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Influence of procurement process on availability of medicines in public health facilities in Bungoma county, Kenya

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Abstract
Medicines are important in health care services delivery. Frequent stock outs of medicines have been a major challenge in public health facilities in low- and middle-income countries like Kenya. This research aimed at determining the influence of procurement process on availability of medicines in Bungoma County, Kenya. Descriptive cross sectional research design with mixed approach methods was applied. The target population included the county pharmacist, sub county pharmacists, medical superintendents, procurement officers, health administrative officers, the county procurement officer and the chief officer for health and sanitation. All the nine sub county hospitals were sampled and a census method used to sample four staff from each of the sub county that is the sub county pharmacists, medical superintendents, procurement officers and health administrative officers in all the nine sub counties of the county hence 36 respondents. This was achieved through G- power Priori power analysis. Additionally, the county procurement officer, the chief officer for health and sanitation and the county pharmacist were purposively sampled, making the total number of respondents to be 39. Semi structured questionnaires: in-depth interview guides and a checklist were the study data collection tools. Qualitative and quantitative data analysis methods were applied. Analysis of quantitative data was done using descriptive statistics while Chi square was used as appropriate. Data was presented in tables. Qualitative data was categorized into specific themes and reported in narrative form together with quantitative presentation. 81.2% of respondents reiterated that procurement processes were followed as compared to 18.8% who indicated that in some cases, laid down procurement procedures were not followed. Health administrative officers were a majority of those who reported adherence to these procedures while all the pharmacists and procurement officers said they had full adherence. An analysis of the different carders of health workers involved in this study revealed that there was no significant relationship between adherence to procurement procedures and the cadre of the health professional involved (χ^2 =2.230: p= 0.534). On the same note, it was shown that there was a significant relationship between adherence to procurement procedures and the work experience of the health professional involved (χ^2= 11.24: p= 0.003). A significant relationship between adherence to procurement procedures and the incidences of discrepancies between received quantities and quantities on the delivery notes (χ2= 6.28: P= 0.025) was established. 87.5% of all respondents noted that their respective health facilities used direct tendering as a method of procuring medicines. Open tendering was said to be in use by only 3.1% of respondents while request for quotation was by 9.4%. Adherence to procurement procedures seemed to have a greater influence on the availability of medicines (OR=4.194, P=0.002). Those involved in the procurement process were health facilities in charges-nurses or clinical officers for rural health facilities or pharmaceutical personnel for hospitals who generate orders. The county pharmacist, county procurement officer, chief officer health & sanitation are involved in sending orders to suppliers and subsequently making payments. Inadequate funding for medicines procurement, inadequate procurement personnel and long procurement process were cited as the main challenges relating to procurement of medicines. The government needs to streamline the procurement process for medicines in order to ensure availability of medicines.

Keywords: procurement, medicines, procurement process, procurement methods

Introduction
Regular shortages of medicines have been reported in many countries particularly in some parts of Europe, Australia, Africa, China, Brazil, Fiji and Israel. This trend continues to increase over time in these regions[1-5]. The situation is even worse in poor countries especially in Asia and Africa where up to 50 % of the inhabitants have no access to essential medicines [6, 7].

The World Health Organization introduced the concept of Essential Medicines Lists (EMLs) in 1977 with a view of standardizing the availability of medicines at each level of health services delivery. Each country develops their own EMLs from the WHO list and tailor makes it to their specific needs [6]. It is noted that EMLs have influenced the provision of medicines and have resulted in higher availability of essential medicines as compared to non-essential medicines particularly in the public sector and in low and lower middle- income countries. However, availability of essential medicines, especially in the public sector does not ensure an equitable access [8].

In Kenya, the medicines situation is not different from what has been reported in varied literature. A study conducted in Kenya's health facilities by the then Ministry of Medical Services and Ministry of Public Health & Sanitation in 2009 established that public health facilities experienced stock-outs of essential medicines for about 46 days yearly on average, ranging from about 30 to even 90 consecutive days [9]. Another study conducted by WHO in 2010 in 39 low and

low to middle income countries including Kenya found out that there was a huge variation on average availability of essential medicines - about 20% in the public health sector and 56% in private health sector [10].

Sourcing and supply of medicines and other health products and technologies to public health facilities was mainly a prerogative of the Kenya Medical Supplies Authority (KEMSA) prior to the devolution of health services in Kenya. This has ever since changed with the adoption of the current constitution in the year 2010, where, most aspects of the public health sector were devolved and thus the supply of pharmaceuticals is a responsibility of the county governments. The central government was left with the roles of policy making, training and regulation of the health sector [11].

Procurement of medicines is an important component of the medicine's management cycle. Other components include selection, distribution, storage and use all of which have to be sustained by financial and management support. Most developing countries are challenged in sustaining public supply chain systems. This can be explained by the fact that there exist breakdowns at multiple points in their procurement process. There is an evidence of total neglect, inadequacy of leadership, poor co-ordination, lack of competition and transparency, corruption and human resource incompetence in public procurement systems. The ultimate inflexibility and bureaucracy in the procurement process contributes to contract delays, exaggerated costs, and contracts manipulation. This eventually results in slowed, ineffective processes in addition to corruption [12].

County governments which have the constitutional mandate of handling health related matters in Kenya have no requirement to source medicines and other medical supplies from the country's medical supplies agency, KEMSA. This is regardless of the fact that KEMSA has an advantage of bulk procurement and hence economies of scale. Further to this, most counties have no elaborate procurement plans and procedures for procurement of medicines leading to a risky compromise on the quality of medicines procured from other sources and an interference with the Kenya Essential Medicines List (KEML) as provided by the national government's Ministry of health. The result of this has been frequent shortage of medicines, procurement of medicines at expensive prices and corruption [13].

In 2015, Mutai conducted a study in Isiolo County, Kenya and established that, in January of the same year, the county is said to have procured medicines and other supplies worth Kshs. 1.2 billion yet health facilities lacked the said commodities. Available records indicated that the commodities were delivered in December 2014. It was further revealed that the county did not have a clear procurement process with supplier pre-qualification not being properly done and tenders not advertised as per the existing procurement laws and regulations [14].

Materials and Methods

The study adopted a descriptive cross sectional research design with mixed approach method. Qualitative data was obtained from interviews with top health department's leadership involvement in management of medicines. Quantitative data was obtained by use of questionnaires. An observational checklist was used to collect data on availability of medicines under this study. Owens (2002) affirms that cross sectional design is important when collecting data at one point in time from a sample thus the design was adopted as the researcher sought to collect information over a short period of time [15].

The study was conducted in Bungoma county which has a total of 184 health facilities: 12 hospitals, 17 health centers, 102 dispensaries, and 52 clinics [16]. Among the hospitals, there are 9 public hospitals, one in each sub county. They were the focus of this study

The target population included the medical superintendents, health administrative officers, pharmacists and procurement personnel of public health facilities in Bungoma County, the head of county procurement department, the county pharmacist and the chief officer in charge of health and sanitation department.

The sample size was computed using G. Power Priori power analysis and a sample of 36 officers working in the hospitals obtained.

Three other officers: the county pharmacist, county procurement officer and chief officer in charge of health and sanitation were purposively sampled thus the total sample of thirty-nine (39).

A census method of sampling was used since the entire study population was small. All the study population formed the sample.

Pilot testing for study tools was done in Kakamega County since it has similarities to Bungoma considering its geographic location. Two participants from Kakamega county referral hospital in Kakamega central sub county were used. According to Mugenda & Mugenda (1991), a successful pilot study uses 1% to 10% of the actual sample size [17].

The objective of pre testing of study tools was to determine the reliability of the tools for use in the main study. Piloting research instruments is necessary as it is a way of finalizing them and enables determination of their validity [18]. The researcher was satisfied with the results obtained from the pretesting exercise and no adjustments were made on the tools.

Reliability (Internal consistency) of the questionnaires in this study was determined through a single test administration for the two sets of questionnaires administered in two health facilities piloted. The reliability coefficient was assessed using Cronbach's alpha (α)

An instrument with a reliability coefficient of 0.7 is considered reliable [19]. The coefficient obtained in this case was 0.79 and was deemed satisfactorily reliable for the questionnaires to be used for data collection.

After administrative approval involving permission from post graduate School of Mount Kenya University, Institutional Research and Ethics Committee and permission from hospital administration, the study was accomplished using appropriate data collection tools

During this period, the data was password protected to prevent unauthorized access.

The data collected was analyzed accordingly. Quantitative data was cleaned to check for completeness, coded and entered into the computer statistical package (Statistical Package for Social Sciences (SPSS version 22.0). Entered data was cleaned to check for discrepancies and errors during entry process. Descriptive statistics were used to produce frequency distribution, percentages, means and standard deviation. Chi square was used to test for the association between variables. Logistic regression analysis was used to describe data and explain the relationship

between the dependent variable and selected independent variables. The data was then presented in tables.
Qualitative data generated was tape recorded, translated, transcribed and categorized into themes according to the objectives under research and reported in narrative form together presentations of quantitative nature.

Results

Demographic characteristics of the respondents

Table 1: Demographic characteristics of the respondents

Characteristic	Frequency	Percent (%)
Gender		
Male	26	81.3
Female	6	18.8
Cadre Medical officers	7	21.9
Pharmacists	8	25.0
Hospital administrative officers	13	40.6
Procurement officers	4	12.5
Work experience (years)		
0-5	14	43.8
6-10	3	9.4
11-15	4	12.5
16-20	5	15.6
21-25	3	9.4
Above 25	3	9.4
Total	32	100

Source: Researcher (2018)

A total of thirty-six (36) questionnaires were prepared, however, only thirty-two (32) respondents could be reached, signifying a response rate of 88.89%. According to Babbie (2004), a questionnaire response rate of between 80% and 90% is adequate for a descriptive research design work. Out of these, 26 (81.2%) were male while 6 (18.8%) were female. This gender distribution was in contravention to a study by Akacho (2014) that found out that a majority of individuals working in health facilities are female.
The distribution of the 32 respondents by cadre is also shown in the table above. The largest number of them was hospital administrative officers constituting, 40.6% while the least number was that of procurement officers who comprised of 12.5%. Pharmacists exceeded medical officers by only one respondent. As it regards the respondents' work experiences, a majority of them had worked for a period of less than five years. They were 43.8% of all respondents. The least percentage had work experiences of between 6 to 10 years, 21 to 25 years and above 25 years, all contributing to 9.4% each.

Adherence to procurement procedures

A very large number of respondents (81.2%) reiterated that procurement processes were followed as compared to a minority (18.8%) who indicated that in some cases, laid down procurement procedures were not followed. This is shown in table 1 below.

This clearly shows that most health care workers are keen to adhere to the laid down regulations according to the Public Procurement and Disposal Act. The few who indicated that they did not adhere to the procurement procedures probably did so in emergency situations where medicines had to be sourced within the shortest time possible in order to save lives.

Table 2: Adherence to procurement procedures by respondents

Adherence to procurement process	Frequency	Percent
Yes	26	81.3
No	6	18.8
Total	32	100.0

Source: Researcher (2018)

Relationship between cadre of respondents and work experience and adherence to procurement procedures

Among those who said procurement procedures were followed, a majority (38.5%) were Hospital administrative officers. All procurement officers noted that procurement processes were followed while out of the 8 pharmacists, only 12.5% of them indicated that procurement procedures were not followed. Of the medical officers, 71.4% responded that appropriate procurement procedures were followed with 28.6% of them saying that procurement procedures were not followed. There was no significant relationship between adherence of procurement procedures and the cadre of the health professional involved (χ^2 =2.230: p= 0.534). It can therefore be said that the knowledge of procurement procedures and processes is across all the cadres of health professionals involved in management of medicines. All procurement officers reported adherence to procurement processes since they are the single most cadre that have training and expertise in procurement matters. A majority of the other cadres also said that there is adherence to procurement processes since in their nature of work, they are exposed to various procurement matters. The few who reported not adhering to procurement processes probably were not aware of the said processes or did so in extreme circumstances, for instance, emergency situations.
All respondents who had work experiences of above 21 years had adherence to procurement processes. These formed 23.1% of all respondents who said procurement procedures were followed. Of those with non-adherence to procurement procedures, 66.7% had a work experience of less than five years. 38.5% of those who reported adherence to procurement procedures had work experiences of between 6 and 20 years with just two in this category indicating non adherence. None of the respondents with work experiences of between 11-15 years reported non adherence to procurement procedures. Application of Chi-square showed a significant relationship between adherence to procurement procedures and the work experience of the health professional involved (χ^2= 11.24: p= 0.003). This information is represented in table 2 below:

Table 3: Relationship between cadre and work experience of respondents and adherence to procurement procedures

Characteristic	Adherence to procurement procedures		Total	Test
	Yes	No		
Cadre	5	2	7	χ^2 =2.230:P=
Medical officers	7	1	8	0.534
Pharmacists	10	3	13	χ^2=11.24: P=
Health administrative officers	4	0	4	0.003

Procurement officers	10	4	14	
Work experience (years)				
0-5	2	1	3	
6-10	4	0	4	
11-15	4	1	5	
16-20	3	0	3	
21-25	3	0	3	
Above 25				
Total			32	

Source: Researcher (2018)

It can be deduced from these findings that work experience of health workers involved in management of medicines is a determinant of adherence to procurement procedures. The higher the work experience, the greater the adherence to procurement processes. All respondents with a work experience of more than 21 years for example, adhered to procurement processes. On the other hand, those with less than 5 years of work experience formed a majority of those who reported non adherence to procurement processes. This is because those who had worked longer were experienced in matters procurement and probably understand the consequences of not adhering to the laid down procurement processes.

Relationship between gender of respondents and adherence to procurement procedures

84.6% of male respondents adhered to laid down procurement procedures while only 15.4% did not. On the other side, 66.7% of females reported adherence to procurement procedures as compared to 33.3% who did not. There was a significant relationship between adherence to procurement procedures and the gender of the health professional involved (Odds ratio=OR=2.75). This is as shown in table 3 below:

A majority of male respondents indicated adherence to procurement procedures as compared to their female counterparts. This could be due to the fact that males are said to be authoritative and this probably is why they adhered to the procurement processes. In most cases, a person in authority will strive to do all it takes so as not to break the laid down rules, regulations and procedures.

Table 4: Gender of respondents and adherence to procurement procedures

		Are the procurement procedures adhered to?		Total
		Yes	No	
Gender of the respondents	Male	22	4	26
	Female	4	2	6
Total		26	6	32

Test: Odds ratio=OR=2.75.
Source: Researcher (2018)

Relationship between adherence to procurement procedures and discrepancies between actual quantities received and quantities indicated on delivery notes of all the respondents, 53.1% reported incidences of discrepancies between actual quantities received and that indicated on delivery notes. 46.9% of respondents had no such discrepancy. A majority (57.7%) of those who had adherence to procurement procedures had incidences of the said discrepancies while only 42.3% of them did not have the discrepancy. A significant number (66.7%) of those with non- adherence to procurement procedures did not have discrepancies between actual quantities received and that indicated on delivery notes.

Discrepancies between quantities actually received and quantities indicated on delivery notes may arise as an error on the part of the supplier. However, it requires that the recipient is very keen so as to notice such discrepancies.

In general, the officer receiving medicines should accurately countercheck to confirm that quantities received are the same as those appearing on delivery notes before making a decision to receive the supplies. If there are any discrepancies, then the consignment should be rejected as a whole and communication made to the supplier. More than half of respondents indicated that they had had these discrepancies. This shows out possible weaknesses in the public health sector supply system. A point to note is that the consignments were just received regardless of the said discrepancies most probably out of desperation on the part of the receiving officers as in most of the cases: supplies are made when the health facility is completely out stocked. A majority of those who reported the discrepancies had adherence to procurement processes: an evidence that they were very keen to identify the discrepancies as a result of them observing procurement processes.

Table 5: Adherence to procurement procedures and incidences of discrepancies between received quantities and qualities on delivery notes

		Incidences of discrepancies between received quantities and qualities on delivery notes		Total
Are the procurement procedures adhered to?		Yes	No	
	Yes	15	11	26
	No	2	4	6
Total		17	15	32

$\chi 2$= 6.28: P= 0.025
Source: Researcher (2018)

There was significant relationship between adherence to procurement procedures and the incidences of discrepancies between received quantities and quantities on the delivery notes ($\chi 2$= 6.28: P= 0.025).

Procedures used to procure medicines

Table 6: Procedures used to procure medicines

	Frequency	Percent
Open tendering	1	3.1
Request for quotation	3	9.4
Direct tendering	28	87.5
Total	32	100.0

Source: Researcher (2018)

An outstanding majority of respondents (28 out of 32) said

that their respective health facilities use direct tendering as a method of procuring medicines. This translates to 87.5% of all respondents. Open tendering was said to be in use by only one respondent (3.1%) while request for quotation was by three respondents (9.4%).

Logistic regression analysis: Effect of cadre, and work experience, procurement process, budget allocation, adherence on procurement processes on availability of medicines (Backward Stepwise Method).

The impact of procurement process on drug availability was evaluated using logistic regression techniques (backward elimination procedure) with categorical values of the variables analyzed as the dependent variable, and availability of medicines as the independent variable. In the model, the following two levels of variables (0,1) were used: working experience (0-5 years, 6-10 years, 16-20 years, 21-25 years and above 25 years), gender (Male, Female), cadre (pharmacist, medical superintendent, health administrative officer, procurement officer, following of procurement process (Yes, No) and adherence to procurement procedures (Yes, No, Other). Cadre of respondents was not statistically significant (OR 2.58, Cl 1.46 - 3.66 P= 0.42). The results at the final elimination step of the regression process are summarized in table 6 below. Significantly greater influence was found in officers with longer work experience (OR=2.58, 95% Cl, 1.46 to 3.66). The work experience of respondents in this study was skewed towards 0-5 years. This means that these officers had only worked for a shorter period of time and were newly employed. When assessing the experience gained in a certain field, the number of years worked should be put into consideration (Laaria, M, 2013). Those who have worked for a shorter time will be expected not to have the same competencies as those who have worked longer. In addition, there was some evidence that male officers better understood procurement processes than females and influenced the availability of medicines (OR=0.65, 95% Cl, 0.49 to 0.86), However, when only those officers who said they follow procurement procedures were included in the equation, the effects of procurement process on the availability of medicines were less striking and inconsistent. The influence of budgetary allocation was significant where subjects who said that budgetary allocation influence availability medicine were included (OR=2.65, 95% Cl, 0.737, 3.123), whereas the adherence to procurement procedure seemed to have a greater influence on the availability of medicine (OR=4.194, P=0.002).

Table 7: Logistic regression results: Effect of cadre, and work experience, procurement process, budget allocation, adherence on procurement processes on availability of medicines

Characteristic	coefficient	SE of β	P-value	O R	(95% CI)
Gender	-1.027	0.179	.053	.65,	(0.49 - 0.86)
Cadre	.169	0.4	.42	2.58,	(1.46 -3.66)
Work experience	-.430	0.143	.002	3.4,	(1.37-7.45)
Procurement process	0.464	1.228	.001	2.65,	(.0737- 3.12)
Budgetary allocation	-1.193	0.528	0.001	2.65,	(0.737-1.123)
Adherence to Procurement procedures	2.072	-0.787	0.002	4.19,	0.94-5.437

Source: Researcher (2018)

Officers involved in procurement of medicines

Findings on officers involved in procurement of medicines from an interview revealed as follows:

'Those involved in the procurement process are health facilities in charges-nurses or clinical officers for rural health facilities or pharmaceutical personnel for hospitals who generate orders. The county pharmacist, county procurement officer, chief officer health & sanitation are involved in sending orders to suppliers and subsequently making payments" (Interview, senior county personnel, 2018).

This is because these officers have the necessary technical knowhow to undertake procurement roles and responsibilities. The nature of their work also dictates that they are actively involved in procurement of medicines.

Challenges in relation to medicines procurement

Main challenges in relation to medicines procurement and how can they be addressed were as highlighted in an interview with a senior county staff as follows:

"Inadequate funding for medicines procurement, inadequate procurement personnel and long procurement process are the main challenges we face. They can be addressed by increasing medicines procurement funding and prioritization of medicines procurement, hiring more procurement officers particularly in sub county hospitals and have more procurement staff to handle these processes to have it shorter" (Interview, senior county staff, 2018.)

The above challenges were sighted as being the main ones relating to procurement of medicines. They are in agreement with the findings by Mwathi and Osuga (2014) [20, 28] as it relates to funding and Economic and Social Rights Center-Hakijamii (2017) as it relates to the length of the procurement process respectively [20, 21].

Discussion

The process of acquiring goods and services in accordance with applicable laws and regulations is referred to as procurement. Procurement may be undertaken locally, nationally, and internationally among public, private, national, international, and local players [22].

81% of respondents indicated that procurement processes were followed while 19% indicated that in some cases, laid down procurement procedures were not followed. This shows that most health care workers are keen to adhere to the laid down regulations according to the Public Procurement and Disposal Act. Those who said that they did not adhere to the procurement procedures probably did so in emergency situations where medicines have to be obtained within the shortest time possible. According to the Public Procurement and Oversight Authority (PPOA), a procurement process may take up to 100 days [23]. This is an unacceptably long period especially in health care service delivery where any delay could lead to worse out comes including death.

39% of those who indicated adherence to procurement

procedures were health administrative officers while all procurement officers adhered to the laid down procedures. This is explained by the fact that health administrative officers are the in charges of administrative staff including procurement officers and thus approve procurement requests and other procurement processes. The procurement officers on the other hand indicated that they adhere to procurement procedures as procurement is their area of specialty by training and practice.

Direct procurement method was cited by about 88% of respondents. This is contrary to a study which indicates that competitive procurement is recommended. Competitive procurement offers a chance to have quality medicines supplied at the lowest possible price [24]. According to section 29 of the Public Procurement &Disposal Act, 2005, open tendering is the preferred method of procurement. Part V of this Act lays out the specifics of how an open tender should be conducted. Alternative procurement methods, subject to meeting the conditions set forth in Part VI, may be used when open tendering is not the appropriate method, such as in emergency situations. They include: Restricted tendering: direct procurement: Request for Proposal: Request for quotation: low level procurement among others. The findings of this study as it relates to the methods of procurement used are therefore in agreement with these provisions [25].

Officers involved in procurement of medicines were health facility in charges- nurses or clinical officers for rural health facilities and pharmaceutical personnel for hospitals. These participate in order generation. The county pharmacist, county procurement and county chief officer- health and sanitation are involved in rationalization of orders, forwarding to suppliers and subsequent payments. The need for having skilled personnel (nurses, clinicians and pharmaceutical personnel) was crucial to ensure effectiveness and proper quantification of medicines. It is also very important in elimination of errors such as over-estimation or under-estimation of the medicine's quantities. It is of essence to note that these staff should be highly qualified with high professional integrity. According to a study conducted by Ombaka (2009), pharmacists who work in hospitals to procure medications regardless of whether they are directly or indirectly involved in procurement must be well versed in medications, the interacting issues, and the various stakeholders with the ability to influence the process or who may have legal responsibility [26].

Challenges faced in procurement of medicines from this study were inadequate funding, inadequate procurement personnel and long procurement processes. These could be addressed by allocating adequate funds as per the quantification needs for medicines in the county and hiring more procurement staff to reduce the lengthy procurement procedures. The finding compares well with what Mwathi and Osuga found out in 2014 particularly as it relates to funding [20]. The procurement process was noted to be exceedingly long, taking more than three months in some cases. This was mainly due to a lot of bureaucracy. Of particular interest was a strict requirement that the county chief officer in charge of health and sanitation signs each and every local purchase order, instead of empowering health facility in charges to do so. These findings are in agreement with those reported by the Economic and Social Rights Center- Hakijamii (2017) in Kakamega County that the procurement process for medicines was long, elaborate and bureaucratic [21].

Conclusion

The study showed a relationship between procurement processes and availability of medicines. It is thus prudent to adhere to the laid down procurement processes with a keen focus on having effective and efficient process so as to achieve the desired medicines availability situation.

Authors' Contributions

Nicholas Barasa and Wilberforce Cholo contributed equally to this work.

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