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ASSESSMENT OF THE EFFECTS OF SHORT MESSAGES COMMUNICATIONS TO PREGNANT WOMEN'S MALE PARTNERS ON THE INSTITUTIONAL CHILD DELIVERIES IN TABORA MUNICIPALITY, TANZANIA

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ABSTRACT

Maternal mortality remains to be a global public health problem, especially in Sub Saharan Africa especially in Tanzania where maternal mortality ratio is 556 per 100,000 live births. This is far away from the strategic development goal targeting 70 per 100,000 live birth by 2030. The major contribution is low health facilities deliveries which are partly contributed by individual factors, policies and health systems. This study aimed at increasing health facilities deliveries to prevent the direct cause of maternal death and indirect through accessing preventive interventions such as PMTCT.

Methodology: *The study involved 314 pregnant women's partners and 364 pregnant women enrolled in Ante-Natal Clinics (ANC) receiving Prevention of Mother- To -Child Transmission (PMTCT) of HIV services in Tabora Municipality. All participants were blindly randomly assigned to control and study groups from which the study group was communicated by short message services on weekly basis for a period of 1 to 8 months on the main advantages of institutional (health facilities) deliveries.*

Results: *The study found out before intervention, the planned deliveries of pregnant women were lower (77.3%) than in the control group (83.6%), p-value of 0.1608 and Chi-square of 1.966. Again, following the intervention, the planned deliveries for intervention rose to 94.3% while the control increased to 92.3%, p-value of 0.4963 and Chi-square value of 0.463. However, in using a double in difference impact evaluation between the intervention and control group, the impact factor 1.896 is generated.*

Conclusion*: The study indicated there is an impact of increased health planned health facilities delivery (1.896 times more for the study group) by SMS communication to pregnant mother's partners. The variability between the intervention and control groups was observed before intervention by Chi-square was insignificant after intervention.*

KEYWORDS: *Institutional Deliveries, Health Facilities Deliveries, Maternal Mortality, Short Message Services, Tanzania*

Article History

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INTRODUCTION

Globally it is estimated that almost 830 women die on daily basis from either pregnancy or childbirths complications of which the majority can be prevented through the implementation of appropriate programs and policies including assisted

professional deliveries in health facilities(1). For reaching the sustainable development goal on the maternal mortality ratio aiming a target of less than 70 per 100,000 by 2030 live births, adaptive innovative strategies may be needed as the ratios are still high in most countries for example in Tanzania it was 556 per 100,000 in 2018(2) World Health Organization (WHO) conducted a systematic analysis of global maternal death where 73% were due to direct obstetric causes which can be minimized or prevented in health facilities set up. Therefore, the best intervention to increase health facilities deliveries will reduce the maternal and neonatal mortality and increase the opportunity to deliver other preventive interventions(3).

Effective communication to pregnant women was among key intervention which was reported in the review of 67 publications from 32 countries concerning health facilities deliveries of which 17 (25%) were emphasized on the advantages of communication in improving health facilities deliveries for reducing maternal mortality(4).The Demographic Health Survey (DHS) in 2016, indicated that Tanzania has low (62 per 1,000 live births) health facilities deliveries and Tabora region had a very low rate of 52 per 1,000 live births (5). Health facility deliveries also provides an opportunity for appropriate use of Anti-Retroviral Therapy (ART) and reduce maternal and infant mortalities contributed to HIV infection(6)

An increasing number of health facilities to increase assess to institutional deliveries is among key interventions advised. Studies have shown that pregnant women's decision to deliver in an institution can be contributed by the distance to the health facility from their houses. In Kenya, it was observed that those pregnant women from Maasai communities staying within three kilometers dimension preferred to deliver in health facilities two times more than those who stayed far from health facilities(7). In this study, it was also observed that pregnant women staying close to health facilities were preferred to use ANC services including PMTCT.

A study involving 485 participants in Tsegedie was conducted in Ethiopia showed pregnant women who were residing less than two kilometers from health facilities were over three times more preferred to have assisted health facility delivery than other Adjusted Odds Ratio (AOR) of 3.3; 95% C.I [1.15 - 9.52] (8). Likewise, another qualitative study that was conducted in rural areas of Malawi involving pregnant women and partners implicated in their pregnancy revealed that distances from the health facilities, attitudes of services providers and availability of transport facilities were associated with health facilities utilization and use of ANC services. (9). Another study in Biharamulo and one in Oromiya indicated that pregnant women who live less than 5 kilometers from health facilities were likely to have institutional deliveries(10,11).

Another study was conducted in Zambia which enrolled 390 participants who tested positive for HIV. The study indicated a distance of 1.9 kilometers away from the health facility as a major decision-making variable to continue using HIV related services (ART and PMTCT) and assisted health facility delivery or not, the AOR of 0.9 (95% CI, 082-0.99)(12). The Zambian study results were resembling to some extent to a household survey of 2,275 women in Nigeria where 58.5% reported that travel distance to health facilities to be a major barrier for utilizing available ANC services including PMTCT and maternal/labor services(13). Similar findings were also observed in a follow qualitative study that distance to a service provision points/health facilities to be a major determinant for participants to whether using or not the available ANC and PMTCT services in the same district in Nigeria(14).

A study involving 200 women in Tanzania indicated that adecision on where to deliver involved several factors but importantly individual factors in which male involvement plays a greater role. In this study, it was indicated the importance of giving male partners important information on the benefits of health facilities deliveries to pregnant

women's partners (15). Another study which was conducted in Cambodia connecting results-based financing and targeted output was health facilities deliveries, through augmented communication from midwives to pregnant women health facilities deliveries raised from 19% in 2006 to 57% in 2011(16). n that study, there were no many pieces of evidence of an increased number of health facilities to reduce the distances. A study involving 1,214 pregnant mothers in Tanzania indicated that 63.6% of the decision to deliver was made by their male partners(17). This depended on the male partners' information on the benefit of health facilities deliveries.

Another study involved 915 women who had assisted deliveries for two years period in health facilities indicated that women who were counseled or informed on the importance of breastfeeding soon after deliveries and danger signs during labor were likely to have institutional deliveries compared to others(18). In the same study among the tribes, the Sukuma tribe was less likely to have health facilities deliveries ($p<0.001$), with no significant variability for the other tribes involved. This is important in this study as Nyamwezi and Sukuma tribes dominate the Tabora Region. A systematic review involving 37 publications from 15 countries indicated the majority of pregnant women preferred to health facilities child deliveries after being well informed on the benefits and knowing danger signs (19).

Policies on exemptions for delivery services reported to have a greater impact on health facilities deliveries. Study in Cambodia indicated after the introduction of a voucher system as part of health -equity- funds, health facilities deliveries rose to 44.9% in 2008 from 16.3% in 2006(20).In Tanzania, these policies have been implemented and results are not much shown, maybe due to inadequate information communicated to male partners who in most cases are deciding where to go for child delivery (21,22).

METHODOLOGY

This study is part of the randomized comparative trial to male participation in the PMTCT program services in Tanzania: moderating role of short message services communications. After consent, women attending PMTCT service in Tabora Municipality were requested to provide male partners' phone numbers. A total of 364 pregnant women and 314 pregnant women's partners were enrolled in the study.All enrolled pregnant women's male partners were communicated by research assistants through phone calls and invited for interviews before, mid of the study and after the study.The list of the collected pregnant women's male partner's phone numbers was used as a sampling framework. From this sampling frame, pregnant women and their partners were randomly clustered into two major groups, the intervention and control groups. For the study group, pregnant women's partners were communicated on the advantages/benefits of health facilities deliveries for their women through weekly short message services for a period of 1 to 8 months.All enrolled participants were allowed freely to discontinued in any stage of the study, however, there was a special arrangement for at least counseling to allow the researchers to collect reasons for defaulters. Also, 42 in-depth interviews were conducted to municipality supervisors from district and health facilities in- charge to supplement the findings from the interviews.

The sample size deployed to the study of 144 to both arms (control and intervention) was obtained from the National Institute for Health Research (NIHR) sample size calculation procedures and formula factor in the 5% precision of the results, 90% survey ANC coverage, and administrative population projections for newborns of 10,210 by 2019(23,24). The selection of key informants was done on convenient sampling for only subject matter specialists.The figure of 42 in-depth interviews was generated by number of health facilities providing ANC services in the municipality and 12 key maternal health coordinators.

All data from pregnant women and their partners' interviews using semi-structured questionnaires were collected using an online platform built on the Open Data Kit (ODK). In this regard, the principal investigator was able to validate and verify real-time data gathered regularly every week. Also, a cross-examination of data from secondary hospital records from the delivery registries in all health facilities of the Tabora Municipality was checked on the actual place of delivery for the period and the same period before the study. An assessment was done before and after the intervention was conducted to pregnant mothers to understand their preference for their place of delivery. Analysis of the results was conducted using Stata 16, while impact evaluation was done using the double in difference impact evaluation method, and significance test was done using Chi-square.

RESULTS

The total study participants were 678 of which pregnant women were 364 (53.7%) and 314 (46.3%) their male partners, these participants were followed for a period of 1 to 8 months and were subjected to the analysis. The response rate for pregnant women respondents was 128.2% and 109% for pregnant women's male partners (Table 1). The study further followed pregnant women in relation to their institutional/health facilities' delivery plans.

Table1: The Distribution of the Enrolled Pregnant Women Study Categorization Response Rate

Study Participants Categorization	Calculated Sample Size	Male Partners' of Pregnant Women's Respondents		Pregnant Women's Respondents	
		Number	Response Rate	Number	Response Rate
Study Group (*received SMS*)	144	157	109%	170	119.7%
Control Group (*didn't receive SMS)*	144	157	109%	194	136.6%
Total	**288**	**314**	**109%**	**364**	**128.2%**

The mean age for the pregnant women participants in the study group was 26.9 years varies from 17 to 53 years, nevertheless, for the control group, the mean age was 26.3 ranges from 16 to 48 years as indicated in table 2. Both the intervention and control groups had the same median age group of 25 to 34 years; however, it reflects 46.5% and 43.3% of the total participants for the intervention and control groups respectively. Most of the study participants at the time of the study were aged 15 to 44 years, contributed 99.4% of intervention participants and 99% of control participants. The age groups of the study participants were tested, and no statistically significant change was observed on the age for the two study arms apart from the 0.4% percentage variation between the groups.

Table 2: The Distribution of the Reported Aged Group of Enrolled Pregnant Women

Variable of Measurement	Study Group (n=170) Mean 26.9 Years: Range 17 – 53 Years	Control Group(n=194) Mean 26.9 Years: Range 17 – 53 Years
Age, completed years		
15 – 24	70 (41.2%)	87 (44.9%)
25 – 34	79 (46.5%)	84 (43.3%)
35 – 44	20 (11.8%)	21 (10.8%)
45 – 54	1 (0.6%)	2 (1.0%)
55+	0 (0.0%)	0 (0.0%)

The study indicated that many participants representing 86.5% and 82.5% for the intervention and control groups respectively (Table 3). Also, 13.4% of the control group pregnant women were single, never married before compared to

9.4% of the study group, this indicates no statistical significance with a chi-square results of 1.417 (95%C.I ranges from -2.71% to 10.54%) and a p-value of 0.2339.

Table 3: The Distribution of the Reported Marital Status of the Enrolled Pregnant Women

Variable of Measurement	Study Group n=170	Control Group n=194
Marital status		
Single	16 (9.4%)	26 (13.4%)
Married	147 (86.5%)	160 (82.5%)
Widowed	1 (0.6%)	1 (0.5%)
Separated	6 (3.5%)	7 (3.6%)

In this study, it was shown that most of the pregnant women had 1 or more live children at the time of the study, 75.9% for the study and 72.2% for the control group as described in table 4. There is no statistical variability as a chi-square stands at 0.642 (95% CI, ranges from -5.37% to 12.56%) and a p-value of 0.4231. However, pregnant women with 2 live children at the time of the study were more in the study group (25.3%), compared to 16.5% for the control group, this is a statistical significant variation, the p-value is 0.0386 (95% CI: ranges from 0.454% to 17.182%). The study indicated that the maximum number of live children was 6 and 7 for the intervention and control group respectively.

Table 4: The Distribution of the Reported Live Children of the Enrolled Pregnant Women

Variable of Measurement	Study Group (n=170) Mean 1.6; Range 0 -6	Control Group (n=194) Mean 1.7; Range 0 -7
Number of live children,		
0	41 (24.1%)	54 (27.8%)
1	44 (25.9%)	57 (29.4%)
2	43 (25.3%)	32 (16.5%)
≥3	42 (24.7%)	51 (26.3%)

Most of the pregnant women in this study, 56.5% and 65.9% for intervention and control group respectively had completed primary school education as shown in table 5. This reflects a 9.4 percentage change between the groups but with no statistical significance, a p-value of 0.0670 (95% CI, ranging from -0.607% to 19.209%). The study also revealed a high secondary school drop out of 20.6% for the intervention and 13.9% for the control group. Although there is variability by 6.7% between the groups, there is no observed significant change.

Table 5: The Distribution of the Reported Education Level of the Enrolled Pregnant Women

Variable of Measurement	Study Group n=170	Control Group n=194
Categorisation of level of education		
No formal education	5 (2.9%)	21 (10.8%)
Primary education	96 (56.5%)	122 (62.9%)
Secondary education (Partially)	35 (20.6%)	27 (13.9%)
Secondary education	19 (11.2%)	17 (8.8%)
Post-secondary (Certificate)	8 (4.7%)	2 (1.0%)
Diploma	6 (3.5%)	5 (2.6%)
Higher education	1 (0.6%)	0 (0.0%)

The study reveals that 92.4% of pregnant women for the intervention and 95.4% for the control group had only one partner in 6 months prior and during the study as shown in Table 6. However, disregard of being pregnant yet 7.1% and 4.1% for the intervention and control group respectively had two concurrent sexual partners in the period. This is more worse to 1 pregnant woman from each group who had more than 2 concurrent sexual partners in the same period.

Table 6: The Distribution of the Reported Number of Concurrent Sexual Male Partners among Pregnant Women

Pregnant Women's Sexual Relationship	Study Group n=170	Control Group n=194
Number of concurrent sexual partners 6 months before the study: 1 2 >2	 157 (92.3%) 12 (7.1%) 1 (0.6%)	 185 (95.4%) 8 (4.1%) 1 (0.5%)

The study reveals that, following intervention the health facility deliveries for the study group raised from 77.8% to 94.3% reflecting a statistical significance change with Chi-Square of 17.119 and a p-value less than 0.0001 (95% CI ranges from 8.985% to 23.855%) as shown in table 7. Likewise, the health facility deliveries for the control group raised from 83. 6% to 92.3%, also indicating a statistical significant change with Chi-square value of 5.628 and a p-value of 0.0177 (95% CI ranges from 1.536% to 15.437%). This study found out before intervention, the planned deliveries of pregnant women were lower (77.3%) compared to the control group (83.6%), p-value of 0.1608 and Chi-square of 1.966. Again, following the intervention, the planned deliveries for intervention rose to 94.3% while the control increased to 92.3%, p-value of 0.4963 and Chi-square value of 0.463. However, in using a double in difference impact evaluation between the intervention and control group, the impact factor 1.896 is generated. Nevertheless, 2.1% and 3.3% of pregnant women interviewed remained with no plan for where to deliver for the intervention and the control group respectively. Also, surprising 2.6% and 6.4% of pregnant women decided to have assisted delivery by the traditional birth attendants for the intervention and the control group respectively.

Table 7: The Distribution of the Reported Pregnant Women's Planned Places for Deliveries

Planned Place for Deliveries	Before Intervention		After Intervention	
	Study Group (n=170)	Control Group (n=194)	Study Group (n=146)	Control Group (n=144)
Institutional maternity/Health Facility	77.8 %	83.6 %	94.3 %	92.3 %
Traditional Birth Attendant	14.1 %	19.2 %	2.6 %	6.4 %
No plan of place for delivery	5.6 %	6.6 %	2.1 %	3.3 %

In this study, most of the key informants (48%), believe that health facilities deliveries will increase if more awareness is being addressed to pregnant women and their male partners as shown in figure 1. Also, 24% of the key informants suggested an increased number of health units providing delivery services and training of health workers to improve interpersonal communication was suggested by 17% of the key informants. This communication training to health workers will reduce the health worker's related barriers to health facility deliveries. Only 2% of the key informants reported that availability of transport at the community to increase health facilities deliveries in the Tabora Municipality.

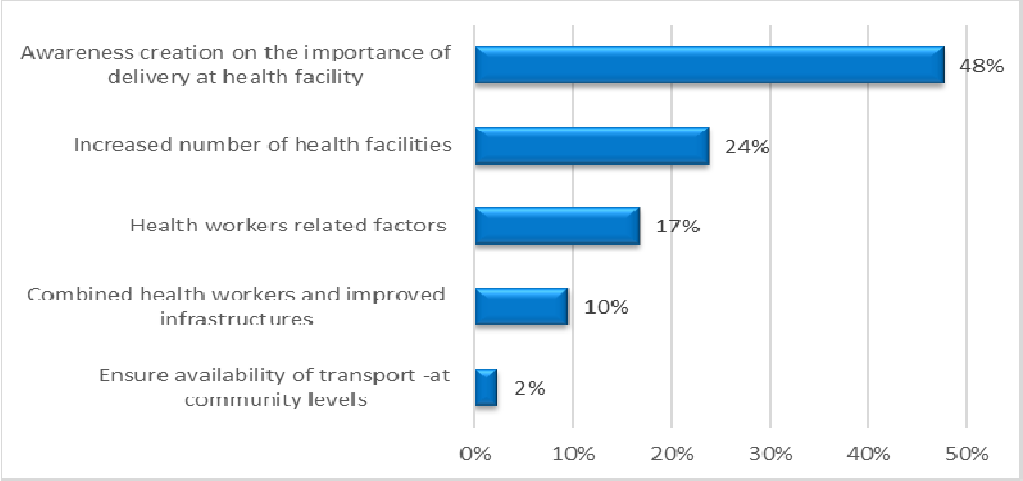

Figure 1: Reported Key Informants Barriers for Health Facility Deliveries.

DISCUSSIONS

This should be among the better strategy for reducing the overarching high rates of maternal mortality especially in Tabora Municipality and Tanzania in general. Among many health facilities deliveries advantages are the opportunities of receiving basic preventive services to both mothers and a newborn including vaccination, vitamin A supplementation and PMTCT drugs which may not be available in traditional birth attendant places. These basic interventions prevent infections including HIV, maternal complications and deaths. The study results indicated an increase in the planned health facility deliveries by 7.8% for the study group compared to the control group after intervention. These study findings are like other studies conducted to men in raising awareness of the benefits of health facilities deliveries in Uganda and Ghana(25,26). We realized, even though the childbirth services are free for almost over 10 years now in Tanzania if male partners are not well-informed home deliveries may remain to be high.

Prevention services such as immunization services, PMTCT, nutrition, and other reproductive and child health which have shown to reduce both maternal and infant mortality rates were seen to be related to health facility deliveries. A study conducted by Finocchario-Kessler et al realized better PMTCT program for enrolled 108 HIV positive tested pregnant women was related to their ANC attendances and health facilities delivery(27). Also, for having a hepatitis birth dose, the only possible opportunity to get at the right time is only when the delivery is conducted in the health facility setting. Also, studies indicated that there is a good relationship between the health facilities deliveries and Hepatitis B birth dose coverage(28). Tabora is among regions in Tanzania where communities are patriarchal, and therefore most family decisions are made by men. It is therefore important to ensure male partners of pregnant women are well informed for their improved decision making of where their pregnant women will deliver. In this study, we realized the impact of innovation, especially SMS messaging for the male partners can make a tremendously public health progress by contributing 7.8%. We thought among the limitation to our findings was the time of intervention and even though communication was made to the study group there were no barriers for them to communicate with the control group. In this regard, we, therefore, believe the observed increase in health facilities deliveries was lower than the real. Another challenge was on pregnant women with multiple concurrent partners and therefore may be difficult to understand among the partner who is more powerful to influence the decision.

The findings from this study are also similar to a certain extent to the previously conducted randomized trial in rural Tanzania where the effect of communication increased 11% of health facility deliveries to the study group more than

the control group(29). Also, the study suggested a new approach to health promotion which is less costly rather than traditional methods of using mass media, posters and meetings. The reported 35.5% of pregnant women were convinced to do HIV tests through SMS communication were likely to be convinced for health facility delivery and other preventive services including immunization and PMTCT services.

CONCLUSIONS

The study reveals a 7.8% increase in planned health facility delivery among enrolled pregnant women following SMS communication to their male partners. This is impressive when one is considering the duration of the intervention, the 1 to 8 months among study participants and the fact that both control and study groups came from the same society. Besides, the double indifference factor of 1.896 indicating the impact of SMS in raising health facilities child deliveries and with time the outcome can be vividly seen.

We believed we could get maybe more impact if enough time was given for the intervention to allow behaviour theory change stages to take place among enrolled study participants especially laggards.

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