Procurement, availability, affordability and use of essential medicines and health supplies at community level in Uganda

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Abstract
Purpose - The challenges associated with procurement in Uganda lead to non-availability of essential medicines and health supplies. Some citizens do not afford prescribed medicines, leading to irrational use. This paper examines procurement, availability, affordability and use of essential medicines and health supplies at community level.
Design/methodology/approach – The study covered a total of 8 purposively selected districts in Uganda. Both quantitative and qualitative methods were used. The study was guided by 22 medicines and health supplies as indicator items. Using mixed methods, data was collected, analysed and interpreted in relation to the drug supply management practice.
Findings – Procurement regulations were not complied with. Health units did not stock all recommended items. Stock outs were more prevalent at lower than higher health units. Affordability was found to be a problem, leading to patients bribing medical personnel to get some medicines and health supplies at cheaper prices. For all sampled respondents, all dimensions of proper use of medicines and health supplies like advice on utilization and side effects and knowledge on appropriate storage conditions for medicines and health supplies were below acceptable levels.
Originality – Whereas there is extensive work on supply chain of medicines and health supplies, not enough knowledge exists which is specific to supply chain at community level for developing counties. Besides, the tracking study that combines procurement, availability, affordability and use is very insightful and a strong starting point for future theoretical work.

Keywords – Procurement, Availability, Affordability, Use Paper type – Research paper

INTRODUCTION
The Government of the Republic of Uganda through the Ministry of Health is responsible for providing for the supply of Essential Medicine and Health Supplies (EMHS). One of the guiding principles of the Uganda National Health Policy (NHP, 1999) is the equitable distribution of health services country wide; with priority given to further decentralization of the health care delivery system.

Monitoring of health sector performance is part of the core functions of the Ministry of Health. Studies are expected to be conducted on the content and relative cost-effectiveness of delivering the Uganda National Minimum Health Care Package (UNMHCP). Specifically, it focuses on: effectiveness of National health financing, efficiency and equity in allocation and utilization of available resources; appropriate accountability and transparent use.

The National Drug Policy (NDP) aims to contribute to the attainment of good standard health by the population of Uganda through ensuring the availability, accessibility and affordability at all times of essential medicines of appropriate quality, safety and efficacy, and by promoting their rational use. One of the goals is to establish and maintain a secure, cost- effective medicines supply system in order to ensure that required essential medicines are available, affordable and accessible to the population and that quality is maintained up to the point of use. Another goal is to promote research which will contribute to the effective implementation of the NDP.

A core strategy for achieving maximum outcomes in the Second Health Sector Strategic Plan 2005/6- 2009/10 (HSSP-II) is the implementation of the UNMHCP. Procurement and management of EMHS are considered key elements in achieving the related objectives of HSSP-II. Objective 2 relates to ensuring the constant availability and accessibility of key items required for provision of core UNMHCP interventions at each level of the health system through a comprehensive, integrated and harmonized EMHS procurement, financing and logistics system (including any third party contributions).

The main objective of this paper is to examine procurement, availability, affordability and use of essential medicines and health supplies at community level. Specifically, the paper examines the procurement of essential medicines and health supplies practices in selected districts in Uganda; the availability of medicines and health supplies in selected districts in Uganda; the affordability of essential medicines and health supplies in selected districts in Uganda and the use of essential medicines and health supplies in selected districts in Uganda.

LITERATURE REVIEW
Procurement
Procurement is the acquisition of external goods, works, consultancy and associated services through purchase, franchise, rental, lease, license or any other contractual means (Knudsen, 1999). In Uganda, public procurement is important because it accounts for about 70% of public expenditure in Uganda (Agaba and Shipman, 2007). Procurement influences availability, affordability and use of medicines and supplies in Uganda. However, the procurement profession has not been given due attention, it has been neglected (Khai Thai, 2001).

Public procurement of medicines poses a bigger challenge to the availability and affordability of medicines and supplies. The procurement of essential medicines is an area of special concern because of the potential risks involved if medicines are unsafe (WHO 2015) or do not reach where they are needed in time.

There is another dimension to availability of medicine. This is to do with the rational use of the medicine. The right medicine does not always reach the right patient; approximately 50% of all patients fail to take their medicine correctly (WHO Report, 2012).

Procurement of medicines involves quantifying medicines requirements, selecting appropriate procurement methods and prequalifying suppliers (WHO 2015). Therefore there is need to strengthen medicines supply management capacity coordinate the different medicines procurement stakeholders.

Availability
Essential medicines save lives and improve health when they are available, affordable and of assured quality and properly used. Availability refers to the fact that health services can be

reached both physically and in a timely manner. It constitutes the physical existence of health resources with sufficient capacity to produce services (Levesche, J., et al. 2013). It is crucial that reachability of medicines should reach a certain standard (WHO, 2008).

Due to lack of public resources, inaccurate demand forecasting and inefficient procurement and distribution, availability of medicines remains a problem (WHO Report, 2010).

In a study by Myhr (2000), Ethiopia and Tanzania had low or non-availability of many of the observed medicines, whereas Uganda was medium rated. The study further noted that availability is more of a problem in public sector than in private and not-for-profit sectors, although the Ecumenical Pharmaceutical Network (EPN) revealed poor availability of medicines for children in both public and private facilities (Robertson et al. 2009). Uganda is struggling to develop adequate health care systems (Kumar et al. 2009). According to Okiror (2009), about 32-50 percent of medicines essential for treating common diseases are not available. This is further confirmed by the Ministry of Health (MoH) (2009) report.

The conclusion from the literature is that availability of medicines is crucial for humanity. It is also clear that in Uganda, the non-availability of medicines remains a problem to sort out.

Affordability
Affordability is the ability of citizens to pay for the medicines (WHO Report, 2008). According to Sussanne G. et al. (2006), affordability is the number of days the lowest paid unskilled government worker would have to work in order to afford the cost of 30 days of treatment for the chronic condition being analysed. It reflects the economic capacity for people to spend resources and to use appropriate services (Levesque, J., et al. 2013). Citizens should be able to pay for health care services without selling their basic assets e.g. homes (Levesque, J. et al. 2013).

Retail medicines prices in developing countries, and in Uganda in particular ae high. Compared to common food items, it was rarely possible to pay for a treatment course (Balasubramaniam, 1996). In Uganda, poverty and social isolation continue to restrain citizens from paying for health needs.

Usage
Use of medicines refers to alignment of activities, capabilities and existing resources of health system stakeholders to ensure patients receive the right medicines at the right time and use them appropriately (WHO, 2012).

Some medication errors are dangerous and should be prevented. Medicines should be used safely and effectively. It is crucial that a consumer knows and participates in rational use of medicines. The consumer can be active by speaking up, asking questions and learning the facts (FDA News, 2015). Besides the overuse, underuse or misuse of medicines results in wastage of scarce resources (WHO, 2012). Approximately, 50% of all patients fail to take their medicine correctly (WHO, 2012).

Irrational use is a global problem and occurs in institutional and community settings (WHO, 2012). Given the heavy African disease burden, with limited resources, optimal use of resources and medicines procured is a logical conclusion.

METHODOLOGY

Study Area
This study covered a total of 8 districts selected evenly amongst the four traditional regions of Uganda. The districts covered were: Masaka and Kiboga in the central region; Tororo and Butalejja in the Eastern region; Moroto and Gulu in the Northern; and Kisoro and Kasese in the Western region. The selection of districts was purposive, choosing one that had performed well and one that had not performed so well according to the Annual Health Sector Performance Report (AHSPR) of 2006/07 and 2007/08. In addition to the above, four (4) regional referral hospitals [RRHs] (one from each of Uganda's traditional regions) were included. In each of the sampled districts, 9 health units ranging from general hospitals to HC II were selected. A total of 72 health units was considered in the study. Health facilities were also purposively selected to include at least three (3) Private-Not-For -Profit (PNFP) health facilities per district. Selection of health facilities for the study was done in consultation with the respective District Health Officers (DHOs).

Data Collection Methods
The study collected data using various methods (Bryman and Bell, 2011, p. 628). These included: In-depth Interviews with Key-informants; Client Exit Interviews; Focus Group Discussions (FGDs); and Document Review.

In-depth Interviews
In-depth interviews were the main source of information. The key informants were all those persons engaged in handling and management of EMHS. These included officials in various ministries comprising; Ministry of Health (MoH), Ministry of Finance Planning and Economic Development (MoFPED) and Ministry of Local Government (MoLG). Development partners that contribute towards procurement of EMHS or support the health sector were also consulted including; Danish International Development Agency (DANIDA), Swedish International Development Agency (SIDA), Irish Aid, Italian Cooperation, Belgian Technical Cooperation (BTC), United Nations Population Fund (UNFPA), United Nations International Children's Education Fund (UNICEF), and African Development Bank. Civil Society Organisations (CSOs) were consulted. Also included were bodies that play key roles in procurement, supply and regulation of EMHS including: National Medical Stores (NMS); Joint Medical Stores (JMS); and National Drug Authority (NDA). Other key informants included; heads of accounts, procurement and administration departments in the study districts, in-charges of health units and Medical Superintendents.

Client Exit Interviews
During the field work, the study teams carried out client exit interviews. These involved asking clients who had received /sought a service from a health facility about various aspects of service delivery at that health facility. These were used to capture quantitative data to gauge the clients' satisfaction with the services provided. Twelve clients were interviewed at each health facility visited, making a total of 886.

Focused Group Discussions
The study conducted 2 FGDs per district visited (apart from Moroto district where only one FGD was conducted). The FGDs were organised in such a way that participants in one FGD included people involved in the management of a health facility the study team had visited. The second FGD comprised community members that were located far away from any health facility. While the first group provided insight into general management aspects of the HUs, the latter presented the challenges faced by communities in accessing EMHS.

Document Reviews
The study involved reviewing of documents at every health facility. This pertained to documents related to procurement of and expenditure on EMHS. It included but not limited to: reviewing stock cards for the indicator items; requisitions; local purchase orders; delivery notes and invoices; certificates of non-availability; and vouchers. Other documents reviewed included; government health policies and frameworks.

Indicator Items
The list of EMHS for Uganda (EMLU 2007) contains 538 unique medicines formulations. This study was guided by a list of 22 medicines and medical supplies as indicator items as agreed upon with the MoH. The list of indicator items for this study is presented in Table I

Table I   Study Indicator Items

	Service	Item
1	Malaria	• Coartem Yellow 20/120 mg Tab • Quinine 300mg/ml 2ml
2	HIV Testing and Counseling	• Determine i/ii kit
3	Family Planning	• Depo Provera Injections
4	STI Diagnosis and Treatment	• Cotrimoxazole 480mg/ 120 mg Tab • Amoxycillin 250mg Capsule • Metronidazole 200mg Tab
5	Immunization	• Measles Vaccine
6	ANC/ PNC	• Ferrous Sulphate/ Folic Acid Tab • Ibuprofen 200mg Tab • Paracetamol 500 mg Tab
7	Hypertension	• Propranolol 40mg Tab • Bendrofluazide 5mg Tab
8	Diabetes	• Glibenclamide 5mg Tab • Insulin Mixtard 30/70 IU 100 IU/ML
9	Mental Health	• Haloperidol 5mg Tab • Carbamazipine 200mg Tab
10	Supplies	• Examination Gloves • Syringes 2ml

DATA MANAGEMENT AND ANALYSIS
The data collected was analyzed and interpreted in relation to drug supply management. Analysis was done using MS Excel to derive ratios and percentages to explain the stated drug supply management indicators and was appropriately interpreted in the context of the drug supply management indicators provided.

Key Informant Interviews
Data collected through key informant interviews and in-depth interviews was analyzed qualitatively using thematic analysis. The interviews targeted key persons at different levels i.e. national, district and health facility levels. The list of key informants is presented in Appendix 1. The data collected was analyzed and interpreted in relation to drug supply management and help to recommend solutions to potential drug supply system or process problems and performance of indicator outputs.

Client Exit Interviews

The data collected through client exit interviews was entered into the computer using EPINFO. This was after cleaning and editing all that data. Data analysis was then done using the SPSS program. Bivariate and Multivariate analyses were conducted in order to find out the clients' level of satisfaction with services offered by their HUs and their assessment of the trends in the health service sector in general.

Focus Group Discussions

Focus Group data was analyzed using thematic procedures. The major issues of concern were analysed in relation to the itemized subjects and the corresponding answer categories classified by each item of a particular theme.

Document Review

A detailed review of relevant documents was undertaken in order to supplement and corroborate information gathered through the field study and other primary sources. Data from documents was analyzed using content analysis and appraised in reference to particular themes under investigation.

RESULTS AND DISCUSSION

To examine procurement of essential medicines and health supplies practices in selected districts in Uganda

Procurement Lead time

Procurement lead time, the time it takes to order an item and when to receive it is an important indicator of efficiency and effectiveness. An order placed by the HU passes through a number of stages: the in-charge compiles the order, which he submits to the Health Sub District (HSD); the HSD submits it to the District Health Officer (DHO) for approval and the DHO requisitions for funds from the Chief Administrative Officer (CAO) before submitting the order to NMS/JMS. In most cases, data at the sampled HUs was insufficient to establish the exact periods the process took at each stage. However, Table II presents randomly selected examples of the period processing the orders took at some of the sampled HFs.

Table II   Average Process Lead Time between HU and Submission to NMS/JMS

Order Number	Requisition Date	Date of DDHS Approval	Date of CAOs Approval	Total Number of days
05/07	13/8/07	16/8/07	16/8/07	4
06/07	25/10/07	31/10/07	31/10/07	7
05/07	13/08/07	16/8/07	16/8/07	4
05/07	13/08/07	16/08/07	16/08/07	4
06/07	8/10/07	31/10/10	31/10/10	24
01/08	5/2/08	12/2/08	13/002/08	9
03/08	28/3/08	10/3/08	11/03/08	15
04/08	21/4/08	6/5/08	7/05/08	17
02/08	10/3/08	13/3/08	14/03/08	4
01/08	21/01/08	12/2/08	13/02/08	24
Average				**11.2**

Source: EMHS Field Data, 2009

The results show that the average lead-time to process an order from the HU to submission to the suppliers (NMS/JMS) was 11.2 days. A number of limitations can be identified in this system. The approvals depended on the availability of the approving officer. It was noted that several officers were required to fully approve an order. For example for a hospital (GGH), the signatories to a requisition included the Medical Superintendent, the DMO, CAO, Internal

Auditor, Chief Finance Officer, and Vote-book Controller. This manifests bureaucracy, which prolongs the lead-time. Secondly, transport and other logistical constraints seemed to delay the movement of the orders from the HF to the DMO. Thirdly, though collective ordering is ideal, it prolongs the lead-time in that those HUs that place their orders to the HSD early have to wait for others before their orders are forwarded to the next stages.

The second stage of the procurement process comprises the activities at NMS. The lead-time at NMS considered all activities between the supplier receiving the order and the time the supplies reach the HU. There is a working arrangement (MoU) between the MoH and NMS that NMS deliver supplies up to the district headquarters. The district and the HSDs arrange the distribution from the district headquarters to the HUs differently. The system at JMS is different in that JMS does not deliver. The clients collect their consignments from JMS. Table III presents the procurement lead times for the sampled districts compiled by the study team from field data.

Table III   Procurement Lead-time at NMS by the Sampled Districts (in days)

Lead time between	Gulu	Tororo	Butalejja	Moroto	Jinja	Masaka	Kiboga	Kisoro	Kasese	Kabarole	Average
Received order & Posting	34	34	24	14	19	38	27	33	13	25	26.1
Posting & Dispatch	24	8	12	9	12	13	9	6	11	9	11.3
Dispatch & delivery (to district)	2	1	4	4	1	2	2	4	4	2	2.6
Sub-total (NMS)	**60**	**43**	**40**	**27**	**32**	**53**	**35**	**43**	**28**	**36**	**39.7**
District to HSD	3	1	0*	2	-	3	2	-	5	-	2.3
HSD to HF	4	3	4	3	-	3	3	6	6	-	4
Sub-total (district)	**7**	**4**	**4**	**5**	**-**	**6**	**5**	**6**	**11**	**-**	**6**
TOTAL District	**67**	**47**	**44**	**32**	**32****	**59**	**42**	**49**	**32**	**36****	**45.7**

Source: EMHS Field Data, National Medical Stores
* Butalejja has no district store; NMS delivers directly to the HSD store at the district hospital
** Jinja and Kabarole only RRHs were sampled.

Table III shows big differences in procurement lead times by the sampled districts. The first stage is under the control of NMS; delivering up to district headquarters. The second stage is arranged differently by the respective districts with their HSDs. The biggest variations were at the stages of receiving and posting orders. Masaka (38) recorded the highest number of days while Kasese (13 days) and Moroto (14 days) reported the shortest. The average lead time for the sampled districts was 26.1 days. The explanation for the large variations at this stage was that districts continuously sent in their orders and yet NMS made deliveries according to a pre-set schedule . Orders that arrived at NMS early therefore stayed longer at NMS and consequently recorded longer procurement lead times than those which came late, but in time

for the same scheduled delivery. Districts close to each other (like Butalejja and Tororo) would be expected to have close delivery dates yet, Table III shows wide gaps (4 days). The explanation given was that verification of deliveries (carton by carton and at times opening the cartons) often took long when orders were large. Drive time and the route chosen by the truck driver could also affect the delivery times. In stage one, Gulu experienced the longest lead-time (60 days), followed by Masaka (53 days) and Kisoro (43 days). Moroto (27 days) and Kasese (28 days) experienced the shortest lead-time. On average the sampled districts experienced a procurement lead-time of 40 days (39.7days) in stage one. The next stage is distributing the supplies from the district to the HSDs and from HSDs to the HUs. Kasese took the longest (11 days) followed by Gulu (7 days). Tororo and Butalejja took the shortest (4 days each) followed by Moroto and Kiboga (6 days each). Overall, Gulu experienced the longest procurement lead-time (67 days), followed by Masaka (59 days) and Kisoro (49 days). Moroto, Jinja and Kasese experienced the shortest lead-time with 32 days each.

On average, the sampled districts experienced a procurement lead-time of 45.7days. This accounts for the time NMS receives the order to the time the HF receives deliveries. However, additional time is spent between the HF compiling the order and the CAO authorizing expenditure as shown in the example in Table II. Figure 1 is a diagrammatic illustration of the trend of lead-times for the sampled districts:
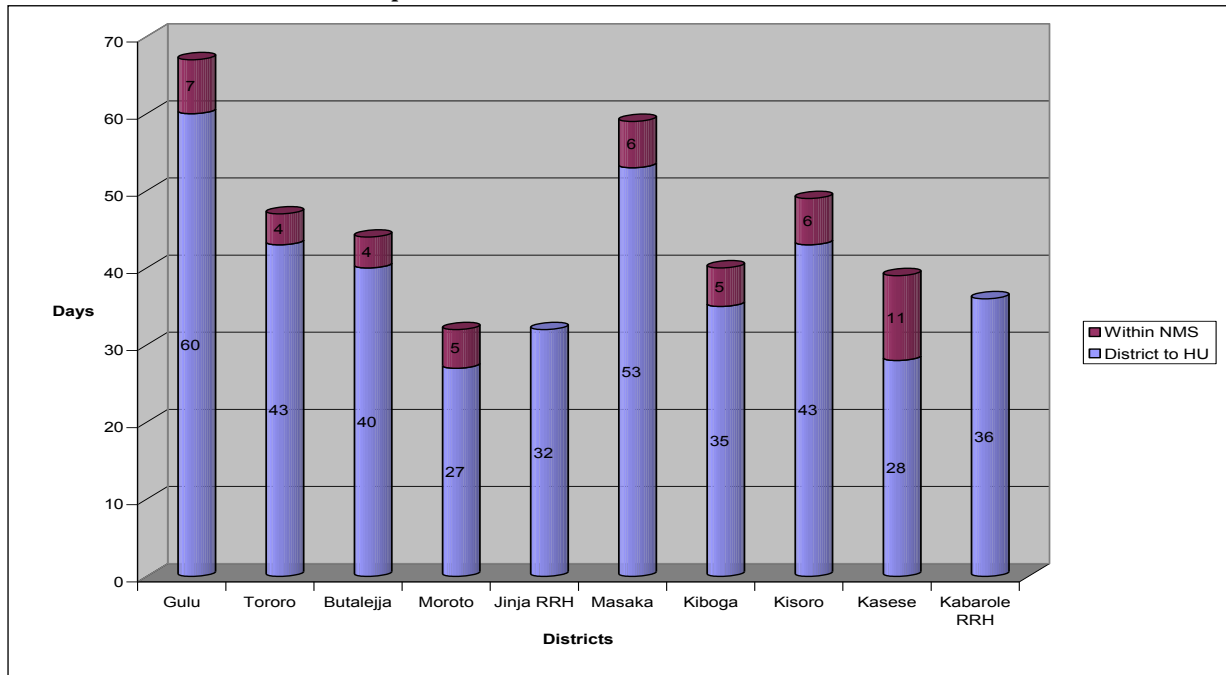

Figure 1.   Procurement Lead Time:
Source: EMHS Field Data, National Medical Stores

The high lead times for Gulu and Kisoro can be attributed to the long distances and difficulties in accessibility to these districts. Moroto district which has similar distance and accessibility circumstances as Gulu had the lowest lead-time of 27 days; yet Masaka district, which is nearer to the supplier, more accessible, experienced a lead-time of 53 days! This shows that besides the time the order is placed with NMS (late or early for the same scheduled delivery), there are several other factors at play like the truck driver deciding where to start delivering from (whether to start with the nearest or the farthest) and the conditions of the roads. On average, the lead-time between the district and the HSD was 2.3 days. The delay in distributing the supplies from the district to the HSDs is attributed to lack of transport and poor communication (information flow). The lead-time between the HSD and the HU was longer

(averaging 4 days) because of lack of transport and communication. The HUs did not have a budget for transporting supplies and many of them are in remote areas where communication is very poor.

To examine the availability of medicines and health supplies in selected districts in Uganda

The pattern of availability was established by first ascertaining the number of days in every month when a given indicator item was out of stock at a given facility. The total number of days in the study period was then summed up to get the total stock out-days for that particular item. The total was divided by 365 (days in a year) to get the proportion of stock out in the year, which was then expressed as a percentage.

We also looked at the percentage of indicator items that were stocked at a given facility (stock items) where the denominator was the total number among the indicator items that were allowable at a given level of health facility. In cases where some records were missing, the denominator was only valid data obtained.

Availability and Accessibility of Indicator Items

This study was guided by a list of 22 medicines and medical supplies as indicator items, selected from the 538 unique medicines and formulations listed in the EMHS for Uganda (EMLU 2007). The selection covered five categories based on burden of disease; maternal and child health; new emerging life-style diseases; mental health; and key health supplies. Table IV shows the service area, items covered and level of healthcare where they may be used.

Table IV   Study Indicator Items and Level of Use

	Service Area	Item	Level of Use
1	Malaria	• Coartem Yellow 20/120 mg Tab	HC II
		• Quinine 300mg/ml 2ml	HC III
2	HIV Testing and Counseling	• Determine i/ii kit	HC III
3	Family Planning	• Depo Provera Injection	HC III
4	STI Diagnosis and Treatment	• Cotrimoxazole 480mg/ 120 mg Tab	HCII
		• Amoxycillin 250mg Capsule	HCII
		• Metronidazole 200mg Tab	HC II
5	Immunization	• Measles Vaccine	HC II
6	ANC/ PNC	• Ferrous Sulphate/ Folic Acid Tab	HC II
		• Ibuprofen 200mg Tab	HC II
		• Paracetamol 500 mg Tab	HCII
7	Hypertension	• Propranolol 40mg Tab	HC IV
		• Bendrofluazide 5mg Tab	HC III
8	Diabetes	• Glibenclamide 5mg Tab	HC IV
		• Insulin Mixtard 30/70 IU 100 IU/ML	HC IV
9	Mental Health	• Haloperidol 5mg Tab	RRH
		• Carbamazipine 200mg Tab	HC IV
10	Supplies	• Examination Gloves	HC II
		• Syringes 2ml	HC II

Stocking Patterns

The level of stock out of EMHS at HUs is a key factor in the study because it acts as an indicator of the level of availability/accessibility to health supplies. This indicator was measured by the

proportion of indicator items available at different levels of HUs against those allowable at that level according to the EMLU. Figure 2 presents the findings about stocking levels of the listed items.
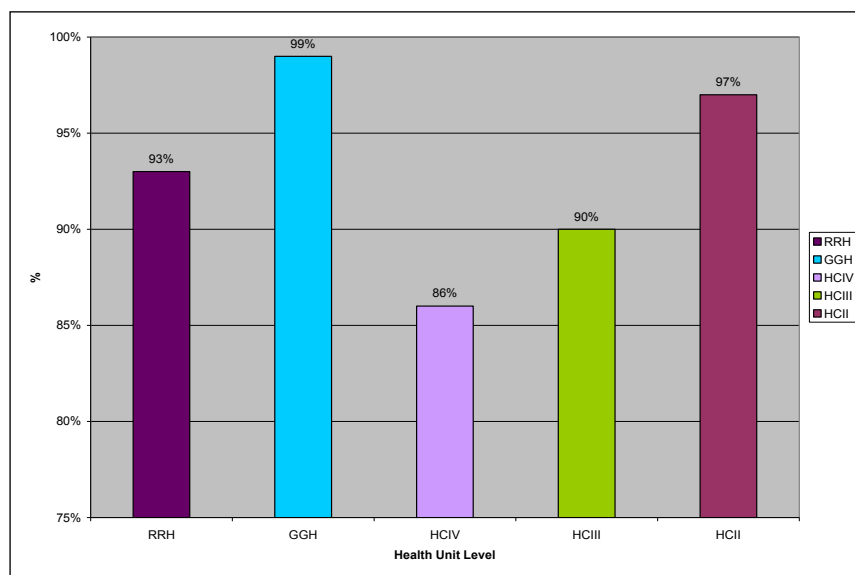

Figure 2.   Stocking Patterns by Health Facility Level
Source: Field Data EMHS Tracking, 2009

Overall, the sampled health units acknowledged stocking 93% of the EMHS Tracking Study listed items allowable at the respective HU level. The RRH stocked all (100%) of the items. However, this study had sampled Lacor among the RRHs and it does not stock contraceptive items. Inclusion of Lacor reduced the stocking rate at RRHs to 93%. The stocking rate for GGHs was (99%), at the HC IV, 86%; at HC III it was 90% and HC II, 97%. The GGHs showed a higher percentage because all of the sampled units were public facilities. Kiboga hospital did not stock Glibeclamide and Moroto hospital did not stock Depo Provera for lack of market.

Eight (67%)of the sampled 12 HC IVs did not stock Insulin; 7 (58%) did not stock Bendrofluazide; while 6 (50%) did not stock Glibeclamide. Two (17%) did not stock Propranolol and Carbamazipine.

The stocking rate at HC IIIs was affected by the number of HUs in the sample that were PNFPs. Nine out of twenty four (37.5%) were catholic-founded and therefore did not stock Depo Provera and Microgynon. Twenty (83%) did not stock Bendrofluazide while four (16.6%) did not stock Ferrous/Folic.

According EMLU, HCIIs may stock measles vaccines but because most of the sampled HUs did not have cold chain facilities, they did not stock it. Of the 24 HC IIs that were sampled, only 4 (16.6%) stocked the vaccine. Six (25%) out of 24 did not stock Ibruprofen while 4 (16.6%) did not stock Ferrous/Folic.

Stock outs across Health Units
The study sought to establish the frequency of stock outs of the listed items at the different health facility levels of the sampled HUs. It was found that all the HUs across the levels experienced stock out of at least one indicator item at any one time during the FY 2007/08. Fig 5.2 presents the details.
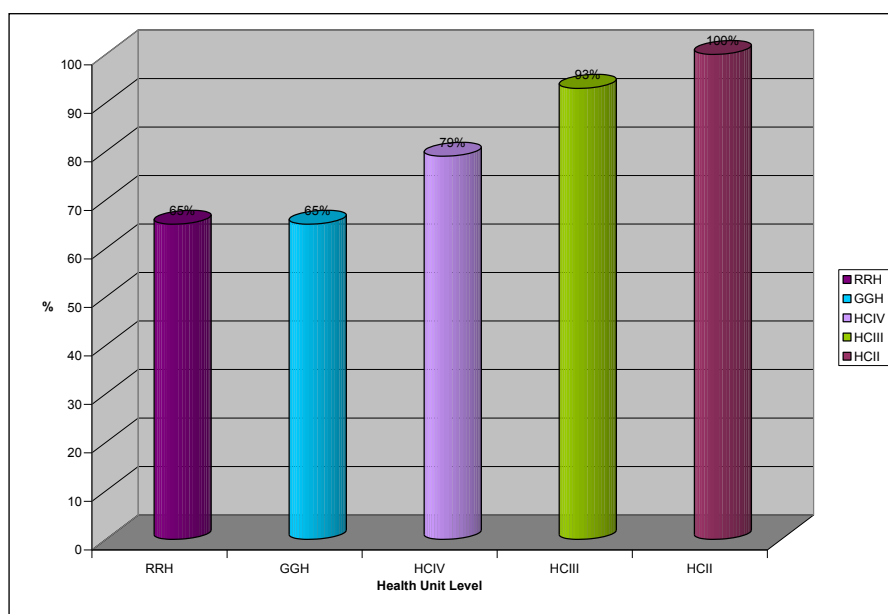
Figure 3.   Stock Out Levels Across Health Units
Source: Field Data EMHS Tracking

The results show that all the sampled HC IIs at one time or other during 2007/08 experienced stock out of each of all (100%) the listed items. At HC IIIs and HC IVs, 93% and 70% respectively of the items in this study were out of stock while at RRHs and GGHs 65% of the items experienced stock outs. This shows that stock outs were more prevalent at lower HUs than at higher ones.

Stock out Rates exceeding 30 Days
Having established that most listed EMHS experienced stock outs at the respective levels of health care, the study team sought to establish a reasonable stock out period. Taking into account, the lead times at the various levels of the supply chain, the team considered any stock out period of indicator items beyond one month (30 days) in a year (365 days) as critical.

Results show that 67% of all the 20 indicator items experienced stock out days of more than 30 days at HC II level. At HC IIIs, 50% of indicator items were out of stock for more than 30 days. RRHs reported stock out days beyond 30 days averaging 60% while that at GGHs and HC IVs was 49% and 40% respectively.

Discrepancies between Physical Count and BIN Card Balance
Records available at the visited HUs tended to provide inaccurate information regarding stocking levels of EMHS at those HUs. In-charges would report stock out of a given item yet the Bin cards/Stock cards reflected contrary information. The study therefore carried out on-spot physical count to ascertain whether stock cards were updated. The importance of this finding was to establish whether the stock card balances represented the actual availability or stock out levels and whether the conclusions drawn from the stock cards were correct. Figure 4 indicates the discrepancies between physical (on spot) count and BIN card balances of EMHS at HUs.
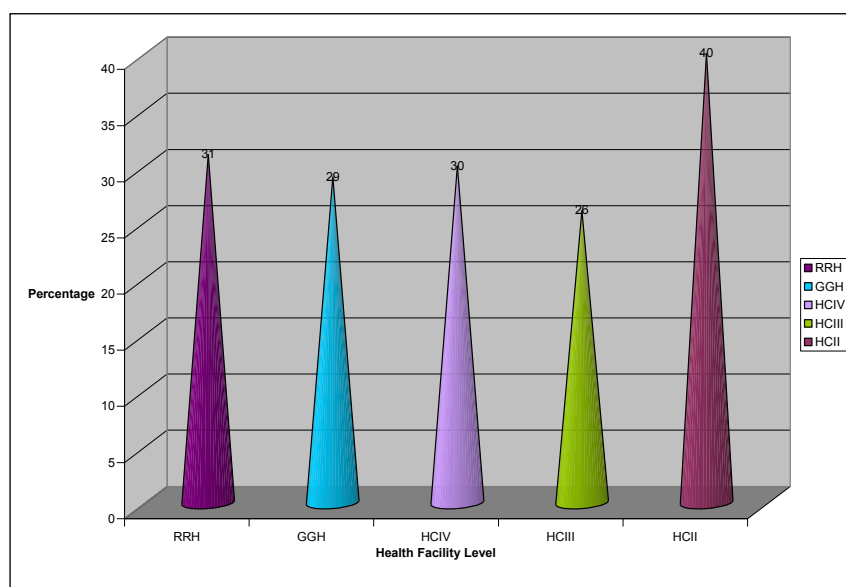
Figure 4.   Discrepancies between Physical Count and BIN Card Balance
Source: Field Data EMHS Tracking, 2009

Figure 4 shows that there were discrepancies in Bin/Stock card balances and physical count of stocks at all health facilities visited across the five levels. HC IIs had the highest (40%) discrepancy between spot check physical count and BIN card balance. RRHs had an average discrepancy of 31% while the discrepancy at HC IVs averaged 30%. The lowest discrepancy (26%) was at HC III. The results show that the Bin/Stock cards do not reflect the correct position of stock levels at the health facilities. In most cases, the balance reflected on BIN Cards was much higher than the physically available stock. Stock card balances are therefore not a reliable indicator of availability of EMHS in the facility.

On investigating the reasons for the discrepancies, the staff at HC IIs claimed that the discrepancies were largely due to inadequate staffing at the HUs; the staff were few in number and prioritized attending to patients leaving them little time to up-date their records including Bin cards. However, the study team noted that in addition to inadequate staff, the available workers largely lacked the capacity to utilize the Bin cards accurately. This is the reason the entries on the cards were often incorrect. At most HCIIs clients reported in the morning and the health units closed at around 1 PM. The remaining time of the day (2 -5 PM) could be used to do administrative work including up-dating Bin cards if the staff were serious at their work. Further, the higher HUs (RRHs and GGHs) had relatively competent staff that could handle stock cards competently but they too had the same problem of inaccurate Bin/stock cards. This means that the reason for not updating stock cards went beyond under-staffing per se. The main reason according to the study team was negligence of duty by most workers. The study further noted that 18% (3 out of the 20) indicator items did not have stock cards. The common items that did not have stock cards were Folic/ Ferrous Sulphate, Examination Gloves and Depo Provera. On why these items conspicuously lacked Bin cards, the stores' staff at various health facilities claimed that these particular items were stored in the maternity wards and were controlled there. However, in the maternity wards, no one was in charge of records. Nurses picked materials and used them without any recording. Overall, 57% of the available Bin cards for the listed items at the sampled HUs were updated.

Level of Prescription Fulfillment

Respondents were asked whether they obtained all the medicines that were prescribed for them from the HU they visited. This indicator would show the level to which the prescribed medicines were available at a given health facility and dispensed if available. By prescribed medicines, the study means prescribed medicines by type and not number. The study assumed that each prescribed medicine was dispensed in full dosage (number of tablets etc). The responses are categorised in two; those who received all the prescribed medicines and those who received less than the prescribed medicines. The assumption was of a full dose i.e each medicine is used to have been received in full dose. Figure 5 illustrates the responses by district.
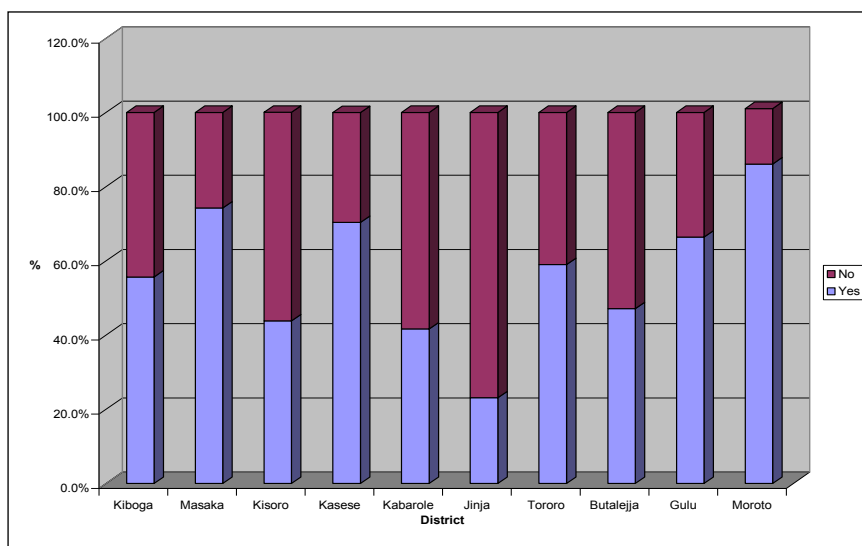

Figure 5.   Prescribed Medicines that were obtained at the Health Facility.
Source: Field Data EMHS Tracking

According to Figure 5, Moroto had the highest number of clients (86.1%) who received all the medicines that were prescribed for them. Masaka and Kasese followed with 74.3% and 70.4% respectively. Jinja regional referral hospital had the lowest (23.1%) number of clients who received all the medicines that were prescribed. The details of proportions the clients received are shown in Table V.

Table V   Prescription Fulfillment by District

District	No. of Respondents	No. of Medicines Prescribed (x)	No. of Medicines fully Dispensed (y)	Level of Prescription Fulfilment (y/x%)
Kiboga	108	648	511	78.9
Masaka	107	642	509	79.3
Kisoro	109	654	455	69.6
Kasese	111	666	592	88.9
Kabarole	12	72	62	86.1
Jinja	13	78	43	55.1
Tororo	94	564	443	78.5
Butalejja	92	552	465	84.2
Gulu	113	678	574	84.7
Moroto	120	720	684	95
Average		**527**	**434**	**80**

Source: Field Data, EMHS Study 2009

The results in Table V show that the average capacity of the sampled districts (and RRHs) to dispense fully the prescribed drugs was 80%. Moroto reported the highest capacity of 95%, followed by Kasese (88.9%) while Jinja (55.1%) reported the lowest. The results further show

that 54.8% of the clients interviewed received all the medicines that were prescribed for them from the health facility they visited. A small proportion (13.3%) of all the clients interviewed received 83.5% of the medicines prescribed while 4.8% of the interviewed clients got 17% of the prescribed medicines as presented in Appendix 4.

Although Moroto and Kasese were among the districts that reported the highest capacity to dispense all the prescribed medicines, the two districts also reported the highest number of clients who claimed to have informally paid health workers in order to be given the medicines. Figure 6 illustrates the responses as to whether or not clients made informal payments for the medicines they received.
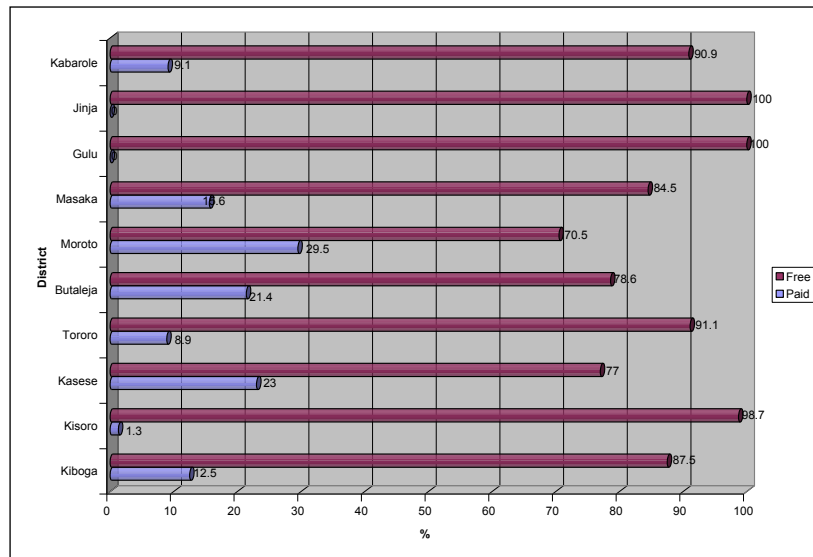

Figure 6.   Informal Payment for the Medicines Received
Source: Field Data EMHS Tracking

The districts that reported the lowest number of clients claiming to have paid for services at public health facilities were Jinja and Gulu (0%), and Kisoro (1.3%). This corresponds to the explanation for the small proportion of clients that received all prescribed medicines in those districts as earlier presented in Table 5.2. This seems to indicate evidence of corruption in dispensing of medicines in public health units. A possible explanation is that HUs in Gulu and Kisoro hoarded the medicines as long as the clients were not offering to pay (informally) for the medicines and sent patients to private pharmacies.

Trends of Availability of EMHS over Time
While the official stock out data as presented in AHSPR 2007/08 showed deterioration in availability of EMHS measured by the six tracer medicines, the general perception of healthcare consumers seems otherwise. A possible explanation would be that the GoU credit line budget increased in FY 2007/08 to Ug.Shs. 12.6b, from Ug.Shs. 8b in FY 2006/07 while stockouts can be attributed to poor management practices. In FY 2008/09 the GoU credit line budget decreased to Ug.Shs. 6.7b, which is even lower than in 2006/07. The study team sought the views of the clients about availability of medicines presently (2008) at the health facilities as compared to one year ago (2007). Figure 7 presents the views expressed by clients that were interviewed at the sampled HUs.
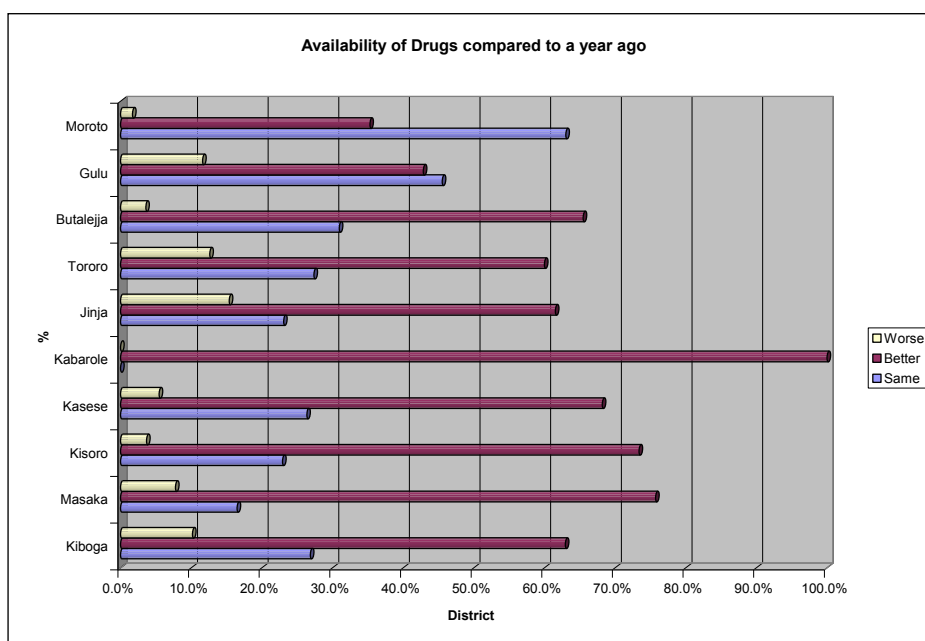
Figure 7.   Clients' Perception of Availability of Medicines Presently Compared to a Year Ago.
Source: Field Data EMHS Tracking

The findings show that all the respondents in Kabarole were of the view that medicines were more available today (2009) than last year (2008). In Tororo, Kisoro, Kiboga, Butalejja, and Kasese, more than 60% of the interviewed clients were of the view that medicines were more available today than they were a year ago. However, in Gulu and Moroto, less than 50% of the clients interviewed thought the situation had improved. In Moroto, more than 60% of the respondents thought the situation had remained the same while in Gulu nearly 50% thought the situation had remained the same and about 15% thought it had gotten worse.

Overall, about 80% of the interviewed clients were of the view that the availability of medicines had improved in 2009 compared 2008. Their argument was that even if the prescribed medicines were not available at the public HU, the medicines would be available at private outlets (PFPs). Participants in Focus Group Discussions were of the same view that medicines were presently more available than the previous year.

Alternative Source of Medicines
Some indicator items were reported to be out of stock for over a year. The study team asked clients what they did in situations where the medicines were out of stock for such long periods. Fig 5.9 presents the alternative sources from which clients sought services.
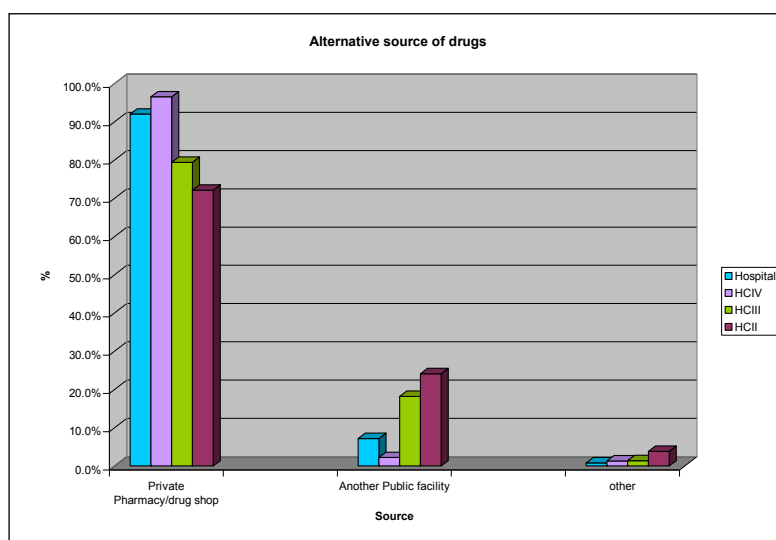
Figure 8.   Alternative Source of Medicines
Source: Field Data EMHS Tracking

The results in figure 8 show that on average 85% of patients who did not receive medicines from the public health facilities bought them from private pharmacies/drug shops. A small proportion (13%) visited another public health facility for the medicines while 2% reported that they waited for the next delivery of the medicines to their HU. More clients (24.1%) at HCII than at any other level went to higher public health facilities for medicines. At hospital level (regional and district), 7% of the clients reported to be getting the unavailable medicines from another public health facility. This leaves one wondering whether they go to lower levels for medicines. Participants in FGDs reported that clients were advised of the pharmacies or drug shops from where to buy medicines they had failed to find at public HUs. This may be a good practice but it raised suspicions as clients alleged that those pharmacies/drug shops belonged to the health workers at public health facilities. According to the clients, health workers who doubled as private drug-shop owners could divert medicines from the public health facilities to sell at their shops. However, this study could not clearly establish the link between the health workers and the drug shops ownership.

Factors Affecting Availability of EMHS
The study identified a number of factors that contributed to unavailability of medicines at service delivery points. Among the main ones are:

Inadequate Funding
The national health budget has not shown any significant increase overtime despite the increase in population and EMHS needs. According to MoH, as earlier indicated, Ug.Shs.252 billion was needed for the health sector but only 144 billion was approved for FY 2008/09 (Ministry of Health Planning Department). The budget for procurement of EMHS, both credit line and PHC (Recurrent Non-wage) is inadequate.

Non- Compliance to Guidelines on Use of PHC to Procure EMHS
All health facilities did not comply with the MoH guidelines regarding the proportion of PHC that should be used to procure EMHS. As indicated in the analysis, MoH guidelines provide that RRHs and GGHs spend at least 40% of the PHC (recurrent non-wage) on procurement of EMHS. The lower HUs are required to spend at 50%. However, it was found that RRHs spent 36.6% (Masaka spending 44.2 and FortPortal 29%, whereas GGHs spent only 37% and the lower HUs spent 32%.

Stock Outs at HUs

EMHS experienced stock outs at all levels of health facilities. The problem was more critical at lower HUs (HC IIs and HC IIIs) yet, these were the main service delivery points to the communities. Some essential medicines and supplies were out of stock for periods exceeding 3 months. At HC IIs and HC IIIs, supplies meant to last 2 months were reportedly consumed in a period of 1-2 weeks because demand far exceeded supply.

Capacity of the Suppliers

The capacity of the main suppliers (NMS/JMS) affected availability of EMHS at health facilities. The study established that most times, NMS supplied less than the ordered quantities despite the fact that the beneficiaries had credit with NMS and had actually ordered for more supplies.

The requirement that the supplier gives the client a certificate of non-availability as authorization to purchase elsewhere was reportedly an impediment to timely procurement as suppliers especially NMS were said to be reluctant to give the certificate of non-availability. This purported "refusal" compelled some clients to wait until NMS stocked the item the HUs wanted.

Poor Record Keeping

Record keeping at most HUs at all levels was poor. This meant that the HUs did not have reliable records upon which they could accurately plan and forecast their work plans including procurement of EMHS.

Long Procurement Lead Times

The procurement process for EMHS was long with various stages. At each of these stages were several processes that required time to complete. Ultimately, the process was long and therefore, it took time to replenish an item that ran out of stock.

Human Resource Capacity

Most HUs especially HC IIs and HC IIIs had insufficient human resource capacity in terms of required skills. Consequently, the HUs could not properly forecast and quantify the EMHS needs to make orders in time. Inadequate capacity contributed to poor record keeping and lack of initiative to follow up orders and deliveries.

Furthermore, there appeared to be no commitment to work as it was found that most HUs especially lower ones opened only in the morning closing at 1' O'clock yet official government business starts at 8AM and should close at 5PM.

Affordability

The majority of the clients (79%) claimed they could afford medicines not obtained at public health facilities from PFPs. This means the 21% who could not afford were unable to access medicines that were not available at public HUs. It was also indicated that there were cases of under-the-counter payments to health workers in order to access medicines at public Health facilities. This means that those who could not afford under-the-counter payments to health workers would not access the medicines at public HUs.

Frivolous Consumption

HC IIs and HC IIIs are situated within the communities. People were more aware of "practices" at these health centres as compared to RRHs and higher HUs. When supplies are delivered the

local people get to know immediately. As indicated earlier, the study found that people tended to flock the HUs whenever medicines arrived at the HUs whether they were sick or not.

Irrational Prescribing of Medicines
Although most clients (98.6%) were adequately advised on how to use the medicines, they were not given sufficient information about how to store the medicines (51.1%) nor their side effects (55.4%). This may lead to irrational use of medicines and ultimately, waste of resources that go into purchase of such badly stored medicines.

To examine the affordability of essential medicines and health supplies in selected districts in Uganda
Availability of essential medicines was identified as a major problem at public HUs. On the contrary, PFPs were found to be generally well stocked with essential medicines most of the time. Even in GGHs that had private wings, the medicines were more available in the private wing than in the public wards. Because medicines were often not available at public outlets, clients at times bought the medicines from private outlets after getting prescriptions from public HUs. Clients interviewed at the sampled public HUs who had not been given the prescribed medicines were asked whether they would be able to buy those medicines at private outlets.

According to the results, 72.3% of the interviewed clients responded that they could afford the charges. The responses were based on the previous contact of the client with the drug source since they were interviewed before going to the pharmacy. However, much as clients expressed the view that they could afford to buy medicines at PFP, health workers were of the contrary view that most clients could not afford. On further inquiry from health workers, the study established that clients thought that affording less than full dosage or just one out of the prescribed medicines was alright. The implication here is that perceived affordability did not consider the issue of right dosage, a situation that is dangerous to clients. Clients using medicines in this way is inappropriate and tantamount to irrational use of medicines, creating medicines use problems in future (such as antibiotic resistance), but this also indicates unprofessional or poor dispensing practices.

To examine the use of essential medicines and health supplies in selected districts in Uganda.
Officials at MoH reported that there had been efforts to promote appropriate use of EMHS by health professionals, patients and the general public. This, they argued, has been implemented through attempts to provide appropriate information on medicines to the health workers and the community.

In 2007, the MoH formulated the latest edition of the EMLU. This has helped in guiding the health workers and streamlining procurement based on the national needs. The Uganda Clinical Guidelines–UCG (2003) was also in place. According to the participants, the most essential medicines were Coartem, Paracetamol, Quinine, Fansidar, Ferrous Sulphate/Folic Acid, and Metronidazole all of which were listed in EMLU. However, they noted that these medicines usually ran out of stock in a short time.

In the study area, all the four (4) sampled RRHs and six (6) GGHs had MTCs. The MTCs at the hospitals participated in compiling the procurement orders of medicines. Members to the MTC were drawn from different departments/sections/units. Each unit representative presented the needs of their unit. These were put together to compile a complete order for the hospital.

The purpose of this participation was to ensure that all and only relevant medicines were ordered.

It is a good practice that health workers advise clients on taking medicines; storage; and possible side effects of the medicines given. The study team interviewed some patients at sampled HUs to find out whether they were given information about: how to take the medicines given; storage of the medicines; and possible side effects.

Advice on How to Use Medicines Given
Exit clients were asked whether they had been advised on how to use the medicines given. This was done by first asking the clients what advice/instructions they had received and the response was compared with the instructions written on the dispensing envelopes. Table VI shows the findings about clients who were advised about medicines dispensed to them and could recall the instructions that were given.

Table VI   Clients who could Recall Instructions give on How to Use Obtained Medicines.

Level of HF	Were given Appropriate Advice on how to use medicines given and could recall it (%)	Were not given Appropriate Advice on how to use given medicines or could not recall advice given (%)
Hospital	98.8	1.2
HCIV	98.9	1.1
HCIII	98.9	1.1
HCII	97.6	2.4
Average	98.5	1. 5

Source: Field Data EMHS Tracking

The results show that most patients were advised on how to use the medicines given to them and could recall it. This was across all the levels of HU. At the hospital level, 98.8% of the interviewed patients had been advised on how to use the medicines and could recall the advice. At the HC IV and HC III level, 98.9% had received and could recall the advice. Similarly, at HC II level the proportion of those who had received and could recall the advice was 98.6%. This implies that most clients (98.6%) at different health facility levels were generally advised on how to use the medicines given to them and could recall the advice. This is a good effort for enhancing rational use of medicines.

Advice on Possible Side Effects
Clients are supposed to be advised on the side effects of the treatment they are undertaking. This information reduces on drug wastage that comes from discontinuing treatment because of side effects of the medicines. In such cases, clients usually think the treatment is not working and they fail to adhere to medicine prescriptions. About whether they were advised of the possible effects of the medicines, clients who responded in the affirmative were 66.5%at HC IV, 44.2% at hospital level, 35.1% at HC III and 32.5 % at HC II. On average, 44.6% across all levels were advised on possible effects of medicines given to them. The implication is that 55.4% of the interviewed clients were not advised on the possible side effects of the medicines they received. This could lead to irrational use of medicine. For example, clients that were not aware of the side effects might discontinue the medicine before completing the dosage.

Advice on Storage
Clients should be advised to keep the medicines according to the prescribed information with regard to appropriate temperatures and where they may not be tampered with especially by

children. Respondents were asked whether they were advised on proper storage of medicines. Table VII presents the results.

Table VII   Advice Given on Best Storage Conditions

Level of HF	Were given advice on best storage conditions (%)	Were not given advice on best storage conditions (%)
Hospital	64.4	35.6
HCIV	59.1	40.9
HCIII	72	28
HCII	58.1	41.9
Average	63.4	36.6

Source: Field Data EMHS Tracking

The results show that 64.4% of respondents at GGHs were not advised on the best conditions to store their medicines. At HC IV, 59.1% had received the advice while at HC III, 72% and at HC II level, 58.1% of the respondents had been advised. The results imply that although most patients were advised on storage conditions for the medicines given, a significant number was not advised. Poor storage may amongst others, compromise the effectiveness of medicines and can be dangerous to children.

EMHS Supply and Utilization of Health Facilities

Health Units reported that once medicines were delivered, even people who were not ill, flocked them overwhelmingly. This was reportedly most common at HCIIs and HCIIIs, where supplies were said to last 1 to 2 weeks because of the upsurge in client attendance immediately after delivery of supplies. This issue was investigated by comparing client attendance records one month before and one month after delivery of the medicines. Records available at HUs showed minor increases in client attendance following delivery of medicines contrary to what HUs reported. The possible explanation to the apparent sharp increases that HUs experienced was that once medicines were delivered, clients came in big numbers over a short period of time (1-2 weeks). The reason, people all of a sudden flocked the HU once supplies arrived, was that many people in the communities were sick but had kept away because they knew there was no medicine and waited until the medicines arrived. In addition, because of the erratic availability of medicines at HUs, some people turned up to collect medicines to keep at home for use in future when they fell sick.

CONCLUSIONS

Tracking procurement of   EMHS

Stock out of EMHS was a chronic problem at most of the public HUs visited. Some of the listed items had been out of stock for over a year. Service delivery at public HUs was rated very poor particularly regarding availability of medicines.

The budgetary allocations and expenditure for EMHS were too low to satisfy the minimum health care needs of the country. This grossly affected service delivery at facility level. The meagre budgets could not address the chronic stock outs of EMHS at public HUs. Furthermore, funds for procurement of EMHS were not disbursed in time. Procurement of EMHS was being done as and when funds were available on an adhoc basis.

District Officials preferred to procure EMHS using PHC funds from local PFPs rather than NMS as recommended by government. The requirement for more than one pre-qualified supplier was frequently ignored. The preference to procure from PFPs was suspect particularly since regulations to use the open tender system with more than one pre-qualified supplier were not

followed. It is possible that unscrupulous district authorities diverted funds for procurement of EHMS to other uses.

Some Districts had not procured EMHS from NMS with any of their PHC funds (cash) as required by the government guidelines claiming that NMS was reluctant to issue the certificate of non- availability. The reluctance by NMS to issue "certificate of non- availability" was being used by the districts as an excuse to ignore the guideline and procure from their preferred sources (PFPs). The requirement for all public HUs to procure EMHS exclusively from NMS exerted a lot of pressure and demand for service on NMS hence creating logistical and capacity problems for NMS.

Record keeping at the HUs regarding funding and procurement of EMHS was very poor. Finances allocated, orders placed and deliveries made could not be tracked easily from the HUs. HUs did not have reliable records upon which to base their procurement and other management plans. Under collective ordering, all HUs submit their orders, at different times before the DHO/HSD finally compiled a combined order to the supplier. Collective ordering prolonged procurement lead time for HUs. Those who submitted their orders first had to wait for late-comers.

Availability, Affordability and Use of EMHS
Access to essential healthcare items was poor due to persistent non-availability of EMHS at the public HUs. In some cases, essential items were out of stock for periods exceeding a year. The EMHS supplies made to HUs were less than the minimum needs of the communities as manifested in the frequent stock outs. Improved forecasting and inventor management practices could improve availability (Kaufmann et al. 2011)

Clients shunned lower HUs and congested at higher HUs especially general hospitals. Persistent stock outs of essential medicines at lower HUs forced clients to seek services from GGHs, which were relatively better on availability of medicines. For the PNFPs (NGO HUs); which charged a modest user fee, they experienced lower stock outs of essential medicines. Therefore a modest charge on patients towards their treatment can improve availability of EMHS.

Private clinics were largely run by health workers who also worked at public HUs. Whereas there were no medicines at public HUs, the private clinics always had medicines. This left the community members wondering and accusing health workers of stealing public medicines for sale at their clinics. Although it was not possible to prove this accusation, allowing heath workers serving at public health facilities to run private clinics nearby, is likely to create conflict of interest.

Clients that failed to get all the prescribed medicines at public HUs and could not afford them at private outlets turned to irrational means of treatment such as taking less than prescribed dosages. The high cost of medicines at private outlets led to irrational use of medicines as clients could not afford the right quantities from the right places.

Monitoring of EMHS at public HUs was poor despite the existence of HUMC (Health Unit Management Committees). Most HUMCs did not go beyond witnessing the delivering of EMHS to the health facility. The performance of HUMCs is reportedly constrained by lack of sustenance of their motivation since their work is purely voluntary. HUMC were not closely

discharging their responsibilities of watching over and ensuring that delivered EMHS were properly used at the HUs.

Rational use of medicines requires that clients be given adequate information about use, storage and side effects of medicines given to them. Health workers explained instructions to patients on how to use the medicines given (e.g. 1X1 daily) but offered little explanation regarding storage, side effects and names of those medicines. Clients were not receiving enough information about the medicines they were given. Lack of adequate information contributed to irrational use of the medicines.

RECOMMENDATIONS

Tracking procurement of EMHS

The various units in the supply chain are dependent on each other for resources and information (Arshinder et al. 2011). There is need to have a coordinated supply chain system in order to improve on efficiency in management of EMHS.

The health sector budget should be increased to match the healthcare needs of the population. The increase should be consistent with the Abuja Declaration (15% of National Budget to be spent on Health).

All DHOs, Hospitals and HSDs should be compelled to fulfil accountability conditions so as to receive the funds for procurement of EMHS in time. The MoH/MoFPED should enact sanctions against districts/RRHs/ GGHs that flout guidelines. Penalties could include cuts in funding. This is a "best practice" that has registered improvements in service delivery in Local Government Administration.

The PPDA guidelines should be enforced with vigilance to ensure use of the open tender system when purchasing from PFPs. However, there is need to adjust procurement guidelines to take care of districts that may not locally get more than one pre-qualified supplier.

NMS should provide the certificate of non-availability immediately on noticing unavailability of needed items to facilitate procurement from other sources.

HUs should train records staff, strengthen supervision and where possible, progressively computerize to improve record keeping. Improve human resource capacity especially at lower level HUs to quantify needs and compile accurate orders. There should be proper planning by NMS to ensure that EMHS deliveries are consistent with orders placed.

Availability, Affordability and Use of EMHS

EMHS managers should optimize utilization of the available funds through rational procurement planning, forecasting and quantification. The more focus should be on availing medicines at lower HUs, which are closer to communities to prevent swarming GGHs. This could be done by increasing the proportionate funding of lower HUs within the available budget and improving efficiency of HU. Increasing allocations for EMHS to PNFPs and embossing of all public medicines could improve on EMHS availability.

MoH should conduct community programmes sensitizing people about the dangers of irrational use of medicines. Progressively, MoH/NDA should ensure that private out lets are managed by qualified personnel to avoid irrational use of medicines. There should be regular

refresher courses for health workers, mainly focusing on medicine prescription and dispensing; including dosage, side effects, storage and usage by clients.

Practical implications
This paper provides useful information on procurement, availability, affordability and use of medicines and health supplies. This information will be useful for academia as blocks for building theoretical knowledge and for medical practitioners and policy makers in their medical practice and administration.

Limitations
Since it was necessary to provide a lot of background information for future researchers in the novel area of medicine and health supplies supply chain in Uganda at community level, the research was more of descriptive than correlational and prescriptive. However, the analytical nature of the discussion and the richness of relevant data will be a strong base for future applied research in medicines and health supplies supply chain.

Future research
With strong contextual base this paper has come up with, future research should be based on theoretical underpinnings of each of procurement, availability, affordability and use of medicines and health supplies. Since the findings may be having an anthropological connotations. Respondents from other areas of sub Saharan Africa, given differing social environments, could have different interpretations of the world, and therefore results may be different and interesting when compared to the Ugandan findings.

References
Agaba, E and Shipman, N. (2007). "Public Procurement Reform in Developing Countries: The Ugandan Experience" Boca Raton, FL: Academics Press.

and equity. Penang, Malaysia, Consumers International-Regional Office for Asia and the

Balasubramaniam K. Health and pharmaceuticals in developing countries: towards social justice

Kaufmann, J.R., Miller, R. and Cheyne, J. (2011), "Vaccine supply chains need to be better funded and strengthened, or lives will be at risk", Health Affairs, Vol. 30 No. 6, pp. 1113-21.

Kumar, S., Niedan-Olsen, K. and Peterson, L. (2009), "Educating the supply chain logistics for humanitarian efforts in Africa: a case study", International Journal of Productivity and Performance Management, Vol. 58 No. 5, pp. 480-500.

Levesque, J.F., Harris, M.F. and Russell, G. (2013), "Patient centred access to health care: conceptualizing access at the interface of health systems and populations" International Journal for Equity in Health Vol. 12 No. 18

Myhr K. Comparing prices of essential drugs between four countries in East Africa and with international prices. MSF Conference, Nairobi 2000

Okiror, B. (2009), "Drug shortage hits Uganda", The New Vision, March 21, available at: www.newvision.co.ug/D/8/13/675331

Pacific, 1996.

Robertson, J. et al. 2009. What essential medicines for children are on the shelf? Bull World Health Organ, 87, 231 – 237.

Sussanne, G., Ewen, M., Noguchi, M. and Liang, R. (2006), "Price availability and affordability: an international comparison of chronic disease medicines"

Thai, K.V. (2001). "Public Procurement Re-examined." Journal of Public Procurement, Vol.1 pp 9-50

World Health Organisation – Health financing and access to effective interventions, 2010. Available at www.who.int/healthsystems/topic/financng

World Health Organisation – Primary Health Care, World Health Statistics, 2008. Available at: www.who.int/whr/2008

World Health Organisation Briefing Note - Access to Controlled Medications Programme. Geneva, World Health Organisation, 2012. Available at: www.who.int/.../medicines/.../ACMP_BrNote_PainGLs_EN_Apr2012..