Lack of Medical Equipment is a Hindrance to Universal Health CoverageUtilization; the case of Seme Sub County in Kisumu County, Kenya

Hellen Ojwang, Dr. Daniel Onguru, Dr. David Otieno, Dorice Owuocha, Raphael Atito

***Abstract*— Many countries have been putting more effort in Universal Health Coverage through strengthening health systems to provide affordable, safe and high quality care. The Kenya government prioritized attainment of Universal Health Coverage which aimed at relieving citizens from out of pocket expenditure on health services, though faced with challenges of staffing and inadequate medical equipment for proper implementation.This was a descriptive cross sectional study design which examined the influence of medical equipment on utilization of Universal Health Coverage. The study targeted both community members and health facility managers. The health facilities were stratified according to their levels of care and randomly selected. The catchment population was stratified by administrative locations and a proportionate sampling technique applied giving a computed sample size of 377 participants, determined by Fischer's formula. The descriptive statistics were organized and summarized using tables and charts, while logistic regression analysis determined relationship between variables. The availability of functional equipment influenced utilization of UHC as a patient is more likely to use UHC card if medical equipment devices are available (OR = 2.08, 95%CI = 1.37 - 3.17, p=0.001). Medical Equipment devices have direct significant influence on utilization of UHC services by community members.**

***Index Terms*— Universal Health coverage, Medical Supplies, Utilization, Medical Equipment.**

I. INTRODUCTION

Medical equipment is an important component of a health system and a vital tool used by health professionals to prevent, diagnose, monitor and treat diseases as well as during rehabilitation after a disease or an injury. Making sure that health facilities have adequate supplies of equipment is essential in making people have confidence in health services provision[1]. These equipments are form of a machine, instrument, appliance, software or material intended by the manufacturer to be used alone or in combination with other devices. A responsive health care system guarantees communities equitable access to essential medical equipment of accepted quality, safety and cost effectiveness to improve the quality of services offer and to promote trust [1].

Medical equipment plays a significant role in improving the health system and in ensuring proper implementation of UHC in Kenya. Medical technology has become a crucial component in the healthcare industry, as it enables the healthcare providers to properly diagnose, monitor and treat various kinds of diseases and or deformities. Efficient equipment does not only provide high-quality patient treatment but also saves cost incurred after misdiagnosis caused by lack of medical equipment. Hospitals need to give high quality care using fewer resources at a reduced cost. Shortage of medical equipment, either due to unavailability or non-functioning was found to be a barrier to delivery of quality health services which led to patient's dissatisfaction [2]. The World Health Organization estimates that between 50 to 80 percent of medical technology in developing countries are non-functional and assessment systems lacking controls to prevent importation of inferior medical equipment. This make the countries get exposed to dishonest market practices by procurement of counterfeit appliances that put patient's lives at risk [3].

Inadequacy in medical supplies and equipment have a significant impact on the quality of patient care and accounts for a high proportion of health care costs [4]. Health service systems need to make informed choices about what to buy in order to meet priority health needs and avoid wasting limited resources on devices which will not promote quality care as one of the main pillar of UHC. Many organizations have produced useful information about essential drugs, but information on essential medical supplies and equipment still lacking [2].

The thought of universal health coverage in the post 2015 development agendas re-emphasized on equity and efficiency in healthcare service delivery, through provision of both technical and financial supports to healthcare facilities at all levels of administering services. This is directly related to realization of several health related targets in the Sustainable Development Goals by 2030 [5]. Apart from the availability and functionality of medical equipment, there are no adequate health care staff who have the capacities to operate these machines [6]. Although UHC is globally embraced as a need for significant economic development, the state of healthcare technology in terms of functional medical equipment and other infrastructure in the low and middle income countries contradicts their support to some global health development

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agendas [7].

Universal Health Coverage is not only for the elimination out of pocket expenditure but it is also about ensuring access to quality health care which can be made possible by availability of functional medical equipment. This means that capacity in both structural and resource must be increased to properly manage the needs of the population [8]. As much as expansion the UHC is good, the County Governments to work with the National Government to ensure provision the necessary equipment at all levels of care at any given time and ensure uniformity when designing various county health programs and schemes [9].

II. Materials and Methods

This was a descriptive cross sectional study design on influence of medical equipment on UHC utilization in Seme Sub County. The health facilities were stratified according to their levels of care and randomly sampled eight for the study. The catchment population was stratified by administrative locations and a proportionate sampling technique applied in each stratum giving a computed sample size of 377 participants, determined by Fischer's formula. Data collection was done by trained research assistants using semi structured questionnaires. The descriptive statistics were organized and summarized using tables and charts, while logistic regression analysis was used to determine relationship between variables. The ethical consent to carry out the study was sought from Jaramogi Oginga Odinga Teaching and Referral Hospital and Medical Officer of Health for Seme Sub County. The validity was ensured by Pretesting and retesting of questionnaires to determine their ability to address all the research questions, training of research assistants on how to carry out data collection and how to fill the data tools. The respondents were also briefed on the importance of giving the right information.

III. Results

A. Socio-Demographic Characteristics of the Community Members

According to the results in Table 3.1, the distribution of the population by gender shows that majority of the community respondents were female 216(57.29%) and male were 161(42.71%). With respect to age, 39(10.35%) of the 377 sampled population were between 18 to 25 years old; majority of the respondents were 147(38.99%) aged between 26 years old and 35 years; 107(28.38%) were aged between 36 years and 45 years and 84(22.28%) were 46 years and above.

With regards to education attainment, 4(1.06%) out of 376 community members who responded had no formal education; 90(23.94%) had primary education; majority of the respondents 200(53.19%) had secondary as the highest level of education and 82(21.81%) attained college. The results also illustrates that out of 377 respondents, 69(18.3%) were single; majority of the respondents 270(71.62%) were married; 30(7.96%) were widows and only 8(2.12%) were divorced.

In relation to occupation, majority 269(71.35%) of the respondents were employed in informal sectors; 89(23.61%) were employed in formal sectors and 13(3.45%) were students. However, 6(1.59%) out of 377 respondents were unemployed. The distribution of the respondents by monthly income reveals that out of 361 respondents, 27(7.48%) were earning less than Ksh. 2500; majority 122(33.80%) were earning between Ksh. 2501 and Ksh. 5000; 80 (22.16%) of the respondents were earning between Ksh. 5001 and Ksh.7500; 40(11.08%) of the 361 respondents were earning between Ksh. 7501 and Ksh. 10000 and 92(25.48%) were earning above Ksh.10000.

Table 3.1: Socio-Demographic Characteristics of the Community Members

Variables	Frequency (n)	Percentage (%)
Gender (N=377)		
Male	161	42.71
Female	216	57.29
Age (N=377)		
18 to 25	39	10.35
26 to 35	147	38.99
36 to 45	107	28.38
46 and above	84	22.28
Mean(SD) ***37.46 (10.86)***		
Level of education (N=376)		
None	4	1.06
Primary	90	23.94
Secondary	200	53.19
College	82	21.81

Marital status (N=377)		
Single	69	18.3
Married	270	71.62
Divorced	8	2.12
Widowed	30	7.96
Occupation (N=377)		
Formal employment	89	23.61
Informal employment	269	71.35
Unemployed	6	1.59
Student	13	3.45
Monthly Income in Ksh (N=361)		
0-2500	27	7.48
2501 - 5000	122	33.80
5001 - 7500	80	22.16
7501 - 10000	40	11.08
Above 10000	92	25.48

B. Utilization of UHC

Figure 3.1 shows that out of the 377 community respondents, majority at 71% (267) respondent used both UHC and private health facilities for health services, 27% solely used UHC while 2% never used UHC.

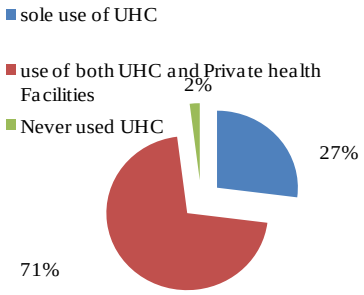

Figure 3.1: Utilization of UHC

C. Community Medical Expenses for the Past One Year in Ksh.

Figure 3.2 presents the medical expenses incurred by the community members after the launch of UHC in Kisumu County, 183 households (48%) spent between 0 - Ksh 2000, and 139 households (37%) spent between Ksh 2000 to Ksh 5000 while 55 households (15%) spent more than Ksh 5000.

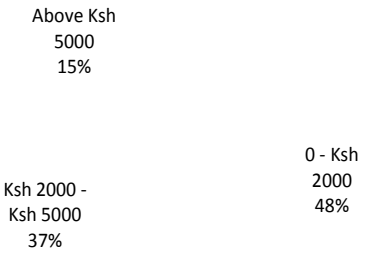

Figure 3.2: Community Medical Expenses for the Past One Year in Kenya shillings

D. Status of Essential Medical Equipment for UHC utilization in Seme Sub County

The result in Table 3.2 reveals that out of 376 community members 147(39.10%) had essential equipment for diagnosis in their link facility while majority 229(60.90%) had no essential equipment for diagnosis in their health facilities. The results further reveal that there is a significant effect of availability of essential equipment on UHC utilization. A patient is 2.08 times more likely to solely use UHC at a health facility if essential equipment is available in comparison to if essential equipment is not available (OR = 2.08, 95%CI = 1.37 - 3.17, p=0.001). However, Figure 3.3 shows that out of 147 community members who responded that their health facility had essential equipment, 123(84%) responded that the available equipment were functional and 24(16%) responded that the available equipment in their link health facility were nonfunctional.

Table 3.2: Bivariate Logistic Analysis Showing the Influence of Essential Equipment on UHC Utilization

Variable	n(%)	OR	95% CI	p-value
Available equipment				
Yes	147(39.10)	2.08	1.37 - 3.17	0.001
No	229(60.90)			

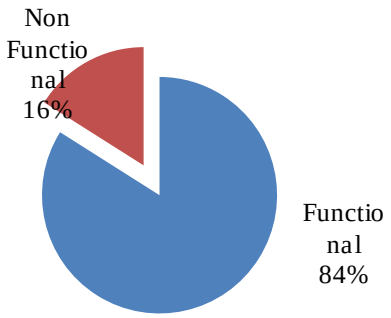

Figure 3.3: Functionality of Medical Equipment

It is also evident in Figure 3.4 that majority of the managers (50%) agreed that they lack essential equipment for diagnosis and treatment of disease; 37% strongly agreed that they lack essential equipment while 13% were neutral. This implies that most of health facilities in Seme Sub-County lack essential equipment for diagnosis and treatment.

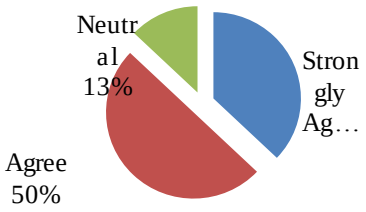

Figure 3.4: Lack of Essential Medical Equipment

E. Health Facility Checklist

Figure 3.5 revealed that four Health facilities namely Bodi, Ratta, Lolwe and Oriang' Alwala had staff training records, Continous Medical Education records, guidelines and SOPs available in their facilities (100%). The other four Health facilities were missing either training and CME records or Treatment guidelines and SOPs in their facilities. The checklist also revealed that all the four level two facilities (Dispensaries) had no medical equipment while the remaining facilities partially possesed the essential medical equipment with Miranga Sub county (level Four) scoring the highest at 60%. All the eight sampled health facilities missed some essential drugs. The drug bin cards were found well updated, drug registers well filled and updated. Only Miranga Sub County hospital and Bodi health Centre had trained pharmacy technicians which made them sore 80% while the remaining six facilities scored 60% each. On Essential services availability, Miranga and Bodi were found to be offering all the essential services at 100% while the remaining six health facilities were missing some services.

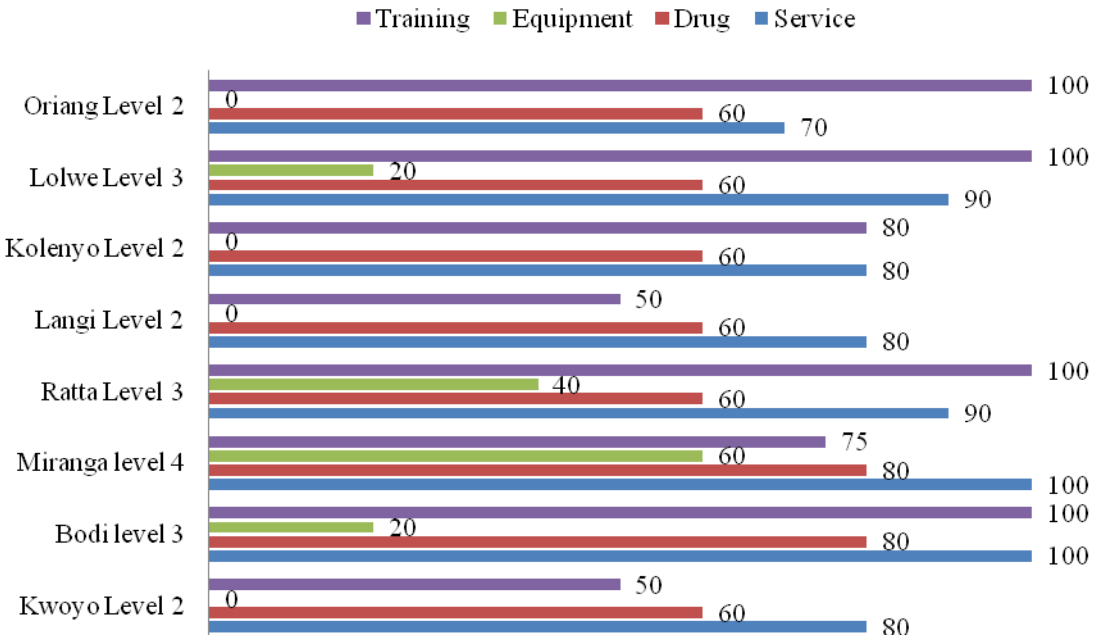

Figure 3.5: Health Facility Checklist Score

F. Responses on Improvement of UHC Utilization in Seme Sub County

The community members mentioned that, to improve UHC utilization, provision of all the necessary equipment to all facilities, supplying of adequate drugs to prevent shortage and employment of more staffs to avoid waiting for long for health services were all necessary to improve UHC utilization. Registering all those who come to the facility and avoid charging unregistered clients also enhances UHC utilization. The Table provides the illustrative quotes from community members

Table 3.3 Community Responses on What Can Be Done to Improve UHC Utilization

Respondents's Quotes
Some names are not in the system/they registered hence should be rectified, Some people missed registration/should be registered
Participant 372 49 year old Female
The card should cover all forms of treatment
Participant 354 37 year old Female
UHC should be rolled in all health facilities to cover all hospitals
Participant 315 52 year old Female
Create awareness to the community on the importance of using UHC
Participant 283 40 year old Male
Advice facility staff to stop charging patients, Employ more staff, Provide enough lab equipments
Participant 225 32 year old Male
Some services are still being charged in some facilities. This should be discouraged
Participant 181 45 year old Female
Some members have been receiving SMS quoting 'Your card has expired' hence demotivate them
Participant 180 24 year old Female
Re-shuffle long term staff at a station, Supply more functional equipments
Participant 127 35 year old Male
Employ more trained health workers
Participant 91 27 year old Female
Construct more health facilities, Provide more lab equipments
Participant 82 31 year old Male
Train more staffs/motivate them by good salaries, Provide more equipments.
Participant 47 29 year old Female
Conduct another UHC registration
Participant 45 28 year old Male
Employ more staff to reduce waiting time
Participant 16 30 year old Male
Registering all those who come to the facility and avoid charging unregistered clients.
Participant 06 22 year old Female
Provide all the necessary equipment to all facility, Stock more drugs to prevent shortage.
Participant 01 24 year old Male

The quotes below show the health facility managers responses on UHC utilization improvement. The major points that they said were necessary were; timely and continuous supply of essential drugs and management of stock outs plus employment of additional of staff. Availability of medical investigational equipment, more on job trainings on guidelines, regular support supervisions and motivation of staff by timely payment were also necessary to enhance UHC utilization. Below are the major responses of the Health facility managers on improvement of UHC utilization in Seme sub County:

"*There should be addition of more staff, constant and continuous supply of drugs and equipment, Continuous CME's and trainings to health care workers, Constant and continuous supply of facility improvement funds*" **(Clinical officer)**

"*Availability of medical investigational equipment and improvement of the health infrastructure, Staffing, More training on guidelines*" **(Clinical officer)**

"*Train more staff in OJT, provide more drugs/equipment, ensure continuous supplies of drugs/ equipment deploy/employ more staff of different centers in the health facilities*" **(Nurse)**

"*Avail enough staff, supply drugs consistently, motivation of staff by timely payment, Continuous updating health care worker (Trainings), regular support supervisions*" **(Nurse)**

IV. Discussion

This chapter shows how the significance of the findings of this study have been interpreted and described in light of the results of other studies reviewed in chapter two. It sheds lights on the new insights about the hindrance of utilization of universal Health Coverage in Seme Sub County in relation to influence by competency of health care staff, adequacy of essential drugs and medical equipment.

The study found out that 122(majority) household owners (33.80%) were earning between Ksh 2501 to Ksh 5000.

Again, 139(majority) households (37%) spent between Ksh 2000 to Ksh 5000 while 55 households (15%) spent more than Ksh 5000 on medical expenses. This is in agreement with a study done by WHO in 2016 which found out that globally every year, nearly 150 million people experience catastrophic health expenditure and household out-of-pocket payments for health care consume a larger proportion of their income that forces them to forego basic needs while 100 million are pushed into poverty [10]. In view of the earning of the majority being less that Ksh. 5000, and incurring medical expenses above Ksh. 2000, the community members are prone to suffering financial hardship hence they will not be able to afford the family basic needs. The ruinous expenses will also affect the education of the children thus impacting negatively on economic growth of various families. A lot of emphasis needs to be put on implementation and enforcement of Healthcare Financing policy by dedicating more resources to health in support of the UHC agenda to improve its implementation and to ensure financial protection for all citizens.

Medical equipment plays a significant role in improving the health system and in ensuring proper implementation of UHC. Medical technology has become a crucial component in the healthcare industry, as it enables the healthcare providers to diagnose, monitor and treat various kinds of diseases. Efficient equipment does not only provide high-quality patient treatment but also saves on cost. Hospitals need to give high-quality care using fewer resources at a reduced cost. Shortage of medical equipment, either due to unavailability or non-functioning, is a barrier to the ability of the health system to deliver quality health services which may lead to patient's dissatisfaction [2].

This study revealed that out of the 147 household representatives who said that their link facilities had medical equipment, 24(16.3%) respondents said that the equipments were not functional. The results showed that availability of functional equipment had influence on utilization of UHC as patients were likely to solely use UHC in a linked facility if medical equipments were available. According to previous studies, lack of essential medical equipment is one of the major factors hindering affordability of health care services and this lowers the quality of medical care in various health facilities[11]. Critical shortage of essential medical equipment is hindered by the ability of health system to deliver quality health services. This is often due to high procurement or replacement costs, supply chain problems and designs that are not tailored to meet local needs [12].

Our study confirmed that implementation of UHC is blocked by inadequate essential medical equipment for diagnosis and treatment of diseases as majority (> 50%) of the facility managers agreed that there is not enough medical equipment in their facilities. Lack and non-functionality of essential medical equipment in various government health facilities motivated the community member to seek diagnostic and other specialized care from the private hospitals where they were forced to spend a lot of money from their pockets. Some health facilities managed the patients clinically using the symptoms without confirmation of the disease conditions; hence some do not recover while others develop complications from misdiagnosis.

V. Conclusion

The community members are more likely to use UHC cards when medical equipment is available in the Health facilities offering UHC services.

VI. Recommendation

The County government of Kisumu to facilitate procurement of adequate essential medical equipment in all the health facilities offering Universal Health Coverage to improve the quality of services and promote sole use of Universal Health Coverage.

VII. Acknowledgement

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- The Ward Public Health Officers for data Collection
- Respondents for accepting to participate in the study

VIII. Ethical Declarations

Conflict of Interest: The authors have no any conflict of interest.

Funding: The Authors did not receive any grant for the study. The expenses for the study were funded by the Corresponded Author Mrs. HellenOjwang.

Ethical Approval: Ethical approval was obtained from Jaramogi Oginga Odinga Teaching and Referral Hospital ERC and a study permit from National Commission for Science, Technology and innovation (NACOSTI).

Informed Consent: A written consent was obtained from both the Health facility managers and the community members before starting the study.

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