



Status of Health workers Knowledge on Maternal and Neonatal Health related to Service Delivery in Makueni County

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ABSTRACT

Introduction: Globally, new born mortality remains unacceptably high. Neonatal mortality accounts for 60% of infant mortality rate in Kenya. In Makueni County, 1 in 22 children does not live to his or her first birth day. This unacceptable high mortality is despite existence of cheap and tested interventions which could reduce up to 70% of current deaths. Evidence of mismanagement of clients in the County health facilities has raised concerns whether health workers attending to mothers and neonates are knowledgeable. The purpose of this study was to determine health worker knowledge on maternal and neonatal health related to service delivery in Makueni County. Specific objectives were to determine prenatal care, pre-eclampsia and postnatal care knowledge among primary care givers and how it relates to service delivery. **Methods:** we used a cross sectional research design. A total of 163 health workers selected through simple random sampling were involved. Data was collected using a structured questionnaire and observational checklist. **Results:** On prenatal care, majority of health workers 89(54.6%) had good knowledge ($X^2=45.1$ $p<0.05$). Practice didn't conform to guidelines since 30.3% and 69.7% of antenatal mothers didn't have full history taken and general physical examination done respectively. On pre-eclampsia, majority of caregivers (78, 49.4%) had poor knowledge while on postnatal care 53(32.5%), 58(37.4%) and 132 (80%) had good knowledge in new-born care, management of neonatal infections and young infant feeding respectively. **Conclusions:** The study concluded that health workers were not following guidelines and lacked adequate knowledge in management of pre-eclampsia, new-born care and neonatal infections. **Recommendations:** The study recommends the following to Makueni County health managers (i) to have refresher course, targeted continuous medical education and standard operating procedure on management of pre-eclampsia (ii) to strengthen supportive supervision and ensure guidelines are adhered to (iii) to retrain workers on new-born care and management of neonatal infections.

Key words: Knowledge, Health, prenatal, pre-eclampsia, postnatal, service delivery, health workers, responsiveness, motivation Makueni County, Kenya

Introduction

A healthcare system comprises all organizations, institutions, individuals and activities whose primary goal is to promote, restore or maintain health (World Health Organization [WHO], 2007). This includes actions that address determinants of health and those that directly improve health situation. According to WHO framework for action, a health system has six building pillars (health workforce; service delivery; information; financing; medical products, vaccines and technologies; leadership and governance) which are interdependent and interrelated making a complex whole. This study focused on health workforce pillar. A productive health workforce is one that works in ways that are responsive to client needs, fair and efficient to realize optimal outcomes considering available resources and circumstances i.e. there are adequate staff, equitably distributed; they are effective and proactive (WHO, 2007).

Globally, about four million newborns die every year during the first twenty-eight days of life (neonatal period) and many more are stillborn. Seventy five percent of neonatal deaths occur within seven days of life and the highest risk of dying is within the first 24 hours. Nearly all (99%) neonatal deaths occur in poor countries. In Africa, the top three causes of neonatal deaths are severe infections (28%), birth asphyxia (27%) and prematurity (29%) (Lawn, Cousens, & Zupan, 2005). In Kenya, asphyxia, birth trauma, prematurity and neonatal sepsis combined account for 80% of newborn deaths (Ministry of Health [MOH], 2012). Even though current trends show that infant mortality rate (IMR) and under five mortality rates (U5MR) in Kenya are declining, the neonatal mortality rate has stagnated (31 per 1,000 live births) and accounts for 60% of all infant mortality rate (Kenya National Bureau of Statistics [KNBS], 2008). In Makueni County, 1 in 22 children do not live to their first birthday. The U5MR and IMR rates are 56/1,000 and 45/1,000 live births respectively (KNBS, 2009). In the County Referral Hospital, the facility based IMR and neonatal mortality rates are 17% and 22 % respectively (Department of Health [DOH] Makueni, 2013).

Over 70% of these deaths can be averted through cost effective evidence-based interventions, and which include equipping health workers with necessary knowledge and skills to provide effective prenatal and immediate postnatal services. To this end, Kenya developed basic paediatric protocols and obstetric guidelines (updated regularly) meant to provide health workers with knowledge on neonatal, infant and pregnant mothers care. The WHO has been publishing and regularly updating international guidelines on child and maternal health (e.g. integrated management of childhood illnesses guidelines) aimed at capacity building health workers with knowledge on how to provide effective and efficient maternal and child health services. The efforts to improve maternal and neonatal health in Kenya got into greater heights in recent times. The sitting president in June 2013 introduced free maternity services in all government facilities to enable as many pregnant women to access skilled delivery services. Similar efforts are being spearheaded by her Excellency the first lady in her campaign “beyond zero”. Even though all these efforts are aimed at improving the health of pregnant mothers and consequently ensure good child health outcomes, it is impossible to realize them if health workers providing services lack essential knowledge on maternal and neonatal care. In Makueni County, delivery of maternal and neonatal services has faced numerous challenges. In the year 2013, out of 1,667 babies born alive at the County Referral Hospital, 29 died before discharge, a situation that could have been avoided. In the same

year, 55 still births were also documented in the hospital (MOH, 2014). The hospital management has documented various complaints from clients, most of them raising issues of mismanagement of their health problems and negligence on the part of service providers. Most of the documented complaints relate to poor and unsafe maternal and neonatal service delivery where mothers lose pregnancies, neonates and or complicate during antenatal and perinatal periods.

This raises the question whether such occurrences are due to negligence, poor attitude or inadequate knowledge thereof among caregivers. This study aimed to determine health worker knowledge on maternal and neonatal health related to service delivery in Makueni County. It specifically aimed to establish healthworker knowledge on prenatal care, pre-eclampsia and postnatal care as related to service delivery in Makueni County.

Methods

The study adopted a cross sectional research design. The study was conducted in Makueni County and the sample was 166 primary care givers (9 medical officers, 28 clinical officers, and 129 nurses) working in public health facilities. The sample was obtained from 47 health facilities selected through sequential stratified, proportionate and simple random sampling. Study respondents were selected through simple random sampling. Data was collected using structured questionnaire and observational checklist. Response rate on questionnaires was 98%, while observational checklist was administered 33 times proportionate to health facility stratification that is respondent contribution by level of care. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 25.

The researcher obtained ethical approval from the Kenya Methodist University Scientific, Ethics and Research committee and from the National Commission of Science and Technology and Innovation. In addition, approval was obtained from the County Department of Health in Makueni. The researcher sought informed consent from the respondents and facility in-charges where observational check list was administered. Participation in the study was voluntary and names of respondents kept anonymous for protection of their identities.

Results

The sociodemographic characteristics included age bracket, education level and years worked in mother child clinic (MCH) as shown in **Table 1**. Majority of respondents were within 26-35 years 92(56.4%) age bracket while 119(73%) were diploma holders. On years worked in MCH, only 11(6.7%) had worked for 6-10 years and 8(4.9%) having worked more than 10 years. These findings were evident during the study since majority of respondents were young. It also reflects status of the problem of study since majority of respondents do not have adequate experience in serving mothers and new born children. This can be implied from the small percentage of workers who had worked in MCH more than 5 years 19(11.6%). As expected from the sampling technique and distribution of workforce in the County, majority of respondents 129(79.1%) were nurses, 28(17.2%) clinical officers and 6(3.7%) medical officers.

Table 1: Sociodemographic Characteristics of Respondents (N=163)

Characteristics	N	%
Age		
Less than 25 years	17	10.4
26-35 years	92	56.4
36-45 years	31	19.0
More than 46 years	23	14.2
Education Level		
Certificate	16	9.8
Degree	13	8.0
Diploma	119	73.0
Higher diploma	15	9.2
Years worked in MCH		
Less than 1 year	72	44.2
1-5 years	72	44.2
6-10 years	11	6.7
Over 10 years	8	4.9

Respondents' Knowledge on Pre-natal Care

The respondents were asked to indicate when a pregnant mother should make her first antenatal care clinic (ANC) visit. The results are shown in **Table 2**. Majority 106 (64.2%) correctly indicated that first ANC visit should be when one discovers she is pregnant. This is the practice prescribed in the national Focused Antenatal Care (FANC) manual which indicates first ANC visit should be when one discovers she is pregnant and not later than 16 weeks of gestation. It is of concern that 35.8% of health workers would not provide correct advice on the same to mothers.

Table 2: First Antenatal Care Visit and Prenatal Care Knowledge

	N	%	Chi-Square	p-value
Knowledge on First ANC Visit				
Immediately she misses menstrual period	26	15.8	216.54	0.000
After missing period for 2 consecutive months	6	3.6		
After 3 months	20	12.1		
When she discovers she is pregnant	106	64.2		
Had have no opinion	5	3.0		
Level of Prenatal care Knowledge				
Less than 50 [poor knowledge]	19	11.7	45.104	.000
Between 51-69 [Moderate Knowledge]	55	33.7		
More than 70 [Good knowledge]	89	54.6		

Respondents were stratified into three categories according to their prenatal care knowledge scores. More than half 89(54.6%) had good knowledge while 19(11.7%) were rated as having poor knowledge ($\chi^2=45.104$, $P <0.001$). These findings indicate that most health workers are able to provide appropriate prenatal care services. However, there is still need to improve knowledge on prenatal care among most of the respondents, 33.7% and 11.7% were rated as having moderate and poor prenatal knowledge respectively, to ensure effective and safe services delivery.

ANC History Taking and Client Assessment

According to observations done during the study, all ANC consultations 33 (100%) were done by nurses (results shown in **Table 3**).

Table 3: ANC History Taking, Assessment, Client Examination, and Laboratory Evaluation

History Taking	N	%
Level of Healthcare Facility		
Dispensary	5	15.2
Health Centre	3	9.1
Hospital	25	75.8
Type of Healthcare Worker		
Nurse	33	100.0
History taking		
Complete	23	69.7
Incomplete	10	30.3
Client Assessment		
	Yes N(%)	No N(%)
Height	7(21.2)	26(78.8)
Weight	33(100.0)	0(0.0)
Pulse	33(100.0)	0(0.0)
Respiration	4(12.1)	29(87.9)
Blood Pressure	33(100.0)	0(0.0)
Exposure of area of interest	16(48.5)	17(51.5)
Physical Examination		
General examination	10(30.3)	23(69.7)
Signs of anemia	17(51.5)	16(48.5)
Breast exam	2(6.1)	31(93.9)
Heart Auscultation	0(0.0)	33(100.0)
Fundal Height	33(100.0)	0(0.0)
Fetal Presentation	33(100.0)	0(0.0)
Fetal Heart Sounds	32(97.0)	1(3.0)
Inspection of external Genitalia	2(6.1)	31(93.9)
Laboratory Examination		
HIV Testing	33(100.0)	0(0.0)
Urinalysis	30(90.9)	3(9.1)
VDRL	27(81.8)	6(18.2)
Blood Group	30(90.9)	3(9.1)
Hemoglobin level	33(100.0)	0(0.0)

Majority of mothers 23(69.7%) had full history obtained and documented however the history taken was incomplete for 10(30.3%) of clients. Majority of the clients 26(78.8%) did not have body height taken and 29(87.9%) did not have their respiration assessed. Client privacy was not adhered to since 51.5% of mothers had assessment done without covering body areas of no interest. Additional data on ANC practices show that majority 23(69.7%) of mothers did not have general physical examination done, 16(48.5%) were not examined for signs of anemia, 31(93.9%) did not have breast examination or inspection of external genitalia and no client had heart auscultation done. This kind of practice is not recommended because it may lead to overlook of critical and serious conditions, e.g. anemia in pregnancy is very common in Kenya and in Makueni County in particular.

Despite universal supplementation of iron and folate, it is not uncommon to get mothers with severe anemia at term. Breast examination during pregnancy can determine mothers who have short nipples and prepare in advance how to tackle breastfeeding challenges that accompany it. Similarly, inspection of external genitalia can help identify mothers who have genital warts and prepare for elective caesarean section. This prevents the neonate from contracting papilloma virus infection, a serious disease in new-born children.

On laboratory evaluation, most investigations were done accordingly. Only a few mothers (18.2%) did not have syphilis (VDRL) screening test and 9.1% blood grouping done. It was of concern that 27.3% and 9.1% of mothers, with abnormal urinalysis results and low hemoglobin levels respectively, did not have appropriate action taken. The findings in tables 4 and 5 clearly indicate failure of health workers to follow FANC guidelines as recommended.

Respondents' Knowledge of Pre-eclampsia

Results on respondents' knowledge of pre-eclampsia are shown in Table 4. The researchers used a scoring scale (0-100%) to grade the knowledge on pre-elampsia among the respondents. The scale was divided into three levels: Less than 50 = poor knowledge, Between 51-69 = Moderate Knowledge, and 70 and above = Good knowledge.

Table 4: Respondents' Knowledge on Management of Pre-eclampsia

Knowledge on Management of Pre-eclampsia		N	%	Chi-Square	P-value
Level of Knowledge of Pre-eclampsia	Less than 50 [poor knowledge]	78	49.4	25.722	.000
	Between 51-69 [Moderate Knowledge]	54	34.2		
	More than 70 [Good knowledge]	26	16.5		
Use of Recommended drugs (Hydralazine, Nifedipine, Labetalol, Methyldopa)	Less than 50 [poor knowledge]	39	23.9	8.926	.012
	Between 51-69 [Moderate Knowledge]	70	42.9		
	More than 70 [Good knowledge]	53	32.5		

On knowledge on pre-eclampsia, majority of respondents 78(49.4%) were rated as having poor knowledge while 26(16.5%) had good knowledge. A test of association using chi-square revealed that there was positive correlation ($\chi^2 = 25.72, P<0.001$). Regarding use of drugs for pre-eclampsia, majority 53(32.5%) had good knowledge and 39(23.9%) poor knowledge ($\chi^2 = 8.93, P<0.012$). Study findings reflect the situation on the ground since most client complaints on poor outcomes were related to poor management of hypertensive disease in pregnancy (DOH Makueni, 2013).

Knowledge of Postnatal Care among the Respondents

Postnatal care is health care provided to mothers and new-born babies immediately after delivery. The study focused on young infant feeding, new born care and management of neonatal infections. The results are shown in **Table 5**.

Table 5: Knowledge on Young Infant Feeding, Newborn Care, and Management of Neonatal Infections

		N	%	Chi-Square	P=
Young Infant feeding score	Less than 50 [poor knowledge]	31	18.8	62.583	.000
	More than 70 [Good knowledge]	132	80.0		
Newborn care	Less than 50 [poor knowledge]	35	21.5	14.773	.001
	Between 51-69 [Moderate Knowledge]	75	46.0		
	More than 70 [Good knowledge]	53	32.5		
Management of Neonatal Infections	Less than 50 [poor knowledge]	24	15.5	24.400	.000
	Between 51-69 [Moderate Knowledge]	73	47.1		
	More than 70 [Good knowledge]	58	37.4		

Knowledge rating on young infant feeding indicated that majority of respondents 132 [80%] had good knowledge ($\chi^2 = 62.583, P<0.001$). Majority of respondents had moderate knowledge in new born care, 75(46%) while 35(21.5%) had poor knowledge [$\chi^2 = 14.8, P<0.001$]. Regarding management of neonatal infections, majority 73(47.1%) had moderate knowledge while 24(15.5%) had poor knowledge ($\chi^2 = 24.4, P<0.05$). The study findings indicated that majority of health workers were knowledgeable on young infant feeding and therefore would provide good services including health education on new born feeding. However, knowledge on new born care and management of neonatal infections was average, with more than a fifth of workers lacking knowledge on new born care. This situation means a remarkable number of new born children would not get appropriate care in the County's health facilities and therefore staff capacity development is required.

Respondents were asked on the best way of stabilizing the temperature of a new born. The findings are illustrated in **Table 6**.

Table 6: Stabilizing the Temperature of a Newborn

		N	%
Stabilizing Temperature of Newborn	Bath in water of appropriate temp	14	8.6
	Have baby close to heat e.g. radiator	4	2.5
	I have no opinion	2	1.2
	Keep in room with temperature of 28-30 degrees Celsius	25	15.3
	Put on clothes and cover head	38	23.3
	Skin to skin contact with mother	74	45.4

Majority 74(45.4%) of health workers indicated they would do so through skin to skin contact with mother while 14(9.6%) would bath newborn in water of appropriate temperature. Hypothermia (loss of body temperature) is among the top leading causes of neonatal mortality, especially immediately after birth. It is notable that more than half of the respondents would not encourage kangaroo mother care (skin to skin contact) in stabilizing the temperature of a new born. Kangaroo care is the best method of preventing hypothermia and is advocated by WHO for resource poor settings like Kenya. In recent times, this approach has been publicized by Kenyan media with Bungoma County recognized as the best example.

Inferential Statistical Analysis

The study objective was to examine health worker knowledge and how it influences service delivery. Knowledgeable health workers would be expected to provide effective and responsive MCH services. They would also be proactive and motivated to serve mothers and new born babies. A bivariate analysis was done to assess relationship between independent (prenatal care knowledge, pre-eclampsia knowledge and postnatal care knowledge) and dependent (health worker responsiveness and motivation) variables. To test for health worker responsiveness, appropriate ANC consultation time was used while motivation was measured using Likert scale. Responses were stratified for inferential analysis (**See Table 7**).

Appropriate consultation time was used as a surrogate measure of health worker responsiveness in providing MCH services. There was a significant correlation between appropriate ANC consultation time and knowledge level of prenatal care $\chi^2 = 120.34$, $P < 0.001$, pre-eclampsia $\chi^2 = 8.48$, $P < 0.04$, use of recommended drugs $\chi^2 = 23.28$, $P < 0.001$, and new born care $\chi^2 = 9.95$, $P < 0.02$. However, there was no significant correlation between appropriate ANC consultation time and knowledge level of young infant feeding and management of neonatal infections. This means that adequate consultation time has positive outcome when providing prenatal, pre-eclampsia and new born care services.

Table 7: Level of Knowledge and Appropriate ANC Consultation Time

		Appropriate ANC Consultation Time		Total N	Chi-Square	P=value
		Less than 10 minutes	Above 10 minutes			
		N	N			
Prenatal Care	Inadequate knowledge	62	12	74	120.342	0.000
	Adequate knowledge	0	89	89		
Pre-eclampsia	Inadequate knowledge	55	77	132	8.486	0.004
	Adequate knowledge	3	23	26		
Use of Recommended drugs	Inadequate knowledge	55	54	109	23.286	0.000
	Adequate knowledge	6	47	53		
Young Infant feeding	Inadequate knowledge	21	24	45	1.964	0.161
	Adequate knowledge	41	77	118		
Newborn care	Inadequate knowledge	51	59	110	9.952	0.002
	Adequate knowledge	11	42	53		
Neonatal Infections	Inadequate knowledge	35	62	97	0.198	0.656
	Adequate knowledge	23	35	58		

The level of respondents knowledge and motivation of serve clients was measured (See **Table 8**).

Table 8: Level of Knowledge and Motivation to Serve Clients

		Motivation to Serve Mothers and Newborns			Total	Chi-Square	P=value
		Motivated	Neutral	Not Motivated			
		Prenatal Care	Inadequate knowledge	38			
	Adequate knowledge	89	0	0	89		
Pre-eclampsia	Inadequate knowledge	99	16	17	132	8.216	0.016
	Adequate knowledge	26	0	0	26		
Use of Recommended drugs	Inadequate knowledge	76	15	18	109	15.337	0.000
	Adequate knowledge	51	2	0	53		
Young Infant feeding	Inadequate knowledge	35	3	7	45	2.224	0.329
	Adequate knowledge	92	15	11	118		
Newborn care	Inadequate knowledge	79	14	17	110	8.445	0.015
	Adequate knowledge	48	4	1	53		
Neonatal Infections	Inadequate knowledge	74	12	11	97	1.175	0.556
	Adequate knowledge	47	4	7	58		

There was significant correlation between staff motivation to serve ANC mothers and new born babies and level of prenatal care $\chi^2 = 55.57$, $P < 0.001$, pre-eclampsia $\chi^2 = 8.21$, $P < 0.016$, use of recommended drugs $\chi^2 = 15.33$, $P < 0.001$ and new born care $\chi^2 = 8.44$, $P < 0.05$ knowledge. However, there was no significant correlation between staff motivation to serve ANC mothers and new born babies and level of young infant feeding and management of neonatal infections knowledge.

Discussion

The optimal functioning and productivity of a health system is highly dependent on the smooth and complimentary functioning of all components that make up the system. Health workforce is one of such components and the most important pillar of a healthcare system. This is because human beings determine the success of processes and also how other resources are utilized. A good, effective and efficient health system should therefore ensure availability of the right mix of health workers, equitably distributed, provided with essential equipment and commodities; and most important having adequate knowledge and skills to assure effective and safe health services delivery. This study looked at the critical aspect of health worker knowledge on maternal and neonatal health and how it influences MCH service delivery in Makueni County.

Study findings established inadequate knowledge among health workers especially on management of pre-eclampsia. This is supported by study findings elsewhere. A study done by Sana et al. (2016) in Pakistan on healthcare provider knowledge and management of pre-eclampsia established numerous shortcomings in knowledge regarding the cause, diagnosis and management of pre-eclampsia among health workers. Findings implied that lesser knowledge could have been due to lack of refresher trainings and written guidelines for management of the disease; and to lack of experience since very few clients sought care in primary and secondary level health facilities.

The study also established knowledge gaps in prenatal care, new born care and on management of neonatal infections. On ANC service provision, the study established glaring gaps and failure to follow prescribed guidelines. The study findings are not so different from research findings found elsewhere. The fact that health workers did not know when a pregnant mother should make first ANC visit is not unique to Makueni. Ivan (2013) found that 72.7% of mothers attending ANC at Mulago hospital in Uganda did not know the gestational age at which an expectant mother should start ANC clinic visits, reflecting failure of good health education on the subject. In a study by Gortmaker (1979) on the effects of prenatal care upon the health of the new born in New York, it was established that caucasian mothers who delivered on a general service, and all black mothers, experienced significantly increased risks on receiving inadequate antenatal care.

How long consultation time is appropriate and effective remains a subject of big debate worldwide. Longer consultation times have been highly associated with better diagnosis and care of psychosocial problems and with better patient outcomes. Client future expectations are however influenced by previous experience but are likely to be satisfied by what they are

used to (George, John, Apali, & Alston, 2002). Mathole, Lindmark, Majoko and Ahlberg (2004) found that consultation times were short and different from what is recommended in FANC guidelines. This made the clients experience unsatisfactory and missed detection of health complications. Inadequate consultation time did not allow effective counselling and health education to expectant mothers.

Simkhada, Edwin, Maureen and Padam (2007) established that in Tanzania, more than half of all expectant mothers were not advised on danger signs during pregnancy, did not have urinalysis done and neither were they given Malaria preventive treatment. Similarly, Boller, Wyss, Mtasiwa and Tanner (2003) found that the provision of ANC services in both public and private clinics in Dar es Salaam did not follow guidelines and diagnostic evaluations were not done by care givers. Ayiasi, Criel, Orach, Nabiwemba and Kolsteren (2011) established that in Masindi, Uganda, majority (over 70%) of caregivers could not tell the right treatment of a bleeding cord and only 10.4% could correctly identify a baby born with abnormally low weight and suggest appropriate treatment. In a study where health workers were assessed regarding breastfeeding knowledge at KwaZulu Natal in South Africa, a high HIV prevalence area with a population of 220,000 people, and where results were compared to recommendations in WHO's breastfeeding counselling course; it was established that even though 93% of doctors knew breastfeeding should start within 30 minutes after delivery, 71% would recommend water and 50% solids to breastfed infants under 6 months of age (Shah, Rollins, & Bland, 2005).

There was significant correlation between staff motivation to serve ANC mothers. This means when workers are motivated, they would provide effective and satisfying prenatal, pre-eclampsia and new born care services. In a study by Robert (2013) in Ghana on association between health worker motivation and healthcare quality efforts, significant positive associations were found between staff satisfaction levels with working conditions and the clinic's effort towards quality improvement and patient safety.

Conclusion

The study concluded that majority of health workers were knowledgeable on prenatal care. However, over a third of workers did not know when a pregnant mother should make her first ANC visit. It also concluded that ANC consultation practices did not follow FANC guidelines since there were many omissions concerning incomplete history taking, incomplete client assessment, incomplete physical examination and laboratory evaluation. There was failure to ensure client privacy and also failure to take appropriate action for all clients who had low hemoglobin or abnormal urinalysis results.

As regards diagnosis and management of pre-eclampsia, the study concluded that majority of health workers had poor knowledge in diagnosing the condition and only a third had good knowledge in use of recommended drugs. On postnatal care, the study concluded that majority of health workers had good knowledge on young infant feeding. However a significant number of health workers had poor knowledge in new born care and management of neonatal infections. More than half of health workers did not recommend skin to skin contact (Kangaroo mother care) as the best method of stabilizing the temperature of a new

born. The study established a statistically significant relationship between health worker responsiveness and knowledge on prenatal care, pre-eclampsia and new born care. A similar correlation was established between health worker motivation to provide MCH services and knowledge in prenatal, pre-eclampsia and new born care.

Recommendations

- i. Makueni County health managers need to ensure all primary care givers have refresher courses and targetted continuous medical education on FANC, quality obstetrics and neonatal care guidelines.\
- ii. Integrate service delivery to ensure all ANC services are provided under one roof.
- iii. Strengthen supportive supervision to ensure guidelines are adhered to and have in place standard operating procedures for management of pre-eclampsia.
- iv. Health managers need to utilize the few experienced workers as mentors to instill knowledge and skills to their juniors before exit from service.

Competing Interests

The authors declare that they have no competing interests.

Authors Contributions

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

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REFERENCES

- Adetugbo, D. (1997). Socio-cultural factors and the promotion of exclusive breastfeeding in rural Yoruba communities of Osun State, Nigeria. *Soc Sci Med*, 113-125.
- Aisien, A., & Shobowale, M. (2005). Health care workers knowledge on HIV and AIDs: Universal precautions and attitudes towards PLWHA in Benin city, Nigeria. *Nigerian Journal of Clinical practice*, 74-82.
- Ayiasi, R., Criel, B., Orach, C., Nabiwemba, E., & Kolsteren, P. (2011). *Primary healthcare worker knowledge related to prenatal and newborn care*. Kampala: Makerere university.
- Bhutta, Z., Ali, S., Samana, A., Cousens, S., Ali, T., Haider, B., . . . Black, R. (2008). Alma ata: rebirth and revision 6: interventions to address maternal, newborn and child survival: what difference can intergrated primary healthcare strategies make ? *Lancet*, 972-989.

- Boller, C., Wyss, K., Mtasiwa, D., & Tanner, M. (2003). Quality and comparison of ANC in public and private providers in the United Republic of Tanzania. *Bull World Health Organ*, 116-138.
- Conrad, P., Schmid, G., Tientrebeogo, J., Moses, A., & Kirenga, S. (2011). Compliance with focused antenatal care services. *Tropical Med Int Health*, 300-307.
- Department Of Health MaKueni. (2013). *Makueni County strategic plan 2013-2018*. Wote: Author.
- Eriksson, L., Nga, N., Malqvist, M., Persson, L., Ewald, U., & Wallin, L. (2009). *Evidence-based practice in neonatal health: knowledge among primary healthcare staff in northern Vietnam*. Hum Resour Health.
- Esmail, & Songa. (1994). Health education on breastfeeding in ANC in Eldoret district hospital, Kenya. *Scientific research*, 149-154.
- Esposito, S., Tremolati, E., Bellasio, M., Chiarelli, G., Marchisio, P., Tiso, B., & Mosca, F. (2007). Attitudes and Knowledge regarding Influenza vaccine among hospital health workers caring for women & children. *Vaccine*, 5283-5292.
- Ganatra, H., & Zaidi, A. (2010). Neonatal infections in the developing world. *semin perinatol*, 416-425.
- George, F., John, H., Apali, H., & Alson, H. (2002). Evolving general practice consultation in Britain: issues of length and context. *BMJ*, 324-880.
- Gortmaker, S. L. (1979). The effects of prenatal care upon the health of the newborn. *American Journal of Public Health*, 653-660.
- Inke Mathaeur, I. I. (2006). Health worker motivation in Africa: the role of non-financial incentives and human resource management tools. *Human Resources for Health*, 1478-1491.
- Ivan, K. D. (2013). Timing and reasons for coming late for the first antenatal care visit by pregnant women at Mulago hospital, Kampala Uganda. *BMC Pregnancy and Child birth*, 1471-2393.
- Kenya National Bureau of Statistics. (2008). *Kenya demographic and health survey*. Nairobi: Author.
- Kenya National Bureau of Statistics. (2009). *Multiple indicator cluster survey*. Nairobi: Author.
- Lawn, J., Cousens, S., & Zupan, J. (2005). 4 million neoanatal deaths: when ? where ? why? *Lancet*, 891-900.
- Lutwama, G., Roos, J., & Dolamo, B. (2012). *A descriptive study on health workforce performance after decentralization of health services in Uganda*. Kampala: Hum Resour Health.
- Marjolein Dieloman, J. W. (2006). *Improving health worker performance: In search of promising practices*. Geneva: World Health Organization.

- Martines, J., Paul, V., Bhutta, Z., Koblinsky, M., Soucat, A., Walker, N., . . . Costello, A. (2005). Neonatal survival: a call for action. *Lancet*, 1189-1197.
- Mathole, T., Lindmark, G., Majoko, F., & Ahlberg, B. (2004). A qualitative study of women's perspective of antenatal care in rural area of Zimbabwe. *Midwifery*, 122-154.
- Ministry Of Health. (2007). *National reproductive health policy*. Nairobi: Author.
- Ministry Of Health. (2012). *National guidelines for quality obstetrics and perinatal care*. Nairobi: Author.
- Ministry Of Health. (2013). *Kenya service availability and readiness assessment mapping*. Nairobi: Author.
- Ministry Of Health. (2013). *Paediatric protocol*. Nairobi: Author.
- Ministry Of Health. (2014, September 25). *Kenya health information system*. Retrieved from hiskenya.org: <http://www.hiskenya.org>
- Mugenda, O., & Mugenda, A. (2003). *Research Methods: Quantitative and qualitative approaches*. Nairobi: Acts Press.
- Okolo, S., & Ogbonna, C. (2002). Knowledge, attitude and practice of health workers in keffi local government hospitals regarding baby friendly hospital initiative practices. *European Journal of clinical nutrition*, 438-441.
- Robert, A. N. (2013). Association between health worker motivation and healthcare quality efforts in Ghana. *Human Resources for Health*, 11-27.
- Rowe, A., Savingy, D., Lanata, C., & Victoria, C. (2005). How can we achieve and maintain high-quality performance of health workers in low resource settings? *Lancet*, 1026-1035.
- Sana, S., Rahat, Q., Asif, K., Rehana, S., Marriane, V., & Diane, S. (2016). Health care provider knowledge and routine management of pre-eclampsia in Pakistan. *Reproductive Health*, 104.
- Saugstad, O., Rootwelt, T., & Aalen, O. (1998). Resuscitation of asphyxiated newborn infants with room air or oxygen: An International controlled trial. *Paediatrics*, 102.
- Shah, S., Rollins, N. C., & Bland, R. (2005). Breastfeeding knowlegde among health workers in rural South Africa. *Journal of tropical paediatrics*, Vol 51.
- Shiffman, J. (2010). Issue attention in global health: the case of newborn survival. *Lancet*, 2045-2049.
- Simkhada, B., Edwin, R., Maureen, P., & Padam, S. (2007). Factors affecting the utilization of ANC in developing Countries: A systematic review of the literature. *Advanced nursing*, 244-260.
- Smith, S. (2013, April). *Determining sample size: how to ensure you get the correct sample size*. Retrieved from Qqualtrics: <http://www.qualtrics.com>
- World Health Organization. (2006). *World Health Report*. Geneva: Author.

- World Health Organization. (2007). *Everybody business: strengthening health systems to improve health outcomes: WHO's framework for action*. Geneva: Author.
- World Health Organization. (2009). *Optimal duration of exclusive breastfeeding* . Geneva: Author.
- World Health Organization. (2010). *The Global strategy for women's and children's health*. Geneva: Author.
- Yengo, M. (2007). *Nurses perception about the implementation of FANC in district health facilities of Dar es Salaam*. Cape Town: University of South Africa.