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DETERMINANT OF ESSENTIAL MEDICINES AVAILABILITY IN THE PUBLIC HEALTH FACILITIES IN UGANDA

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ABSTRACT

This study aimed at examining the key essential medicines availability determinants in public health facilities in Gulu District, Northern Uganda. This cross-sectional study focused on stock-out rates of the six official tracer medicines listed by the Ministry of Health. Data from the health facilities at health centre II to IV levels were collected using questionnaires and interviews. It was established that quantification, ordering methods, lead-time, stock-card management, stores management, quality assurance, collaborative linkages, personnel, funds and health unit management committee were the key determinants of essential medicines availability (P-value 0.000). Stock-out rate was 85% and this was more prevalent in the lower health center IIs and IIIs under the push supply system than in the higher health center IVs which operate under the pull system. Quinine was the most commonly out-of-stock medicine in lower health units. There is a high stock-out rate in the public health facilities and addressing key determinants could improve stocks-in rates.

Key words: Essential medicines, availability determinants, public health units, Gulu, Uganda

INTRODUCTION

Unavailability and inaccessibility to essential medicines by any one is now considered a violation of fundamental human right[1]. However, essential medicines have remained unavailable in many countries, for example; a study in Malawi found the median period of its non-availability to be 240 days per year[2]. In Ethiopia, essential medicines unavailability is 99.2 days per year [3]. In Uganda, the unavailability stands at 32-50% in the public health units.

Often essential medicines are supplied to the health facilities using the pull or push supply chain system[4,5,6]. Uganda adopted the dual pull and push system policy of drug supply chain management in 2010 with the lower health facilities of health center IIs and IIIs using the push system and the higher facilities of Health center IV and hospital using the pull[4]. This is after initially trying out either system singly in all health facility levels. Despite all these attempts, essential medicines have remained out of stock in the public health units drawing a large public out-cry and untold suffering on the populace. Hence, there was need to examine the key availability determinants or predictors of essential medicines in order to re-focus attention of policy makers and address the vice.

Objectives

The objectives to which this study was anchored were:

1. To examine the key availability determinants of essential medicine in the public health facilities of Gulu District, Northern Uganda

2. To examine the extent to which essential medicines are available in the public health facilities of Gulu District, Northern Uganda

MATERIALS AND METHODS

A three month prospective survey was done between May to July 2014 to find the key determinants of essential medicine availability in the public health facilities of Gulu District. Six tracer medicines drawn from the standard list approved by Ministry of Health of Uganda were used to measure availability of essential medicines as the dependent variable. The quantitative research method was employed in order to collect data from the health workers in the public health facilities. Data were collected from health center IIs, IIIs and IVs in Gulu district from which a random sample of 131 respondents was prospectively studied using a coded and pretested questionnaire. The internal consistency of the data collected was established to have a Cronbach's Alpha value of 0.813. The following variables were appraised to measure availability and key determinants of medicine availability in the public health unit: number of drugs in stock and duration the drug is out of stock; quality of medicines; planning and efficiency of medicines management; drug quantification method; ordering; lead time; stores and storage practices and use of stock cards; health worker availability and training; collaborative linkages and support supervision and health unit management committee. Data was entered and analysed using SPSS version 15.

RESULTS

Out of 131 total respondents, 73(55.7%) were from Health Center (HC) IIs, while HC IIIs had 33(25.2%) and HC IV had 25(19.1%). The majority of respondents were females (61%) while the male gender made up only 39% (*P- value 0.011*). A significant proportion of the respondents had a working experience ranging between 6 to 10 years (*P-value =0.000*) or held administrative position such as being the in-charge of the unit hence were knowledgeable about medicines availability.

Table 1: predictors of medicine availability (Likelihood Ratio Tests)

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	D.f.	Sig.
Intercept	3438.885(a)	.000	0	.
Eff-supply	188.302(b)	.	12	.
Stock out	177.482(b)	.	9	.
Quantification	6253.920(b)	2815.035	9	.000
Ordering	6523.413(b)	3084.528	9	.000
Lead-time	3680.303(b)	241.418	12	.000
Stock-card	3472.320(b)	33.435	9	.000
Stores	11032.997(b)	7594.112	9	.000
Quality	4137.770(b)	698.885	12	.000
Linkages	137048.838(b)	133609.952	9	.000
Personnel	4161.357(b)	722.471	12	.000
Funds	55299.377(b)	51860.491	12	.000
Supervision	3444.265(b)	5.379	6	.496

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.
a This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.
b Unexpected singularities in the Hessian matrix are encountered. This indicates that either some predictor variables should be excluded or some categories should be merged.

Table 2: Comparison of Stock-out of essential medicines between HC IIs & IIIs and HC IVs

Medicines often out of stock	Proportion	Public health facilities		
		HC IVs	HC IIIs & IIs	Total
Coartem	% of Total	.8%	.0%	.8%
coartem, fansidar	% of Total	.0%	.8%	.8%
coartem, fansidar, ors	% of Total	.0%	.8%	.8%
coartem, ors	% of Total	.0%	.8%	.8%
coartem, quinine, ors	% of Total	.0%	.8%	.8%
coartem,fansidar,quinine	% of Total	.0%	.8%	.8%
Fansidar	% of Total	.8%	.8%	1.5%
fansidar, measles vac	% of Total	.0%	.8%	.8%
fansidar, quinine ors	% of Total	.0%	.8%	.8%
fansidar, quinine, mea	% of Total	.0%	.8%	.8%
fansidar,depo-pro	% of Total	.0%	.8%	.8%
fansidar,ors	% of Total	1.5%	1.5%	3.1%
fansidar,quinine	% of Total	.0%	1.5%	1.5%
fansidar,quinine,measl	% of Total	.0%	.8%	.8%
fansidar,quinine,ors	% of Total	.0%	3.1%	3.1%
fansidar,quinine,septr	% of Total	.0%	1.5%	1.5%
measles vac	% of Total	.0%	4.6%	4.6%
None	% of Total	9.2%	5.3%	14.5%
Ors	% of Total	4.6%	4.6%	9.2%
ors, mealse vac, depo	% of Total	.0%	.8%	.8%
ors,measles vac	% of Total	.0%	3.1%	3.1%
Quinine	% of Total	1.5%	13.0%	14.5%
quinine, coartem, ors	% of Total	.0%	.8%	.8%
quinine, depo-pro	% of Total	.0%	.8%	.8%
quinine, measles vac	% of Total	.0%	1.5%	1.5%
quinine, ors, measles	% of Total	.0%	.8%	.8%
quinine, ors, septrin	% of Total	.0%	.8%	.8%
quinine,coartem,fansid	% of Total	.0%	.8%	.8%
quinine,fansidar	% of Total	.8%	.8%	1.5%
quinine,fansidar,	% of Total	.0%	.8%	.8%
quinine,measles vac	% of Total	.0%	3.8%	3.8%
quinine,ors	% of Total	.0%	22.1%	22.1%
Septrin	% of Total	.0%	.8%	.8%
Total	Count (n)	**25**	**106**	**131**
	% within The following Essential Medicines tracer drugs are often out of stock in our unit	**19.1%**	**80.9%**	**100.0%**
	% of Total	**19.1%**	**80.9%**	**100.0%**

Predictors of availability of essential medicines in the public health sector

A multinomial-logistic regression analysis was used to desegregate the key predictors of availability of essential medicines in the public health facilities as indicated in the Table 1. Twelve key variables in relation to the availability of essential medicines in three levels of public facilities (HC IIs, IIIs, and IVs) were examined and amongst the variables only supervision of the health centers does not predict availability of essential medicines (Chi-Square=5.3779; df=6; *P-value >0.05*). In other words even if supervision is good, essential medicines might still not be availability. On the contrary however, the following variables were significant predictors of essential medicine availability in the public health facilities: quantification, ordering methods, lead-time, stock-card management, stores management, quality assurance, linkages with the supplier, personnel, funds and the health unit management committee (*P-value 0.000*). Hence all stakeholders and the government of Uganda should concentrate efforts and build capacity in these key areas to curb the vice of essential medicines unavailability.

Essential Medicines often out of stock in the public Health sector in Gulu District

From Table 2, however, out of the 131 respondents, 106 (80.9%) were from HC IIs and IIIs which uses the push system of essential medicine supply system. Furthermore, the health center IVs in Gulu District which receives essential medicines supplies through the pull system had, 25 (19.1%) respondents included in the study. Nineteen out of the 131 (15%) of respondents reported full time availability hence no stock out of essential medicines in their unit out but, the majority (9.2%) were from the HC IVs and only 5.3% from the HC IIs and IIIs. On comparing HC IIs/IIIs and HC IVs, the most frequently out of stock combination was quinine and oral rehydration salt (ORS) 22.1% vs 0%, followed by quinine and measles vaccine (3.8% vs 0%) respectively. The single most frequently out of stock medicine was quinine (13% vs 1.5%; HC II & IIIs and HC IVs respectively), followed by measles vaccine (4.6% vs 0%) respectively. It can be inferred therefore that the HC IIs and IIIs which uses the push method of supply have more stock out of essential medicines compared with HCIVs that uses the pull system.

DISCUSSION

As a country, Uganda is using the pull system to supply essential medicines to the higher HC IVs and the push system to supply the lower HC IIs and IIIs in the public health system [4,5]. Despite that, availability of essential medicines and the frequent stock out has been a major concern in the world as well as in Uganda [7,8,9]. From our findings most of the health workers had knowledge and long experience in essential medicines at their unit. The role of work experience in ensuring essential medicines quality, rational use, availability was also reported separately by Kar, Pradhan and Mohanta, (2010) [10] and Yang, Liu, Ferrier, Wei and Zhang, (2012) [11]. This implies that most of the respondents recruited in the study gave a fairly reliable information on availability and predictors of medicines in their units

Predictor of Essential Medicines Availability

The key availability predictors of essential medicines according to Tumwine *et al*, (2010) [5] are availability of funds, staffing level and their training, quantification of medicines requirement, lead time, store management, stock card management, ordering, availability of medicines with the supplier and support supervision. This study also found out that the key variables that significantly predict essential medicine availability in the public health facilities to be: quantification, ordering methods, lead-time, stock-card management, stores management, quality assurance, linkages with the supplier, personnel, funds and the health unit management committee. Thence when stakeholders focus on improving them, essential medicine unavailability may be solved. Support supervision however was not a key predictor of availability because it mainly improves stock and store management. Furthermore supervision is often constrained by lack of manpower and lack of effectiveness of the supervision [5]. According to the National Medical Stores (NMS) Pharmacy Division (2013) [12], support supervision mainly improves stock management, storage management, ordering, reporting, prescribing and dispensing practices. Therefore inferentially, support supervision is not a direct predictor of support supervision and efforts to improve support supervision alone may not improve availability.

On availability on medicines, only a few respondents (15%) reported full time availability hence no stock out of essential medicines in their unit. The majority of those without stock out were from the higher health centers (HC IVs) that uses pull system and a smaller proportion of them were from the push system used in the lower health facilities (HC IIs and IIIs). This implies the essential medicine stock out rate is high in Gulu. The Ministry of Health of

Uganda, in 2011 [13] also found only few (15%) had full time availability of essential medicines in the country versus the targeted.

Delays in procurement, poor quantification, late orders from facilities and poor records keeping contributes to high stock outs and wastage of medicines in the public sector in Uganda. Due to different sample sizes, numbers and types of tracer medicines, methodologies and time periods many studies tend to come up with varying proportion of stock out rate. However our finding of high stock out rate is similar to the 2012 Afrobarometer finding of 88% in Tanzania public health facilities (Wales, Julia, Malangalila, Swai and Wild, 2014) [14].

Furthermore, when the HC IIs and IIIs was compared to the HC IVs, the most frequently out of stock medicine combination in the push was quinine and oral rehydration salt (ORS) followed by quinine and measles vaccine. Many authors have also found that the lower units are associated with higher level of stocks out rates compared to the higher units [4,5,15 &16]. Similar to our findings, Luoma, *et al*, in 2010 [17] also found that the push system used in the lower health facilities causes multiple drug stock out and it poses the largest constraint to the availability of antimalarials [18].

The single most frequently out of stock medicine in the push system compared with the pull was quinine followed by measles vaccine respectively. Vaccines require cold chain maintenance with refrigeration, but lower health centers IIs and IIIs in Gulu District have no electricity hence the reason for higher rate of stock out of measles vaccine in the lower facilities. Tumwine *et al*, in 2010 [5] also found that quinine tablets had the highest stock-out rate in the Push system compared to the pull system. Quinine being the most commonly out of stock essential medicine is a serious cause of concern because it is the second line medicine which is used to treat life threatening and complicated malaria. Generally from all the above it can be inferred that the push system is associated with more stock out of essential medicines compared with the pull system.

CONCLUSION

The main predictors of essential medicines availability in the public health facilities in Gulu District comprise of; quantification, ordering, lead time, stores management, stock and bin card use, linkage between facilities and suppliers, personnel and adequacy of funding (P value 0.000). Stock out rates in the public health facilities in Gulu District was 85% and stock out rate is worst in the lower health unit (HC IIs, IIIs) compared to the higher health units (HC IVs).

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