Storage Mechanisms For Health Commodities Management And Service Delivery: A Case Of Level 4 Public Hospitals In Western Kenya

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Abstract: Health commodities are stored and managed at the hospital warehouses and service delivery unit stores in level 4 hospitals to promote accessibility and availability at all times. Despite huge sums of money spent by county governments and other stakeholders to purchase health commodities in Kenya, service delivery interruptions due to inadequate health commodities is still recorded in public hospitals leading to patients dissatisfaction. The objective of this study was to establish the relationship between storage mechanisms used for health commodities at the hospital warehouse plus unit stores and service delivery at level 4 public hospitals in western Kenya. The target population was 99 level 4 public hospitals with NHIF codes within the region and 426 respondents. The hospitals were sampled using stratified sampling technique and the sample size calculated using Yamane formula (1967) giving 79 public hospitals. For the respondents both at the county and hospital levels, purposive sampling technique was used giving a sample size of 346 respondents. The respondents included nursing officers, medical laboratory technologists, pharmaceutical officers and warehouse personnel handling health commodities at the hospitals plus health administrators, finance officers and supply chain management officers at the county health management office in each county. Data collection instruments used were structured questionnaires, observation checklists and interview schedules whose reliability and validity were tested to ensure internal consistency at > 0.70. Descriptive statistics and regression analyses models were used to analyze the collected data. Data was presented in tables as was appropriate in the study. The findings obtained from the regression model were at R^2 value of 0.881, p = 0.000, $\beta = 1.182$ and F = 2215.867. This implied that 88.1% of variation in service delivery was determined by the storage mechanisms used at the hospital warehouses and unit stores and also indicating that a unit change in storage mechanisms at the hospital warehouses and unit stores led to an increased improvement of service delivery by 1.182 units at the level 4 public hospitals in western Kenya. The study therefore, conversely asserted that good storage mechanisms at the level 4 public hospitals was one of the key factors in determining the availability and accessibility of health commodities thus efficient service delivery to patients. The study recommended that every level 4 public hospital should have a designated hospital warehouse and unit stores with ideal storage conditions at each service delivery unit as per the guidelines.

Keywords: Storage Mechanisms, Hospital Warehouse. Unit stores and service delivery

I. INTRODUCTION

Public health landscape is changing rapidly throughout the world due to devastating health problems ranging from communicable diseases that are either bacterial, parasitic or viral to non-communicable conditions that are termed as lifestyle diseases among the population. To combat these problems of public health concern, huge resources like adequate infrastructure, human resource and effective, functional health commodities management systems are required. In Sub Saharan Africa where the disease burden is highest, demand at the hospitals to have adequate health commodities has greatly increased the complexity and burden on public health supply chains. Therefore to ensure health commodities security using the scarce resources, there is need for both developed and developing countries to take a holistic view of public health systems and optimize the supply chains (MSH, 2012 and USAID, 2011).

A. STORAGE MECHANISMS FOR HEALTH COMMODITIES

Storage mechanisms for health commodities at the hospital warehouse and service delivery units entails keeping of the products in a safe, secure and accessible location that will maintain the physical integrity and quality of the products awaiting use (USAID, 2008). Characteristics of good storage areas that were assessed and observed by the study at level 4 public hospitals include availability of adequate space, good ventilation, lockable, clean, dry, well arranged, accessible stores free of harmful insects and rodents. Other conditions include availability of cold chain systems, fire safety equipment, use of shelves and pellets to raise the products from the ground and separation of expired, damaged or obsolete health commodities (USAID, 2011). Availability of ideal storage facilities at the level 4 public hospitals reduce wastages, pilferage, theft, expiries and also help in maintaining quality and potency of the health commodities.

B. SERVICE DELIVERY AT LEVEL 4 PUBLIC HOSPITALS

The primary goal of any hospital is to offer quality services to patients seeking medical attention. Patients with different illness visit hospitals to receive medical attention to revert the conditions which may cause disabilities, spread of communicable diseases or death in case of delayed response (Ali, 2013 and WHO, 2000). Service delivery is an output of health workforce, health commodities and health finance. These inputs should be well coordinated, accessible and timely to meet the patients demand (Barouch, 2011 and American Health Association, 2000). Efficient service delivery according to WHO (2010), is one of the six health system strengthening pillars promoting quality health outcomes, therefore, for any hospital to record it, skilled personnel, appropriate infrastructure, adequate health commodities, effective communication strategy and standard operating procedures to guide the processes are very vital (Owino and Kinoti, 2015, Hodge and Brown, 2011 and Shaw, 2003). The indicators measured by the study under service delivery were accessibility, reliability, responsiveness, quality assurance and safety. Study was conducted at level 4 public hospitals guided by Government policies and guidelines.

C. STATEMENT OF THE PROBLEM

Quality patient management does not only depend on health workforce knowledge, skills and expertise but also on other support functions like effective and functional health commodities management systems. This will ensure availability and accessibility of health commodities at the service delivery to promote efficient service delivery. Despite huge expenditure for health commodities, several studies still indicate high cases of wastages, pilferages, theft and expiries leading to inadequate health commodities at service delivery units thus delayed response to different medical cases leading to patients dissatisfaction and sometimes death at level 4 public hospitals.

D. GENERAL OBJECTIVE

To establish the relationship between storage mechanisms used for health commodities management and service delivery at level 4 public hospitals in western Kenya.

a. SPECIFIC OBJECTIVES

- ✓ To assess the availability of hospital warehouse (central store) for storing all supplied health commodities at level 4 public hospitals
- ✓ To assess the availability of unit stores at each service delivery unit of casualty, laboratory and pharmacy for holding unit commodities from either the hospital warehouse or suppliers for use
- ✓ To evaluate availability of ideal storage conditions at the hospital warehouse and unit stores at level 4 public hospitals
- ✓ To determine knowledge and skills of the health commodities users on good storage mechanisms promoting availability and accessibility of health commodities at the service delivery units.

II. LITERATURE REVIEW

A. THEORETICAL REVIEW

The study adopted two theories Contingency theory and theory of constraints

a. CONTINGENCY THEORY

This is an organizational theory that was developed by Fred Fiedler in 1958 that rejects classical management theory of having only one best way of structuring and managing an organization but instead depend on various factors and contingency variables such as firm strategies and technology used (Holmes, 2013 and Donaldson, 2001). The theory states that the organization will not undergo structural adjustments in the event of any mismatch between the organization structure and contingent variables but the contingencies will dictate the explicit structure, activities and management style of an organization (Hicks, McGovern and Earl, 2001). Fiedler (1964) developed and evaluated a contingency model allowing mangers to always assess the changes in the environment and determine the appropriate decisions to promote efficient organization performance (Northouse, 2007). This can be adopted at level 4 public hospitals by commodities users and determined appropriate storage mechanisms that will ensure appropriate handling of health commodities to promote efficient service delivery at the units.

b. THEORY OF CONSTRAINTS

Theory of constraints was developed by Dr. Goldratt stating that there is always at least one constraint limiting organization performance (Goldratt, 2004). The theory is based on the principle that a chain is only as strong as the weakest link or constraint (Kazim, 2008). Level 4 public hospitals strong links are health workforce with wealth of technical expertise guided by well laid down policies, guidelines and procedures for quality patients management and better health outcomes. However there are still weakest links causing high rates of deaths, disabilities and spread of communicable diseases among patients seeking medical attention as reported by different surveys. This study was conducted in order to identify any constrain(s) in storage mechanisms used for health commodities at the hospital warehouses and unit stores of casualty, laboratory and pharmacy limiting efficient service delivery to patients then propose interventions and periodic performance evaluation that can be adopted by the public hospitals for improvement.

B. EMPIRICAL REVIEW

Hospital warehouses and unit stores are key component of the health sector supply chain that ensures availability and accessibility of health commodities at service delivery units. When properly managed and appropriately stocked, the hospital warehouses and unit stores apart from ensuring consistency in health commodities quantities will also ensure maintenance of the commodities potency thus promote efficient service delivery to patients.

A study was conducted in Canada by Blandine, Smail and Michael (2018) to assess current issues and future challenges on healthcare logistics and supply chain established that electronic information systems were a great source of improvement in medical stores and had impact on replenishment system performance. Also the study found out that significant time which could be used by nurses to provide quality care to patients was wasted at the central store therefore the study suggested need to decentralize nursing unit storage areas. Didier, Jacob, Corinne and Abdoulaye (2013), conducted a study in Benin to estimate how access to storage technologies and storage losses from insects affects a smallholder African farmers' decision to hold grain from production, in an environment of high price variability. The findings established that access to storage chemicals increases the average quantities of grains stored. It also highlighted various gaps and conclude that there was need to develop effective and accessible new or improved storage technology for small farmers in Sub-Saharan Africa.

A study on effectiveness of stores management on turnover performance was conducted by Namakajjo (2011) at the National Medical stores Uganda using a cross sectional research design methodology. The findings revealed that good storage practices had a strong effect on inventory turnover thus improve performance. A study was conducted by Akingeneye (2019) to assess storage conditions of pharmaceutical products in Rwanda using descriptiveanalytical research design. Results indicated that warehouses were available in all the sites but did not meet the standard in terms of space, ventilation, security and storage conditions. Also, there was lack of staff refresher trainings and updates. Mwebia (2016), also conducted a study to analyze effects of effective storage and material handling on the tobacco company profitability in Migori, Kenya. The study established that cost reduction of production and improved profitability were attained using improved systems through effective storage mechanisms and material handling. The study recommended regular training and updates to material handlers plus store keepers and allocation of adequate funds for proper planning at the departments.

III. METHODOLOGY

The study adopted cross sectional research design and positivism philosophy to handle and address data from different sources. The target population was 99 level 4 public hospitals in western Kenya and 426 respondents comprising of nursing officers, medical laboratory technologists, pharmaceutical officers, store personnel and county health management teams consisting of health administrators, accountants and supply chain management officers. Stratified sampling technique was used to sample the level 4 public hospitals where each county formed a stratum from which samples were selected randomly using simple random technique. Yamane formula (1967) was used to calculate the sample size of 79 hospitals. Purposive sampling technique was used for the respondents both at the hospitals and county health management levels. Data was collected using questionnaires, observation checklists and interview schedules and analyzed by descriptive statistics and inferential analysis. Both bivariate and multivariate linear regression model were used and study hypotheses were tested and would be rejected if p> 0.05.

IV. STUDY FINDINGS

Descriptive statistics and inferential analysis were conducted and results summarized as shown in the tables below

	Interviews	Questionnaires	Observation Checklists		
Target	30	316	79		
Completed	28	301	77		
Proportion	93.3%	95.3%	97.5%		

Source: Survey Data, (2021)

Table 4.1: Survey Response Rate from Interviews, Questionnaires and Checklists

Table 4.1 indicates that the overall response rate of the study was at 95.4% where the interview schedules data contributed to 93.3% while the questionnaires and observation checklists contributed to 95.3% and 97.5% respectively. The researcher and research assistants failed to administer two observation checklists and eight questionnaires since two of the selected level 4 public hospitals had been turned into COVID 19 treatment sites. Also, seven healthcare providers at

Observation Checklists	Ye	es	No			
	Freq.	%	Freq. %			
Availability of designated	I I CQ.	70	1104.	/0		
hospital warehouse	31	40.3	46	59.7		
Availability of good	51	10.0	10	57.1		
storage conditions at the						
designated hospital						
warehouse	7	22.6	24	77.4		
Availability of designated	63	81.8	14	18.2		
service delivery unit						
stores						
Availability of good	22	34.9	41	65.1		
storage conditions at the		0.112		0011		
designated service						
delivery unit stores						
Availability of hospital	26	33.8	51	66.2		
room thermometer at the			-			
hospital warehouse and						
unit stores						
Availability of well	6	7.8	71	92.2		
documented temperature						
charts for monitoring cold						
chain health commodities						
Availability of Expiry	38	49.4	39	50.6		
Monitoring chart at the						
hospital warehouse and						
unit stores						
Availability of well	6	15.8	32	84.2		
marked expiry monitory				\mathbf{A}		
chart displayed on each						
store wall				Y		
FEFO/FIFO rule being	74	96.1	3	3.9		
observed at the hospital				7		
warehouse and unit stores						
Availability of stock/bin	49	36.4	28	63.6		
card for each health						
commodities at the						
hospital warehouse or unit						
stores						
Proper documentation on	29	40.8	20	59.2		
the available stock/bin						
cards at the stores						
Availability of	67	87.0	10	13.0		
appropriately filled						
accountability tools like						
S11 at the hospital						
warehouse and unit stores						
Availability of monthly	27	35.1	50	64.9		
physical count records at						
the hospital warehouse						
and unit stores						

the hospitals and two county health managers declined to participate in the study.

Source: Research Study, 2021

Table 4.2: Frequency of Storage Mechanisms

From table 4.2 above, only 40.3% of the level 4 public hospitals had designated hospital warehouses out of which 77.4% did not have good storage conditions as per the standards. 81.8% of the hospitals had service delivery unit

stores or commodities holding areas however 65.1% of the unit stores did not meet standard storage conditions. It was also noted that despite availability of cold chain systems for health commodities that require refrigeration, 92.2% of the hospitals were not monitoring and documenting temperatures on the charts. 49.4% of the hospitals had expiry monitoring charts at the hospital warehouse and unit stores however only 15.8% of these hospitals especially in laboratories had well marked expiry charts displayed on the walls. 63.6% of the hospital warehouses and unit stores did not have stock/bin cards assigned for each health commodity. Out of the available stock/bin cards, 59.2% were poorly filled. 87% of the hospitals had accountability tools like S11 and delivery notes which were appropriately filled and filed however 64.9% of the hospitals were not conducting monthly physical count as per the guidelines.

The key informants reported that "the level 4 hospitals lack adequate storage space to accommodate the pharmaceuticals, non-pharmaceuticals, diagnostic reagents, equipment and other health commodities. Also > 50% of these hospital warehouses double as the central Sub County storage units for the rural health facilities making control of health commodities in the hospitals very difficult. At the service delivery units, cupboards, cabinets and shelves have been improvised as stores and the storage conditions like control temperatures, good ventilation and lighting, availability of shelves and pellets for proper arrangement of the commodities are inadequate. This has promoted theft, pilferages, expiries and loss of potency at the stores creating health commodities management breakdown. If funds can be available, each level 4 hospital should have one big hospital warehouse for all health commodities storage and small unit stores to act as holding areas once the commodities are taken to the service delivery units for use. This will create easy monitoring and evaluation, reduce pilferages and theft".

			Descr	iptive Statistics	
Items	Ν	Freq	uency	Min.Max.Mean	Standard
				(M) 1	Deviation
		Agreel	Disagre	e	(SD)
Designated hospital	301	285	16	3.00 5.00 4.385	0.592
warehouse (central store)		(95)	(5)		
for storing all the					
procured or supplied					
health commodities not					
available in the hospital					
The available hospital	301	193	108	1.00 5.00 3.545	1.567
warehouse lack good		(64)	(36)		
storage conditions in					
terms of space,					
ventilation, adequate					
lighting, pellets,					
refrigerators for					
commodities requiring					
cold chain systems, room					
thermometers and					
lockable doors and					
windows for safety					

Service delivery units 201 213 88 [$105.004.070$ 1.113 rescued by back ideal unit structures of bdfing the health commodifies from the ministeries of bdfing the health commodifies from the health						
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lack ideal storage (64) (36) conditions in terms of space, ventilation, adequate lighting, pelles, refigerators for commodities requiring cold than systems, roum therements and lockable doors and lochable doors and lockable doors and lockable doors and	The available unit stores 301	193	108	1.00 5.00 3.615	1.608	within the unit
conditions in terms of space, ventiliation, adequate lighting, pellets, refrigerators for commodities requiring coold chain systems, noom thermometers and lockable doors and windows for safety at the hospital warehouse and unit stores FEPOFFFI or like is keing 301 260 41 2.00 5.00 4.276 0.744 been and unit stores for for the hospital warehouse in the starts of for the hospital warehouse is to use from the heavily monitored matched Espiny (M) and the unit stores for for the hospital warehouse 301 103 108 2.00 5.00 3.847 1.182 and unit stores for storing (GI) (39 heaving (GI) (3	lack ideal storage	(64)	(36)			Health commodities focal 301 298 3 3.00 5.00 4.648 0.485
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refrigerators for commodities requiring: cold chain systems, room thermometers and lockable drors and windows for safety at the hospital warehouse and unit stores FFFO-FIFO rule is being 301 260 41 2.00 5.00 4.276 0.744 fical persons while distributing health commodities for use from the hospital warehouse to service delivery unit stores of rom the unit stores of rom the unit stores of sorts of not the hospital warehouse 301 193 108 2.00 5.00 3.847 1.182 and unit stores for sorts of soft 191 108 2.00 5.00 3.781 1.331 refrigerators for storing (61) (39) have well marked Expiry Monitoring Charts displayed on the wails remeres for sorts of storing (61) (39) have well marked Expiry Monitoring temperatures and the stores were allowed advances the designated durits of stores of rom stores (64) (36) have well marked Expiry Monitoring temperatures and the stores were allowed advances the designated durits stores (73) 185 116 1.00 5.00 3.781 1.331 refrigerators for storing (61) (39) have well marked Expiry Monitoring temperatures and the stores were allowed advances the designated durits stores (73) 193 108 2.00 5.00 3.927 1.201 mot available for service delivery units were lacking designated unit stores do not regularly monitored nor service delivery units were lacking designated unit stores do the hospital warehouse have storage conditions at (M = 3.3817 and SD = 1.608). FEFFOFIPC rule was being observed at the level 4 public hospitals as shown by 86% respondents at (M = 4.276 and SD = 0.744) however well marked expiry monitoring charis were not top blay conducts at (M = 3.3817 and SD = 0.744) however well marked expirat the hospital warehouses area for systematic arrangements (63) (37) of the health commodities were and storage conditions at (M = 3.3817 and SD = 0.344). Jonly 57% of the respondents at (M = 4.276 and SD = 0.744) however well marked expirat the hospital warehouses area for pharmaceuticals, non pharmaceuticals, non pharmaceuticals and haboratory reagents supplied to the hospital at M = 3.337 and borato	adequate lighting, pellets,					mechanisms
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points within the units' The hospital warehouse 301 193 and unit stores do not (64) (36)108 2.00 5.00 3.847 1.182Source: Research Data June, 2021 Table 4.3: Descriptive statistics on Storage Mechanisms and Service Delivery Table 4.3: Descriptive statistics on Storage Mechanisms and Service Delivery Table 4.3: Illustrates that 95% of the respondents agreed that level 4 public hospitals in western Kenya lacks hospital warehouses had good storage conditions as was confirmed by 64% of the respondents agreed that sorvice delivery units were lacking designated unit stores at the designated charts Room thermometers are 301 193 to the designated day and (66) (36)108 2.00 5.00 3.927 1.201Nonitoring temperatures at the hospital warehouse at the hospital warehouse to collect health commodities for use and storage at the unit stores108 2.00 5.00 3.927 1.2011.00 5.00 3.927 1.201There is lack of of the realsh commodities areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse112 1.00 5.00 3.837 1.2691.269 1.201There is lack of of the health commodities areas for pharmaceuticals and laboratory reagents or medical equipment but commodities received are maked up at the warehouse112 1.00 5.00 3.837 1.2691.262 1.262There is lack of of the respondents and laboratory reagents or medical equipment but commodities received are areas for112 1.00 5.00 3.837 1.2691.262 1.262There is lack of of the hospital warehouse at the hospital warehouse at the hospital warehouse at the hospital warehou	stores to service delivery					unit stores
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nor regularly monitored nor well documented at the designated chartsservice delivery units were lacking designated unit stores at (M = 4.070 and SD = 1.113). 64% of the respondents further confirmed that the available unit stores do not have ideal storage conditions at (M = 3.615 and SD = 1.608).monitoring temperatures and unit stores3.00 5.00 4.1030.844mad unit stores933.00 5.00 4.1030.844mas designated day and time for service delivery units to collect health commodities for use and storage at the unit stores3.00 5.00 4.1030.844There is lack of of the health commodities areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse1121.00 5.00 3.8371.269Mark due the warehouse1121.00 5.00 3.8371.2691.201Systematic arrangements opharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse1121.00 5.00 3.8371.269Non toring temperatures strangement but commodities received are mixed up at the warehouse1.121.00 5.00 3.8371.269Non termaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse1.121.00 5.00 3.8371.269Non termaceuticals, non pharmaceuticals and laboratory reagents or marked up at the warehouse1.121.00 5.00 3.8371.261Non termaceuticals and laboratory reagents or mixed up at	cold chain systems are					= 3.545 and SD = 1.567). 71% of the respondents agreed that
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$ \begin{array}{c} \text{FEFO/FIFO} \text{ rule was being observed at the level 4 public hospital warehouse and unit stores } \\ \text{The hospital warehouse 301 208 } \text{93} 3.00 5.00 4.103 0.844 \\ \text{has designated day and (69) (31)} \\ \text{time for service delivery units to collect health commodities for use and storage at the unit stores } \\ \hline \\$	not available for	(64)	(36)	2.00 5.00 5.927	1.201	storage conditions at $(M = 3.615 \text{ and } SD = 1.608)$.
The hospital warehouse and unit stores The hospital warehouse 301 208 and unit stores The hospital warehouse 301 208 (69) (31) Time for service delivery units to collect health commodities for use and storage at the unit stores There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse	monitoring temperatures	(04)	(50)			FEFO/FIFO rule was being observed at the level 4 public
and unit stores The hospital warehouse 301 208 93 3.00 5.00 4.103 0.844 has designated day and (69) (31) time for service delivery units to collect health commodities for use and storage at the unit stores There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse warehouse M = 3.837 and M = 3.927 and $SD = 1.201$. 69% of the respondents agreed that the hospital warehouses had a designated day and time for the service delivery units to request and collect health commodities at (M = 4.103 and SD = 0.844). Only 37% of the respondents accepted that the hospital warehouse has designated areas for = 0.844). Only 37% of the respondents accepted that the hospital warehouse has designated areas for each health commodities free cived are mixed up at the warehouse	at the hospital warehouse					hospitals as shown by 86% respondents at $(M = 4.276 \text{ and } SD)$
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units to collect health commodities for use and storage at the unit stores There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse mixed up at the warehouse	time for service delivery					was commuted by 0470 of the respondents at $(W = 5.047)$ and $SD = 1.182$)
commodities for use and storage at the unit stores There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse	units to collect health					SD = 1.102).
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There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse	storage at the unit stores					available, monitoring and charting the temperatures were
There is lack of 301 189 112 1.00 5.00 3.837 1.269 systematic arrangements (63) (37) of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse						recorded as a challenge, 61% of the respondents agreed that
systematic arrangements (63) (37) being monitored at $(M = 3.781 \text{ and } SD = 1.331)$ while 64% of of the health commodities at the hospital warehouse that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse (63) (37) being monitored at $(M = 3.781 \text{ and } SD = 1.201)$. being monitored at $(M = 3.781 \text{ and } SD = 1.331)$ while 64% of the respondents confirmed that room temperatures were not monitored and documented at $(M = 3.927 \text{ and } SD = 1.201)$. 69% of the respondents agreed that the hospital warehouses had a designated day and time for the service delivery units to request and collect health commodities at $(M = 4.103 \text{ and } SD = 0.844)$. Only 37% of the respondents accepted that the hospital warehouse has designated areas for each health commodities like pharmaceuticals, non pharmaceuticals and laboratory reagents supplied to the hospital at $(M = 3.837 \text{ and}$ SD = 1.262). This leads to easy access and distribution.	There is lack of 301	189	112	1.00 5.00 3.837	1.269	temperatures for cold chain health commodities were not
of the health commoditiesthe respondents confirmed that room temperatures were notat the hospital warehousemonitored and documented at $(M = 3.927 \text{ and } SD = 1.201)$.that is no designated areas for69% of the respondents agreed that the hospital warehousespharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are 0.844 . Only 37% of the respondents accepted that the hospital warehouse has designated areas for each health commodities received aremixed up at the warehouseSD = 1.262.The health commoditiesSD = 1.262.	systematic arrangements	(63)	(37)			being monitored at ($M = 3./81$ and $SD = 1.331$) while 64% of
at the hospital warehousemonitored and documented at (M = 3.927 and SD = 1.201).that is no designatedmonitored and documented at (M = 3.927 and SD = 1.201).areas for69% of the respondents agreed that the hospital warehousespharmaceuticals, nonpharmaceuticals andlaboratory reagents ore 0.844). Only 37% of the respondents accepted that themedical equipment butcommodities received aremixed up at themixed up at thewarehouseSD = 1.262). This leads to easy access and distribution.	of the health commodities					the respondents confirmed that room temperatures were not
that is no designated areas for pharmaceuticals, non pharmaceuticals and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse69% of the respondents agreed that the hospital warehouses had a designated day and time for the service delivery units to request and collect health commodities at $(M = 4.103 \text{ and } SD$ $= 0.844)$. Only 37% of the respondents accepted that the hospital warehouse has designated areas for each health commodities received are mixed up at the warehouse69% of the respondents agreed that the hospital warehouses $= 0.844$). Only 37% of the respondents accepted that the hospital warehouse has designated areas for each health commodities like pharmaceuticals, non pharmaceuticals and laboratory reagents supplied to the hospital at $(M = 3.837 \text{ and}$ $SD = 1.262$). This leads to easy access and distribution.	at the hospital warehouse					monitored and documented at ($M = 3.927$ and $SD = 1.201$).
areas forhad a designated day and time for the service delivery units topharmaceuticals, nonhad a designated day and time for the service delivery units topharmaceuticals andrequest and collect health commodities at $(M = 4.103 \text{ and } SD = 0.844)$. Only 37% of the respondents accepted that themedical equipment buthospital warehouse has designated areas for each healthcommodities received arecommodities like pharmaceuticals, non pharmaceuticals andmixed up at thelaboratory reagents supplied to the hospital at $(M = 3.837 \text{ and}$ warehouseSD = 1.262). This leads to easy access and distribution.	areas for					69% of the respondents agreed that the hospital warehouses
pharmaceuticals, nonrequest and collect health commodities at $(M = 4.103 \text{ and } SD)$ pharmaceuticals andlaboratory reagents orlaboratory reagents or $= 0.844$). Only 37% of the respondents accepted that themedical equipment buthospital warehouse has designated areas for each healthcommodities received arecommodities like pharmaceuticals, non pharmaceuticals andmixed up at thelaboratory reagents supplied to the hospital at $(M = 3.837 \text{ and})$ SD = 1.262). This leads to easy access and distribution.	nharmaceuticals non					had a designated day and time for the service delivery units to
philinaccurrents and laboratory reagents or medical equipment but commodities received are mixed up at the warehouse= 0.844). Only 37% of the respondents accepted that the hospital warehouse has designated areas for each health commodities like pharmaceuticals, non pharmaceuticals and laboratory reagents supplied to the hospital at (M = 3.837 and SD = 1.262). This leads to easy access and distribution.	pharmaceuticals, 11011					request and collect health commodities at $(M = 4.103 \text{ and } SD$
medical equipment but commodities received are mixed up at the warehousehospital warehouse has designated areas for each health commodities like pharmaceuticals, non pharmaceuticals and laboratory reagents supplied to the hospital at (M = 3.837 and SD = 1.262). This leads to easy access and distribution.	laboratory reagents or					= 0.844). Only 37% of the respondents accepted that the
commodities received are mixed up at the warehousecommodities like pharmaceuticals, non pharmaceuticals and laboratory reagents supplied to the hospital at (M = 3.837 and SD = 1.262). This leads to easy access and distribution.	medical equipment but					hospital warehouse has designated areas for each health
mixed up at the laboratory reagents supplied to the hospital at $(M = 3.837 \text{ and } SD = 1.262)$. This leads to easy access and distribution.	commodities received are					commodities like pharmaceuticals, non pharmaceuticals and
warehouse $SD = 1.262$). This leads to easy access and distribution.	mixed up at the					laboratory reagents supplied to the hospital at $(M = 3.837)$ and
	warehouse					SD = 1.262). This leads to easy access and distribution.

monitoring and evaluation of each commodity in the hospital warehouse.

96% of the respondents agreed that accountability was observed at the hospital warehouse and unit stores through appropriate filling and filing relevant tools at (M = 4.655 andSD = 0.698). 74% of the respondents agreed that stock/bin cards are filled in batches not individually for each health commodities at the hospital warehouse or unit stores as per the guidelines at (M = 4.047 and SD = 1.015). Safety at both the hospital warehouses and unit stores were reinforced as was confirmed by 89% of the respondents at (M = 4.542 and SD =0.690). Monthly physical count and documentation of health commodities is recommended as ideal by the guidelines however, 79% of the respondents confirmed that this is not regularly conducted at level 4 public hospitals at (M = 4.259)and SD = 0.969). 99% of the respondents confirmed being trained on proper storage mechanisms at (M = 4.648 and SD =1.015).

Model Summary										
	Standard Change Statistics									
Adjusted Error of R										
	R	R	t	he	Squared	1	F		Sig. F	
R	Square	ed Squar	ed Est	imat	e Change	e Ch	ange	df1 df2	Change	
0939 ^a	0.881	0.88	1 0.	341	0.881	211	5.867	1 299	0.000	
ANG	OVA									
		Sum	of		Mean					
		Squar	res	df	Squared	d l	F	Si	g.	
Regro	ession	257.6	20	1	257.320	0221	5.867	0.0	00 ^b	
Res	idual	34.76	52 2	.99	0.116				1	
То	otal	292.3	82 3	800						
a. Depe	ndent	Variable	: Servi	ice L	Delivery					
b. Predi	ictors:	(Consta	nt): St	orag	e Mecha	nism				
		Regr	ession	Co	efficients	5				
Mod	lel	Unstan	dardiz	ed	Standard	lized	Т	Sig.		
	Coefficients				Coeffici	ents	-			
		В	Stand	ard	Beta	L				
			Erro	or						
(Con	stant)	0.851	0.10)5			8.086	5 0.000		
¹ Stor Mech	rage anism	1.182	0.02	25	0.939	9	47.07	30.000		

Table 4.4: Regression Analysis of Storage Mechanisms and Service Delivery

Table 4.4 shows regression analysis between storage mechanisms used for health commodities and service delivery at level 4 public hospitals. The correlation coefficient R² value of 0.881 was realized by the study implying that 88.1% of variation in service delivery is determined by the storage mechanisms used at the hospital warehouses and unit stores of the level 4 public hospitals in western Kenya. The p value and F statistics were both significant at p <= 0.000 and F value at 2215.867 respectively. This implied that the model was reliable in predicting the relationship between storage mechanisms and efficient service delivery. The regression coefficient (β) was at 1.182 indicating that a unit change in storage mechanisms at the hospital warehouses and unit stores of the level 4 public hospitals led to an increased improvement of service delivery by 1.182 units.

				Mode	l Summ	ary				
Mode	1 R	R	Adjusted	Standard	1	Chang	ge Sta	atistics		
		Squared	R	Error of	R	F	df1	df2	Sig	5. F
			Squared	the	Squared	l Change			Cha	nge
				Estimate	e Change					
1	0.946	5 ^a 0.895	0.893	0.323	0.895	628.412	4	296	0.0	000
2	0.948	^a 0.899	0.897	0.317	0.004	522.322	1	295	0.0	01
				Α	NOVA ^a					
	Mod	iel	Sum Squa	of tres	Df	Mean S	quare	ed	F	Sig.
	R	egression	261.	579	3	65.3	95	628	3.412	0.000^{b}
1	ł	Residual Total	30.8 292.1	03 382	272 275	0.10	04			
	R	egression	262.7	707	5	52.5	41	522	2.322	0.000 ^c
2	F	Residual Total	29.6 292.1	75 382	295 300	0.1	01			
]	Regressi	ion Coef	ficients				
Mode	ls			Unstand Coeff	dardized icients		S (tandaro Coeffic	lized ients	Sig.
]	В	Standa Erro	rd r	Beta	a	t
1		(Const	ant)	1.2	243	0.177	7			7.035 0.000
	Sto	orage Mee	chanisms	0.5	588	0.101		0.46	7	5.8220.000
2		(Const	ant)	1.3	336	0.176	5			7.594 0.000
	Sto	orage Mee	chanisms	0.6	575	0.103	3	0.53	6	6.577 0.000
	I	nteraction	n Term ICM)	0.2	235	0.070)	0.14	2	3.349 0.001

Dependent Variable: Service Delivery;

b) Predictors: (Constant), Storage Mechanisms, Interaction (Gov. Policies *Health Commodity Management); and

c) Significance level, p<0.05

a)

Source: Research Data, June 2021

 Table 4.5: Multiple regression analysis of independent,

 dependent and moderating variables

The findings in table 4.5 shows that the correlation coefficient R^2 value of 0.895 was obtained indicating relationship between storage mechanisms used for health commodities management as independent variable and service delivery as dependent variable. Considering moderating effects of the Government policies and guidelines, the correlation coefficient R² value changed from 0.895 to 0.899 indicating a net positive improvement with R² change of 0.004 which is significant. Generation of moderating effects of Government policies and guidelines gave an interaction term of regression coefficient (β) of 0.235. Storage mechanisms also recorded an increase in the regression coefficient (β) from 0.588 to 0.675 and p=0.000 which were significant. From the multiple linear regression results above, there was sufficient evidence that storage mechanisms used for health commodities management at the hospital warehouse and unit stores had a significant positive relationship on service delivery at the level 4 public hospitals.

The findings were similar with findings of a study conducted by Mwebia (2016) which established that efficient storage mechanisms and material handling led to production cost reduction and improved profitability. Also converged with the findings of a study conducted in Uganda by Namakajjo (2011) at the National Medical stores which revealed that good storage practices had a strong effect on performance. The findings however diverged with those of Akingeneye (2019) which established that lack of refresher trainings and updates to the staff led to poor storage conditions for pharmaceutical products as the current study established that > 90% of the respondents had been trained on good storage mechanisms.

V. CONCLUSION

The study focused on establishing the relationship between storage mechanisms used for health commodities management at the hospital warehouse plus unit stores and service delivery at level 4 public hospitals in western Kenya. The results indicated positive significant relationship leading to a conclusion that designated stores for health commodities with ideal storage conditions and good storage practices at level 4 public hospitals promotes availability and accessibility of health commodities at the service delivery units thus efficient service delivery to patients.

VI. RECOMMENDATION

There is need to build designated hospital warehouse and unit stores with ideal storage conditions in every level 4 public hospital to reduce pilferages, wastages, theft, expiries and loss of potency.

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