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IMPLICATIONS OF USING ASSISTANT MEDICAL OFFICERS TO PERFORM CAESAREAN SECTIONS ON MATERNAL AND NEONATAL OUTCOMES IN THE CONTEXT OF TASK SHARING PRACTICE AT SELECTED SECONDARY AND PRIMARY HEALTH FACILITIES IN TANZANIA

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IMPLICATIONS OF USING ASSISTANT MEDICAL OFFICERS TO PERFORM CAESAREAN SECTIONS ON MATERNAL AND NEONATAL OUTCOMES IN THE CONTEXT OF TASK SHARING PRACTICE AT SELECTED SECONDARY AND PRIMARY HEALTH FACILITIES IN TANZANIA

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ABSTRACT

Background: **Fifty-six years ago, Tanzania introduced Assistant Medical Officers (AMOs), capable of providing health services which might be performed by Medical Doctors (MDs) at primary and secondary level of care. For the purpose of this study, the primary and secondary health facilities refer to Health centres and district hospital/ Designated District Hospitals respectively. Since the country established the task sharing policy in recent years, the success rate of caesarean sections (C-sections) performed by AMOs and the maternal and neonatal outcomes, have not been systematically evaluated in the country.**

Objective: **To assess the contribution of AMOs in performing C-sections and maternal and neonatal outcomes in primary and secondary health facilities in Tanzania.**

Design: **A cross sectional retrospective study**

Setting: **Three secondary and 3 primary health facilities in Kigoma, Morogoro, Mtwara and Tanga regions, Tanzania.**

Subjects: **Four thousand, three hundred and two (4302) clinical records of C-sections conducted between 1st January 2014 and 31st December 2015. Data analysis was done using IBM SPSS software package.**

Results: **AMOs were more likely than MDs to perform elective C-sections at selected health centers and district hospitals than emergency C-sections, OR=2.52 95% CI (1.80 - 3.54); AMOs were more likely than MDs to report big baby-small maternal pelvis indications than foetal distress, OR = 1.35 95%CI (1.01 – 1.81). In**

both univariable and multivariable analysis, there was no statistical difference between AMO and MDs on outcome of the baby and post-operative complications. *Conclusion:* **In this study setting, maternal and neonatal outcomes of C-sections performed by AMOs compared well with those performed by MDs. Therefore, there is a clear policy implication to consider more efforts to improve quality and outcomes with awareness of the fact that more women can access C-section services through task sharing strategy.**

INTRODUCTION

Globally, 800 women die daily due to causes related to pregnancy and childbirth with obstructed labour being a major direct cause of death (1). Two thirds of these deaths occur in sub-Saharan Africa. Caesarean section (C-section), one of the nine signal functions of comprehensive emergency obstetric and newborn care (CeMONC), is a key surgical intervention used to avert maternal mortality resulting from obstructed labour (2-4). Critical shortage of health care providers has been cited as a major contributor to poor maternal and neonatal indicators in developing countries including Tanzania (5-6).

At independence, 56 years ago, Tanzania inherited a fragile health care system with a critical shortage of human resources for health (HRH), mostly in underserved areas. Since then, the country has been implementing various strategies to address access to health care services inluding several attempts to close the HRH gap. In 1963, the country introduced a non-physician referred to as the assistant medical officer (AMO), to perform advanced care provision such as surgical procedures including C-sections in health centres and district hospitals where medical doctors (MDs) were scarce (7). Examples of policies and strategies include: the Arusha Declaration of 1967 that underscored the country's need for self-sufficiency in the public sector (8); the Primary Health Services Development Programme (PHSDP) 2007–2017 that re-affirmed the country's commitment to improve access to life-saving maternal health services and the National Road Map Strategic Plan (2008–2015) to accelerate reduction of maternal and new-born deaths. The introduction of AMO was a way to improve equitable access to maternal health services and reduce maternal mortality ratio (MMR). The AMOs are qualified clinical officers with more than 3 years' experience and have undergone further training for two years to obtain an advanced diploma in clinical medicine (7). The AMO training program involves rotations in the areas of obstetrics and gynecology, child health, medicine, surgery, and a community medicine at a teaching hospital (9). In this manuscript, the initiative to utilise AMOs in complementing MDs is considered as akin to the contemporary task sharing strategy as stipulated in the Tanzania Task Sharing Policy Guidelines for Health Sector Services (10).

Globally, there has been renewed interest in task shifting and sharing following the WHO report on HRH crises in developing countries (11). Task shifting is defined as rational utilisation of available workforce or alternatively creating a new category of health workforce (12). In task shifting practice, tasks are re-organised so that cadres with shorter training and less qualification can perform some of the tasks traditionally performed by cadres with higher qualifications and longer training. Specifically for reproductive health services, the WHO guideline clearly spelt out the role of advanced associate clinician (the equivalent of AMO in Tanzania) in performing C-sections (13). Tanzania established a task sharing policy stipulating

the role of AMOs in performing C-Sections besides other essential care and treatment services (10). Initially, AMOs were exclusively expected to perform C-sections in health centres and district hospitals in underserved areas. However, they increasingly co-exist with the MDs at various levels of care in most health facilities. Staffing norms have been reviewed and each health centre should have at least one AMO and one doctor while a district hospital should have 8-23 MDs and 16-39 AMOs (14).

Despite the initiatives taken so far, Tanzania is among the top ten countries contributing 58% of the global maternal mortality (1). The estimated 70% rural population remains vulnerable to higher risks of maternal mortality and morbidity due to shortage of qualified personnel (10, 15-16). Based on the staffing norms, AMO deficit stands at 70% while that of MDs stands at 80% (10). Meanwhile, the Tanzania MMR is very high at 556 per 100,000 live births and average C-section rate for rural areas is only 4% (17), below 5-15% range recommended by the WHO (18-19).

So far, there is a scarcity of literature on the role of AMOs in performing C-sections under task sharing arrangements and whether maternal and neonatal outcomes of C-sections performed by them have changed over time. Thus, there is a need to understand the contribution of AMOs in performing C-sections and maternal and neonatal outcomes in the context of the task sharing policy and co-existence of qualified service providers in health centres and district hospitals in Tanzania. Here we report contribution of AMOs and associated outcomes in relation to performing C-sections in health centres and district hospitals in Tanzania.

MATERIALS AND METHODS

Study design and settings: A cross sectional retrospective documentary review of 4302 clinical records of C-sections was performed between 1st January 2014 and 31st December 2015 in 3 secondary and 3 primary health facilities from various regions in different zones of Tanzania. Secondary health facilities included in this study were, Muheza Designated District Hospital of Muheza district in Tanga region, North Eastern Tanzania, Mkomaindo District Hospital in Mtwara, Southern of Tanzania and Kasulu District Hospital in Kigoma region, in Western Tanzania. Primary health facilities were Nyenge health centre in Kigoma region, and Mlimba and Kibaoni health centres both located in Kilombero district in Morogoro region, South Eastern Tanzania. These facilities were purposively selected to allow the inclusion of a) hospitals with AMOs; b) geographical representation of the four zones from the Northern, Southern, Eastern and Western parts of Tanzania; c) different levels of the national caesarean section rates (average, below and the national average); d) one region in each zone; d) one underserved district in each region and g) half of the facilities being health centres and the rest being district hospitals.

Data collection and measurement instruments: Data was collected by health officials including MDs who were trained on use of the data collection tools, to ensure data quality and validity. Three pre-tested data collection instruments were used to extract information from various sources including registers of labour wards, operating theatres, post-natal wards, the health facility profile and the health facility information system in a period of 4 weeks. The data collection instruments used were; the health facility data extraction tool, the facility staff establishment tool and the clinical summary statistics tool. The facility

data extraction tool collected data on facility catchment population, bed capacity per government policy and actual bed capacity, total numbers of C-sections, live births, fresh and macerated stillbirths. The facility staff establishment tool gathered information on the number and category of available staff in 2014 and 2015.

The clinical summary statistics tool collected information on each C-section conducted including the service provider that performed the surgery, indication, month and year when each C-section was conducted and whether elective or emergency. Data collection on early neonatal outcomes was limited to the first 24 hours after C-section to enable calculation of perinatal and very early neonatal death rate as defined in the Measure Evaluation family Planning and Reproductive Health Indicators Database. The data for each C-section included, number of live births, number of fresh stillbirths, number of neonates that died within 24 hours and any neonatal complications that occurred within the same period. Data collection on early maternal outcomes was limited to 48 hours after C-section, being the acute postnatal phase where most early complications arise and during which mothers are unlikely to be discharged from hospital. The data on maternal outcomes for each C-section included live births, maternal deaths and any other complications that occurred within 48 hours post C-section.

Data management and Analysis: All data entry, cleaning and analysis was done using a Statistical Package for Social Sciences software (SPSS 23). Post-coding was done to facilitate data entry by creating new variables and combining others (20). A variable of "*outcome*" had to be created to cover major events that happened during and after C-section like occurrence or non-occurrence of maternal or neonatal death. A new variable "big baby-small maternal pelvis" was created by combining the following similar indications: big baby, small pelvis and contracted pelvis. The indication of "*previous C-section*" was created to include any number of previous C-sections. Malpresentations (arm prolapse, transverse lie, shoulder and face presentations) were combined into a newly created variable of "*malpresentation'*. All indications for C-sections (foetal distress, APH, previous C-Section, obstructed labor, ruptured uterus, eclampsia, Cord presentation, malpresentations, big baby-small maternal pelvis) were adjusted as confounders for outcomes of C-section performed by either AMOs or MDs, using logistic regression model. The main outcome variable was binary (1=C-section done by AMO and 0=C-section done by MD).

Early outcome measures for the period January 2014 to December 2015 were calculated for both AMOs and MDs to facilitate comparison as indicated below;

The proportion of C-sections performed by AMOs:

This proportion was calculated by dividing number of C-sections performed by AMOs with total facility C-sections and multiplying by 100. This was calculated to determine AMO contribution towards meeting the C-section need for each facility.

The proportion of emergency C-section deliveries:

The proportion of emergency C-section deliveries by AMOs was calculated as the number of emergency C-sections per 100 C-sections deliveries by AMOs per each facility.

The proportion of elective C-section deliveries:

The proportion of elective C-section deliveries by AMOs was calculated as the number of elective C-sections per 100 C-section deliveries by AMOs per each facility.

Indications for C-sections:

Proportions of indication-specific C-sections by AMOs were calculated as the number of indication-specific C-sections per 100 C-sections performed by AMOs.

Maternal death rate

The proportion of women that died during and within 48 hours after C-section in 2014 and 2015 was calculated for both AMOs and MDs using the formula in equation one (21).

Equation 1:

No. of maternal deaths among C-sections by AMOs during and within 48 hours X 100

Total number of C-sections performed by AMOs

Intrapartum including very early neonatal death rate

Intrapartum including very early neonatal death rate was calculated using the Measure Evaluation formula as shown in equation two (2) to determine neonatal outcomes of C-sections performed by AMOs compared to those by MDs

Equation 2:

No. of C-sections by AMOs resulting in intrapartum deaths and within first 24 hours X100

Total number of women giving birth by C-sections performed by AMOs

Complications

The proportions of specific post-C-section complications among C-sections performed by AMOs were calculated by dividing the number of C-sections with a particular complication by total number of all C-sections performed by AMOs and multiplied by 100.

Ethics and approval

The study protocols were approved by the University of KwaZulu-Natal Biomedical Research Ethics Committee (number BE390/14) and the Tanzania National Institute for Medical Research (number NIMR/HQ/R.8a/Vol.IX/2249). Permission to collect data from health facilities was granted by the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC). Permission was also granted by the regional and district health authorities. At facility level, the Medical Officer In-Charge (MOIC) provided permission and facilitated access to clinical records. All data collectors were health professionals that were bound by the Secrecy Act and were fully aware of the responsibility to keep patient information confidential. All data from individual clinical records were kept confidential. No names or other identifying information was recorded to protect client identity. Each clinical record was assigned a unique code that could not be traced to the individual. All reports are based on summary data that cannot be linked to individuals.

RESULTS

C-sections performed by AMOs versus C-section by MDs: A total of 4302 C-section records were analysed. In two years, AMOs performed a cumulative total of 3544 (82%) C-sections compared to 758 (18%) performed by MDs. At district hospitals level, AMOs performed more C-sections than MDs. At Mkomaindo hospital, where most C-sections were recorded, five (5) AMOs performed 757 (93%) C-sections in 2014 and 604 (83%) in 2015. Comparatively, five (5) MDs at Mkomaindo performed 25 (3%) and 121 (17%) C-sections in 2014 and 2015 respectively. On average each AMO performed 272 C-sections in 2 years compared to 29 performed by each MD, 9 times less than those performed by each AMO.

At health centre level, AMOs performed all C-sections, 332 at Mlimba and 17 at Nyenge because there were no MDs. At Kibaoni health centre, AMOs performed 33 (70%) in 2014 and 32 (91%) in 2015. Despite Kibaoni having 2 MDs and 3 AMOs, the total number of C-sections performed (65) was less than that at Mlimba (332) with only two AMOs. On average, an AMO at Mlimba performed 166 C-sections in 2 years compared to 22 for an AMO at Kibaoni for the same period. Table 1 shows further

details on numbers and percentages of C-sections performed by AMOs and by MDs in 2014 and 2015, the average number of C-sections performed by each AMO and each MD in 2014 and 2015 per each health facility.

Table 1

Total number of C-sections conducted by MDs and AMOs at 6 health facilities per health care provider, 2014-2015, Tanzania

	C-sections performed in 2014			**C-sections performed in 2015**			**Grand Total**		**Average No. of C-sections by**	
	AMOs (%)	MDs (%)	Total	AMOs (%)	MDs (%)	Total	AMOs	MDs	each AMO	each MD
Kasulu DH	411(83)	87(17)	498	501(86)	83(14)	584	912	170	182	57
Mkomaindo DH	757(97)	25(3)	782	604(83)	121(17)	725	1361	146	272	29
Muheza DDH	404(62)	251(38)	655	453(72)	174(28)	627	857	425	142	85
Kibaoni HC	33(70)	14(30)	47	32(91)	3(9)	35	65	17	22	9
Mlimba HC	149(100)	n/a	149	183(100)	n/a	183	332	n/a	166	n/a
Nyenge HC	9(100)	n/a	9	8(100)	n/a	8	17	n/a	9	n/a
Total	**1763(82)**	**377(18)**	**2140**	**1781(82)**	**381(18)**	**2162**	**3544**	**758**		

Key
DH: District hospital
DDH: Designated district hospital
HC: Health centre
n/a: Not applicable because facility does not have MDs

Status of C-sections performed by AMOs versus C-sections performed by MDs: Numbers of Emergency and Elective C-sections performed by AMOs and MDs in six health facilities are shown in table 2. Out of 4302 C-sections, 3828 (89%) were emergencies. At district hospitals level, all C-sections performed by MDs at Kasulu (170) and Muheza (425) were emergencies. In all three hospitals, MDs performed higher proportions of emergencies than AMOs. At Kibaoni HC, MDs performed 15 (88%) emergency C-sections compared to 55 (85%) performed by AMOs. In total, AMOs performed 3110 (88%) emergency C-sections out of 3544 C-sections that they performed in 2014 and 2015. MDs performed 718 (95%) emergency C-sections out of 758 C-sections that they performed in same facilities during the same period indicating a higher proportion of emergencies among C-sections by MDs. Elective C-sections accounted for 474 (11%) out of all C-sections (4302) by both AMOs and MDs. At district hospitals level, most elective C-sections were performed at Mkomaindo where MDs performed 38 (26%) compared to 386 (28%) performed by AMOs. At Muheza DDH, there were no elective C-sections performed by either AMOs or MDs. At health centers level, Kibaoni recorded 10 (15%) elective C-sections by AMOs and 2 (12%) by MDs while Nyenge reported none. In total, AMOs performed 434 (12%) elective C-sections and MDs performed 40 (5%) indicating a lower proportion of elective C-sections done by MDs.

Table 2

Numbers of Emergency and Elective C-sections performed by Assistant Medical Officers (AMOs) and Medical doctors (MDs), Tanzania, 2014-2015 at different health facilities

	C-sections		Emergency C-sections		Elective C-sections	
	AMOs	MDs	AMOs (%)	MDs (%)	AMOs (%)	MDs (%)
Kasulu DH	912	170	911(100)	170(100)	*1(0)	0(0)
Mkomaindo DH	1361	146	975(72)	108(74)	386(28)	38(26)
Muheza DDH	857	425	857(100)	425(100)	0(0)	0(0)
Kibaoni HC	65	17	55(85)	15(88)	10(15)	2(12)
Mlimba HC	332	n/a	295(89)	n/a	37(11)	n/a
Nyenge HC	17	n/a	17(100)	n/a	0(0)	n/a
Total	3544	758	3110(88)	718(95)	434(12)	40(5)

Key

**Value was 0.01% and on rounding off, it became 0.*

DH: District hospital

DDH: Designated district hospital

HC: Health centre

n/a: Not applicable as the facility does not have MDs

Indications for C-sections: Most indications were obstructed labour (36%), previous C-sections (21%), foetal distress (19%) and big baby-small maternal pelvis (13%). Obstructed labour accounted for 1265 (36%) C-sections performed by AMOs compared to 290 (38%) performed by MDs. Previous C-sections accounted for 740 (21%) of all C-sections performed by AMO in comparison to 151 (20%) by MDs. Proportions of C-sections performed for big baby-small maternal pelvis were 460 (13%) for AMOs and 83 (11%) for MDs. Table 3 shows further details on indications for C-sections, number and proportions of indicator–specific C-sections by AMOs and by MDs.

Table 3

Indications for C-sections performed by AMOs and MDs, Tanzania, 2014-2015.

	AMO C-sections (%)	**MD C-sections (%)**	**Total (%)**
Ruptured uterus	36(1)	5(1)	41(1)
Cephalo-pelvic disproportion	460(13)	83(11)	543(13)
Previous C-section	740(21)	151(20)	891(21)
Ante partum haemorrhage	134(4)	23(3)	157(4)
Obstructed labour	1265(36)	290(38)	1555(36)
Foetal distress	640(18)	156(21)	796(19)
Cord presentation	59(2)	10(1)	69(2)
Malpresentations	71(2)	10(1)	81(2)
Eclampsia	139(4)	30(4)	169(4)
Total	3544(100)	758(100)	4302(100)

Maternal outcomes For C-sections performed by AMOs and MDs: All 3544 mothers came out alive after C-sections performed by AMOs. Comparatively, among the 758 C-sections performed by MDs, 754 (99.5%) came out alive and 4 (0.5%) died. All deaths occurred in district hospitals with Kasulu recording three deaths and Mkomaindo one death. Health centres did not record any deaths.

Intrapartum and early neonatal mortality: A total of twenty-five (25) neonates out of 4302 C-sections performed in six health facilities in 2014 and 2015 died giving a cumulative mortality rate of 5.8/1000 live births. Out of 3544 C-sections performed by AMOs, 24 (0.7%) neonates died giving a mortality rate of 6.8/1000 live births. There was only one (0.1%) neonatal death among the 758 cases performed by MDs giving a mortality rate of 1.3/1000. A comparison of neonatal deaths by hospital showed that Kasulu DH had the majority (12) followed by Mkomaindo with 10. Only 3 neonatal deaths occurred in 2 health centres (Mlimba and Kibaoni).

Post C-section complications: Most C-sections, 4272 (99%) did not develop any complications within the first 48 hours. Among 3544 C-sections performed by AMOs, the following complications occurred; post-partum haemorrhage (PPH) 21 (0.5%), asphyxia 2 (0.05%), wound gaping 2 (0.05%) and sepsis 1 (0.02%). Among 758 C-sections performed by MDs, PPH occurred in 4 (0.5%) C-sections. All complications were recorded at Mkomaindo except for one case of PPH and another one of sepsis that occurred at Mlimba, a health centre where there were no MDs.

Logistic Regression Analysis: A logistic regression analysis was conducted to obtain an adjusted odds ratio (OR) for C-sections outcomes comparing AMOs and MDs (Table 4).

Table 4

Logistic regression analysis of CS-sections outcome comparing AMOs and medical doctors

	Univariable analysis		**Multivariable analysis**	
	OR	95%CI	OR	95%CI
Complication				
No (Reference)	1			
Yes	1.39	(0.48 – 4.00)		
C-section status**				
Emergency	1		1	
Elective	2.50	(1.80 – 3.50)	2.52	(1.80 - 3.53)
Outcome of the baby				
Alive	1			
Dead	5.16	(0.70 -38.2)		
Indications				
-Foetal distress	1		1	
-Ante Partum Haemorrhage	1.42	(0.88 – 2.28)		
-Previous C-Section	1.19	(0.93 - 1.52)		
-Obstructed labor	1.06	(0.85 – 1.32)		
-Ruptured Uterus	1.75	(0.68 – 4.54)		
-Cord presentation	1.43	(0.72 – 2.87)		
-Malpresentations	1.73	(0.87 – 3.43)		
-Eclampsia	1.12	(0.73 – 1.73)		
-Big baby-small maternal pelvis**	1.35	(1.01 – 1.81)	1.26	(0.94 - 1.70)

*Footnote: ** p<0.001*

Univariate analysis showed that, AMOs were more likely to perform elective than emergency C-sections than MDs {OR=2.50; 95% CI (1.80 - 3.50)}. Multivariate analysis showed that AMOs were more likely to perform elective than emergency C-sections {OR=2.52; 95% CI (1.80 - 3.53)}. On indications, AMOs were more likely to perform C-sections for big baby-small maternal pelvis than foetal distress {OR=1.35; 95% CI (1.01 - 1.81}). However, this difference was only significant on univariate analysis. Although a greater number of neonatal deaths 24 (0.7%) occurred among C-sections performed by AMOs, the adjusted OR showed no significant difference between perfomance of AMOs and MDs. The proportion of complications was higher among C-sections performed by AMOs, but this difference was not significant.

DISCUSSION

Our findings showed that a significantly higher proportion of C-sections was performed by AMOs. These findings concur with evidence from other studies conducted in Tanzania and elsewhere demonstrating a tendency of AMOs to often be performing the larger number of C-sections (23-25). This implies a need to provide more professionals and other necessary support towards improved quality of care provided to the populations that rely on the AMOS for such important services.

Although AMOs performed large numbers of C-sections, such procedures were more likely to be elective while MDs performed a significantly higher proportion of emergencies. This could explain why there were no deaths among C-sections performed by AMOs while 4 deaths were reported among C-sections that MDs performed giving a crude death rate of (0.5%). While crude death rate is an indicator for quality of services provided in health facilities, this finding does not necessarily represent the performance of MDs in Tanzania as the deaths occurred in only 2 facilities out of six. It can also be argued that MDs are expected to perform C-sections of complicated pregnancies referred to them by AMOs or lower levels of care. It may also be argued that the 4 fatalities may have already been compromised by the time MDs attended to them as results indicated that MDs were more likely to perform emergency surgeries.

Although our study did not find significant differences in intrapartum and very early neonatal mortality between AMOs and MDs, there was a higher number of babies dying, (0.7%), among C-sections performed by AMOs, particularly at Kasulu and Mkomaindo district hospitals where 10 and 12 deaths were recorded respectively. Similarly, a study in Burkina Faso found that neonatal outcomes were significantly better with MDs than with non-physician clinicians known as the attache's de sante' enchirurgies (26). Intrapartum and very early neonatal mortality is a measure of quality of intrapartum care. We recommended an investigation on factors contributing to neonatal mortality among C-sections by AMOs.

Our findings corroborate those of earlier studies on medically justifiable indications for C-sections that include obstructed labour, previous C-sections, malpresentation, ruptured uterus and foetal distress (27). Despite AMOs having a shorter training period and a lower qualification than MDs, they successfully performed C-sections whose indications were like those performed by MDs. Furthermore, as confirmed by our study, post C-section complications like baby asphyxia, wound gaping, PPH and sepsis may occur, underscoring the need to avoid unnecessary C-sections that subject mother and baby to surgical risks.

LIMITATIONS

Our results were based on secondary data analysis. This method has inherent limitations in that, while it enables researchers to develop insights on what happened, it does not offer explanations. For example, the reasons why AMO to MD C-section ratio was so high, why maternal and neonatal negative outcomes occurred in some facilities and not others or what factors contributed to higher neonatal deaths among C-sections performed by AMOs could not be established. To answer these questions, a more analytical study needs to be conducted. We limited our follow up for post–C-sections outcomes to only 48 Hours to reduce risk of loss to follow up. Another limitation was data gaps. To address this challenge, we used different data sources, from operation theatre, labour, postnatal wards and neonatal units.

CONCLUSIONS

In this study setting, maternal and neonatal outcomes of C-sections performed by AMOs compared well with those performed by MDs. Therefore, there is a clear policy implication to consider more efforts to improve quality and outcomes with awareness of the fact that more women can access C-section services through task sharing strategy.

RECOMMENDATIONS

We recommend continuing support and investment in task sharing of C-sections in health centres and district hospitals as majority of mothers in underserved areas are accessing C-sections through this arrangement. Given the large disparity in proportions of C-sections performed, even in facilities where the number of AMOs was equal to that of MDs, there is need to investigate the reason for this to ensure rational task sharing and prevent burnout. Finally, although deaths were minimal, there is need to prevent those that could have been avoidable. Hence, in the interest of public health, we recommend that both AMOs and MDs receive regular supportive supervision and coaching to continue upgrading their skills particularly at Mkomaindo DH where most complications occurred.

POLICY AND PROGRAMMATIC IMPLICATIONS

The formalization of the task sharing policy is an important strategy that gives legal mandate to AMOs to conduct C-sections at health centres and district hospitals. High proportion of C-sections performed by AMOs shows a major contribution by this cadre to the provision of C-sections with the expectation to reduce MMR and NMR among underserved populations. However, it remains a concern that maternal and neonatal deaths associated with C-sections continue to occur in health facilities. This is a threat to meeting the Sustainable Development Goal (SDG) target to reduce the global maternal mortality ratio to less than 70 per 100,000 live births between 2016 and 2030. Furthermore, the disparity between the C-sections performed by AMOs and MDs in every facility, with AMOs performing the most, may put AMOs at risk of burnout. Therefore, there is need to clearly define the nature and extent of the shared responsibilities. Alternatively, an assessment of workload indicators of staffing need (WISN) should be conducted to inform policy makers on the staffing levels per a given facility based on the facility workload. The fact that AMOs performed so many C-sections in 2 years, in six facilities, even where there were no MDs, shows that AMOs are an important component of the integrated health system and help to bridge the clinical HR gap and

increase accessibility to C-sections services. Policy makers may consider scaling up the AMO programme given that outcomes of C-sections by AMOs compared well with those of MDs. The fact that AMOs are less qualified and receive a shorter training should not be a hindrance in a situation where all the 3 district hospitals had less numbers of AMOs than required.

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