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## **DOCUMENTING CHALLENGES AND VIABLE STRATEGIES IN THE MEDICAL SUPPLY SYSTEM OF THE CENTRAL PROVINCE, PAPUA NEW GUINEA**

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### ABSTRACT:

Central province is one of twenty two provinces that make up Papua New Guinea (PNG). With varied vegetation from mountainous terrains to coastal plains, limited basic infrastructure, growing population and lack of scheduled air services to remote areas make distribution of medical supplies a challenging task for the province. Medical supply logistics studies have mostly been from government reports which have deemed both the push and pull distribution systems as not fully functional. In addition, the media has frequently pointed to shortage of medical supplies in Health centres (HCs), Health Sub-Centres (HSCs) and provincial hospitals in PNG. There have been limited research reports in this area of interest. Hence the need to study and document challenges facing the medical supplies procurement and distribution system in the Central province as a typical setting area and suggest a viable interventional system. This was a descriptive cross-sectional study designed to assess the extent of in-province distribution of medical supplies and to identify viable strategies to improve the current system. The study was conducted in Central province which is located along the south-east coast of mainland PNG. Semi-structured questionnaires were used to carry out interviews with personnel's at HCs and HSCs. In addition, two sets of structured questionnaires were developed to interview key informants within the supply system and compare other distribution systems working within the province. Furthermore, a tracking and monitoring form was used to assess the overall supply process of the province. The findings indicated limited funding, non-availability of a reliable transport system, inadequate storage space and limited adherence to standard operating procedures (SOPs) of inventory control systems. In addition, fragmented communication and collaboration among the different parties that use the system and the ill-defined roles and responsibilities of personnel along the pipeline contributed to the current breakdown of the supply system in the province. There are medical supplies reaching the rural HCs of Central province however, not as efficiently and effectively as anticipated. Overall the whole medical supply distribution system lacked proper reporting and feedback mechanisms to provide up-to-date logistics information from HCs to Area Medical Store (AMS) and vice versa. The current pull distribution system should be maintained with viable strategies of introducing 'delivery teams' to provide the link between HCs and AMS; in doing so better advancements would be seen in the medical supply distribution system.

**KEYWORDS:** Medical Supplies, Distribution, Supply System, Central Province, Papua New Guinea

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**INTRODUCTION:**

Central province is one of the twenty-two provinces that make up Papua New Guinea (PNG). The province consists of four districts: Abau, Rigo, Kairuku-Hiri and Goilala [1]. Vegetation varies from mountainous terrains to coastal plains, limited basic infrastructure and a population of about 237,016 with a growth rate of 2.3% [2,3]. In addition there is lack of scheduled air services to remote areas, which makes distribution of medical supplies a challenging task for the province. There are a total of ten health centres (HCs); twenty-five health sub-centres (HSCs) of which one was closed down due to vandalism; two urban clinics (UCs) and one hospital [2,4]. Over the years the province rates poorly with respect to the National Health Indicators; most HCs and HSCs have deteriorated buildings over the years that they rarely admit patients [2]. The top five leading causes of morbidity and mortality in the province are: pneumonia for children < 5 years, malaria, accidents and injuries, simple cough and other respiratory tract problems [2, 5].

Logistics is defined as “the science (and art) of getting the right amount of the right things to the right places at the right times” [6] and consists of four main components: selection, procurement, distribution and utilisation. This study will focus on the distribution aspect of logistics; which begins when health commodities are dispatched by the manufacturer or supplier and ends when drug

consumption information is reported back to the procurement unit [6]. Distribution of medical supplies involves storage facilities and transport links at various levels throughout the supply system; there are two broad distribution systems: pull and push systems. A distribution system is considered a pull system when each lower level of the system determines the types and quantities required, hence determined by the patient whilst a push system is when the supply source at higher levels in the system determine the types and quantities of health commodities required for the patient. There have been considerable number of studies conducted worldwide varying from district, state/province to national and multi-country reports; recognising and finding ways of improving accessibility and availability of essential medicines at an affordable cost [7-11]. In the Central province as well as in PNG as a whole, information on medical supply logistics have mostly been from government reports which have deemed both push and pull distribution systems as not fully functional [12-14]. While media reports have emphasised that health facilities around the country experience chronic shortage of medical supplies [15-19]. There are little or no published reports on the scientific literature about distribution of medical supplies in PNG [20-23]. This apparent lack of scientific data prompted this study to document challenges with the current system in the Central province and to suggest viable strategies for medical

supplies distribution system in the Central province in order to eliminate the perennial medicines shortages. The objectives of this study were: to assess the current medical supplies distribution activities in the Central province with the aim of identifying the gaps and the strengths of the system and to propose viable strategies to improve the medical supplies distribution system for the province.

### **MATERIALS AND METHODS:**

Ethical clearance and approval to conduct the study from the School of Medicine and Health Science-University of Papua New Guinea, Central Provincial Government and Medical Research Advisory Committee-National Department of Health were attained before carrying out the study in Central province.

The semi-structured questionnaire from Jahre et al [24] was modified and developed. The questionnaire consisted of eight sections: general information detailing interviewee and health facility characteristics; human resource and staff capacity; procedures for ordering medicines and supplies; receiving procedures and transportation links; storage checklist; communication tools and recommendations. Convenience sampling was used for selection of HCs, HSCs and UCs in the province which at the time of data collection was the most applicable sampling method as bad weather conditions, deteriorating road infrastructure and safety mitigations prevented an initial randomised sampling method. The inclusion

criteria required study units to be HCs, HSCs and UCs and the facility had to exist and operating, thus the hospital and a closed HSC were excluded from the study. Interviews were conducted using this health facility questionnaire and a total of 23 health facilities (HFs) out of 36 HFs were surveyed in the province.

In addition, a HC requisition order tracking form was developed to determine lead-times, distribution costs incurred and modes of transport used. Data were collected over a period of eight months from 1st November 2011 to 30th June 2012. All completed HC requisition order forms from Area Medical Store (AMS) were collected, dates were used to determine the ordering process from HCs to AMS and back to HCs. Other data sources included the supply section logbook and transport logbook at the AMS. The content of each HC requisition order form were collected to determine order value and compare with distribution costs incurred for each HC order transported. Two other qualitative questionnaires were developed. One set of questionnaire focused at collecting data from church agencies perspective. The other set of qualitative questionnaire was used to interview key informants in the private sector for comparison with other distribution systems.

The data collected from the health facility questionnaire were categorised under three main variables: transportation, storage conditions and inventory control. Analysis was

carried out using SPSS creating frequency tables and cross-tabulating indicators. While data gathered from the tracking of HC requisition order form was analysed using MS Excel 2007 application. The qualitative questionnaires responses were categorised according to key words prepared for each question, then there were entered on to separate master sheets.

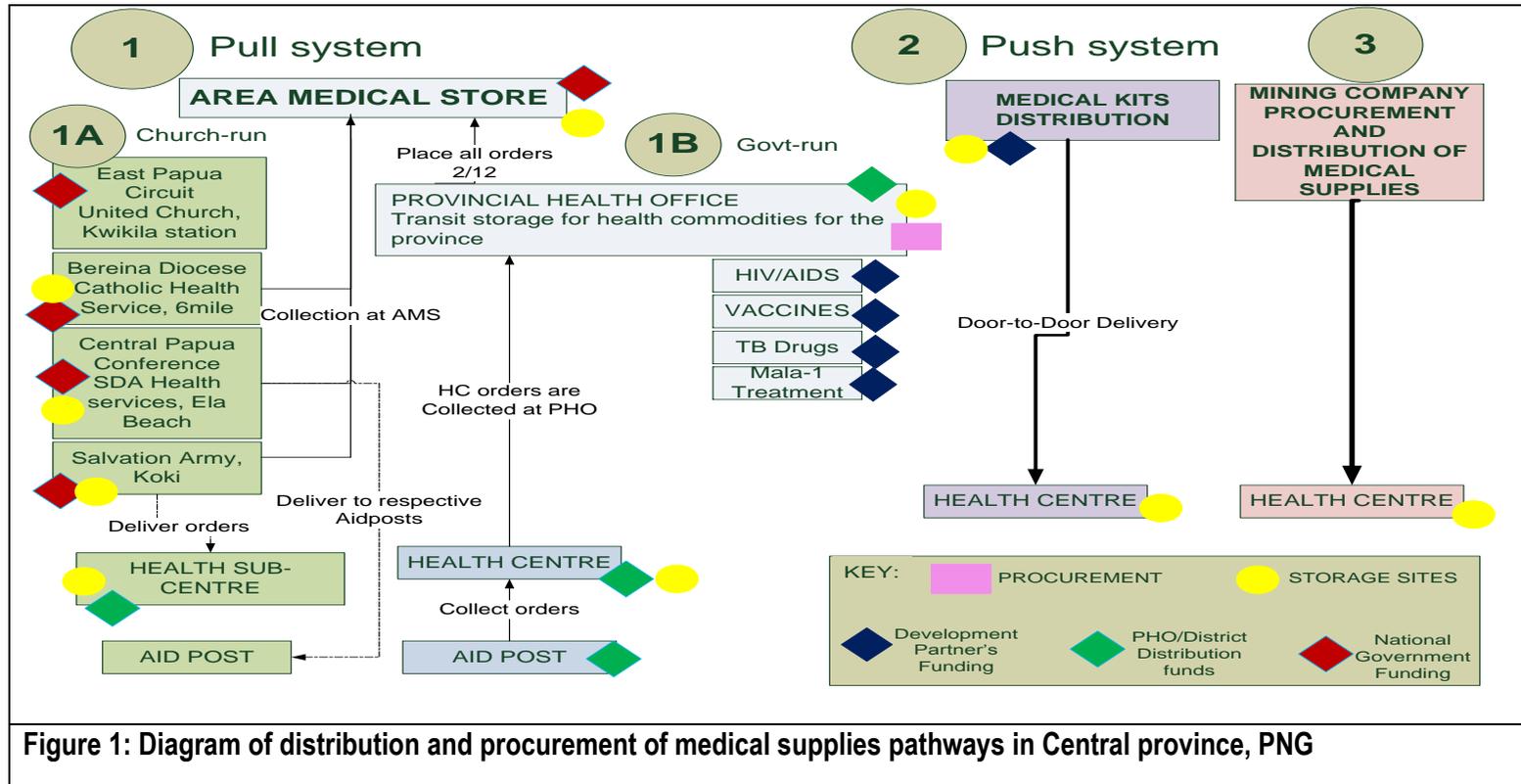
#### Study strengths and limitations:

The study concentrates in providing current issues of the distribution of medical supplies at the provincial level. In doing so, provides viable strategies that under current certain conditions, these strategies if implemented can improve the distribution of medical supplies in the province. The results indicate at the provincial and district levels, the current challenges faced in providing an effective and efficient medical supply distribution system. While the study as attempted to include a holistic overview of the medical supply distribution system, funding limitations to travel to all surveyed health facilities and verify storage conditions was challenging. In addition, tracking of health centre order forms by dates only gives relative lead-times which would need to be verified using other forms of tracking tools or devices.

#### RESULTS:

The results are structured according to the three main variables: inventory control, transportation and the storage conditions. It begins with the overview of the distribution activities and pathways found in the province. In figure 1, sub-section 1, 1A and 1B illustrate the pull system as the main source of medical supplies to rural health facilities. The collection of HC orders was seen to be the main method of indicating distribution activities in the province. The majority of medical supplies were purchased by the government and distributed by the AMS according to Medical Stores Catalogue [25]. The church agencies run their collection system independently from the Provincial Health Office (PHO) with limited liaison and collaboration.

All HC requisition orders forms need to be approved by the PHO before been sent to AMS. The vertical programs, such as, the National TB program are managed at the national level whereby overall coordination and procurement are dealt with at this level however, the distribution of these health commodities utilise the pull system. Therefore figure 1 shows that these vertical programs come under PHO when been distributed in the provinces.



The push system designated as number 2 in Figure 1 is a separate government sanctioned program aimed at delivering essential medicines directly to HCs, HSCs and aid posts. At present, the medical kits are organised by the Australian Agency for International Development (AusAID) and distributed on a door-to-door delivery schedule which is simply considered as supplementary supplies by HCs and HSCs. The third distribution system in figure 1, designated as number 3 operates completely independent of the other two distribution systems. This system targets health centre communities of immediate interest to the mining sites and was therefore not covered in this study.

#### Inventory Control:

Personnel in-charge of storeroom had additional knowledge of medicines supply management and or Standard Operating Procedures (SOPs). The province showed that slightly more than half (55%) of the officers had SOP knowledge and drug supply management against 45% who lacked this knowledge. With adherence to SOPs a larger proportion of HC-Dispensary workers with additional SOP knowledge 7 (58.3%) usually used re-order levels as opposed to 5 (41.7%) who did not observe the rule. Over-ordering was seen to be practiced at HCs and HSCs although SOP knowledge was seen to be demonstrated in the province, however only 11 (47.8%) indicated

this practice while 12 (52.1%) indicated otherwise. Frequency of HC orders received from AMS showed 9 (39.1%) HCs/HSCs received 3 orders in a year, 7 HCs indicated that orders were received 4 times in a year, whilst only two HCs/HSCs showed that all 6 orders made to AMS were received in a year.

In proper management of stock and inventory control, judicious stock rotation must be carried out to ensure the usage of old stock first to avoid losses due to premature expiry of medicines. The data in Table 1 indicates that almost all or 19 (86.4%) of the HCs/HSCs stored and organised medicines in a manner accessible for First-Expiry-First-Out (FEFO) arrangement. Although only 3 (13.6%) deviated from this practice and FEFO concept must therefore be emphasised to the affected HCs.

#### Transportation:

The most used mode of transporting orders was seen to be the usage of HC ambulances (31%) followed by private transport (22%) and mission vehicles (13%).

Table 2 depicts the comparison between distribution cost ratio, mode of transport used, costs incurred per order for all HC orders obtained from the AMS between 1st November 2011 and 30th June 2012. The Relatively high ratio indicates the mode of transport and route used is expensive to maintain while a relatively low ratio indicates the efficient route with low

transport costs incurred. HCs requiring two or more modes of transport to collect HC orders from AMS showed relatively high distribution ratios, for instance, Boru HSC in abau district (0.50) and Tapini HC in Goilala district (1.23, 0.72 and 0.41). Road transport showed relatively low distribution ratios, for instance, Bereina HC (0.01) and Agevairu (0.01). During the eight month period, two aid post orders were supplied, indicating that aid posts are not receiving supplies from supervising HCs. Supplementary HC orders showed relatively higher distribution ratios when compared to HC main orders, for instance, Kwikila HC and Kokorogoro HSC supplementary HC orders had relatively high distribution ratios 0.44 and

0.81 respectively then the main HC orders which had relatively lower distribution ratios 0.23 and 0.08.

Storage conditions:

Table 3 outlines the type of storage space found in HCs/HSCs in the province. Most HCs or 11 (47.8%) showed adequate storage space for medical supplies, whilst 12 (52.2%) HCs indicated inadequate storage space. Shelves and cupboards are essential for proper storage of medical supplies. The table also depicts that medicines are stored appropriately at HCs on shelves and in cupboards which provides access to retrieve the correct medicines and rather not placed on the floor.

Table 1: General layout of storage area and stock rotation methods applied at HCs in Districts

		Products are separated by using the AMS Catalogue numbers and usage of FEFO	
		Yes	No
District	Abau	4	0
	Rigo	3	1
	Kairuku	5	2
	Goilala	3	0
	Hiri	4	0
Total		19	3

Table 2: Comparison between distribution ratio, mode of transport used, costs incurred per order for all health centres orders obtained from AMS during the period between 1st November 2011 to 30th June 2012 and the population it serves

District	Health facility	Operating Agency	Population catchment (2012)	Order Type	Transport mode	Distance from AMS Km	Total cost of transporting commodities <sup>b</sup> Kina (K)	Total value of commodities transported Kina (K)	Distribution Ratio <sup>a</sup>	Total Transport cost x 6 <sup>c</sup> Kina (K)
Abau	Iruna HC	M	10,640	MAIN	R,S	328.1	5,555.68	22,004.78	0.25	33,334.08
Abau	Boru SHC	M	3,351	MAIN	R,S	269.3	5,555.68	11,209.35	0.50	33,334.08
Abau	Moreguina HC	G	9,198	MAIN	R	225.2	5,464.78	369,502.92	0.02	32,788.68
				MAIN			5,464.78	18,248.19	0.30	
Abau	Kupiano HC	G	25,141	MAIN	R	193.9	2,959.18	23,322.95	0.13	17,755.08
				MAIN			2,959.18	25,979.79	0.11	
Abau	Upulima SHC	G	2,089	MAIN	R	157.9	1,423.98	10,359.92	0.14	8,543.98
Rigo	Kwikila HC	G	29,350	MAIN	R	85.8	1,155.15	42,987.98	0.03	17,755.08
				MAIN			1,155.15	4,930.90	0.23	
				SUPP			1,155.15	2,648.40	0.44	
				MAIN			1,155.15	11,455.84	0.10	
Rigo	KAK SHC	G	1,835	MAIN	R	101.8	1,371.73	4,935.25	0.28	8,230.38
Rigo	Hula SHC	M	9,545	MAIN	R	117.4	1,388.20	8,429.20	0.17	8,329.20
Rigo	Boregaina SHC	M	3,724	MAIN	R	102.5	1,213.34	6,824.48	0.18	7,280.04
				MAIN			1,213.34	1,364.50	0.89	
Rigo	Kokorogoro SHC	M	1,276	MAIN	R	250	1,213.34	15,931.94	0.08	7,280.04
				SUPP			1,213.34	1,492.00	0.81	
Goilala	Tapini HC	G	6,894	MAIN	R or A	123.4	2,659.18	2,156.61	1.23	15,955.08
				MAIN			2,659.18	3,691.20	0.72	
				MAIN			2,659.18	6,483.78	0.41	
				MAIN			2,659.18	3,700.77	0.72	
Goilala	Tororo SHC	M	1,443	MAIN	A & T	138	2,449.27	19,742.70	0.12	14,695.62
Kairuku	Akufa SHC	M	2,827	MAIN	R & S	205.2	2,667.44	10,398.79	0.26	16,004.64
				MAIN			2,667.44	8,466.01	0.32	
Hiri	RMC UC	G	20,300	MAIN	R	4.1	24,320.38	-		Delivered by AMS
				MAIN				19,414.87	-	
HQ	PHO-Disease	G		SUPP	R	4.1	14,063.70	-		Delivered/collec

	Control									ted from AMS
				MAIN				4,775.75	-	
Hiri	Sogeri HC	G	8,451	MAIN	R	48.6	1,147.00	33,198.26	0.04	6,884.64
Kairuku	Veifa'a HC	M		MAIN	R	172.4	1,035.20	57,770.22	0.02	6,211.20
			11,422	MAIN			1,036.20	20,260.66	0.05	
Kairuku	Yule Is. SHC	M	3,869	MAIN	R & S	101	832.53	6,290.75	0.13	4,995.18
				MAIN			686.93	6,041.96	0.11	
Kairuku	Inauaia HC	M	6,918	MAIN	R	152.4	907.18	35,080.36	0.03	5,443.08
				MAIN			907.18	20,800.70	0.04	
Kairuku	Agevairu SHC	G	7,506	MAIN	R	97.2	185.60	39,045.45	0.01	1,113.60
				MAIN			185.60	15,550.24	0.01	
				MAIN			185.60	14,134.10	0.01	
Hiri	Kuriva SHC	G	3,757	MAIN	R	56.8	185.60	5,907.90	0.03	1,113.60
Hiri	Doa SHC	G	3,215	MAIN	R	81.2	285.60	5,033.91	0.06	1,713.60
				SUPP			285.60	4,582.28	0.06	
Rigo	Gabagaba Aid post	G	2,130	MAIN	R	52.5	211.80	121,764.44	0.00	1,270.80
				MAIN			211.80	616.00	0.34	
Kairuku	Mainohana Aid post	M	1,329	MAIN	R	NA	211.80	3,372.24	0.06	1,270.80
Hiri	PAU Clinic	M	2,057	SUPP	R	17.6	117.67	3,097.45	0.04	706.02
				MAIN			117.67	3,943.15	0.03	
Hiri	Goldie Brks Clinic	G	2,808	SUPP	R	20.5	117.67	2,401.34	0.05	706.02
Kairuku	Bereina HC	G	11,618	MAIN	R	162.2	688.78	70,374.03	0.01	688.78
Kairuku	Bakoidu SHC	M	4,476	MAIN	R	164.6	1,523.98	17,120.51	0.09	9,143.88
<b>TOTAL</b>										<b>262,547.08<sup>d</sup></b>

G = Government M= Mission NA = Not available; R = Road S = Sea A = Air T = Trekking; MAIN = main orders; the scheduled bimonthly orders placed by health facilities to AMS SUPP = Supplementary orders; unscheduled orders or emergency orders placed by health facilities to AMS which is not according to the ordering cycle

a = "Ratio of distribution cost to value of commodities distributed" is defined as the transport cost divided by the total value of commodities per order. Relatively High ratio indicates the mode of transport and route used is expensive to maintain thus an alternative route will need to be identified. Relatively Low ratio indicates the efficient route with low transport costs incurred.

b = Cost of transport includes; hire for vehicle/dinghy + fuel + officers' travel allowances for a maximum of 3 officers

c = Transport cost multiplied by factor of 6 – the extrapolated distribution costs for health facilities tracked (1<sup>st</sup> Nov 2011 to 30<sup>th</sup> June 2012) to determine relative distribution costs for a year.

d = compared with the annual recurrent provincial medical supply distribution budget allocation of PGK 298,900.00 (2010)

Table 3: The parameter of ample storage space with regards to the type of storage space used at health centres

		Adequate space		Allocated storage space			Presence of shelves and cupboards		
		Yes	No	dedicated building (stand-alone)	Room	shared room	Shelves	Cupboards	Shelves + cupboards
Districts	Abau	2	2	1	3	0	4	0	0
	Rigo	2	2	1	2	1	3	0	1
	Kairuku	2	5		6	1	6	1	0
	Goilala	3	1	1	2	1	4	0	0
	Hiri	2	2	0	4	0	3	0	1
Total		11	12	3	17	3	20	1	2
Percentage (%)		47.8	52.2	13.0	73.9	13.0	86.9	4.3	8.6

The organisations providing products and services were assessed to evaluate their supply systems in the province. The findings showed that grocery items, fuel and other products were the responsibility of the consumer to determine their value and necessity to their community and not their distributor. Therefore the distribution systems were pull systems for which customers determined demand by travelling into the city to access products and services. Warehousing and storage were identified as the organisations' own infrastructure, whilst transportation was contracted out depending on the mode of transport such as road, sea freight and air freight. Nevertheless, health commodities are products which are not chosen by the customer but chosen for the customer, and in this case, medicines are chosen to treat the patients' illness. These distribution systems have teams of logistics

officers coordinating distribution, this team work feature lacks in the current medical supplies distribution system in the province.

#### DISCUSSION:

Challenges and gaps in the current medical supplies system in Central province

We found that medical supplies do reach the HCs however not as effective and efficient as anticipated even with the pull and push systems operating concurrently in the province. Medical supplies accounts for 3% of the total PGK 3 million health budget and 18% of the total recurrent budget of the province [26]. The allocations include: funds for conducting SOP-training in the province, conducting supervisory visits, distributing medical supplies to rural health facilities including aid posts and funds for procuring medical equipments and maintenance. This allocation is only for government managed HCs and HSCs. Church

agencies receive health grants for overall operational costs from the government – this includes distribution costs. Comparing the extrapolated relative distribution costs incurred to the annual provincial health allocation (table 2) this apparently showed limited funds are allocated for funding distribution in the province. Therefore, PHO and respective church agencies re-direct other funds towards distribution costs. For instance, funds earmarked for supervisory visits are re-directed to transport charges. While for example in Nigeria, it was found that there was a lack of interest in funding the supply system which contributed to low access to medicines and supplies at health facilities [9].

The study showed that supervision along the supply system was lacking thus logistics data collection at health facilities contributed to lack of reporting and feedback mechanisms. For example, in Vanuatu, Brown and Gilbert found similar issues of the lack of supervision among actors in the distribution supply system [11]. They also observed that lack of supervision was predominant amongst Pacific Island Countries [11]. The findings suggest that there was a lack of reporting and feedback mechanism in the whole medical supplies distribution system in the province. This showed weakness in the proper distribution and delivery planning, poor audit tracking and monitoring of HC orders from AMS to HCs. For instance, once a HC order leaves AMS premises responsibility of the safe transporting

of HC orders were passed to PHO. Whether the HC order was received in full or partial on a timely manner to HCs was the responsibility of PHO, which in turn was passed down to the HCs. Logistics data gathered at HCs do not reach the AMS. There were no processes or procedures in place for lodging formal complaints, feedbacks, dissatisfaction with health commodity quality by HCs to the AMS. In addition, all HC orders received from AMS had 50% of items not available, frustrating HCs. The findings showed that the bimonthly ordering cycle for HCs favoured HCs with closer proximity to the AMS while remote HCs experienced difficulties in submitting and collecting HC orders. There were relatively long lead-times experienced (99 days  $\approx$  3 months) which was found to be longer than the bimonthly ordering cycle. The relatively long lead-time was influenced by: non-availability of transport, slow submission of orders to AMS, long picking and packing and slow collection of orders by the HCs. The vertical programs such as the National TB program also experienced long lead-times between PHO to the HCs [27]. Although there were stock cards and stock ledger books found at HCs, inventory was not up-dated regularly: due to slackness of HC dispensary worker, unavailability of stock cards to be replenished and the lack of supervision from PHO and AMS.

Viable strategies to improve the medical supply distribution system in Central province

The medical supplies distribution system should be simple with the purpose of obtaining and moving medical supplies in a timely fashion at a reasonable cost. An essential decision must be made as to which levels of the distribution system will order medicines and supplies. Either a pull or push distribution system are equally effective but to have both systems run concurrently is seen as costly to manage. However both push and pull distribution systems can be mixed into one supply system, the findings obtained would suggest having both distribution systems mixed into one supply system which would improve accessibility of medicines and supplies to the rural population. Whereby maintaining the current pull system between AMS and HCs and introducing the push system between HCs and aid posts.

Centralising the medical supply distribution system to the AMS, making AMS solely responsible for distribution by placing reliable ordering cycle schedules, tracking of HC orders leaving AMS premises down to HCs, provide good monitoring and surveillance practices with strict adherence to SOPs. According to Bossert et al, [28] a more centralised supply system was found to be associated with better performance in inventory control and information systems.

One strategy is to create 'delivery teams' that would form an important aspect for strengthening the medical supply system. This 'delivery teams' would consist of at least 3-4

trained officers; a driver and two assistants with the roles to check stock status, make adjustments and return expired stock to AMS, provide training and supervision to HCs, and ultimately deliver HC orders. This would minimise over ordering incidences which were observed, over stocking and re-distribution of slow moving items, prevent losses through expiration of stock, improve supervision, better logistics information collected and increase availability of medical supplies at HCs/HSCs. This would successively provide quality reporting and feedback information in the whole medical supply system. The proposed "Delivery teams" system in this study is similar to a successful Delivery Team Topping-Up (DUTT) system in Zimbabwe that saw effective distribution of condoms for the prevention of HIV/AIDS in the country. Since its introduction in 2004 the DUTT system is still operating effectively and has yielded positive results in increasing the availability of products in difficult environments by guaranteeing direct delivery to health facilities and creating systematic accountability at all points of procurement, delivery and receipt of commodities [29,30].

We found that an unreliable transportation system, lack of supervision from higher levels of the supply system and limited adequate storage space resulted in an inefficient and ineffective medical supply distribution system in the province. Therefore to improve the current system, the establishment of delivery teams as an important aspect which would provide the

link between HCs and AMS. This creates supervised goods flow and information flow along the supply system. Successively, this would prompt adherence to SOPs, provide on-the-job training for isolated officers and overall better reporting and feedback mechanisms along the supply system. This study has greatly opened up opportunities for more investigations in the other aspects of pharmaceutical commodity logistics in the country. Therefore, further research and monitoring activities would be needed to further investigate issues such as availability, rational usage and other aspects of medical supplies distribution systems in the country.

#### CONCLUSION:

There are medical supplies reaching the rural HCs of Central province however, not as efficiently and effectively as anticipated. There are good operating procedures in place across the province with a satisfactory level of drug supply management knowledge however, supervision from higher levels of the supply system was lacking. Overall the whole medical supply distribution system lacked proper reporting and feedback mechanisms to provide up-to-date logistics information from HCs to AMs and vice versa. The current pull distribution system should be maintained with viable strategies of introducing 'delivery teams' to provide the link between HCs and AMS; in doing so better advancements would be seen in the medical supply distribution system.

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