4.1 4.2, 4.3 4.3 8.1 4.3 4.3 4.2 4.1 (partially in year one)
Facility storage, supplies management and waste management	<ul style="list-style-type: none"> Have national medical supplies quantities and types of medicines been appropriate for health facilities? Does this vary for different distribution systems? (E1, E2) Have recent 'push' kit distributions provided appropriate quantities and types of supplies? (E2) For example: <ul style="list-style-type: none"> Is there wastage or under-supply? Were inappropriate medicines received?, if so what/how? Are effective adjustments made to kit contents or distribution? How, and how well, do facilities communicate with provincial or district managers, and/or medical stores, for routine ordering, routine distributions, and re-distribution of un-needed supplies? What proportion of health facilities can appropriately store medical supplies? (E2) Have medical supply waste (including expired medicines) been disposed according to national guidelines? (E2) <ul style="list-style-type: none"> What is the value of wasted/expired medicines at each level? (E2) 	<ul style="list-style-type: none"> 3.1, 5.2 5.1, 5.2.3 4.3 4.1, 4.2 6.1 6.2

System level	Detailed questions	Relevant section's in Year One Report
Access and utilisation (including rational use of medicines)	<ul style="list-style-type: none"> Have stock-outs at facilities (measured at various levels) been reduced over the evaluation period? What areas or levels have fewer stock-outs and why? (E1) <ul style="list-style-type: none"> What is the likelihood that reduced stock-outs will be maintained in the long-term? (S) What has been the relative contribution of different procurement and distribution systems to medicines availability? (R, E1) For example: <ul style="list-style-type: none"> Changes to AMS to facility distribution, recent 'push' kit programs; Changes to vertical disease-specific programs Other roles of private sector and non-state actor (e.g. MSF) provision to public facilities)? (R, E1) Has increased availability of medical supplies been associated with increased health service provision (volume and quality)? (E1) What proportion of health facilities use expired medicines (E2)? <ul style="list-style-type: none"> Which medicines are commonly used when expired? Have there been changes in user fees, household spending or use of public funds to purchase medical supplies from commercial providers? If so, why?(E1) Are there changes in rational use of medicines, including compliance with standard treatment guidelines? (E1, E2) To what extent is there improved management of high priority diseases: e.g. maternal and childhood illness, diseases of poverty? (E1) Has health facility readiness for childhood illness management, emergency obstetric care or management of important infections changed? (E1) 	<ul style="list-style-type: none"> 5.1 9.1 5.1, 9.1 5.1, 8.1, 9.1 5.2, 6.2 5.2, 7.2 (partially in year one) 5.2 8.1, 8.2, 9.1 8.2, 8.3
Community engagement	<ul style="list-style-type: none"> Do community members perceive any changes in medicines availability or quality? (E1) Do patients understand correct use of medicines? (E1) Have communities been engaged in holding facilities accountable, and/or supporting facilities, for appropriate medical supply management? (R) Has community engagement led to improvements in health facility management? (E1) Which strategies have been most effective (e.g. media)? (E1, E2) <ul style="list-style-type: none"> To what extent have demand-side programs⁵⁴ contributed? (E1) 	<ul style="list-style-type: none"> 7.1, 5.2 Not addressed in year one Not addressed in year one No addressed in year one

⁵⁴ Such as Strongim Pipol Strongim Nesen, Churches Partnership Program, the Rural Primary Health Service Delivery Project, and provincial health service agreements.

System level	Detailed questions	Relevant section's in Year One Report
Transparency, governance and anti-corruption	<ul style="list-style-type: none"> Have anti-corruption efforts (such as Operational Sweep) been effective and maintained? (E2) What affect, if any, have these anti-corruption efforts had on medical supply reforms? (E1) Have system reforms reduced opportunities for corruption and is this likely to be maintained? (E1, S) Have perceptions of corruption reduced? (E1) 	<ul style="list-style-type: none"> 3.2 3.2, 9.1 (partial in year one) Not addressed in year one 3.2, 9.1
Health impacts	<ul style="list-style-type: none"> What impact on morbidity or mortality can be attributed to medical supplies changes, and what does this imply for numbers of deaths averted, as a result of increased availability of quality-assured medical supplies (I)? Which can be measured, or estimated, with existing health information systems? For example: <ul style="list-style-type: none"> Have deaths of children under five from pneumonia been reduced as a result of increased availability of quality-assured medical supplies? (I) Have proxies for maternal deaths and morbidity changed⁵⁵? (I) 	<ul style="list-style-type: none"> 8.2 8.2, 9.1, 5.1

11.5.4 Overall Evaluation Approach & Management

Phase 1 of the impact evaluation will involve constructing a baseline, establishing standardised data collection methods, indicators and tools to monitor time-series data and evaluating the outputs, outcomes and impacts of the reforms by 2016. Monitoring systems will be developed and reviewed annually throughout the process and ex-ante and ex-post evaluation will be implemented to demonstrate before/after effects. Annual assessments will include Port Moresby consultations and detailed provincial, district and facility-based field work. Specific locations and community visits will be jointly determined by the Government of PNG, development partners and the evaluation team.

- Year 1:** Measurement of progress as of 2013, using national consultations and a survey of facilities. This is to be supplemented by a reconstruction of a baseline from 2010 including past trend data and exogenous factors such as international drug supply prices, standardising M&E indicators and questions for 2013-2016 and evaluating progress to date.

This will also include proposing a set of monitoring indicators which PNG systems and development partner programs will be required to collect to establish effective time series data. This work will involve working in partnership with the NDoH Monitoring and Research Branch which has responsibility for the NHP M&E plan, the NHIS, and the sector performance annual review (SPAR), and the Australian government-funded Health and HIV Implementing Service Provider (HHISP) partnership with an M&E consortium over 2013-2016.

- Year 2 & Year 3:** Collection and analysis of monitoring data and quality-assurance.
- Year 4:** Further impact evaluation of interventions, repeating and expanding 2013 measurements, and final assessment.

The Burnet Institute will provide overall coordination and leadership of the evaluation, both in the initial year and, subsequently, across the four years as determined by the Evaluation Plan.

The evaluation team will consist of expertise in the following areas:

⁵⁵ This would be only assessed in sample locations and/or where maternal death audits are available to assess whether appropriate interventions were used.

- M&E: expertise in implementing impact evaluations in social sectors, and preferably experience working in PNG/Pacific
- Medical supply procurement/supply chain management: expertise in implementing medical supply procurement and supply chain management reforms in similar developing country contexts
- Quality and regulation: expertise in quality assurance, testing and appropriate regulation of medicines in similar developing country contexts
- Public health: expertise in health systems and service delivery issues related to rational use of medical supplies, particularly with emphasis on maternal and child health
- National research: expertise in qualitative and quantitative research methods and field work in PNG.
- Partner government representatives from national, provincial and/or local levels.

Logistics will be coordinated through the Australian government Health and HIV Implementation Services Provider (HHISP). A national research lead from within UPNG, with national data collectors, will be coordinated by Burnet and contracted separately through HHISP. Additional consumables and travel for the Burnet-supplied advisors, will be procured directly through HHISP.

The evaluation will be overseen by a Technical Review Committee (TRC) comprising the NDoH Performing Monitoring and Research and Medical Supply Procurement and Distribution branches, University of PNG and Development Partners. It will report to the NDoH Technical Working Groups for Medical Supply Procurement and Distribution and Quality and Regulation and provide updates through the Health Sector Partnership Committee on an annual basis.

11.5.5 Overall Evaluation Methodology

The impact evaluation will be guided by international lessons and best practice for designing and conducting impact evaluations. It will be consistent with the focus of the NHP M&E Plan.

The evaluation will use mixed method (qualitative and quantitative) approaches. This is critical to triangulation of evaluation findings and incorporating a wider diversity of values, and necessary to:

- Examining the interactions among the complex and changing contextual factors that can influence program implementation and impacts;
- Defining and measuring indicators of the cultural, historical, political, legal, environmental and psycho-social factors that affect implementation;
- Capturing complex processes of organisational and behavioural change;
- Taking into account how programs change in response to how they are perceived;
- Capturing processes and outcomes which are difficult to observe.

This impact evaluation will not use randomised control trials (RCTs) or quasi-experimental approaches which rely on control and treatment groups. Aside from any ethical issues, this is due to the scope of the program and strategy – i.e., ensuring quality-assured medical supplies reach all health facilities on a regular basis. However, quasi-experimental approaches such as before and after comparisons, and broader contribution analysis and theory-based approaches will be used to determine counterfactuals.

Key Data Collection Methods

The following key data collection methods will be used:

- Review of records, plans and evaluation report from government and partner agencies;
- Consultations with national, provincial and district stakeholders including health service managers in government and partner agencies;
- Observations and interviews with staff and clients at health facilities including medical stores, hospitals, and rural health facilities.

The impact evaluation will rely on a mix of primary and secondary data sources and utilise existing information and data sets as far as possible.

The NDoH and provinces are responsible for annual planning, budgeting, tenders, contracts, expenditures, acquittal, audits and performance information on procurement and distribution contracts. Assessments of medicine quality may include testing if feasible, otherwise will draw on existing assessments of drug quality for publicly funded drugs and commercial sectors and quality testing approaches to internationally quality-assured drugs. NDoH, area medical stores (AMS), provincial transit stores, and health facilities are responsible for inventory stock and ordering data. Australian government's procurement agents and sub-contractors are responsible for data on procurement and distribution of medical supplies including collecting and providing geo-mapping data to the University of PNG.

For assessments of medical supply availability and relative contributions to maternal and child health indicators, the National Health Information System (NHIS) trend data will be utilised and complemented by additional primary research, including a facility survey, to determine causality and counterfactual assessments. While Demographic Health Surveys (DHS) are the accepted method for measuring reductions in maternal deaths, this evaluation will instead rely on other methods such as in-depth case studies to determine the contribution of improved availability of equality medical supplies to reducing maternal deaths.

Sampling Approach

A purposive sampling approach is proposed to ensure adequate representation of:

- Stakeholders at national, provincial, district levels, from government and non-government agencies, and from within and beyond the health sector;
- All four regions in PNG as logistical challenges for each are vastly different;
- Rural/remote facilities and households as they are typically harder to reach than urban facilities;
- High poverty districts;
- Various health system levels: hospitals, health centres, sub-centres and aid posts;
- Provinces/districts with low performing maternal and child health indicators and which experience a higher proportion of stock-outs.

For the health facility survey, the World Health Organisation (WHO) Operational Package for Monitoring and Assessing Country Pharmaceutical Situations recommends that sampling includes at least 30 health facilities and surveys at least 30 clients per facility. This is estimated to provide 95 per cent confidence in the results for the majority of indicators. The PNG facility survey will include at least 100 facilities and medical stores in eight provinces.

Limitations and Constraints

The following will be assessed and recorded as part of data collection phase in Year 1:

- Any concerns about the quality of secondary data sources used;
- Any challenges encountered during the collection of primary data.

The evaluation report will discuss how the findings may be affected by concerns or challenges identified, if any, and provide recommendations for overcoming these in the future.

Evaluation Timeline & Reporting

The first phase of this impact evaluation will be undertaken over four years commencing in mid-2013, with assessments occurring annually thereafter.

The team leader will provide the following reports on an annual basis:

- a) *Evaluation Plan* – for agreement with TRC, submitted at least four weeks prior to the in-country mission. This plan will outline the scope and methodology of the evaluation.
- b) *Annual Mission Aide Memoire* – to be presented to the relevant stakeholders at the completion of in-country missions.
- c) *Draft Annual M&E Report* – to be provided within 12 weeks of completion of the field-work.
- d) *Final Annual M&E Report* – final document within 4 weeks of receiving the feedback, incorporating stakeholder comments.

For Year 1 and Year 4 evaluation reports, ratings against all quality criteria will be provided using a rating scale of 1 to 6, with 6 indicating very high quality and 1 indicating very poor quality. A rating below 4 indicates that an activity has been less than satisfactory against a criterion.

11.5.6 Year 1 (2013) Evaluation Focus Areas

The evaluation questions listed above were refined following early national stakeholder consultations⁵⁶ and, thus, served as a guide to planning for Year 1 work in addition to providing direction across the whole evaluation process. Detailed methods and tools for this are provided in the following sections.

The Year 1 evaluation has a two-fold broad purpose: (1) evaluation of performance to date; and, (2) establishing benchmarks for multi-year evaluation purposes. This will entail:

- Review of system and process performance to-date, including:
 - The financing, expenditure, multi-year procurement planning and forecasting for the national medical supply budget and relevant partner contributions;
 - Procurement and distribution of ‘pull’ system medical supplies for hospitals and rural health facilities and other systems in PNG, including parallel vertical program supplies such as TB drugs, malaria testing and treatment, ARTs/HIV test kits, condoms, family planning commodities, and vaccines;
 - Recent ‘push’-system procurements (including “40% kits”, above mentioned “100% kits”, Emergency Obstetric Care (EOC) kits and cold chain equipment;
 - Current and planned warehousing (Area Medical Stores, Provincial Transit Stores, Private Sector Storage) and inventory control systems (FoxPro, mSupply, GIS mapping); and,
 - Medicines availability, accessibility, quality, rational usage and potential effectiveness at the health facility level.
- Use of review findings to present a baseline assessment⁵⁷ of procurement and supply chain management systems in PNG’s health sector and identify a set of relevant performance measures/indicators which can be measured annually (reflecting past trends, current baselines and 2015-16 performance targets);
- Provision specific and time-bound recommendations to improve the relevance, effectiveness, efficiency, sustainability, impact, and monitoring and evaluation of procurement and supply chain management system reforms.

⁵⁶ Revised during a five day consultation visit with stakeholders in PNG by Dr Chris Morgan, Burnet Institute (19–22 Feb 2013).

⁵⁷ This assessment will draw on the large amount of existing documentation and translate this into clear performance indicators against relevant functions of the medical supply procurement and supply chain management system.

11.5.7 Year 1 (2013) Evaluation Activities

The following specific activities were implemented in 2013:

Establishment of a Technical Review Committee

The Technical Review Committee was established and includes representatives from NDOH, Australian government, HHISP, UNFPA, UNICEF, UPNG SMHS, WHO. The Committee was formed to provide advice to the evaluation team on the design of a multi-year evaluation of medical supplies procurement and distribution in PNG.

The Committee was briefed on the overall evaluation purpose and the first year of work during a meeting held on 8 May 2013. Specific technical input was requested on the methodology of the two key activities. See below for Minutes of First Technical Review meeting.

Desk Review of Monitoring Data to reconstruct Baseline

Initial consultations suggested that:

- some baselines (2010 and 2012) for the higher level benchmarks of procurement, planning, and distribution processes will be possible to obtain from national consultations and review of existing reports. Ideally, these should be reconfirmed and expanded in detail through a process of stakeholder consultation and consensus;
- the essential detailed stock-out indicators may be able to be reconstructed from analysis of NHIS raw data which is currently being done;
- cost data is likely to be restricted at present, limiting the possibility of immediate cost-benefit analyses of different distribution methods. However, these analyses may be possible in the future.

National Stakeholder Consultations

The review of procurement of medical supplies aims to focus on the 40% and 100% health centre kits but also include other aspects of the medical supplies reform context. The main methods are:

- international review of the 100% kits supplier;
- national consultation interviews and review of existing assessments;
- information from the health facility survey and the additional health manager survey – these two methods will provide validation of findings generated through the national consultations.

A brief guideline for national consultation discussions was prepared in order to provide a framework for analysis. However, the guideline was intentionally kept short and fairly generic to avoid leading questions. It is expected that discussions will vary significantly, based on the knowledge and level of engagement of key informants and, thus, will require an unstructured interview format.

Specifically, this element addresses:

1. Procurement and distribution of 40% and 100% medical supply kits with a specific review on the procurement of 100% kits through the International Dispensary Association (IDA) to determine:
 - a. Value for money and efficiency (compared to international markets)
 - b. Quality-assurance of medicines (manufacturing quality and IDA testing procedures)
 - c. Efficiency and implementation progress in shipping and storage procedures
 - d. Coordination with procurement agent in PNG and National Department of Health
2. Procurement and distribution of Emergency Obstetric Care kits and cold chain equipment
3. Procurement and distribution of 'pull' system medical supplies for hospitals and rural health facilities (including vertical program supplies such as TB drugs, malaria testing and treatment, ARTs/HIV test kits, condoms, family planning commodities, and vaccines)

4. Technical assistance interventions to improve quality-assurance and regulation of medical supplies, multi-year planning, and tender processes
5. Potential performance measures/indicators which can be measured annually (reflecting past trends, current baselines and 2015-16 performance targets)

The review aims to provide a snapshot of recent progress in procurement processes during the past two years and set a benchmark for future measurement.

The evaluation team is conducting national consultations during May, June and July 2013.

Health Facility Survey

Survey Rationale

A national survey of health facilities will allow objective assessment of the impact of outsourced procurement and direct distribution, both of which represent a significant investment by the Australian and PNG governments. A survey is required because routine administrative data do not reliably capture medical supplies availability. Although the National Health Information System does include one indicator of stock availability, the measurements for 2011 and 2012 are currently being re-calculated and, in any case, do not offer sufficient detail. A survey offers the opportunity to document various aspects of access to medicines, how health workers have used them, additional measures of quality, and assess whether there is discernable impact on community confidence and health outcomes. This will create an internationally comparable measurement of the situation in 2013 and, by using international standardised methods, be repeatable in three to four years.

Survey Methods based on the Standard WHO Package

The WHO Operational Package for Assessing, Monitoring and Evaluating Country Pharmaceutical Situations⁵⁸ is intended as a useful tool for researchers, policy-makers, planners and others who need to use standardised measurement tools. The tools have already been used for several years at global and country levels, by international agencies and donors, professional groups and nongovernmental organizations. Additional detail on the survey sampling and methodology is contained in Annexes to the Year One evaluation report.

A survey that uses internationally standardised tools, adapted to the local context, has increased likelihood of comparability with other national settings and also with a future survey that may be warranted as part of the broader multi-year evaluation. The evaluation team adapted WHO survey tools to the PNG. The following additions were made to the survey tool:

- Emergency obstetric and newborn care equipment, to allow a snapshot of EMONC readiness;
- Case records review to assess local case fatality rates for pneumonia, and other MNCH outcomes to triangulate with NHIS data on this, and support impact evaluation;
- questions regarding medicine handlers and other pharmaceutical issues such as storage spaces and conditions; and procedures for disposal of expired medicines;
- observation of handling of HC kit delivery;
- questions on perceived changes in quality and availability over recent years;
- specific questions on HC kit volumes and content;
- questions about local health workers, logistics and supply managers' experiences with 'push' and 'pull' systems.

The *WHO Operational Package for Assessing, Monitoring and Evaluating Country Pharmaceutical Situations*⁵⁹ ("WHO package") uses **a core list of 15 drugs**. This package provides an internationally

⁵⁸ *WHO Operational Package for Assessing, Monitoring and Evaluating Country Pharmaceutical Situations*
http://www.who.int/medicines/publications/WHO_TCM_2007.2/en/ This package provides an internationally comparable set of indicators of access, availability, quality and usage of essential medicines (core list of 15 drugs).

⁵⁹ http://www.who.int/medicines/publications/WHO_TCM_2007.2/en/

comparable set of indicators of access, availability, quality and usage of essential medicines (see below).

Survey Implementation

The health facility survey is conducted by the evaluation team during June 2013 in partnership with UPNG SMHS Pharmacy Department (Prof Jackson Lauwo as lead investigator). Pharmacy students from year 2, 3 and 4 are recruited and trained to act as surveyors for data collection in the inter-semester break in June 2013. Transport, security, insurance and other logistics are supported by the HHISP. The scheduling during a relatively short mid-semester break adds significantly to the logistic challenges involved, however, it is thought that these are outweighed by the capacity development and academic partnership advantages of this arrangement. The risks of not obtaining a sufficient sample are counteracted by increasing the sample size of health facilities above the WHO norms.

An overview of the schedule for field testing the survey tool, training the data collectors and the actual data collection is provided in **Table 2**.

Table 2: Data collection schedule for health facility survey

Mon	Tue	Wed	Thu	Fri	Sat	Sun
May 27	May 28	May 29	May 30	May 31	June 1	June 2
Field test survey tool	Field test survey tool	Field test survey tool	Finalise tool, printing.	Finalise tool, printing. Student Exams finish		
June 3	June 4	June 5 –	June 6 –	June 7	June 8	June 9
Training	Training	Training	Start Travel	Travel or data collection	Data collection at Hospitals or AMS	Data collection at Hospitals or AMS
June 10	June 11	June 12	June 13	June 14	June 15	June 16
Data collection	Data collection	Data collection	Data collection	Data collection	Data collection at hospitals only	Data collection at hospitals only
June 17	June 18	June 19	June 20	June 21	June 22	June 23 –
Data collection	Data collection	Data collection	Data collection	Data collection	Travel back to POM	Travel back to POM

Health Manager Survey

The health manager survey aims:

- To gather individual (written) and group (discussion) opinions on medicines distribution and availability
- To contrast the views from provincial government, church health service, and district health managers.

See Annexes to the Year One evaluation report for survey and discussion tools.

11.6 Health Facility Survey Tools

See separate document for copies of questionnaires and other survey instruments.

11.7 Evaluation team and roles

Name	Role in Evaluation	Agency
Dr Christopher Morgan	Public Health Specialist	Burnet Institute
Mr Fabian Kong	Quality and Regulation Specialist	Burnet Institute
Ms Sera Ngeh	Quality and Regulation Support Officer	Burnet Institute
Ms Pallavi Yagnik	Research Program Manager	Burnet Institute
Dr Greet Peersman	Monitoring and Evaluation Adviser	Burnet Institute
Ms Beatriz Ayala Ostrum	Procurement Specialist	Independent Consultant
Dr Jackson A K Lauwo	In- Country Counterpart to Team Leader	UPNG
Dr Philip G K Kigodi	Data Collation Supervisor & Data Analysis	UPNG
Dr Prem P Rai	Data Collation Supervisor & Data Analysis	UPNG
Mr George Gani,	Field Supervisor	UPNG
Ms Rosewitha Iannes	Field Supervisor	UPNG
Ms Beulah Sipana	Field Supervisor	UPNG

11.8 Assessment against standard Australian Government evaluation criteria

Introduction

These ratings refer to the Australian Government investments, from 2011-2013, in support of the Government of Papua New Guinea (GoPNG)'s reform of the medical supplies system, and in direct medical supplies procurement and distribution. These "health centre kits", also referred to as "40% kits" (in 2010-11) and "100% kits" (in 2012-13), were a large intensive investment in medicines procurement and distribution, as a complement to the standard GoPNG system. Key aspects included: national scope, targeting rural and remote health facilities, international quality-assured procurement of a standardized package of essential medicines, and out-sourced distribution of pre-packed deliveries 'pushed' on a regular basis to all health facilities. These ratings reflect opinions of the core evaluation team that conducted the first year of a multi-year impact evaluation, which also assessed changes due across the whole medical supply system. The ratings below should be read in conjunction with the evaluation findings of the team's Year One Evaluation report.

Evaluation Criteria Ratings

Evaluation Criteria	Rating (1-6)	Explanation
Relevance	5	All stakeholders recognise this as a critical and urgent health system need. The Australian Government investment is appropriately targeting both rapid improvement in service delivery as well as medium-term system reforms.
Effectiveness	5	There has been a clear boost to availability of essential and life-saving medicines through the investment, especially in the most remote facilities, with equitable penetration into sites designated as 'high-poverty' districts.
Efficiency	4	There is good value-for-money for commodities, and good quality assurance (for example in validating deliveries). The expected inefficiencies inherent in any standardised 'push' system were observed, and some aspects of quantification, targeting, and co-ordination of supplies could be improved.
Sustainability	4	Sustainability is hampered by dependence on GoPNG policy and practice reforms, which are progressing slowly. However such 'push' systems are likely to be needed as a stop-gap measure for several more years, and this investment demonstrates a feasible means to do this.
Gender equality	4	The investment preferences supplies of benefit to mothers, their children, and women in general. Direct delivery to remote facilities is likely to reduce healthcare travel and other costs that are disproportionately borne by women. There has been limited opportunity to increase women's participation in decision-making or policy.

Rating scale

Satisfactory		Less than satisfactory	
6	Very high quality	3	Less than adequate quality
5	Good quality	2	Poor quality
4	Adequate quality	1	Very poor quality

