Healthcare structural factors that determine quality of Maternal, Newborn and Child Health services at tier 3 public health facilities of Kisumu county, Kenya

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Abstract: **Healthcare structural aspects such as physical structures, equipment and human resources are still a major challenge in the world. The structural measures of quality of healthcare assesses the capacity of the service provider and enables users to assess quality of services they access. Africa and other developing countries are still constrained in providing quality services due to poor and inadequate structural aspects. In Kenya, the Ministry of Health has initiated different measures and strategies to address these challenges to improve the quality healthcare. However, the recent change in policy introducing free maternal and neonatal services to increase demand and access to care also increased workload on the MNCH service functions, with varying impact on service quality.**

Methods: Using a cross-sectional design, structural measures (based on WHO, Kenya healthcare quality and Kenya human resources for health standards) were applied to assess the quality of physical structures, equipment and human resources of all 7 tier 3 public health facilities in Kisumu County. Data was analysed both descriptively and by using Principal Component Analysis to determine impact of structural aspects on service quality. Factor loading/impact weights with absolute values ≥ 0.4 are considered to contribute sufficiently to the overall variability in quality accounted for by the factor, and those <0.4 are either irrelevant or don't explain the observed variability. A positive impact weight indicates a positive relationship with the factor, whereas a negative sign suggests an inverse relationship.

Results: At least 5 of the health facilities were adequate in 5 of the 7 listed items of the physical aspects; 2 of the 5 cadres of human resources, and 5 of the 22 equipment types assessed. For all the factors/indicators assessed, the impact weights obtained had absolute values <0.4.

Conclusion: More than half of the facilities had adequate quality of most items listed for physical aspects required for MNCH. However, unavailability and lack of adequate quality of majority of the items listed for human resources and equipment still pose considerable drawbacks to providing quality MNCH services. These are critical to correctly performing recommended technical and functional maternal, newborn and child health care tasks. These results indicate a clear need for improvement intervention strategies to strengthen all the structural components of MNCH service delivery functions in Kisumu County.

Keywords: **Maternal, Newborn and Child Health, Structural aspects, quality healthcare, tier 3 public health facilities.**

I. INTRODUCTION

There is evidence that provision of quality essential Maternal, Newborn and Child Health (MNCH) services is beneficial in curbing disease and mortality burden associated with pregnancy, childbirth and in the postnatal period [1]. Globally, it is estimated that by improving both coverage and quality of the recommended contacts with MNCH services could avert about 113 000 maternal deaths, 531 000 stillbirths and 1.325 million neonatal deaths annually by 2020[2]. However, hitherto there has been an insufficient progress towards achieving the global MNCH indicators, especially among

developing countries [2]. Globally, there was only a 44% decline in maternal mortality ratio between 1990 and 2015 against the global target of 75%, while the under–five mortality rate decreased by 53% against the global target of 25 per 1,000 live births in every country [3,4]. The major factors attributable to the slow progress include and not limited to expanding healthcare needs (affordability/financial security, social support and, client awareness, acceptability of MNCH care and physical access to facilities available); inadequate inputs to enable corresponding improvement in the relevant components of MNCH services delivery and management structures [5]. While many countries with poor MNCH indicators are rolling out improvement interventions to achieve higher program coverage, there are concerns about the quality of MNCH services including adherence to the recommended timing and number of client visits as well as content of care during the visits [6]. On the other hand, since most country reports on MNCH services focus largely on coverage by number and timing of visits, which are process indicators only of contacts between mothers and their children with the health system, they are limited in clarifying the scope, content and quality of service components patients would have received. Structural quality measures provide additional components to assess the capacity and general tendency of healthcare facilities to provide required services to the recommended standards and achieve the desired health outcomes.

According to Institute of Medicine[7] healthcare quality is defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." Service quality was long categorized by Donabedian [8] into: structural quality, process quality and outcome quality. Structural quality for MNCH services refers to quality of the professional and organizational resources, such as staff credentials and facility operating capacities that are necessary to provide the recommended standard of care. Structural measures gauge the care attributes of the healthcare setting, including: material resources (e.g. electronic health records, instruments for checking vital signs, etc.); human resources (e.g. availability and status of staff skills and competence) and; organizational structure (e.g. hospital or clinic visit days; special clinics; facility opening and closing hours; count, frequency and elapsed time per procedure performed, etc. The disadvantage in the use of structural measures of quality of healthcare is that often the association between structure and process and/or structure and outcome are not well established and developing evidence for such associations is difficult and often very complex.

In Kenya, MNCH indices remain poor. The infant mortality ratio is at 37.1 per 1000 births and maternal mortality ratio of 362 per 100,000 live births against SDG target of less than 70 maternal deaths per 100 000 live births [9]. The health indicators in Kisumu County are still low with maternal mortality ratio at 495/100,000 and Infant mortality at 54 per 1000 live births [10]. The reasons for the poor progress in these indicators are not yet well understood. In 2013 the government declared free maternal and child health services to address demand and access for MNCH services. However, this initiative occasioned considerable unintended systemic challenges, particularly to an already fragile service delivery function[11]. Most facilities still lacked satisfactory physical infrastructure as well as appropriate service delivery structures, including essential equipment and supplies that facilitate service provision. Staff shortages and skewed deployment of staff by the government to health facilities further contributed to lack of effective implementation of quality MNCH services [12] Lack of simultaneous improvement in service delivery components as demand increases is more likely to occasion progressive deterioration in quality health. It's on this basis that this study was conducted to assess how the healthcare structural aspects contribute to status of quality MNCH services.

II. METHOD

Study site and design

This was an analytical cross sectional study on the determinants of the quality of maternal, newborn and child health services offered in the tier 3 public health facilities (i.e. Kisumu county referral hospital, Muhoroni, Ahero, Nyakach, Nyahera, Chulaimbo and Kombewa Sub-county hospitals) in Kisumu county, Western Kenya. Of the County's 210 health facilities, 7 are classified as tier three public health facilities previously level 4 according to Kenya Essential Package for Health (KEPH)[13]. The general health indicators in this County, including maternal and infant health indicators remain poor remain below the national and global targets. HIV prevalence is at 16.3% compared to the national one of 4.9%. Hospital delivery rate is low at 42.5% while qualified medical assistant during birth is at 40.8%. Maternal mortality rate is 495 per 100,000 live births; infant mortality rate at 54 per 1000 births while immunization coverage is at 53.6% [13].

Data collection

Data was collected from all the 7 tier 3 public health facilities of Kisumu County which are referral centres for the Primary Health Care facilities. The tier 3 health facilities also provide the primary health care services. Structured and open-ended questionnaire were used to collect data from the service providers and hospital superintendents (facility in-

charges). The questions assessed the physical structures, equipment and human resource for health to determine the extent to which they met the quality requirements for MNCH service delivery according to WHO standards [14], Kenya health care Quality standards[15] and Kenya human resources for Health standards[16]. Listed items were assessed for availability and Quality (adequate or inadequate) (Table 1).

Table 1: Variables and how they were measured

Healthcare structural aspects	Measure reference
Physical structural aspects (7 items)	Recommended WHO and Kenya health care quality standards
ANC Clinic	
Post-natal Ward	
FP Room	
Nursing station	
Ante-natal Ward	
Theatre	
Toilets	
Human resources for health (5 items)	Recommended WHO, Kenya health care quality standards and Kenya human resources for health strategy
Nutritionist	
Medical Officer	
Pharm Technologists	
Nursing officer(midwife)	
Obstetrician/Gynaecologists	
Equipment (22 items)	Recommended WHO and Kenya health care quality standards
Linen trolley	
BP Machine	
Delivery coach	
Stethoscope	
Oxygen machine	
Suction machine	
Portal lamps/overhead	
General trolley	
Ultra sound	
MUAC tape	
Autoclave	
Baby cots	
Blood warmer	
Ultrasonic Nebulizer	
Rescucitaire	
Speculum set	
Infant radiant warmer	
Phototherapy unit	
Infant weighing scale	
Telephone	
Baby stethoscope	
Nursery with incubator	

Data analysis

Data was analysed descriptively and by using Principal component analysis (PCA) which is a factor analysis model (a type of regression model) for data reduction and to maximize variability in the data based on the amount of variability accounted for by the listed items. Exploratory factor analysis was used to identify associations among multiple items comprising each of the structural aspects. This process generated absolute values or coefficient scores for the structural

components. These scores represent common variance of service readiness indicators (or impact weights). The coefficient scores were rotated using varimax method to maximize their variability between respective structural factors. Meaningful factor structure is achieved when items load highly, ideally, on one factor [17]. Further, the larger the value, the more likely the factor is available, as they contribute sufficiently to the overall variability accounted for by the factor whereas the lesser the value the less likely its availability. Ideally, factor loading or impact weights with absolute values ≥ 0.4 are considered to contribute sufficiently to the overall variability in quality accounted for by the respective factor, and those <0.4 are either irrelevant or don't explain the observed variability. A positive impact weight indicates a positive relationship with the factor, whereas one with a negative sign suggests an inverse relationship [18].

III.   RESULTS

The study sought to establish the healthcare structural aspects that affect the quality of MNCH services. The specific structural aspects were equipment (22 items), physical structures (7 items) and human resource for health (5 items). These aspects were measured according to the recommended WHO standards, the Kenya Quality Model for Health framework (KQMH) and Kenya Health Sector Human Resources strategy.

At least 5 of the health facilities had 5 of the 7 listed items of the physical aspects. Only 2 out of the 5 cadres listed under human resource for health were reported adequate in at least 5 facilities; while availability of adequate equipment was low, with only 5 of the 22 equipment types assessed reported as adequate in at least 50% of the facilities (Table 2).

Table 2: Proportion of adequate healthcare structural aspects

	N=7	Proportion of health facilities with	
Structural components	**N**	**Adequate/good quality (%)**	**Not adequate/poor quality (%)**
Physical structural aspects			
ANC Clinic	6	85.7	14.3
Post-natal Ward	6	85.7	14.3
FP Room	6	85.7	14.3
Nursing station	6	85.7	14.3
Ante-natal Ward	5	71.4	28.6
Theatre	3	42.9	57.1
Toilets	3	42.8	57.2
Human resources for health			
Nutritionist	6	85.7	14.3
Medical Officer	5	71.4	28.6
Pharm Technologists	3	42.8	57.2
Nursing officer(midwife)	1	14.3	85.7
Obstetrician/Gynaecologists	1	14.3	85.7
Equipment			
Linen trolley	6	85.7	14.3
BP Machine	5	71.4	28.6
Delivery coach	5	57.1	42.9
Stethoscope	5	57.1	42.9
Oxygen machine	5	57.0	43.0
Suction machine	5	57.0	43.0
Portal lamps/overhead	3	42.9	57.1
General trolley	3	42.9	57.1

Ultra sound	3	42.9	57.1
MUAC tape	3	42.9	57.1
Autoclave	3	42.8	57.2
Baby cots	3	42.8	57.2
Blood warmer	2	28.6	72.4
Ultrasonic Nebulizer	2	28.6	72.4
Rescucitaire	2	28.5	71.5
Speculum set	2	28.5	71.5
Infant radiant warmer	1	14.3	85.7
Phototherapy unit	1	14.3	85.7
Infant weighing scale	1	14.3	85.7
Telephone	1	14.3	85.7
Baby stethoscope	1	14.3	85.7
Nursery with incubator	1	14.3	85.7

Results from factor analysis shown in Table 3 demonstrates that all listed items under respective structural components (physical structure, human resource for health and equipment) had absolute values <0.4. Having antenatal wards (0.2126), Medical Officer (0.2126), suction machine (0.2126) and an ultra sound (0.2093) were strongly positively correlated with their respective principle components while having a Nursing Officer (Midwife), antenatal clinics (-0.2294), toilets (-0.2294) autoclave (-0.2294) and baby cots (-0.2294) were inversely correlated.

Table 3: Healthcare structural aspects' impact weights

	Structural aspects	
A	**Physical structural aspects**	**Factor weights**
	Antenatal ward	0.2126
	Nursing station	0.1979
	Family Planning Room	0.1979
	Postnatal ward	0.1979
	Theatre	0.0484
	ANC Clinic	-0.2294
	Toilets	-0.2294
B	**Human resources for health**	
	Medical officer	0.2126
	Nutritionist	0.1979
	Obstetrician/Gynaecologists	0.0210
	Nursing officer(midwife)	-0.2294
	Pharm Technologists	-0.0456
C	**Equipment**	
	Suction machine	0.2126
	Ultra sound	0.2093
	General trolley	0.1979
	Rescucitaire	0.1979
	Speculum set	0.1715
	Portal lamps/overhead	0.1618
	Oxygen machine	0.0765

Nursery with incubator	0.0318
Baby stethoscope	0.0318
BP Machine	0.0234
Linen trolley	0.0234
MUAC tape	0.0234
Phototherapy unit	0.0210
Blood warmer	0.0177
Autoclave	-0.2294
Baby cots	-0.2294
Delivery coach	-0.213
Infant radiant warmer	-0.213
Infant weighing scale	-0.2294
Stethoscope	-0.2294
Telephone	-0.2294
Ultrasonic Nebulizer	-0.0545

IV. DISUSSION

The study examined the adequacy of healthcare structural aspects from the management perspective to enable objective evaluation of MNCH service delivery quality performance among tier 3 public health facilities of Kisumu County. This was necessary since the consumers' viewpoint only is less likely to reflect accurately on structural aspects of service provision functions as examined in this study. Of the physical structures more than half of the health facilities reported adequate quality in 5 of the 7 listed quality items required, including post-natal wards, family planning rooms and ante-natal clinics. However, lack of required mix of staff cadres and equipment still predominates, indicating considerably deficient MNCH services. Lack of theatre facilities is a major setback in handling obstetric emergencies which can lead to unnecessary delays and further exacerbates adverse obstetric outcomes. A study done in Africa by Kruk, showed health facilities with caesarean section capacity particularly those with birth volumes higher than 500 per year, had higher scores for quality maternal health care[19].

Majority of the health facilities in this study had adequate number of nutritionists and medical officers with only (14.3%) having adequate number of nurses and Obstetric/gynaecologists. Nurses and obstetrics/gynaecologists play a critical role in improving maternal, newborn and child health services [20], and shortage of these and other complementary cadres in a referral health facility impacts negatively on the quality of MNCH services.

The current study results demonstrates that whereas in majority of the health facilities basic physical structures were available, previous studies 21, 22,] have shown that in addition to making the physical facilities available, ensuring corresponding availability of equipment [23]; appropriate staff mix, with necessary competence to correctly perform MNCH tasks [24]; sufficient and equitably distributed numbers of staff to match the increasing demand and healthcare management [25,26,27] are essential in realizing the potential public health impact envisaged by the efforts to address access to care, such as the national free MNCH policy. but play an active role in ensuring efficiency and accountability hence improving quality of healthcare and helping to achieve universal health coverage.

V. CONCLUSION

This study has shown that most tier three public health facilities in Kisumu County have the recommended ANC clinics, post-natal wards, family planning rooms but with inadequate theatre facilities, appropriate staff mix and sufficient range of equipment to meet the requirements for quality MNCH services. These results indicate a clear need for improvement intervention strategies to strengthen all the structural components of MNCH service delivery functions in Kisumu County. The findings have programmatic, political and administrative implications unique to this County in addressing deficiencies in MNCH service provision among the tier 3 health facilities, thus causal or comparative inferences with other contexts may not be drawn.

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