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Original Research Article

Determinants of commodity management practices in public health facilities in devolved health systems: a case of essential medicines in Makueni County, Kenya

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ABSTRACT

Background: Good health commodities management is an essential component of effective and affordable health care services globally. Curative, preventative and rehabilitative care involve the utilization of medicines and medical supplies. The specific focus of the research was on the impact of: healthcare worker training; policy and institutional framework; healthcare budgetary allocations; and, available infrastructure on effective management of essential medicines in publicly owned health facilities in a devolved system.

Methods: The researcher used descriptive cross-sectional research design and a mixed method of qualitative and quantitative data collection techniques in collecting both primary and secondary data. The study adopted a stratified random sampling procedure to choose targeted 50 public health facilities in Makueni County from a population of 162 health facilities. The calculated size of the sample was 96 respondents through stratified sampling technique. The analysed data was presented using tables, charts and narration for qualitative data.

Results: The study findings established that health worker training, health budgetary allocations and available infrastructure had significant and positive effect on management practices of essential medicine in Makueni County, Kenya. However, the effect of policy and institutional framework was found to insignificant in predicting the management practices of essential medicines in Makueni County.

Conclusions: The study concluded that healthcare sector is a dynamic sector that faces different changes on a daily basis. Health worker training; policies and institutional structures; budget allocation; and infrastructure need to be advanced to meet the expectations in the evolving healthcare sector.

Keywords: Health workers training, Policies and institutional framework, Healthcare budgetary allocations, Available infrastructure, Commodity management practices, Essential medicines

INTRODUCTION

Access to essential medicines is one among six pillars of health systems strengthening and plays a key role in ensuring the population remains healthy. Commodity management practices of pharmaceutical products are important in maintaining and providing health services to

the population.¹ Since the Constitution of Kenya was promulgated in 2010, the health sector was devolved and counties have been mandated to adopt the best practices to see to it that quality healthcare services are provided to the public, which start with provision of essential medicines in all the public health facilities. The essential medicines would comprise the category of medicines which satisfy

priority health needs of a population and should remain available in the context of a properly and effectively functioning healthcare system; in amounts that are adequate, dosage that is appropriate and with assured quality for an affordable cost.²

There was a study which was done at the global level on essential medicines and which revealed that the median value for availability of the essential medicines was below what was considered optimal at 61.5 percent, but considerably higher than other non-essential medicines which was found to be 27.3 percent. The study further revealed that the median availability of essential medicines in the public healthcare facilities was at 40 percent but at 78.1 percent in the private sector. As for non-essential medicines the median availability was at 6.6 percent and 57.1 percent for public and private health facilities respectively. An inverse relationship exists between income at the dose, in ensured quality, and with relevant and enough information.³ In many instances, the reasons have been connected to issues inherent in commodities management techniques.⁴ It is consequently critical to continuously analyze and enhance drug distribution systems in order to assure continuous and uninterrupted access to these treatments.⁵ Based on empirical evidence of ineffective commodity management practices, including essential medicines in public healthcare facilities, and frequent challenges with medicine shortages in Kenyan counties, the need for effective commodity management practices remains a priority, particularly among county governments.

Problem statement

Frequent shortages of essential medicines among many public facilities significantly increases the Country's morbidity and mortality rates since these facilities provide services to majority of the population in the low-income bracket and who largely depend on subsidized healthcare services promised in government facilities. Procurement and management of essential medicines in many counties continues to be a challenge for many public facilities in the country. The shortage of the medicines in government health facilities affects uptake of services from government health facilities from where subsidized services are expected.⁶ In Makueni County, private chemists are thriving alongside government facilities because many patients get prescriptions for medicines but cannot find those in the public health facilities and have to buy from private chemists. Previous studies in this area are focused on determinants and factors which affect availability of essential medicines in public facilities.^{6,7} There is scarce knowledge and limited attention on commodity management practices and their determinants. The current study sought to address this research gaps since availability of essential medicine is the outcome of the commodity management practices adopted by the health facilities. The study sought to address the question what are determinants of commodity management practices adopted by health facilities?

Objectives

Objective of current study was to investigate the determinants of commodity management practices of essential medicines in public health facilities in Kenya.

METHODS

For primary data collection, the researcher employed a descriptive cross-sectional study design using a mixed approach of quantitative and qualitative methods. The research was conducted at Makueni County public health institutions. In each of the health institutions, the research population included a pharmacist, procurement officer, nurses, laboratory staff, clinical officers, bio medics, and shop clerks. There were approximately 2323 health care staffs in selected health facilities. The study sample was 96. This research adopted purposive sampling to select one county in Kenya with Makueni County selected. Statistical package for social sciences (SPSS) v 25 was used for analysis. Descriptive statistics (frequencies, means and standard deviation) and inferential statistics were used in summarizing and analysing the data. The researcher analyzed all completed questionnaires. Then, items (variables) were categorized; coded and data fed into the computer for analysis. The study was conducted in period of 3 months; start of May 2022 and completed at the end of July 2022.

Inclusion criteria

Healthcare workers: Respondents working in public health facilities, work experience of 6 or more months; available during the data collection period and those willing to participate in the study.

Exclusion criteria

Healthcare workers: Respondents who were on sick off, study, or other leave and those who did not volunteer to participate in the study were excluded from the study.

RESULTS

The study achieved a response rate of 91%. The socio-demographic characteristics is depicted in (Table 1).

Health worker training

The results show that majority of the respondents agreed on whether their health facilities conducted trainings on essential medicine management (65.5% (57) demand forecasting 60.9% (53), needs assessment 64.4% (56) and supply chain practice 65.5% (57). However, the training did not include every stakeholder as shown by a significant proportion of the respondents who disagreed on whether they were trained on essential medicine management practices. Health worker training is a critical strategy of ensuring effective essential medicine management practice (Table 2).

Table 1: Socio-demographic characteristics.

Parameters	Characteristics	N	%
Type of the health facility	Level 5	10	11.5
	Level 4	15	17.2
	Level 3	27	31.0
	Level 2	35	40.2
Area of specialization	Pharmacist	7	8
	Procurement officer	3	3.4
	Nurse	64	73.6
	Laboratory	4	4.6
	Clinical officer	4	4.6
	Bio medics	2	2.3
	Stores clerks	3	3.4
	Total	87	100
Highest level of education	Postgraduate	13	14.9
	Undergraduate	16	18.4
	Diploma	4	4.6
	Certificate	54	62.1
	Total	87	100
Work experience (years)	Below 2	8	9.2
	3-5	27	31
	6- 10	30	34.5
	Above 10	22	25.3
	Total	87	100

Further the findings show that those who indicated that they were trained on various aspects of essential medicine management practices, the study sought to establish the frequency of training. The results show that 44.8% indicated not to have attended training organized by the county, 20.7% indicated rarely, 19.5% indicated annually while those who indicated semi-annually, quarterly and regularly were 4.6%, 4.6% and 5.7% respectively.

Table 2: Essential medicine management practices trainings.

Parameters	No, % (N)	Yes, % (N)
Have you undergone essential medicine		
Management training	34.5 (30)	65.5 (57)
Have you undergone essential medicine		
Demand forecasting	39.1 (34)	60.9 (53)
Have you undergone essential medicine needs		
Assessment	35.6 (31)	64.4 (56)
Have you undergone essential medicine		
Supply chain practice	34.5 (30)	65.5 (57)

Policies and institutional framework

The study sought to find out whether the county had adequate policies and institutional framework to facilitate essential medicine management practices. The respondents were asked whether County of Makeni have necessary supporting policies to enhance essential management practices adopted by health facilities. The results show that slightly more than half (57%) indicated yes while 22% and 21% indicated not sure and disagreed respectively. The

results also show that slightly more than half (57.4%) of the respondents indicated that county health policy was adequate and very adequate. The results further that 10.3% (9) indicated that the county health policy was moderately adequate while 19.5% (17) and 12.6% (11) indicated inadequate and very inadequate respectively (Table 3).

Healthcare budgetary allocations

The study further sought to determine whether health budgetary allocations affected essential medicine management practices in Makeni County. First, the respondents' views on whether the budget allocation for health facility to cater for essential medicine management activities was adequate was sought.

The results show that majority as shown by mean scores of above 4 agreed that funds availability, amount allocated, timely disbursement and financial planning for health facilities essential medicine management was sufficient (Table 4). On the extent to which health care budget allocation affected commodity management practices of essential medicines, 47.1% indicated large extent while 44.8% indicated very large extent. Similarly, majority of the KIIs further noted that the commodity management practices adopted must be in line with the budgetary allocated. They further noted that health facilities cannot procure expensive equipment yet there no adequate budget.

Available infrastructure

The results indicated that 39.1% (34) and 47.1% (38) indicated to large extent and very large extent respectively. On whether health facility had adopted latest ICT systems in management of essential medicines, the results show that majority agreed as indicated by the mean of 4.18. Furthermore, the majority stated that their institution had up-to-date vital medications delivery systems and that all necessary pharmaceuticals were kept in accordance with manufacturer recommendations. The finding further confirmed that availability of the necessary infrastructure for essential medicine management in majority of the health facilities in Makeni County, Kenya (Table 5).

Commodity management practices of essential medicines

The study assessed the effectiveness of the commodity management practices of essential medicine in Makeni County, Kenya. The study asked the respondents to indicate their views on whether management of essential medicine was effective in their health facilities. The results show that 74% (64) indicated that management of essential medicine in their facilities was effective while 26% (23) indicated ineffective. The results further show that 76% (66) disagreed that they sometime experienced stock outs in their hospitals while 24% agreed. These finding are further an indication of the effectiveness of essential medicine management practices (Table 6).

Table 3: Policies and institutional framework.

Parameters	Very Inadequate % (N)	Inadequate % (N)	Moderate % (N)	Adequate % (N)	Very Adequate % (N)
County health policy	12.6 (11)	19.5 (17)	10.3 (9)	33.3 (29)	24.1 (21)
Guidelines on management of essential medicines	12.6 (11)	12.6 (11)	17.2 (15)	27.6 (24)	29.9 (26)
Standard operating procedures	17.2 (15)	11.5 (10)	9.2 (8)	29.9 (26)	32.2 (28)
Separation of functions	18.4 (16)	5.7 (5)	14.9 (13)	31 (27)	29.9 (26)

Table 4: Healthcare budgetary allocations.

Parameters	Very Insufficient % (N)	Insufficient % (N)	Moderate % (N)	Sufficient % (N)	Very Sufficient % (N)	Mean	SD
Funds availability	8 (7)	9.2 (8)	1.1 (1)	36.8 (32)	44.8 (39)	4.01	1.25
Amount allocated	3.4 (3)	5.7 (5)	2.3 (2)	44.8 (39)	43.7 (38)	4.20	0.99
Timely disbursement	5.7 (5)	5.7 (5)	2.3 (2)	44.8 (39)	41.4 (36)	4.10	1.09
Financing planning	5.7 (5)	4.6 (4)	2.3 (2)	41.4 (36)	46 (40)	4.17	1.08

Table 5: Available infrastructure.

Parameters	Very low extent % (N)	Low extent % (N)	Moderate Extent % (N)	Large Extent % (N)	Very Large Extent % (N)
Our facility includes contemporary warehouse capabilities for vital medicine storage.	1.1 (1)	9.2 (8)	3.4 (3)	39.1 (34)	47.1 (38)
In order to handle important drugs, our health center has implemented cutting-edge ICT technologies.	3.4 (3)	3.4 (3)	4.6 (4)	48.3 (42)	40.2 (35)
The facility features modern distribution systems for key pharmaceuticals.	2.3 (2)	8 (7)	4.6 (4)	36.8 (32)	48.3 (42)
All critical medications are kept in accordance with manufacturer recommendations.	4.6 (4)	4.6 (4)	3.4 (3)	43.7 (48)	43.7 (48)

Table 6: Adequacy of commodity management practices of essential medicines.

Parameters	Very Inadequate % (N)	Inadequate % (N)	Moderate % (N)	Adequate % (N)	Very Adequate % (N)	Mean	SD
Essential medicines procurement practices	5.7 (5)	2.3 (2)	3.4 (3)	39.1 (34)	49.4 (43)	4.24	1.05
Storage practices	3.4 (3)	2.3 (2)	8 (7)	44.8 (39)	41.4 (36)	4.18	0.93
Distribution practices	6.9 (6)	5.7 (5)	2.3 (2)	40.2 (35)	44.8 (39)	4.10	1.15

Inferential statistics

The inferential statistics were conducted to test the establish the significant determinants of commodity management practices of essential medicines in public

health facilities in Kenya. The study used chi-square measures of association and binary logistics regression to tests the effect of health workers training, policy and institutional framework, healthcare budgetary allocations and available infrastructure.

Chi-Square measures of association

The results show that health worker training and essential medicine management practices had a chi square $\chi^2=12.607$, $p=0.001$. These results indicate that there existed a positive and significant association between health worker training and essential medicine management practices. The finding implied that increase in health worker training would result to better management practices of essential medicines in health facilities (Table 7).

Table 7: Chi-Square measures of association.

Variable	N	Chi-Square (χ^2)	df	P value
Health worker training	87	12.607	1	0.001
Policy and institutional framework	87	1.729	1	0.189
Healthcare budgetary allocations	87	46.428	1	0.000
Available infrastructure	87	47.945	1	0.000

Dependent variable: essential medicines management practices

Binary logistics regression analysis

Further, to test whether health worker training, policy and institutional framework, healthcare budgetary allocation and available infrastructure predicted the management practices of essential medicines, this study adopted a binary logistics model. The study sought to determine the likelihood that the above variables could improve management practices of essential medicine in health facilities in Makueni County. The results show that health workers with satisfactory training were 0.59 (Odds Ratio=0.59) more likely to be effective in essential medicines management. The finding implied that training of health workers led to adoption of better management practices of essential medicines in health. The results further show that adoption of effective policy and institutional framework was 0.526 more likely to improve the effectiveness of essential medicines management practices in health facilities than having ineffective policy and institutional framework. The results also show that having sufficient budgetary allocation was 8.684 more likely to improve the management of essential medicines in health facilities as compared to having insufficient budgetary allocations. Finally, the results of univariate binary logistics analysis indicated that health facilities with adequate available infrastructure were 2.336 more likely to adopt effective essential medicine management practices compared to those with inadequate infrastructure (Table 8).

Table 8: Binary logistics regression analysis (n=87).

Variable	B	SE	Odds Ratio	P value	Nagelkerke R Square
Health worker training					
Unsatisfactory (ref)			1		
Satisfactory	0.528	0.263	0.59	0.045	0.283
Policy and institutional framework					
Ineffective (ref)			1		
Effective	0.642	0.492	0.526	0.041	0.599
Healthcare budgetary allocations					
Insufficient (ref)			1		
Sufficient	2.162	1.1	8.684	0.049	0.627
Available infrastructure					
Inadequate (ref)			1		
Adequate	0.129	1.208	2.336	0.015	0.391

Table 9: Multivariate binary logistics regression analysis.

Model summary			
Step 1	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
	49.831 ^a	0.507	0.774

^aEstimation terminated at iteration number 8 because parameter estimates changed by less than .001.

Multivariate binary logistics regression analysis

The study finally conducted a multivariate regression analysis to test the most significant determinants of essential medicines management practices among the health facilities in Makueni County, Kenya (Table 9). The

results of the model summary revealed Nagelkerke R Square =0.774 which implied that all the independent variables (health worker training, policy and institutional framework, healthcare budgetary allocations and available infrastructure) accounted for 77.4% of the variation in essential medicines management practices.

Table 10: Multivariate binary logistics regression analysis (n=87).

Parameters	B	SE	Wald	df	Significance	Exp(B)
Health worker training	1.374	0.819	2.816	1	0.093	3.95
Policy and institutional Framework	3.232	0.909	12.654	1	0.000	25.325
Healthcare budgetary Allocations	2.185	0.822	7.067	1	0.008	8.892
Available infrastructure	5.296	0.887	35.659	1	0.000	8.892
Constant	5.486	0.898	37.292	1	0.000	199.494

The results of multivariate binary logistics analysis show that health workers with satisfactory training were 3.95 (Odds Ratio=3.95) more likely to be effective in essential medicines management. The finding implied that training of health workers led to adoption of better management practices of essential medicines in health. Adoption effective policy and institutional framework was 25.325 more likely to improve the effectiveness of essential medicines management practices in health facilities than having ineffective policy and institutional framework. The study further established that policy and institution a framework had a significant effect on effectiveness of essential medicines management practices. The results also show that having sufficient budgetary allocation was 8.892 more likely to improve the management of essential medicines in health facilities as compared to having insufficient budgetary allocations. The regression results also revealed that budgetary allocation significantly predicted the effectiveness of essential medicine management practices in health facilities in Makeni. Finally results of multivariate binary logistics analysis indicated that health facilities with adequate available infrastructure were 0.728 more likely to adopt effective essential medicine management practices compared to those with inadequate infrastructure.

DISCUSSION

The results revealed that the health care industry in virtually all counties is now beset by massive issues ranging from capacity shortages to a lack of human resources.⁷ The ability of health professionals to handle commodities, as well as the manner and timing of funding, was critical in ensuring that non-program medications were adequately managed.⁸ It was claimed that stock outs were caused by a lack of capacity. According to a research completed in Meru County, commodities trainings were held to improve the management of vital medications.⁹ The efficacy of health worker trainings, such as commodity management training, is therefore critical for achieving high levels of vital medication management in health facilities.¹⁰ According to the results, the institutional architecture; the policy and regulatory environment; government leadership; finance; and openness are the most important determinants for successful procurement of vital reproductive health supplies.¹¹ The counties also confront issues such as capacity shortages, a lack of human resources, a lack of crucial legal and institutional

infrastructure, pervasive corruption, and a strained relationship with the national government.⁹ The results reinforced the importance of technical competence, finance, and institutional infrastructure in poor nations in managing vital pharmaceuticals.¹² One of the key factors of successful acquisition of necessary drugs in Kenyan public health facilities was ICT infrastructure.¹³ The implementation of UHC guaranteed that all individuals could access the promotive, preventative, curative, rehabilitative, and palliative health services they need, of sufficient quality to be effective, while also guaranteeing that the use of these services did not expose the user to financial hardship.¹⁴ The institutional framework involving governing policies, financing, and procurement was identified as a key component in Kenya's legal and institutional framework for successful management practices of vital medications. This finding was supported by other relevant data.¹⁵ The challenges of managing medications in the public and private sectors of Ghana's National Health Insurance Scheme were examined using a qualitative study, and the results of the interviews revealed that delays in receiving NHIS reimbursements and low reimbursement rates for medications, which force providers to charge patients additional fees, were some of the concerns shared by all facilities.¹⁶ The accessibility of medications in two states in northern India's public health systems. Based on the level of infrastructure development, it was determined that the availability of vital medications differed among the districts.¹⁷

CONCLUSION

The study concluded that healthcare sector is a dynamic sector that faces different on a daily basis. Therefore, health worker training is critical since to enables the healthcare professional to share knowledge on new ways of managing essential medicines to enables other professional to adopt better practices. Therefore, the study concludes that continuous trainings is significant in ensuring provision of best quality health care services. The study further concludes that a healthcare system cannot operate effectively devoid of standard rules, policies and proper institutional structures. Therefore, health systems that adopts proper policy and institutional framework provides the necessary basis for effective management practices in health facilities. Standardization of rules, policies and structures ensure that practices adopted for instance in management of essential medicines are

effective. The study also concludes that procuring, storage and distribution of essential medicines in public health facilities heavily rely on the financial resources available. For health facilities to adopt best practices in management of essential medicines the budgetary allocation must be sufficient. Finally, essential medicines and other basic amenities required to deliver quality healthcare require modern infrastructure, hence availability of infrastructure will always determine the management practices of essential medicines in health facilities.

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