TACKLING SUPPLY CHAIN BOTTLENECKS OF ESSENTIAL DRUGS: A CASE OF UGANDA LOCAL GOVERNMENT HEALTH UNITS

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ABSTRACT. Recent empirical studies point to structural supply chain constraints in the supply of essential drugs in developing countries, hence calling for interventions and policy direction. Despite Uganda's commitment to improve drug access and availability, actual realization remains low and structural bottlenecks in the chain have not been identified and documented. A cross sectional survey was conducted on 240 respondents in four malaria prone districts. Structural bottlenecks at each stage of the supply chain have been systematically identified and documented as a starting point. Findings indicated hospitals were mainly affected by lack of credible and accessible drug consumption information, poor planning, forecasting and logistics. Health centre IVs mainly faced inadequate procurement skills and consumption information. Health centre IIIs encountered poor procurement practices and logistics. Health centre IIs faced poor procurement practices, collaborative linkages and logistics. These findings add to the literature of the increasingly complex drugs supply chains in developing countries. The paper concluded that access and availability of essential drugs remains sub-optimal. Recommendations are drawn towards policy interventions aimed at strengthening programmes at local governments, investing resources in collaborative services, training staff in procurement best practices, and logistical management.

BACKGROUND TO THE STUDY

Governments world over, in a bid to have a healthy population and wealthy nations, have continued to strive to ensure that supply chains of essential drugs are effective and efficient for improved health care. This is after the realization that the supply, availability and accessibility of these drugs can improve the quality of lives of the rural poor

In order to improve the quality of living especially among the poor, there has been a deliberate government emphasis throughout Uganda, on primary health care targeting health centers. There are 57 hospitals, 179 health centers and 989 other medical facilities across the country (Integrated Regional Information Network, 2008).

In spite Uganda's commitments to improve access and availability of the essential drugs, actual realization remains low and structural bottlenecks at each stage of the supply chain have not been systematically identified and documented (Okot-Chono, Mugisha, Adatu, Madraa, Dlodlo, and Fujiwara, 2009).

Many people especially the rural poor for example, still experience shortage of essential drugs in government health units. According to the latest survey by the Uganda Country Working Group (2009), 32-50% of essential medicines to treat diseases like malaria, pneumonia, diahorrea, HIV/AIDS, Tuberculosis, diabetes among others, are not readily available. According to Office of the Prime Minister, (2007) the situation is even worse in district health centers making it one of the key issues stakeholders will strive to address through the supply chain approach.

The period between 2002/03 and 2005/2006 in Uganda, further revealed a downward trend in access and quality of health service (National Integrated Monitoring and Evaluation Strategy, 2007). This trend makes realization of the Millennium Development Goals (MDGs) unlikely. The report further notes increased level of medicines stock-outs at health facilities is rampant. The percentage of health facilities without drug stock-outs deteriorated from 35% in 2004 to 27% in 2005. The increasing tendency for the population to use private clinics rather than government health centers could as well be a proxy indicator of deteriorating quality of government health services yet at the same time

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there are reports of expired drugs (National Integrated Monitoring and Evaluation Strategy (2007).

Available information indicates that the National Medical Sores (NMS) body charged with the acquisition and distribution destroys expired drugs frequently (The Monitor Newspaper, Wednesday, 2009). These drugs actually are the ones supposed to address the inadequacy of medicines in the health centers. Absence of essential drugs in health centers while at the other end (National Medical Stores) they are expiring and being destroyed, points to a defective supply chain.

Indeed, TecNet Consultation (2008) observes that supply chains of essential medicines in developing countries is becoming increasingly complex, and as diseases span the poorer populace, availability and access are critical to the welfare of a healthy nation. If these drugs do not arrive at their destination on time, the process will come to a halt and links within the supply chain will break, causing problems for other entities down the chain.

Fundafunda (2007) while agreeing with the complex nature of the supply chain asserts that availability of essential drugs and supplies in the public health sector is a continuing problem due to a combination of problems which ought to be tackled urgently to avert disastrous outcomes through supply chain accountability. Copacino (1996) therefore argues that the supply chain if well managed will enhance efficient flow of drugs and help to avert health problems amongst the rural poor.

Unfortunately as Ntayi, Rooks and Eyaa (2009) aver, not much is known about the functioning of the supply chains in developing countries. This assertion is supported by Lokollo (2004) who observes that supply chains approach has been practiced more in developed countries than in developing economies. Where it exists in developing countries, it is basically agriculture focused and tightly linked with social structures. This could probably explain why the concept of supply chain means very little to most people in developing countries. Policy makers in especially developing countries must focus on building on selective intervention approach by promoting the supply chain approach within the districts to ensure that the essential drugs for malaria in particular are available or affordable to enhance the rural poor wellbeing.

The aim of this study is to add to the literature by increasing our understanding of the performance of supply chains in a developing country namely Uganda with regard to essential drugs in a bid to increase the welfare of the rural people. This research, however, will not focus on the production chain but will emphasize the procurement, receipt, storage and distribution of the essential drugs to the ultimate consumer with emphasis on malaria (Malaria- ACT medicine) drugs.

PROBLEM STATEMENT

The Government of Uganda is a signatory to a number of international treaties specifying obligations. The most high profile of these international initiatives is the Millennium Development Goals (MDGs), under which a number of targets have been set that both developing countries and developed partners are committed to achieving by 2015, among which include eradication of extreme poverty and hunger and combating diseases.

Despite the Uganda Government's efforts to combat poverty and diseases, Uganda's health ministry has been scrambling to stave off a nationwide shortage of essential drugs that could jeopardize the lives of tens of thousands of people. The primary health care in Uganda is below international standards. The health centers are in insufficient supply of essential drugs.

Ironically in the past two years, the local media have regularly raised the alarm over essential drugs expiring and having to be destroyed by the National Medical Stores (NMS), the main supplier of government drugs and yet at the same time drugs shortage is rampant (PlusNews East Africa, 2008; Office of the Prime Minister , 2007).

These conditions call for examining the bottlenecks at each stage of the supply chain in the supply of essential drugs and designing interventions that can enhance an efficient flow of drugs from the source to health units. It also suggests policy recommendations that could be adopted by government in ensuring efficient flow of essential drugs to the rural poor.

OVERVIEW OF ESSENTIAL MEDICINE SUPPLY CHAIN IN UGANDA

Rouse (2005) asserts that supply chains consists of network of firms which in themselves are systems of systems which must be understood if meaningful solutions to supply chains inhibitions are to be addressed. Rigby et al (2000) emphasizes the importance of systems thinking for organizational change and improvement, but warns the tendency of underestimating the complexity when translating this reality into a

mental model since systems approaches is not fully capable of capturing the 'soft factors' such as power, trust, interdependency and human factors. Kumaraswany, Ekambaran and Humprey, (2000), contend that the benefit of any business entity in the supply chain directly depends on the performance of others along with their willingness and ability to coordinate.

Currently district health centers are charged with acquiring drugs through the National Medical Stores (NMS) either through the conditional grant or through the district medicines credit line system in which case Ministry of Finance pays later.

FIGURE 1
A typical essential medicine supply chain in Uganda
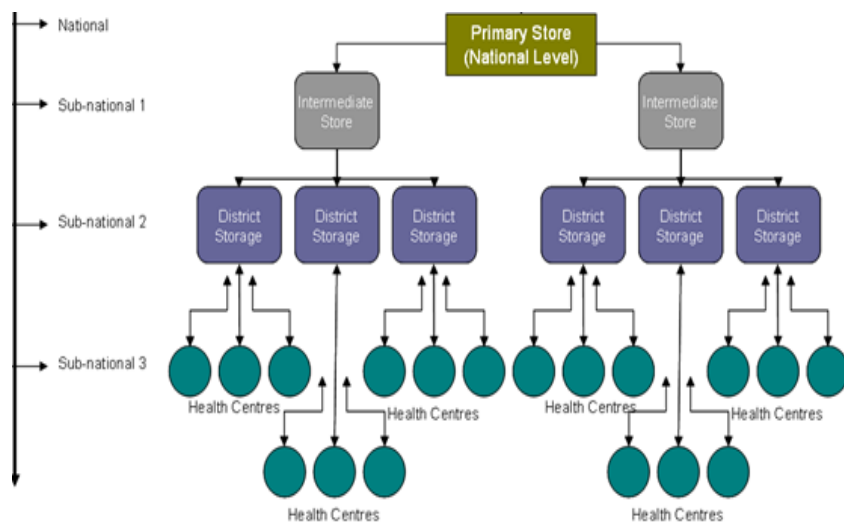
Source: Source: TecNet Consultation (2008)

In the diagram above, in Uganda, sub-district hospitals and health centers' place orders for drug purchases with district health officials, who requisition the drugs from the NMS or the Joint Medical Stores (JMS). In the absence of these drugs from NMS or JMS, the local governments acquire them directly from the private sector after NMS issuance of a certificate of non availability. It is the responsibility of NMS to ensure that the drugs are procured and distributed as per the schedules from the health centres.

To achieve efficiency in such a long supply chain, the procurement, receipt, storage and distribution of essential drugs must be efficiently planned and synchronized if the time wasted by the rural poor in search of drugs is to be used productively to improve their livelihoods.

However, available information indicates that health centers do lack even the most essential drugs (Office of the Prime Minister, 2007). Absence of these drugs reduces the quality of life and more still exacerbate illness. Patients are forced to travel/ walk long distances to other health facilities where they still fail to get drugs, thereby opting for other alternative medicines or at worst just wait at home to die.

ESSENTIAL MEDICINE/ DRUGS SUPPLY CHAIN BOTTLENECKS

According to National Drug Policy and Authority Act 1993 (Ch 206), the national drug policy is aimed at ensuring that essential, safe, efficacious and cost-effective drugs are made available to the entire population of Uganda. Despite this, problems of access to quality essential drugs are persistent. This is complicated by availability of few hard data regarding bottlenecks, especially in the poorest parts of Africa and Asia where more than half the population still lacks access to essential drugs World Health Organization (WHO, 1998).

The Global Fund to fight AIDS, Tuberculosis and malaria (2006) asserts that availability of essential drugs and supplies in the public health sector is a continuing problem due to a combination of problems that include: Lack of an agreed procurement policy; lack of a single, Ministry of Health (MOH) - led procurement strategy; lack of an integrated procurement approach (MOH + donors, NGOs, vertical programmes); lack of credible data and information for procurement planning; poor forecasting; funding structures and arrangements not always able to support procurement and ineffective procurement arrangements with suppliers. Others according to the above author are: poor fund management and use at MOH; non- compliance to basic procurement rules and regulations; weak regulatory infrastructure / underpinnings; poor use of advisory services from cooperating partners. These problems result in regular emergency procurement activities with high costs.

FIGURE 2
Some challenges/bottlenecks in drug supply chain

Plan demand	Select and purchase product	Manage delivery	Distribute in country
❑ Lack of/or Inadequate information and planning systems.	❑ Lack of supply. ❑ Limited procurement capacity. ❑ High product prices.	❑ Delays in shipping and clearance.	❑ Poor infrastructure and systems.

Source: *Global Fund to fight AIDS, Tuberculosis and malaria (2006)*

In the diagram above, Global Fund to fight AIDS, Tuberculosis and malaria (2006) highlight bottlenecks to include among others; poor inadequate information resulting in poor forecasting and planning, bureaucratic procurement guidelines, delays in shipping and poor infrastructure. This is consistent with Fundafunda (2007) who avers that supply chain bottlenecks hinder high-quality interventions to reach the target population of end users.

INTERVENTIONS IN THE SUPPLY CHAIN FOR DRUGS

While existing literature considers several interventions in the supply chain that could enhance the efficient flow of drugs, this research hypothesized and considered three independent variables below to test the efficacy of their interventions; collaborative linkages, Procurement practices, and efficient logistics and distribution of drugs.

Interventions along the supply chain approach ought to be made on the assumption that constraints that face essential drugs supply are multifaceted and addressing them requires a whole set of interlinked actions along entire drugs supply chain, hence the applicability of the systems' theory. It is now evident that piecemeal interventions along some parts of the chain, without addressing the capacities and linkages of all actors results in no or sub-optimal returns to the government programmes.

Anecdotal evidence from Uganda reveals that health centers tend to suffer from collaborative constraints. This has negatively affected health centers' ability to serve patients well due to rampant stock outs while at the same time drugs are reported as expired and therefore unfit. This phenomenon is unwarranted leading to increased wastage, which is not needed in supply chain performance. This observation is corroborated by Annual Poverty Eradication Action Plan (PEAP 2007).

Simatupang and Sridharan (2004), assert that collaborative linkages are essential efforts by supply chain members if they are to benefits from their efforts. According to Ntayi et al., (2008) the enablers of collaborative relationships are information sharing, collaborative planning or decision synchronization and the alignment of incentives. While Fisher (1997) observes that collaboration leads to cohesive market focus, better coordination of sales and demand fulfillment, and minimum risks associated with demand uncertainty.

Companies have continued to seek new ways of improving operational performance through supply chain inter-linkages. This ultimately has translated into building close relationships with key supply chain actors so as to enable participants achieve wastage and enhancement of service delivery leading to flexibility in dealing with supply and demand uncertainties (Bowersox 1990; Lee, Padmanabhan, and Whang, 1997).

Spekman, Salmond and Kamauff (1994) observe that that collaborative partnership is a value adding resource for firms seeking to increase their responsiveness and satisfy their clients. Collaborative relationships enhance information flows thus contributing to the reduced operational expenses thereby helping to mitigate losses and increase supply chain efficiency.

Collaborative linkages consists of three dimensions, namely information sharing, decision harmonization and better coordination, all resulting in order fulfillment and assurance that deliveries are made on time facilitated by information technology facilities (Simatupang and Sridharan, 2004). Fisher (1997) also supports this notion that collaboration leads to cohesive market focus, thus reducing demand uncertainty. Information sharing enables chain members to create better performance (Lee et al. 1997; Whipple et al. 2002). From the foregoing we hypothesize that Information sharing enables chain members to create better performance in terms of reduced stock outs.

H_1a. *The more firms share information, the more efficient the supply chain*

Ramdas and Spekman, (2000) define decision harmonization as the collaborative and centralized planning of activities. Ntayi et al., (2008) argue that collaborative planning of activities reduces the gap between delivery requirements and actual delivery, thereby

improving customers' perceptions of fulfillment performance. Patients achieve utility when they find medicines well matched to their prescriptions at the right time and at the right place. Decision harmonization thus contributes to a reputation of on-time delivery and consistent product availability (Bowersox, Closs, and Theodore 2000).

Hence, we hypothesize that:
H_1b. *The higher the degree of collaboration among supply chain actors, the efficient the supply chain*

Procurement Practices
Procurement practices according to Carr and Smeltzer (1997) relate to the process of obtaining supplies for a firm and author further defines the dimensions of procurement practices as strategic purchasing, purchasing knowledge and skills. He further emphasizes that such strategies lower costs and improve procurement efficiencies. For the purpose of this study, the researchers focused on two aspects of procurement practices: the amount of Professionalism of the purchase managers, and the degree to which purchasing serves strategic (i.e. longer term) goals. It is hoped that proper implementation of these strategies will lead to cost efficiency and effectiveness. Ntayi et al., (2008) argues that the more professional the purchase organization is, the better it will be able to adapt to changing circumstances, and the more effective and efficient the supply chain will be.

Hence purchasing has to be beneficial and efficient if the supply chain is to become efficient. From this discussion, we derive the second hypothesis:

H_2a. *The more professional procurement practices are developed in district health centre, the more efficient the drug supply chain*

H_2b. *The higher, the degree of strategic purchasing, the more efficient the drug supply chain*
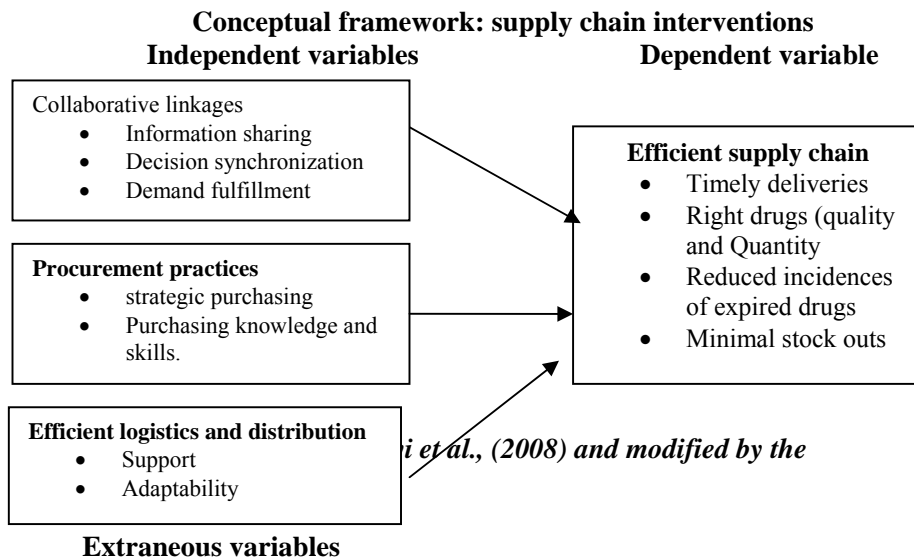
Efficient logistics and distribution
Lee (2004) specifies that to make the supply chain component of distribution and logistics efficient, it has to respond to short-term changes in demand or supply quickly and to handle external disruptions smoothly. Hence an efficient supply chain has to be responsive to changes in the market. Responsiveness requires that accurate information

is available to facilitate decision-making. Information technology can help to collect process and share information. Timely flow of information facilitated by collaborative inter linkages enables supply chain members to be responsive to customer's needs and act very fast (McCarthy and Golicic 2002).

From this discussion, we derive the following two hypotheses:
H_3a. *The more the distribution and logistics system is supported by information technology, the more efficient the supply chain*

H_3b. *The better information technology can be adapted to logistics, the efficient the supply chain*

FIGURE 3
Conceptual framework: supply chain interventions
Independent variables   **Dependent variable**

Collaborative linkages
- Information sharing
- Decision synchronization
- Demand fulfillment

Procurement practices
- strategic purchasing
- Purchasing knowledge and skills.

Efficient logistics and distribution
- Support
- Adaptability

Efficient supply chain
- Timely deliveries
- Right drugs (quality and Quantity
- Reduced incidences of expired drugs
- Minimal stock outs

i et al., (2008) and modified by the

Extraneous variables

The assumption here is that the intervening variables remain constant.

These are government policies, budgets and laws.

METHODOLOGY

A cross sectional survey research design was used adopting quantitative and qualitative approaches given the nature of the hypothesis to be tested. The respondents were District Health Officers, District procurement officers, Stores personnel and Accounts personnel. Data was collected using a self administered questionnaire. The questionnaire had a structured questions and the responses to the questions were anchored on a four point Likert Scale, ranging from 4 – strongly agree; 3

– agree; 2 – disagree; and 1 – strongly agree. A mid – point / neutral response was avoided so that respondents do not mistake it for "I do not know" or "not available". We preferred that our respondents make a definite choice rather than choosing a neutral position in agreement with Raaijmakers Hoof, Hart, Verbogt, and Vollebergh, (2000).

Four districts with high prevalence of malaria were chosen as case studies through survey methodology. These included Kyenjojo, Mubende, Arua and Kumi districts. Convenience-based sampling was adopted. This specific non-probability sampling technique was adopted for the purpose of gathering information from difficult to locate health centers.

Individuals chosen to participate in survey were purposively selected. The local health centers in Uganda are categorized into grades (hospitals IV, III, and II) hence the stratified sampling. This helped the researchers in determining bottlenecks at each health centre. The research team was then directed to individuals familiar with essential drugs requisition, procurement, distribution, storage and payment. Among the technical staff were District Health Officers, Heads of dispensaries/ Pharmacists, Procurement and finance/accounts departments.

A total of 240 questionnaires were issued and 146 were retuned representing a 60.8%. Data from this study provide some insights into important bottlenecks faced by the different health centers in the supply chain.

Data Collection Methods and Procedures

The researchers began with a pilot study of Ministry of Health for acclimatisation and preliminary information gathering. This pilot study was useful to test the practicability of the tools research procedures to be undertaken. At each of the four districts, permission was obtained from the District Health Officer. This enabled the smooth data collection.

The self-administered questionnaires were mainly delivered by hand to each of the respondents (delivery and collection questionnaires). The main advantage with a delivery and collection questionnaire was that it minimised the rate of non-response and it allowed the researchers to make appointments as to when to pick them after completion. However to minimise the rate of non-response follow up calls were made.

Test of validity, reliability and Data Analysis

To ensure validity, of the research instrument were first tested on 20 purposively selected respondents from MOH and National Drug

Authority as pilot to ascertain the consistence and clarity of the questions in the study and irrelevant questions were eliminated. Some of the officers in the Ministry of Health (MOH), includes among others the Chief Programme Officer of Malaria Control and staff of the National Drug Authority.

To confirm the reliability of the results, we computed a Cronbach alpha coefficient. We found that this value was 0.88 well above the internationally recommended value of 0.7. Although Nunnaly (1967) observes that for a research instrument to be reliable, the research instruments with values higher than o.5 is in order. This value therefore confirmed to us the data collected was reliable and could be used to confirm the importance of respondent's opinion on the supply chain bottlenecks and interventions that can be used to address supply chain bottlenecks in Uganda's Local Governments Health Centres.

Data Analysis

The analysis took a three stage analysis; descriptive statistics in form of cross-tabs and values ranking, factor analysis, and a corelational analysis. Descriptive statistics was in form of frequencies, percentages and ranks .This technique was applied to identify specific problems and their location. The components were ranked in order of significance. The factor analysis technique was used to determine the nature, significance and variance of bottlenecks at each level of the chain. A correlation analysis was then used to establish the nature and magnitude of the relationships between individual supply chain inhibitions and drugs procurement. This enabled to reduce on statistical errors and a quick input-output analysis. The qualitative part of this research was used to achieve four main objectives: Collaborate the quantitative data; Build further understanding of supply chain inhibitions identified and determining how these challenges could be addressed. With these objectives in mind, the qualitative research was less structured aimed at comprehending the meaning of the data and enabling reflection and conceptualization. Data collected was categorized and reorganized to gain insight and explanation for the research hypotheses and objectives of this research.

RESULTS AND DISCUSSION

Back ground characteristics of Respondents

The study included both male and female respondents: 75(51%) of the respondents were male compared to 71(49%) who were females.

Pharmacists were 45(31%), management was 61(42%), procurement was 11(8%), stores were 24(16%) and accounts were 5(3%). Respondents were from hospitals 12(8%), health centre IV 19(13%), health centre III 67(50%), health centre II 48(43%).

A cross tabulation was done to determine whether there was a variance in the nature of bottlenecks faced at each level. The highest level of the chain was hospital, followed by health centre IV, then by health centre III and the lowest level was health centre II. The bottlenecks with the highest percentage of occurrence were picked from the cross tabs in each category. The table below gives a summary of the percentage of occurrence and ranking at each level (centre).

TABLE 1
Across tabulation of supply chain bottlenecks across the specific health Centers

Health centre	Major Procurement bottlenecks	Frequency	Percentage %	Rank
Hospital	Lack of Credible consumption information causes	5	20	1
	Poor forecasting and Planning cause delays	3	16	2
	Poor transport and Drug handling	3	15	3
Centre IV	Credible consumption information	8	42	1
	Inadequate procurement skills	7	40	2
	Inadequate storage facilities at health centre is responsible for drug wastage	5	28	3
	Poor forecasting and Planning cause delays	4	25	4
	Poor transport and Drug handling Non Compliance to procurement rules	3	20	5
Centre	Complicated	34	50	1

III	Procurement policy Poor transport and Drug handling	27	35	2
	Extreme Bureaucratic guide lines	15	26	3
Centre II	Inadequate storage facilities	26	57	1
		26	57	1
	Credible consumption information	23	46	3
		23	46	3
	Inadequate procurement skills	19	40	5
	poor fund Management	19	40	5
	Non Compliance to procurement rules	12	28	8
	Poor forecasting and Planning	10	25	9
	Poor transport and Drug handling			
	Lack of drug procurement policy causes delays			

Findings indicated hospitals were mainly affected by collaboration and synchronization challenges (credible and accessible consumption information thus affecting planning and forecasting and poor logistics). Health centre IVs mainly faced inadequate procurement skills and credible consumption information; Health centre IIIs faced complicated Procurement guidelines and poor logistics, while Health centre IIs are challenged by inadequate storage facilities, credible consumption information and inadequate procurement skills.

The commonest challenge exhibited from all the health centres is lack of credible consumption data. These findings add to the existing literature and support World Health Organization (1998) which argues that in the poorest parts of Africa and Asia there are few hard data regarding drug supply chain bottlenecks. The Global Fund to fight AIDS, Tuberculosis and malaria (2006) too, asserts that availability of essential

drugs and supplies in the public health sector is a continuing problem due to a combination of problems.

FACTOR ANALYSIS

Factor analysis was done on all the variables to identify the most important components in each of the variables. Principal component analysis and VARIMAX rotation were used in the analysis. The criteria for the number of extracted components were based on the characteristic value variance percentage and component importance. Principle components were considered to be those with Eigen values equaling or exceeding 1 and factor loadings greater than 0.3. The results of factor analysis are presented in the following tables below.

TABLE 2
Principal Component Factors showing major bottlenecks in Procurement practices

Components	Value	% of Variance	Cumulative %	Cronbac α
1.Proc. Inefficiencies	2.801	31.122	31.122	0.7159
2. Non compliance	1.421	15.793	46.914	
3.Bureaucratic procedures	1.021	11.342	58.256	

As indicated in the table above, three procurement practices components were obtained. They were; Procurement Inefficiencies contributing (31.12%), non compliance (15.8%), and bureaucratic procedures (11.34%). Overall they contributed to 58.26 %. The procurement inefficiencies and non compliance could be better explained by the level of training in procurement whereby some key positions are held by personnel with no procurement skills 100(68.5%), Certificate 19(13%), Diploma 7(4.8) and those who have attended procurement workshops/ seminar 20 (13.7%). This has policy implications as observed by Ntayi et al., (2008) who argue that the more professional the purchase organization is, the better it will be able to adapt to changing circumstances, and the more effective and efficient the supply chain will be. On interviewing some officials at the districts and NMS, it was ascertained that bureaucratic procedures and procurement inefficiencies are due to the bureaucratic procurement regulations and lack of consumption data by the country in general causing a lot of uncertainties

and poor forecasts. This view is in agreement with Global Fund to fight AIDS, Tuberculosis and malaria (2006)

TABLE 3
Principal Component Factors showing major bottleneck in Collaborative linkages

Component	value	% of Variance	Cumulative %	Cronbac α
1. poor decision synchronizing	2.142	35.694	35.694	0.6216
2. weak collaboration	1.106	18.431	54.125	
3. Weak information flow	1.016	16.938	71.063	

In the table 3 above, three bottlenecks to collaborative components were obtained. They were; poor decision synchronizing contributing (35.694%), weak collaboration (18.431%), and weak information flow (16.938%). Overall they contributed to 71.063 %. These findings inhibit collaborative partnership as observed by Spekman et al., (1994) who assert that once there is a lapse in the above components, responsiveness will be affected and hence clients needs may never be satisfied. In order to corroborate this information, interviews were held with some officials of NMS who agreed that without collaboration, timely delivery of medical supplies, prevention of stock outs will continue unabated. The officials thus argued for continued feedback in terms of quality, availability and recalls.

TABLE 4
Principal Component Factors showing major logistics

Component	value	% of Variance	Cumulative %	Cronbac α
1. lack of adaptability to ICT	3.122	62.435	62.435	0.8470

In table 4 above, one logistics components was obtained as lack of adaptability to information communication technology contributing to 62.435%. This scenario could probably be partly explained by low

possession on of ICT skills at the different health centers whereby 114 (78.1%) lack the skills, while the remaining 32(22.9%) possess them. This is further evidenced by low levels of online purchasing where no access represents 131 (89.7%), some access 11(7.5%), and complete access 4 (2.7%). Despite the ICT challenge faced by the numerous health centers, it is worthwhile to note that Information technology can help to collect process and share information. There is considerable support for hypotheses that postulate that the more firms share information, the more responsive. Timely flow of information facilitated by collaborative inter linkages enables supply chain members to be responsive to customer's needs. This is supported by McCarthy and Golicic (2002), who contend that responsiveness requires that accurate information is available to facilitate decision-making.

TABLE 5
Principal Component Factors showing major Interventions

Component	Value	% of Variance	Cumulative %	Cronbac α
1. Increased Decision synchronizing	3.719	41.319	41.319	0.8164
2. Increased information sharing	1.239	13.764	55.083	

In the table 5 above, two intervention components were obtained. They were; increased decision synchronizing contributing (41.319%) and increased information flow (13.764%). Overall they contributed to 55.083 %. These interventions are comparable to those identified in the Discussion Paper 7, (2008) in which it is stated that the interventions along the supply chain are multifaceted and addressing them requires a whole set of interlinked actions along the drugs supply chain. It is now evident that piecemeal interventions along some parts of the chain, without addressing the capacities and linkages of all actors results in no or sub-optimal returns to many of the investments.

The findings are supported by Simatupang and Sridharan (2004), who assert that collaborative linkages through information sharing are essential efforts by supply chain members if they are to benefits from

their efforts. According to Fisher (1997) collaboration leads to cohesive market focus, better coordination of sales and demand fulfillment, and minimum risks associated with demand uncertainty. Ntayi et al., (2008) also echoed the enablers of collaborative relationships as information sharing, and decision synchronization and the alignment of incentives. This is hoped to reduce wastage and enhancement of service delivery leading to flexibility in dealing with supply and demand uncertainties (Bowersox 1990; Lee et al., 1997). But Kumaraswany, Ekambaran and Humprey, (2000), emphasize that the supply chain performance will depend directly on the performance of others along with their willingness and ability to coordinate.

CORRELATION RESULTS

Correlational analysis was done to determine the magnitude and strength of the relationship between collaboration, procurement practices and logistics and bottlenecks the findings are shown below

TABLE 6

Correlations between Bottlenecks and collaboration, procurement practices and logistics

Dependent	independent	r	P-Value
Efficient SC	collaboration	.159	.055*
Efficient SC	Logistics	.346	.000*
Efficient SC	Procurement Practices	0.94	.000*

* Correlation is significant at the 0.05 level (2-tailed).

As indicated in the table above, there was a non- significant positive relationship(r=.159) between supply chain and collaboration at 0.05 level of significance. There was also a positive relationship(r= .346) between supply chain and logistics. A strong positive relationship also existed between supply chain and procurement practices. This implies that the three variables (Collaboration, logistics, procurement practices significantly contribute to an efficient supply chain of essential drugs.

This is supported by Bowersox et al. (2000) who argue that these contribute to a reputation of on-time delivery and consistent

product availability. This answers the assumptions that were hypothesized that the more professional procurement practices are in district health centre, the efficient the drug supply chain; the more the logistics system is supported by information technology, the more efficient the supply chain and the more firms share information, the efficient the supply chain. This is consistent with Forrest (1994) who avers that capturing relevant information and passing it immediately to suppliers to generate replenishment orders has become the watchword of time.

LIMITATIONS OF THE STUDY

Several restrictions were faced in this research. A cross sectional survey was adopted without mentioning its limitations. For instance we were not really able to establish causality. It should be noted, however, that this research considered parameters that dealt with or related with supply chain. There was a fear that research carried out relating to a supply of essential drugs would be leaked to the media since at the time the research was conducted, there were media reports that some medical personnel were being arrested on the claims that they had stolen government drugs. This almost created non-responsiveness. However, confidence building had to be built. The research assistants employed first engaged with the various stakeholders at each district to address the aspect of confidentiality of information acquired from individual stakeholders.

Secondly, this research dealt with management issues that involved a sincere analysis of Uganda's health centres. There is a tendency for some people to cover up their institutional and personal weaknesses. This called for more confidence building and on-site visits were necessary to build trust. The research assistants were highly experienced professionals and knowledgeable in the subject who kept to the ethics of research.

CONCLUSIONS

The findings indicated hospitals being mainly affected by collaboration and synchronization challenges. The district hospitals faced lack of credible data, poor planning and forecasting and poor logistics. Health centre IVs mainly faced by inadequate professionalism (procurement skills and credible data and information), Health centre IIIs characterized by poor procurement practices and poor logistics (lack of transport and bureaucratic procurement guide lines) and Health centre IIs challenged by poor procurement practices, logistics and poor collaborative linkages (storage bottlenecks and lack of credible data and

procurement skills). These findings add to the existing literature of essential drugs supply chains in developing countries which are becoming increasingly complex. Structural bottlenecks at each stage of the supply chain have been systematically identified and documented as a starting point.

A strong positive relationship also exists between supply chain and procurement practices, collaborative linkages and logistics. The findings show that the independent variables are positively related to the dependent variable(r=0. 034), implying that collaborative linkages, procurement practices and logistics influence the efficiency of the supply chain.

POLICY INTERVENTIONS

Government should simplify and popularize the present procurement regulation so as to make it operational and more understandable and convenient than the case today. Government should also strengthen enforcement and commitment to enforcement of the procurement policy and regulation.

Promote participatory engagement, trust, collaboration and partnership of all players in the supply chain of essential drugs. Promote transparency and integrity in the supply chain through creating channels for informational flows (ICT development), checks and balance and a systematic monitoring mechanisms that will facilitate professionalism.

MOH, Districts and regulatory bodies like PPDA and National Drug Authority must consider adequate investment in training the various participants in the essential drug supply chain.
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