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Factors Influencing Management of Pharmaceutical Supplies at Meru Teaching and Referral Hospital, Kenya

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ABSTRACT

Introduction: Availability of medicine is vital especially in the reduction of mortality and morbidity associated with disease burden. However, lack of essential medicines is one of the most serious public health problems worldwide. Government hospitals in Kenya have for a long time experienced frequent shortages of pharmaceutical products. The purpose of this study was to investigate management of pharmaceutical supplies in Meru Teaching and Referral Hospital in Kenya. Specific objectives were to examine how procurement process, budgeting process, legal requirements, and health workers characteristics influence management of pharmaceutical supplies. **Methods:** We used a cross-sectional research design. The study population comprised of 154 management, procurement, pharmacy, and nursing staff of Meru Teaching and Referral Hospital. Data was collected using a structured questionnaire. **Results:** The results showed that budgeting process (r= 0.433, $P < 0.001$), legal requirements (r=0.355, $P < 0.001$), and human resource factors (r=0.460, $P < 0.001$) were statistically significant and influenced the management of pharmaceuticals supplies. The study found that legal requirements contribute significantly to management of pharmaceutical supplies. The study established that, there was no significant relationship between procurement process and management of pharmaceutical supplies ($p>0.05$). **Conclusions:** The study recommends the following to the hospital management board (i) to involve key and competent stakeholders in budgeting in order to enhance management of pharmaceuticals supplies, (ii) to adherence to pharmaceutical regulations including forming a procurement committee, and (iii) train staff on inventory management.

Key Words: *Procurement; Legal requirement; Budgeting; Management; Pharmaceutical supplies, Meru, Kenya*

Introduction

Availability of medicine is vital especially in the reduction of mortality and morbidity associated with disease burden. However, lack of essential medicines is one of the most serious public health problems worldwide. It is estimated that about 30% of the world's population lacks the medicine they need. This situation is even worse in the poorest parts of Africa and Asia where the figure rises to 50% (WHO, 2004). The demand for pharmaceutical products has gone immensely higher. Kaiser (2008) estimated that since 1999 to 2008, the number of prescriptions purchased in the United States increased by 39%. This explains the steady growth of the pharmaceutical industry. Pharmaceuticals have transformed health care in Africa including Kenya over time.

The health system in Kenya is organized and implemented through a network of facilities organized in a pyramidal pattern. The new system under devolution specifies six levels with dispensaries and health clinics at the bottom dubbed level two and National Referral Hospitals at the apex, level six (MOH-Kenya Health Policy, 2014). The Ministry of Health and the County Governments are the major financiers and providers of health care services in Kenya. The mandates of the two separate entities were detailed in the guidelines of devolving health under the new constitution, which was promulgated in 2010 (Kenya Constitution, 2010). In the arrangement, the national government would retain the oversight of referral hospitals, formulating health policies, financing healthcare at both referral and county hospitals and ensuring quality assurance and standards. The county governments on the other hand are responsible for promoting primary care, offering ambulance services, managing all county health facilities and pharmacies as well as carrying out disease surveillance and planning response (KPMG, 2013).

Legal, policy and strategy issues have also preoccupied the management of healthcare machinery in the county for a long time. For instance, efforts at different levels to control diseases have seen the adoption of the Directly Observed Treatment Short-course (DOTS) as a national strategy in Kenya to contain Tuberculosis. The treatment success rate had improved to about 80% by end of 2003 (WHO, 2004).

Pharmaceutical drugs play a critical role in the management of health because whenever one is sick medicine are always prescribed by health practitioner. This makes their purchase to represent one of the largest shares of health expenditure in any country worldwide ranging from 5% to 12% in developed countries to as much as 40% in developing countries (Ombaka, 2009). The availability of drugs is thus crucial in the functioning of any hospital.

Government hospitals in Kenya have for long time experienced frequent shortages of pharmaceutical products. Due to lack of constant supplies, most of the hospitals have been experiencing time-to-time shortages of pharmaceuticals therefore not being in a position to deliver better health care to patients. In most hospitals, patients have been asked to buy pharmaceutical products from private chemists. In an effort to stabilize the supply of pharmaceuticals products, Kenya Medical and Supplies Authority (KEMSA) was set-up by the government in the year 2000 to procure and supply drugs and pharmaceutical supplies to public, mission, and private hospitals in the country (KEMSA ACT, 2013). Having formed KEMSA to be in charge of pharmaceutical products distribution in Kenya, the government has

taken a move towards achieving consistency in supply to government hospitals. However, this has not been achieved since, inconsistency in supply of pharmaceutical products still engulf government hospitals in Kenya. The factors culminating to this state of affairs have not been well identified and this research therefore seeks to establish the factors influencing management of pharmaceutical supplies.

Meru Teaching and Referral Hospital (MTRH) is one of the county referral hospitals in Kenya. It is located in Meru County in the Eastern part of Kenya. The MTRH has faced continuous stock outs of pharmaceutical products despite being the largest hospital in the County. For example, according to the County Health Management Team (CHMT) Health report (2012), malaria remained the leading cause of outpatient morbidity in Meru County. There was inadequate supply of Insecticide Treated Mosquito Nets especially for pregnant mothers and under-five children. The recommended malaria treatment was too expensive for the community and drugs were not available in most health facilities, hence making the treatment inaccessible by the community members. Cases of diabetics and cancer have increased, while ways of early detection and control/cure are limited due to inadequate materials and drugs. In light of this discourse, this study examined the management of pharmaceutical products in Meru Teaching and Referral Hospital which is a government Tier 3 hospital.

The general objective was to examine factors influencing the management of pharmaceutical supplies at Meru Teaching and Referral Hospital, Kenya. The study was guided by the following specific objectives: (i) to examine how procurement process affects the management of pharmaceutical supplies, (ii) to investigate how budgeting process influences management of pharmaceutical supplies, (iii) to assess how legal requirements influences the management pharmaceutical supplies, and (iv) to establish how health workers characteristics affect management of pharmaceutical supplies.

Methods

Research Design: The study adopted a cross-sectional study design. This was a descriptive research and it was conducted in Meru Teaching and Referral Hospital in Meru County, which is a Level Five government hospital in rural Kenya.

Sampling Procedures and Sample Size: The study population comprised of management, procurement, pharmacy, and nursing staff from the Meru Teaching and Referral Hospital. The study sample was 154 respondents. To select the appropriate sample size, we applied a proportionate stratified random sampling method. The sample respondents were then identified using random tables, where all staff members were numbered randomly selected. The respondents were distributed as follows: 7 management, 6 pharmacy personnel, 2 procurement staff, and 136 nurses. Data was collected using a structured questionnaire.

Data Analysis: Quantitative data was analyzed using both descriptive and inferential statistics in Statistical Package for Social Sciences (SPSS) version 23. The research questions in this study were tested using the Pearson's Rho (r) and its corresponding p-value. The psychometric likert based questions were analyzed using chi-square. The study used the following functional

relationship to arrive at the model that was used in this study**:**

$Y=f(X_1, X_2, X_3, X_4) + \varepsilon$

Where Y stands for management of pharmaceuticals supplies

X_1 = Procurement Process; X_2 = Health workers characteristics; X_3 = Budgeting Process; X_4 = Legal Requirements; ε = Stochastic disturbance error term.

Ethical Considerations: The researcher obtained ethical approval from the Kenya Methodist University Scientific, Ethics, and Research Committee and from the National Commission of Science and Technology and Innovation. In addition, approval was obtained from the County Director of Health in Meru County. The researcher sought informed consent from the respondents and participation in this study was on voluntary basis. The names of the respondents were kept anonymous for protection of their identities.

Results

Respondents' Socio-demographic Characteristics

The socio-demographic characteristics of respondents are presented in **Table 1**.

Table 1: Socio-demographic Characteristics of Respondents

Socio-demographic Characteristics	Frequency	Percent
Gender		
Male	37	24.0
Female	117	76.0
Age Bracket		
<25 years	14	9.1
26-34 years	89	57.8
35-44 years	41	26.6
45-54 years	10	6.5
Education Level		
Certificate	12	7.8
Diploma	128	83.1
Bachelor degree	11	7.1
Master degree	3	1.9
Years of Experience		
<3 years	16	10.4
4-9 years	83	53.9
10-15 years	44	28.6
16-19 years	10	6.5
20-24 years	1	0.6

The socio-demographic characteristics included age, gender, level of education, and work experience. Majority of the respondents 117(76%) were female and 37(24%) were male. This showed that majority of the personnel were female, hence there was gender disparity in the distribution of employees during the study. This could be attributed by the fact that majority of the employees in nursing profession are female who represented a larger portion in the survey. Majority of the respondents 89(57.8%) were aged between 26 and 34 years. This was evident during the survey where majority of the employees in nursing profession were young people. In addition, 10(6.5%) of the respondents were aged above 45 years of whom majority were top management employees of the facility. Most notably, 103 (66.9%) of the respondents were young people below the age of 35 years.

The level of formal education achieved was considered an important factor in broadening employees' capacity to be more effective, self-reliant, resourceful and capable of solving problems they encounter in their service delivery. The results reveal that the respondents had a relatively high level of qualification with 128(83.1%), 11(7.1%) and 3(1.9%) holding diploma, bachelors and masters' degrees respectively. This implies that the respondents have the relevant knowledge in their areas of operation within the medical facility. It is expected that attained education qualification is critical in management of pharmaceutical supplies in the health facility. The level of education has been cited as a critical success factor in service delivery, (Yusuf, 1995).

The findings show that majority of the respondents 83(53.9%) had served in service delivery for 4 to 9 years. Those with less than four years' experience were 16(10.4%). This indicated that majority of the respondents 138(89.6%) had over four years' experience in their professional career which implies that they had the pre-requite knowledge to effectively respond to the study questions. High level of experience normally goes hand in hand with efficient and effective management of pharmaceutical supplies.

Management of Pharmaceuticals Supplies

Management of pharmaceutical product refers to a process of dealing and controlling pharmaceutical supplies in a medical facility. The respondents were asked to indicate the extent to which process of dealing and controlling pharmaceutical supplies is adhered to at Meru Teaching and Referral Hospital **(Table 2).**

The findings indicate that less than half 61(39.6%) of the respondents concurred that record keeping and control procedures are above board as a major aspect of management of pharmaceutical supplies (χ^2=3.545, P= 0.062). Majority of the respondents 86(55.8%) agreed to a small extent that pharmaceutical supplies management are done in a manner that ensures transparency and a corruption-free process (χ^2=341.701, P < .001) and 89(57.8%) agreed to a small extent that pharmaceutical products such as medical supplies and drugs are often stolen (χ^2=354.792, P < .001). The findings suggest that in order to have effective management of pharmaceutical supplies, an organization needs to take in to consideration availability of enough medical supplies, efficient inventory control systems on pharmaceutical products, adherence to consistency of supply of pharmaceutical products and observe regularity of stock-outs and record keeping and control procedures.

Table 2: Respondents Perception on Management of Pharmaceutical Supplies

Management of Pharmaceutical Supplies	Small Extent	Moderate	Great Extent	Chi-Square	P=Value
	N (%)	N (%)	N (%)		
a) Availability of medical supplies is enough	59(38.3)	43(27.9)	52(33.8)	2.506	0.286
b) Consistency of supply of pharmaceutical products is adhered to	50(32.5)	50(32.5)	54(35.1)	0.208	0.901
c) Pharmaceutical products such as medical supplies and drugs are often stolen	89(57.8)	51(33.1)	14(9.1)	54.792	0.001
d) Pharmaceutical supplies management are done in a manner that ensures transparency and a corruption-free process	86(55.8)	47(30.5)	21(13.6)	41.701	0.001
e) There are efficient inventory control systems on Pharmaceutical products	42(27.3)	55(35.7)	57(37.0)	2.584	0.275
f) Record keeping and control procedures are above board	38(24.7)	55(35.7)	61(39.6)	3.545	0.062

Procurement Processes and Management of Pharmaceuticals Supplies

The respondents were asked to indicate the extent to which procurement processes influence management of pharmaceuticals supplies. The results are shown in **Table 3.**

Majority of the respondents agreed to a great extent that the procurement procedures are always transparent 99(64.3%) (χ^2=71.545, $P < .001$), that there is always timely and accurate information on procurement processes 86(55.9%) (χ^2=52.299; $P < .001$), and that there are often bureaucracies in the supply chain 93(60.4%), (χ^2=65.545, $P < .001$). However, the respondents disagreed that the procurement procedures are always clear 43(27.9%) (χ^2=3.208, $P > 0.201$).

Table 3: Respondents Perception on Procurement Processes

Procurement Process	Small Extent	Moderate	Great Extent	Chi-square	P=Value
	N (%)	N (%)	N (%)		
a) The procurement procedures are always clear	43(27.9)	50(32.5)	61(39.6)	3.208	0.201
b) The distribution and appropriation of pharmaceuticals products is standardized	16(10.4)	50(32.5)	88(57.1)	50.545	0.001
c) The procurement procedures are always transparent	16(10.4)	39(25.3)	99(64.3)	71.545	0.001
d) There is always timely and accurate information on procurement processes	13(8.4)	55(35.7)	86(55.6)	52.299	0.001
e) There are often bureaucracies in the supply chain	11(7.1)	50(32.5)	93(60.4)	65.545	0.001
f) There are often well outlined monitoring systems	15 (9.7))	69(44.8)	70(45.5)	38.584	0.001

The influence of Budgeting Process on Management of Pharmaceuticals Supplies

The study further sought to establish the influence of the budgeting process on management of pharmaceuticals supplies **(Table 4).**

Table 4: Respondents Perceptions on Budgeting Process

Budgeting	Small Extent	Moderate	Great Extent	Chi-Square	P-value
	N(%)	N %)	N(%)		
a) Source of funding	14(9.1)	35(22.7)	105(68.2)	88.455	0.001
b) Location of facility	35(22.7)	53(34.4)	66(42.9)	9.442	0.009
c) Availability of funding	9(5.8)	42(27.3)	103(66.9)	88.610	0.001
d) Budgetary policies in place	8(5.2)	53(34.4)	93(60.4)	70.455	0.001
e) Cost of pharmaceutical Product	8(5.2)	47(30.5)	99(64.3)	81.208	0.001
f) Demand of pharmaceutical supplies	11(7.1)	57(37.0)	86(55.8)	55.727	0.001
g) Availability of pharmaceutical products	24(15.6)	56(36.4)	74(48.1)	24.987	0.001
h) Type of suppliers	24(15.6)	61(39.6)	69(44.8)	22.455	0.001
i) Involvement of key stakeholders in budgeting	30(19.5)	52(33.8)	72(46.8)	17.195	0.001

The study found that majority of the respondents concurred to great extent that the following budgeting processes influenced management of pharmaceutical supplies: availability of funding 103(66.4%) (χ^2=88.610, $P < .001$), budgetary polices in place 93(60.4%) (χ^2=70.455, $P < .001$), cost of pharmaceutical product (64.3%) (χ^2=81.208, $P < .001$), as well as source of funding 105(68.2%) (χ^2=88.455, $P < .001$).

The influence of Legal Requirements on Management of Pharmaceuticals Supplies

The respondents had been asked to indicate the extent to which legal requirements influence management of pharmaceutical supplies. The results are shown in **Table 5.** Study results revealed that majority of the respondents agreed to a great extent that, code of conduct and ethical standards 89(57.8), (χ^2=50.818, $P < .001$), government procurement policies 98(63.6%) (χ^2=77.701, P value .001), as well as tendering and vetting procedures 104(67.64%) (χ^2=89.818, $P < .001$), were the legal requirements that bear significant effect on management of pharmaceutical supplies. On the other hand, majority of the respondents disagreed that formation of the procurement committee 92(59.7%) and availability of a monitoring and evaluation policy of pharmaceutical supplies 95(61.7%) influence the management of pharmaceutical supplies.

Table 5: Respondents perception Rate on Legal Requirements

Legal issues	Small Extent	Moderate	Great Extent	Chi-Square	P-Value
	N(%)	N(%)	N(%)		
a) Adherence to pharmaceutical regulations	40(26.0)	50(32.5)	64(41.6)	5.662	0.059
b) Government procurement policies and laws	9(5.8)	47(30.5)	98(63.6)	77.701	0.001
c) Competency of the procurement committee	28(18.2)	51(33.1)	75(48.7)	21.519	0.001
d) Formation of the procurement committee	25(16.2)	67(43.5)	62(40.3)	20.506	0.001
e) Tendering and vetting procedures.	10(6.5)	40(26.0)	104(67.5)	89.818	0.001
f) Controls of distribution chain.	15(9.7)	66(42.9)	73(47.4)	39.052	0.001
g) Imposition of fees	37(24.0)	64(41.6)	536(34.4)	7.182	0.028
h) Monitoring and evaluation policy of Pharm. Supplies	28(18.2)	67(43.5)	59(38.3)	15.532	0.001
i) Code of conduct and ethical standards	17(11.0)	48(3102)	89(57.8)	50.818	0.001
j) Complain Handling and Resolutions.	28(18.2)	59(38.3)	67(43.5)	16.532	0.001

The influence of Human Resource on Management of Pharmaceuticals Supplies

The respondents were requested to state the extent to which human resource related issues influence the management of pharmaceutical supplies. The results are shown in **Table 6.**

Majority of the respondents agreed to a great extent that workload among the procurement staff 96(62.3) (χ^2=68.273, P < .001), performance appraisal and staff motivation 95(61.7%) (χ^2=60.870, P <.001), were the most significant human resources aspects that influenced the management of pharmaceutical supplies. Nearly half of the respondents agreed to a great extent that said that reporting procedures 75(48.7%) (χ^2=50.273, P < .001) was significant and that it influenced the management of pharmaceutical supplies. Nearly half of the respondents disagreed to a small extent that staff turn-over 48(31.2) (χ^2=1.299, P >.552) influenced the management of pharmaceutical supplies.

Table 6: Respondents perception Rate on Human Resource Related Issues

Human Resource Related Issues	Small Extent	Moderate	Great Extent	Chi-Square	P-Value
	N(%)	N(%)	N(%)		
a) Competence of the procurement staff and committee	33(21.4)	59(38.3)	62(40.3)	9.909	0.007
b) Training and capacity building on supply chain management	24(15.6)	53(34.4)	77(50.0)	27.442	0.001
c) Systematic approach to Human Resource for Supply Chain Management	21(13.6)	72(46.8)	61(39.6)	28.065	0.001
d) Staff turn-over and mobility.	48(31.2)	48(31.2)	58(37.7)	1.299	0.522
e) Workload among the procurement staff.	13(8.4)	45(29.2)	96(62.3)	68.273	0.001
f) Reporting procedures.	10(6.5)	69(44.8)	75(48.7)	50.273	0.001
g) Information management in supply chain.	23(14.9)	56(36.4)	75(48.7)	26.974	0.001
h) Influence of ICT in the supply chain management	28(18.2)	66(42.9)	60(39.0)	16.260	0.001
i) Performance Appraisal and staff motivation.	18(11.7)	41(26.6)	95(61.7)	60.870	0.001
j) Government Regulations and Policies	10(6.5)	50(32.5)	94(61.0)	68.779	0.001

Inferential Statistical Analysis

The main objective of the study was to examine factors influencing the management of pharmaceutical supplies at Meru Teaching and Referral Hospital, Kenya. In order to assess the relationships among the independent variables and dependent variable, a bivariate analysis was conducted. This analysis set to determine whether each of the independent variables in this study that is, procurement processes (X_1), budgeting processes (X_2), health workers characteristics (X_3), and legal requirements (X_4) influences on the management of pharmaceutical supplies (Y). The results for each variable in this study are given by the Pearson's Rho (r) and its corresponding *p-value* (**Table 7**).

Table 7: Bivariate Linear Correlation

		Management of Pharmaceutical Supplies *(n=154)*
Management of Pharmaceutical Supplies	Pearson Correlation Sig. (2-tailed)	1
Procurement Processes	Pearson Correlation Sig. (2-tailed)	0.114 0.157
Budgeting Processes	Pearson Correlation Sig. (2-tailed)	0.433** 0.001
Legal Requirements	Pearson Correlation Sig. (2-tailed)	0.355** 0.001
Human Resource	Pearson Correlation Sig. (2-tailed)	0.460** 0.001

**. Correlation is significant at the 0.01 level (2-tailed)

The results of the Pearson's product moment correlation analysis as presented in Table 7 show varied degrees of interrelationships. The results suggested that budgeting, legal and human resource factors influence the management of pharmaceuticals supplies. Budgeting processes (X_2) was statistically significantly correlated with management of pharmaceuticals supplies ($r= 0.433^{**}$, $P < 0.001$). This implies that any improvement in budgeting process translates to an improvement in management of pharmaceuticals supplies in Meru Referral and Teaching Hospital. The null hypothesis that there is no influence of budgetary factors on management of pharmaceuticals supplies was rejected. Results showed that there was statistically significant relationship between the budget processes and management of pharmaceuticals supplies.

Similarly, legal requirements factors (X_3) are statistically significantly correlated with management of pharmaceuticals supplies ($r=0.355^{**}$, $P < 0.001$). This implies that adherence to legal requirements enhances management of pharmaceuticals supplies. The null hypothesis that there is no significant influence of legal process on management of pharmaceuticals supplies in Teaching and Referral Hospital was rejected. The study found that adherence to legal requirements positively influences the management of pharmaceutical supplies. Further analysis revealed a correlation between human resource factors (X_4) and management of pharmaceuticals supplies ($r=0.460^{**}$, $P <0.001$). This suggests that there was statistically significant relationship between the human resource factor and management of pharmaceuticals supplies in Meru Teaching and Referral Hospital. Hence, the null hypothesis that there is no significant influence of human resource requirement on management of pharmaceuticals supplies in Meru Teaching and Referral Hospital was rejected.

However, there was no significant statistical evidence on the relationship between procurement processes (X_1) and management of pharmaceuticals supplies. Hence, the null hypothesis that there is no significant influence of procurement process on management of pharmaceuticals supplies in Meru Teaching and Referral Hospital was not rejected.

Discussion

The study findings on management of pharmaceutical supplies are similar to findings by Ferinho, (2004), who found that large quantities of pharmaceutical products such as medical supplies and drugs are often stolen from central stores and facilities. This was due to under-financed and poorly managed systems, poor record keeping and ineffective monitoring and accounting mechanisms. Therefore, any pharmaceutical supplies management must be done in a manner that ensures transparency and a corruption-free process. Rafael and Emesto (2002) highlighted that management of pharmaceutical products also involves distribution of medical supplies to the healthcare facilities.

The results are in line with a study by Muhia, et al., (2017) who found that bureaucracy brought about a potential for manipulation of contract awards and lack of fair competition, all of which created the perception in the population at large, that public expenditure is slow, ineffective, expensive and often corrupt, hence lack of transparent in the process. They also noted that pharmacists involved in hospital procurement of medicines, whether directly or indirectly, must be knowledgeable about medicines as well as the interacting issues and the many stakeholders who can potentially affect the process or who may have legal responsibility. This implies that there is need for proper management of pharmaceutical supplies in Meru Teaching and Referral Hospital.

Procurement is a significant aspect of efficient drug management and supply and is important at all levels of health care institutions. An effective procurement process ensures the availability of the right drugs in the right quantities, available at the right time, for the right patients and at reasonable prices and at recognizable standards of quality (WHO, 2007). The findings in this study differ from a study by Muhia, et al., (2017) who found that procurement process affects the consistency levels of obtaining pharmaceutical supplies in Narok county referral hospital. They also noted that the major challenge faced in the procurement of drugs in NCRH was inadequate funding and delay in paying the suppliers owing to bureaucracy required to acquire money from the county offices. Ombaka (2009) highlighted four main operational principles of drugs, quantification, registration, selection and efficient management. He observed that procurement encompasses a complex range of operational business, information technology, safety, legal requirements and risk management. Lysons and Gillinham (2012) states that materials management is concerned with the flow of materials to and from production or manufacturing and has been defined as: the planning organization and control of all aspects of inventory embracing procurement warehousing work in progress and distribution of finished goods.

The findings on budgeting process concur with a study by Gottret and Schieber (2006) who argued that public financing of pharmaceuticals can be strengthened through better quantification of medicine needs, per capita pharmaceutical budgets, and demonstration of medicines' effect on health, recognition of political benefits, improved management,

expenditure trend analysis, and comparative expenditure analysis. This study was in harmony with findings by Muhia, et al., (2017) who noted that there is need for equitable funding to the various county governments who also need to pay on time so as not to delay tenders. They further noted that checks and measures including thorough auditing needs to be provided to avoid misappropriation of funds. Potential sources of funds for pharmaceutical procurement include government financing, user fees, health insurance, community co-financing and donor financing (WHO, 2004). These options however, may vary in terms of their efficiency, equity and sustainability. The most important considerations for procurement are the total funds available, adequate access to foreign exchange and the regularity with which funds are available. The legal requirement findings in this study are similar to findings that legal requirements lengthened the procurement process negatively affecting the consistency levels of obtaining pharmaceutical supplies (WHO, 2012).

Conclusion

The study established that, there was no significant relationship between procurement process and management of pharmaceutical supplies. This implies that adherence to procurement process does not enhance management of pharmaceutical supplies in Meru Teaching and Referral Hospital. The study found that budgetary factors had significant influence on management of pharmaceuticals supplies. This implies that budgetary process contributes significantly to availability of pharmaceutical at Meru Teaching and Referral Hospital.

The study revealed that there is statistically significant influence of human resource factors on management of pharmaceuticals supplies. Human resource factor contribute significantly towards availability of pharmaceuticals supplies in Meru Teaching and Referral Hospital. The study found that legal requirements contribute significantly to availability of pharmaceutical supplies. Adhere to tendering and vetting procedures, government procurement policies and laws were considered most important in management of pharmaceutical supplies.

The study recommends that the hospital management board (i) to involve key and competence stakeholders in budgeting, assessing disease burden and evaluating the type of suppliers in order to enhance management of pharmaceuticals supplies, (ii) to adherence to pharmaceutical regulations including forming a procurement committee and (iii) train staff on inventory management.

Competing Interests

The authors declare that they have no competing interests.

Authors Contributions

Julius Kaluai conceptualized the study. All authors contributed to study design and data analysis. All the authors reviewed and approved the final version of the publication manuscript.

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REFERENCES

Cohen, J. (2008). *Using technology to fight corruption in pharmaceutical purchasing*: Lessons from the Chilean experience. Retrieved on 10th October 2017: http//www.info.worldbank.org/etools/docs/library

Ferrinho, P., Omar, M., De Jesus M. and Van, L. (2004). Pilfering for survival: how health workers use access to drugs as a coping strategy. *Human Resources for* health, Vol 2 (4)

Gottret, Pablo and Schieber, George. (2006). Health Financing Revisited : A Practitioner's Guide. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/7094 License

Kaiser Family Foundation (2008). *Calculations using data from IMS Health,* http://www.imshealth.com (Press Room, US Top-Line Industry Data), and Census Bureau, http://www.census.gov

KEMSA Taskforce (2008). Report of the KEMSA Taskforce. http://www.usaid.gov/ke

Kenneth Lysons and Brian Farrington. (2012) Purchasing & Supply Chain Management, 8th Edition. Pearson Education Limited.

Kenya Medical Supplies Authority (2013). KeMSA ACT, 2013http://www.kemsa.co.ke

KPMG. (2013). Devolution of Healthcare Services in Kenya: Lessons learnt from other countries. KPMG Africa, www.kpmgafrica.com

Ministry of Health. (2014). Kenya Health Policy, 2014-2030. Nairobi, Kenya.

Muhia J, Waithera L, and Songole R. (2017). Factors Affecting the Procurement of Pharmaceutical Drugs: A Case Study of Narok County Referral Hospital, Kenya. Med Clin Rev. Vol. 3 No. 4: 20.

National Council for Law Reporting. (2018). The Government of Kenya Constitution, 2010. http://kenyalaw.org/

Ombaka. E. (2009). *Management of medicines procurement in developing countries*. http://www.health-care-procurement.com/content/pdf/1689-2231-6-8.pdf

Oyamo E.A. and Mburu D.K. (2014). Effects of procurement processes on the distribution of pharmaceutical drugs in public hospitals in Kenya: A case of Mission for Essential Drugs and Supplies (MEDS). Prime J Social Science 721-732.

Rafael, D. and Ernesto, S. (2002). *Political and economic incentives during an anti-corruption crackdown.* Empirical themes in the politics and political economy of corruption.

Van Scotter C, Wang X., and Giaakis. G. (2000). *The inclusive approach: Creating a place where people want to work. Facility Management.* Journal of the international Facility Management Association. Vol 12 (1) pp 26-30

World Health Organization. (2004). *Equitable access to essential medicines: a framework for collective action; In who policy perspectives on medicines.*

World Health Organization. (2006). *Uganda National Observatory and Country profile.* WHO AFRO, Brazaville

World Health Organization. (2007). *Development effectiveness achieving development outcomes:* The millennium Challenge Report 2007.

World Health Organization. (2008). Practical guidelines on pharmaceutical procurements for countries with small procurement agencies. *http: www.who.int/bookorders/angels.detart.jsp=10*

World Health Organization. (2012). Managing Procurement. Management Sciences for Health, chapter 18. Retrieved from World Health

Yusuf, A. (1995), Critical success factors for small business: Perceptions of South Pacific entrepreneurs. *Journal of Small Business Management*, *32(3),* 68-73.