

Health Care Professional Knowledge and Attitude toward the Use of Digital Technologies in Provision of Maternal Health Services at Tumbi Regional Referral Hospital in Tanzania

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Abstract

Objectives: In recent years, Tanzania introduced digital technologies in health industry where several initiatives such as Government of Tanzania, Hospital Management Information System along other digital devices are taken to ensure quality services delivery. The purpose of this study was to assess Health Care Professionals (HCPs) knowledge and attitude toward the use of digital health technology (DHT) in provision of maternal health services at Tumbi Regional Referral Hospital. **Materials and Methods:** Descriptive cross-sectional design involving 50 purposively selected HCPs from the obstetrics and gynecology department was used. A self-administered questionnaire and direct field observation were used to collect data from respondents. Data were analyzed using SPSS V.20 and presented by using tables, percentages, and frequencies. **Results:** We found that DHT is highly used by HCPs 49 (98%). Furthermore, DHT devices are available and functioning properly, thus used in providing maternal health services by enhancing effective patient management. Forty-three (86%) of HCPs were aware of DHT practice and about 46 (92%) understood the use of DHT in the provision of maternal health services despite varying knowledge level. On the side of attitude, we found that 43 (86%) of the HCP had a positive attitude on the use of DHT. **Conclusion:** Knowledge, attitudes, and rate of use of DHT by HCP were found to be good, despite notable challenges such as dependent on the internet signals for their proper functioning. More initiatives should be undertaken by the Ministry of Health, Community, and other stakeholders to promote DHT practices in the health facilities.

Keywords: Digital technology, Health care professional, Tanzania, Tumbi regional referral hospital

Introduction

Background information

Provision of Maternal health services continues to be a serious problem in developing countries, particularly in Africa, although the current world focuses on the need to improve maternal health services, particularly with the use of digital technologies brought by continuous innovations on science and technology.^[1] At present, 85% of the world has been covered by cell phone signals,

in which 95% of people live in areas covered with mobile cellular networks and mobile broadband networks (3G, 4G or above) reachable to 84% of the world's population. Such widespread use of mobile phones has helped to drive their integration into healthcare.^[2]

Globally by 2017, maternal mortality rate (MMR) was unacceptably very high, whereby it is approximated about 295000 women died during and following pregnancy and childbirth. Moreover, the majority of

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these deaths, about 94%, occurred in low-resource settings, where most could have been prevented.^[3] Tanzania is one of the countries with high MMR, which is approximated to be 398/100,000 live births. In the northern part of Tanzania and Zanzibar, deaths of children under 5 years are approximately 56/1000 live births. In addition, in the lake zone is approximated to be 88/1000 live births, 87/1000 live births in the urban mainland, to 76/1000 live births in the rural mainland part of Tanzania. The differences on MMR have been considered to partly be explained by differences in the provision of adequate maternal health care services, including Skilled Birth Attendances.^[4]

Tanzania has been among a few countries that have developed digital software systems and technologies that assist in the provision of health services, particularly maternal health services. In 2015, Tumbi regional referral hospital (TRRH), which is one of the directorates of Kibaha Education Center in collaboration with Mzumbe University, initiated an electronic software system known as Government of Tanzania, Hospital Management Information System (GoT-HoMIS) installed in computers and mobile phones as a software application where health care providers use it in filling patient particulars, ordering of equipment such as drugs and enhancing effective management of the patient. The system is used by health care professionals (HCP) together with other digital technologies, that is, computers, mobile phones, and video conference system as to improve provision of health services, particularly maternal health services.^[5] The application of this digital technology for service delivery is new to health professionals; thus, little is known about their attitude and practice toward the use of digital technology for service delivery, particularly at Reproductive Child Health (RCH) unit. This study assessed HCP knowledge and attitude toward the use of digital technologies in provision of maternal health services at Tumbi Regional Referral Hospital in Tanzania.

Materials and Methods

Setting

We conducted a descriptive cross-sectional study in TRRH located in Coast region of Tanzania. TRRH was chosen as the study area because it was the first regional referral hospital in Tanzania to install digital software systems, particularly Government of Tanzania, Hospital Management Information

System that is used in filling patient particulars, making follow-ups, management, bill filling, and processing. It is also one of the hospitals with the aim of using digital technology to reduce and eliminate maternal deaths through integration with district health information software for health management information system statistics where the statistics can be used to develop appropriate policies and strategies toward the reduction of maternal deaths as stated in its 5 years' development plan II of 2016/17-2020/21.

Study population and sampling

The study targeted HCP with 18 years and above from the obstetrics and gynecology department composed of five units, that is, maternity, gynecology, pediatrics general, neonates, and RCH, as they are responsible with the provision of maternal health services.

A sample size of 50 HCP from the obstetrics and gynecology department was used. All HCP in the obstetrics and gynecology department were included in the study because the number of HCP in the department was <100; therefore were manageable to be included in the study. The inclusion criteria for the study were all HCP from the five units of the obstetrics and gynecology department, that is, maternity, pediatric general, neonates, gynecology, and RCH. The exclusion criteria for the study were all other HCP from other departments that were not concerned with maternal health care. In addition, HCPs from this department were responsible with provision of maternal health services through the use digital systems. Table 1 indicates the composition of the sample size included

Measurements

Study questionnaires and field observations were adopted in collecting relevant information for the study. The questions were developed and translated into Kiswahili to facilitate adequate comprehension of the respondents. The questionnaire was self-administered under the supervision of the research team. The questionnaire included six questions determining social demographic characteristics of HCP, eight questions measuring the rate of use of digital health technologies in the provision of maternal health services, 12 questions measuring knowledge of HCP on the use of digital health technology (DHT) in the provision of maternal health services, and



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Table 1: Sample size composition

Departmental units of obstetrics and gynecology department	Total number	Selected sample size
Maternity	12	12
Gynecology	9	9
Pediatrics general	13	13
Neonates	7	7
Reproductive child health	9	9
Total number of health care professionals	50	50

6 questions measuring the attitude of HCP on the use of digital health technologies in the provision of maternal health services. It took 15–20 min for a participant to fill the questionnaires which were sent physically to the respondents. Direct field observation was used by the researcher to observe the presence of installed digital health devices and systems such as computers, mobile phones, video conference system, and GoT-HoMIS. Proper functionality of available digital health systems, rate of use of the digital systems in the provision of maternal health services, mostly used digital health system in the provision of maternal health services, and availability of internet services that facilitate effective usage of the digital health system.

Data analysis

The study used a quantitative approach; thus, quantitative data were analyzed by the use of excel spreadsheet and SPSS software V.20. Data were edited, coded, and cleaned before being analyzed. The results are presented in tables, graphs, and charts.

Ethical issues

The research was approved by Mzumbe University. At TRRH the research team requested and granted permission from TRRH management for conducting research to the facility. Respondent consent was obtained and confidentiality was observed in dealing with the respondents so as to obtain in-depth information on knowledge and attitude of HCP toward digital health in the provision of maternal health services

Results

Demographic characteristics of the respondents

Study questionnaires were administered to 50 HCP in all units of the obstetrics and gynecology

department in TRRH, of which all 50 HCPs completely fill all information needed that made a response rate of 100%. Most 35 (70%) HCP were female and 15 (30%) were male. Furthermore, 15 (30%) of the HCP were at the age of 18–25. Those aged between 26 and 35 were 12 (24%), those with age between 36 and 45 were 9 (28%) HCP and those with the age of 46 and above were 9 (18%) HCP. Regarding education level, only one respondent, equivalent to 2% had a primary level of education, 5 (10%) had a secondary education level, 15 (30%) had a college education level, and 29 (58%) had a university educational level. Results on working experience of HCPs showed that 22 (44%) of the HCP had an experience of <5 years, 18 (36%) HCPs had an experience of 6–10 years, and 10 (20%) HCP had an experience of more than 10 years. Based on HCPs careers, the findings revealed that 5 (10%) HCP were gynecologists, 15 (30%) HCP were medical doctors, 8 (16%) HCP were nursing officer, 6 (12%) HCP were an assistant nursing officer, 10 (20%) HCP were enrolled nurses, and 5 (10%) were medical attendants and only 1 (2%) of HCPs was obstetricians [Table 2].

The rate of use of digital health technology in provision of maternal health services

With regard to the rate of use of digital health technologies by HCP, a majority of respondents 100% responded that digital health technologies and devices, that is, GoT-HoMIS and mobile phones were available and installed at their working area. Among them, 66% are functioning properly and only 34% of the respondents responded that digital health system was not function well. In addition, it was also revealed that software system GoT-HoMIS is the mostly (90%) used digital technology in the provision of maternal health services and other services. It is because of its simplicity and availability to all department offices of TRRH. Thus, due to its simplicity and availability, the technology GoT-



Table 2: Social demographic characteristics of health care professionals

Variable	Frequency (N)	Proportion (%)
Sex		
Females	35	70
Males	15	30
Age		
18–25	15	30
26–35	12	24
36–45	14	28
45–above	9	18
Education level		
Primary	1	2
Secondary	5	10
College	15	30
University	29	58
Working experience		
Less than 5 years	22	44
5–10 years	18	36
11 years and above	10	20
Professional careers of health care professionals		
Gynecologists	5	10
Medical doctor	15	30
Nursing officer	8	16
Assistant nursing officer	6	12
Enrolled nurse	10	20
Medical attendant	5	10
Other	1	2

HoMIS is used by 98% in facilitating the provision of maternal health services, although it is highly used by 50% [Table 3].

Knowledge of HCP on the use of DHT in the provision of maternal health services

With regard to knowledge of HCPs on the use of digital health technologies in the provision of maternal health services, 86% were aware of DHT practice, where the majority 52% became aware from the working place, 24% from school, and 10% elsewhere. Furthermore, the findings revealed that 92% of HCP had an understanding on the practice of DHT despite having a moderate knowledge level on using DHT in the provision of maternal health services. On the other hand, 64% of HCP at the obstetrics and gynecology department had attended training as a means of improving and updating their knowledge level and improve their understanding on the use of DHT in the provision of maternal health services. In addition, the training provided helped to improve their knowledge level by 60%; thus, provision of training helped to improve the

provision of maternal health services through digital health technologies by 64% [Table 4].

Attitude of HCP on the use of DHT in provision of maternal health services

With regard to the attitude of HCP on the use of digital health technologies in the provision of maternal health services majority of respondents (86%) think that the use of DHT will improve the provision of maternal health services. This is because it simplifies communication and ensures effective management of the patient, thus ensuring the effective provision of maternal health service. Furthermore, 80% of respondents had a positive perception on the use and practice of DHT in the provision of maternal health services and only 20% had a negative perception. Finally, majority (86%) of HCP believed that the use of DHT will improve the provision of maternal health services [Table 5].

Discussion

The results of our study revealed that digital health technologies, that is, GoT-HoMIS and mobile



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Table 3: The rate of use of digital health technology in provision of maternal health services

Question	Response	Frequency (N)	Proportion (%)
Are DHT available/installed in your working area?	Yes (available)	50	100
	No (not available)	0	0
Do they function properly?	Yes (properly functioning)	33	66
	No (not functioning properly)	17	34
From installed/available DHT which one is the most used in provision of maternal health services?	Government of Tanzania, Hospital Management Information System	45	90
	Mobile phones	5	10
Are they used in provision of maternal health services?	Yes (used in provision of maternal health services)	49	98
	No (not used in provision of maternal health services)	1	2
How often are they used in provision of maternal health services?	Low	3	6
	Medium	22	44
	High	25	50
For how long have you been using installed/available DHT in providing maternal health services at your working area?	0–5 years	46	92
	6–10 years	4	8
	11 and above	0	0

DHT: Digital health technology

Table 4: Knowledge of health care professionals on the use of DHT in provision of maternal health services

Question	Response	Frequency (N)	Proportion (%)
Do you know about DHT practice?	Yes	43	86
	No	7	14
Where did you get that knowledge?	School	12	24
	Working place	26	52
	Other	5	10
Do you have an understanding on the usage of DHT?	Yes	46	92
	No	4	8
What is your knowledge level on the use of DHT in provision of maternal health services?	Low	14	28
	Moderate	31	62
	High	5	10
Have you ever attended any training on the use of DHT in provision of maternal health services?	Yes	32	64
	No	19	36
After the training, the level of your knowledge on DHT was improved?	Yes	30	60
	No	20	40
Did it improve the provision of maternal health services	Yes	32	64
	No	18	36
Are there other means apart from training that improved your knowledge on DHT?	Yes	35	70
	No	15	30

DHT: Digital health technology



Table 5: Attitude of health care professionals on the use of digital health technology in provision of maternal health services

Question	Response	Frequency (N)	Proportion (%)
Do you think the use of digital health technologies improves provision of maternal health services?	Yes	43	86
	No	7	14
How do you perceive the use of digital health technologies in provision of maternal health services?	Positively	40	80
	Negatively	10	10
Do you believe that the use of digital health technologies will improve the provision of maternal health services?	Yes	43	86
	No	7	14

phones, are highly used at a rate of 90% by HCP in the provision of maternal health services. HCPs were also well knowledgeable in the use of digital health technologies and had attended training as a means of improving their knowledge on the use of DHT. Moreover, it was revealed that the knowledge of HCPs was directly proportion with their positive attitude in terms of their views and beliefs on the use of DHT. This is because HCP considered the use of digital health technologies such as GoT-HoMIS, mobile phones, and computers as an improvement over the current practices in the health industry, which is well fitted with the requirements needs of the current practices of health industry in the provision of maternal health care services. Studies conducted by Woodward *et al.*, 2014^[6] that explored personal experiences of health care workers toward the use of e-health innovations in selected post-conflict situations, Sukums *et al.*, 2014^[7] that analyzed Health care workers' knowledge of and attitudes toward computer applications in rural African health facilities and Orton *et al.*, 2018^[8] that determined the relationship between healthcare professionals' attitudes toward e-health, level of Information and Communication Technology (ICT) skills and e-Health use in healthcare delivery in government and private hospitals in northern Uganda, respectively, have also argued that HCP had a positive attitude on the use of digital technologies in the provision of health services.

The current study "Health Care Professional Knowledge and Attitude toward the Use of Digital Technologies in Provision of Maternal Health Services at TRRH in Tanzania" results also found an inverse relationship in terms of the knowledge level of HCPs versus their understanding level on the use of DHT in the provision of maternal health services. Surprisingly, a moderate knowledge level of HCPs on the use of DHT reflects HCPs confidence on using ICT application, that is, GoT-HoMIS in facilitating maternal health services. It

also appears that moderately knowledge level was much influenced by the presence of commonly available ICT devices (computer) and applications in hospitals. Thus, it was not surprising that the results indicated a moderate knowledge level on the use of DHT that has been continuously used based on experience and self-learning. Moreover, in some units of the obstetrics and gynecology department, it was revealed that low knowledge level was attributed to poor skills on using digital devices, that is, computers. This is consistent with previous studies including Woodward *et al.*, 2014;^[6] Kipturgo *et al.*, 2014;^[9] and Orton *et al.*, 2018,^[8] where digital devices and applications, such as internet, e-mail, word processors, and computers received a moderate understanding level on using them among healthcare professionals and staffs.

We also found that the knowledge of HCPs varies directly with the rate of use of DHT in the provision of maternal health services. This means that since there is a high use of digital technology by HCPs at the obstetrics and gynecology department, there is also a high understanding level among HCPs on using digital devices and software systems in facilitating the provision of maternal health services. These results are similar from what was initially expected and the reason behind is because the study area TRRH was the first regional referral hospitals in Tanzania to install digital software systems, that is, GoT-HoMIS that is used in filling patient particulars, making follow-ups, ensuring patients management, bill filling, and processing thus expecting that HCP would also have a high of understanding on using DHT in providing maternal health services. These results were different from those obtained in a study done by Noordam *et al.*, 2011,^[10] who found out negative (inverse) relationships between the rate (80%) of use of mHealth and staffs understanding (36%) on mobile health technology in the provision of health services in the study area.



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Limitations

Our study had the following constraints; first, there were eight departments in the hospital using DHT to provide health services, but this study was limited to only one department (obstetrics and gynecology) concerned with the provision of maternal health services through digital technologies; thus, the study may not be representative and should be used with caution. Second, based on the available digital health technologies adopted in this study, the study based more on software technological system, that is, GoT-HoMIS and pays narrow attention on other digital technology devices such as computers; thus, it has not reflected a real picture of DHT practice at TRRH.

Conclusion

The use of digital technology such as GoT-HoMIS by HCP in the provision of maternal health services is high. The majority of HCP has an understanding on the use of digital systems in the provision of maternal health services and had a fairly positive attitude in terms of their views, beliefs, and perception on the use of digital technologies in the provision of maternal health services. More initiatives should be undertaken by the government and other stakeholders to promote the use of DHT and ultimately improvement of health service delivery.

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References

1. Sumankuuro J, Crockett J, Wang S. Maternal health care initiatives: Causes of morbidities and mortalities in two rural districts of Upper West region, Ghana. *PLoS One* 2017;12:0183644.
2. West D. How mobile devices are transforming healthcare. *Issues Technol Innov* 2012;18:1-1.
3. UN. The Millennium Development Goals Report; 2018. Available from: <https://www.unstats.un.org/sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018-EN.pdf>. [Last accessed on 2020 May 16].
4. United Republic of Tanzania. Primary Health Service Development Programmed 2007-2017 (MAMM). Dar es Salaam: Ministry of Health and Social Welfare; 2007.
5. United Republic of Tanzania. Digital Health Strategy. Dar es Salaam: Ministry of Health, Community Development, Gender, Elderly and Children; 2019.
6. Woodward A, Fyfe M, Handuleh J, Patel P, Godman B, Leather A, *et al*. Diffusion of e-health innovations in post-conflict settings: A qualitative study on the personal experiences of health workers. *Hum Resour Health* 2014;12:22.
7. Sukums F, Mensah N, Mpembeni R, Kaltschmidt J, Haefeli WE, Blank A. Health workers' knowledge of and attitudes towards computer applications in rural African health facilities. *Glob Health Action* 2014;7:24534.
8. Orton M, Agarwal S, Muhoza P, Vasudevan L, Vu A. Strengthening delivery of health services using digital devices. *Glob Health* 2018;6:S61-71.
9. Kipturgo MK, Kivuti-Bitok LW, Karani AK, Muiva MM. Attitudes of nursing staff towards computerisation: A case of two hospitals in Nairobi, Kenya. *BMC Med Inform Decis Making* 2014;14:35.
10. Noordam AC, Kuepper BM, Stekelenburg J, Milen A. Improvement of maternal health services through the use of mobile phones. *Trop Med Int Health* 2011;16:622-6.

