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Factors Associated with Adherence to mRDT Test Procedure by Community Health Workers during Management of Malaria for Under-Five in former Northern Bar El Ghazal-South Sudan

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Abstract

South Sudan Government and health partners started implementation of malaria Rapid Diagnostic Test (mRDT) testing at community level through Community Health Workers in 2017 in order to reduce malaria morbidity and mortality through improvement of malaria case management among children under five. Malaria diagnostic equipment were available at only 25% of the health facilities (HMIS Report 2012). This study was conducted to determine the factors associated with adherence to mRDT test procedure among Community Health Workers (CHW) while managing malaria for under-fives in former Northern Bar El Ghazal.

Methods and materials: *A cross sectional study design was conducted among 480 randomly selected CHWs. Mixed method data collection methods were conducted by using questionnaire for quantitative data which was divided into three sections; demographic, mRDT assessment checklist and adherence factors and focus group discussion guide for qualitative data. Quantitative data was analysed using stata Version 14. Pearson correlation product moment, chi-square, odds ratio and logistic regression were used to ascertain the association. Qualitative data was analysed using thematic analysis and triangulation was done.*

Results showed *that 30% of the CHWs adhered to mRDT test procedure 100%. Workplace environment (p=0.02), education (p=0.00) age (0.04), equipment and supplies(p=0.01) and documentation and reporting (p=0.02) tools availability were found to be significantly associated with adherence of CHWs to mRDT test procedures.*

Conclusion: *Education, age, workplace environment, equipment and supplies and documentation and reporting tool were significantly associated with adherence of CHWs to mRDT test procedure. Therefore, selection criteria should emphasise education and age. Also programme implementers should provide tools to facility conducting of mRDTs.*

Keywords: *Individual, community, program, Factors, Adherence, mRDT Test Procedure, Community Health Workers during, Management of Malaria for Under-Five, mRDT Procedures, Individual, community, program, Northern Bar El Ghazal.*

Introduction

South Sudan is malaria endemic in all parts, with the entire population at risk of infection and the prevalence of fever among children below 5 years of age increased from 30% to 45%, malaria parasite prevalence in pregnant women increased from 10% to 15%, from 2009 to 2013 respectively (CCM-South Sudan, 2018). By 2012, in South Sudan the majority malaria of cases was diagnosed and treated clinically and only 25% of the health facilities had malaria diagnostic equipment (microscopy or mRDTs) (HMIS, 2012). The 2013 Malaria Indicator Survey (MIS) found that only 28% of patients received parasitological confirmation before treatment (MIS, 2013). At community level testing for malaria before treatment had not been done until 2017 when South Sudan Government with support from partners adopted the world health organisation policy where testing malaria prior to treatment is done by Community Health Workers (CHW) at community level. Community Health Workers (CHWs) were trained and equipped with mRDTs to test before treating accompanied by support supervision under the Integrated Community Case Management (iCCM) strategy. However, it should

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be noted that CHWs adherent use of malaria treatment guidelines can improve malaria health care services delivery in communities (Rowe, et al, 2007). In the bid to increase CHWs' adherence to malaria treatment guidelines, it is important to put into consideration of CHWs' motivation through delivery/provision of required material, financial and information support (Health Communication Capacity Collaborative, 2015). Empirical research from Ghana showed that adherence to dosing guidelines by CHWs was successfully practiced though CHWs never adhered to referral-based guidelines which resulted into poor health care services delivery in communities of Ghana (Chinbuah et al, 2013).

This study therefore assessed factors associated with adherence to Malaria Rapid Diagnostic Test (mRDT) test procedure by community health workers during management of malaria for under-fives in former Northern Bar El Ghazal, South Sudan prior to scale up of the intervention.

Methods and material

Study setting

The study was conducted among CHWs in former Northern Bar El Ghazal. The state was established in 2015 after Government's merger of the 10 states that initially existed and it has an area of 30,543Km^2, bordered by South Darfur in the North, Western Bahr el Ghazal in the west and south part of the country. It is estimated that this province has a population of 1 million South Sudanese with only 20.6 percent of the population being children below the age of 5 years.

A cross-sectional research design was adopted, quantitative and qualitative data collection methods were used. A structured questionnaire and FGD-guide were used to collect data regarding CHWs adherence to mRDT procedures.

Sampling

Simple random was utilised to select 480 CHWs from the list of those delivering iCCM and had worked for more than six months while using mRDTs during management of malaria for children under five. STATA software command was applied to randomly select the respondents of this study.

Data collection

Quantitative data was collected using a structured questionnaire divided into three parts, the demographic characteristics, the mRDT test procedure assessment checklist and the presumed factors that affected adherence to test procedure. The questionnaire was administered by a well-trained enumerator who observed the CHW will testing a child using an mRDT. A right procedure conducted was ticked yes and otherwise a no was ticked. The children tested were selected randomly from the community near the CHW whether with or without fever after seeking consent from their guardians. For the presumed adherence factors, the questions included working environment, availability of commodities, reporting materials and furthermore other performance factors assessed were based on a Five-Point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) which a CHW would respond to or choose a facial expression on what they felt.

Qualitative data was collected through focus group discussions to capture in-depth understanding of the factors associated with adherence to mRDT test procedure.

Data management and analysis

Quantitative data was entered in epi data software and analysed using of STATA V14. For qualitative data analysis was done using thematic analysis and the triangulation was done to supplement and complement based on the study objectives and questions.

To determine the adherence of CHWs to mRDTs test protocols, percentage scores were generated. The total score obtained from getting the right steps following the mRDT procedures over the total expected times 100 determined the CHWs percentage score. This kind of computation gave each component of assessment questions equal weight (Langbein, 2014; Kellow, 2006). Furthermore, in the degree of adherence to mRDTs test procedure was classified into two forms, strict for CHWs who performed 100% the steps as per the assessment checklist and moderate adherence when the CHWs got at least 80% of the procedures recommended for mRDT right. Logistic regression analysis was

employed to evaluate the factors associated with CHWs adherence to mRDT procedures. Odds ratios were used to reflect the likelihood of behavioural occurrence among CHWS in terms of adherence to mRDT test procedures.

Ethical Approval: The University Ethical Committee-Texila American University Guyana, South Sudan Ministry of Health Department of Policy, Planning, and Budgeting Research Institution Review Board approved this study. Consent was obtained from CHWs' and care givers before their children were tested and their rights and freedom observed.

Findings and discussion

Adherence to mRDT Protocol

Results showed that 29 percent of CHWs who participated in study strictly adhered (100 percent) to the mRDT test procedure. However, 64.8 percent of the CHWs adhered to 80 percent and above (moderate adherence) to the mRDT test procedures. The results therefore, are in agreement with Agrawal et al, (2012) who argued that in health care service delivery, adherence to treatment guidelines enhances CHWs' effort to make mothers practice acceptable care to the new born babies and this can be advanced further in a community leading to improved health care for the mothers and the newborn as well as the entire community. Figure 1.

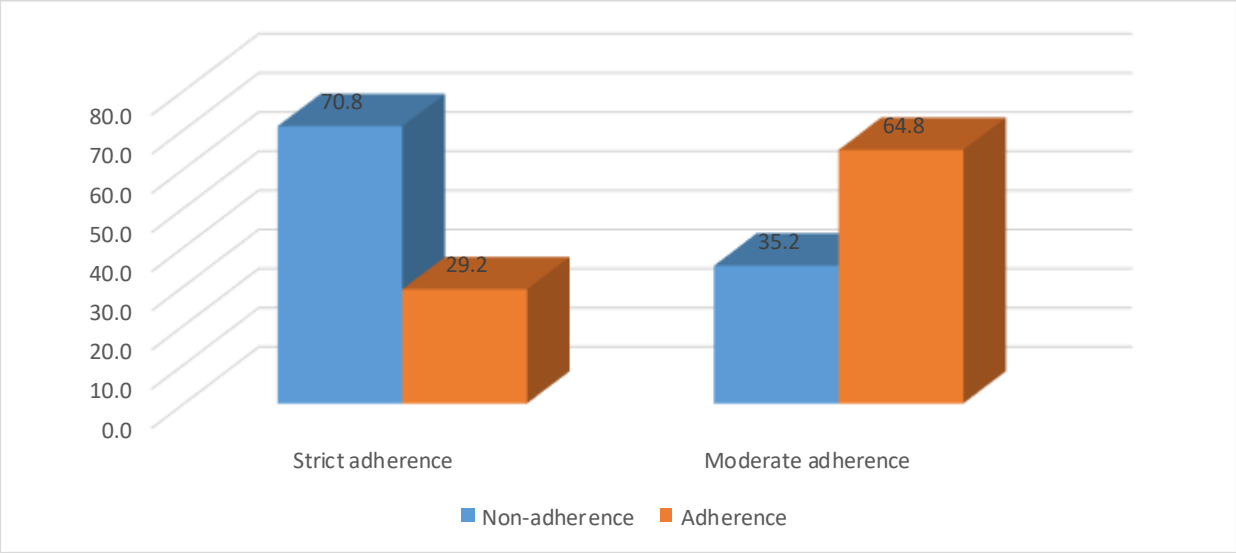

Figure 1. Adherence to mRDT Procedures

Source: Field Data (2019)

Individual Factors and Adherence to mRDT Test Procedure by Community Health Workers in Northern Bar El Ghazal

Education

Logistic regression results revealed that education was significantly associated (p=0.00) with adherence to mRDT Test Procedure by community health workers in Northern Bar El Ghazal (Table 4). Findings implied that CHWs with secondary level of education were 2.82 times more likely to practice strict adherence to mRDT procedures compared to those who moderately adhered to mRDT procedures. The results are in agreement with Mukanga et al (2010) who noted that highly educated CHWs can better adhere to mRDT procedures and can be easily trained for more skills and competences while in service.

iCCM Experience

Results showed that CHWs with experience of over 8 years were 4.3 times more likely to strictly adherence to mRDT procedures and this implies that with more experience, there was better adherence to mRDT procedures among CHWs. Altaras et al (2016) presented experience as one of the factors that influence adherence to mRDT among CHWs. However, although ICCM experience

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dummies are statistically significant, the odds are less than 1, implying that CHWs who have worked with ICCM longer are less likely to adhere to mRDT procedure. This is surprising result since it was expected that more experienced CHWs would be more knowledgeable and proficient in mRDT procedures but since mRDTs testing was recently introduced, having worked for many years under ICCM may not necessarily influence once adherence to the procedure.

Age of CHWs and adherence to mRDT test procedure

The logistic regression results show that for strict adherence to mRDT procedures age of CHWs had a positive and statistically significant association (p=0.04) with adherence to mRDT procedures. (Table 4) Older CHWs were more likely to adhere to mRDT procedures. Results are in support of Health Communication Capacity Collaborative (2015) where it was noted that age of CHWs is associated with adherence to mRDT Test Procedure. Thus, the results may be attributed to age having a relationship with experience in service among health professions; that is CHWs in a community.

Motivation and adherence to mRDT test procedure by CHWs

Overall aggregate mean score for motivation stands at 4.5 and the standard deviation at 0.82. This implies that, on average, CWHs who participated in the study are motivated (Table 1).

Qualitative results obtained from the focused group discussion indicated that CHWs are motivated to work as they feel they serve their communities and this has reduced mortality of children under five.

'……I love being a CHW, we have reduced the deaths. Before children used to die and every day, we used to be doing burials and every home had a fire place by the road side but with ICCM and MRDT introduction this has stop……. CHW in Aweil West….

Programme factors and adherence to mRDT test procedure by community health workers in northern bar El Ghazal

Training

Overall aggregate mean score for training stands at 4.64 and the standard deviation at 0.68. This implies that, on average, CWHs who participated had received adequate training. Results are supported by Black et al (2010) who noted that integrated community case management iCCM in a community system entails community health workers being trained to be able to manage malaria and other diseases among children under five. However, regression results did not indicate any association between training and adherence to mRDT test procedures among CHWs in Northern Bar El Ghazal.

Support supervision

Overall aggregate mean score for support supervision stands at 4.42 and the standard deviation at 0.86. This implies that, on average, CWHs who participated believe that the support and supervision they receive in doing the community health work is adequate. (Table 2).

Results from FGDs revealed that CHWs are satisfied with the supervision and feel they benefit as they get chance to practice when the supervisors visit them and have chance to correct them when they make a mistake. This has improved their ability to use the MRDT than when they had just started.

'……. Recording patients name was difficult for me since most of us don't know how to write and we have to write the children names so that we don't forget who was negative and who was positive but from the supervision, our supervisors have encouraged us to write the names and now I do……." (Male, CBD, Aweil South].

"all the stages of testing for malaria are easy, if you do it every day you become better and better, but if you stay for a long time without doing it you forget but when the supervisors come we practice with them again…." [Female CBD, Aweil Centre].

Results are supported by Kallander et al (2015) who expressed that increased support supervision, performance and coverage of communities can increase uptake of timely and appropriate treatment for malaria among care-takers for children under the age of five years. However, in this study there was no association between support supervision and adherence to mRDT test procedure.

Workplace environment

Work environment within which CWHs conduct their roles and responsibilities directly affect their performance in managing malaria. An assessment of the perceived availability of three work environment aspects was carried out for the assessment and the study revealed that of CHW work place conditions were significantly associated(p=0.02). Availability of equipment and supplies to conduct an mRDTs was significantly associated(p=0.01) with adherence to test procedure. The findings are in line with a study by Kalyango et al (2012) who asserted that in the health care service delivery system, the attitude of CHWs is shaped by the availability of drugs, equipment and other motivation factors which translates into improved performance in terms of malaria management among children under the age of five. The results are also supported by Bagonza et al (2015) who found that under the ICCM drugs availability influenced community health workers.

One of the CHWs interviewed decried that some CHWs do not have supplies which undermine their performance;

"mRDT supplies where are not enough, with some CHWs completely not having anything and the others only having part of the supplies which affect their performance".

CHWs having documentation and reporting tools like patient registers adhered to test mRDT test procedures and the association was significant (0.02). Results in agreement with Hay et al (2011) who presented the importance for CHWs to document and report information regarding how they carry out their duties to support decision making while managing malaria among children under five.

Community Factors and Adherence to mRDT Test Procedure by Community Health Workers in Northern Bar El Ghazal

Community cooperation

Overall aggregate mean score for cooperation was at 4.56 and the standard deviation at 0.79. This implies that, on average, CWHs who participated had received cooperation from caregivers, health facilities community. However, this variable was not statistically significant. From FGDs, CHWs feel the caregivers are cooperative especially when they are given negative results, they accept them which makes their work easy.

"…*We have never experienced any caregiver rejecting this because our explanations before opening up mRDT kit were clear to every caregiver. Communities had high expectations of mRDTs. They welcomed the tests as aiding clinical diagnoses and as tools that could communicate their children problem better than they could, verbally" [Female CHW, Aweil North].*

The results are attributed to the fact that CHWs who engaged in this study had been trained under iCCM to manage malaria among children below the age of five in their respective rural communities. Therefore, the results are in agreement with Kalyango et al (2012) in their study noted that there is need for community cooperation with CHWs to have better health care services delivery in the community as well as increased health seeking behaviours among the local people in rural communities most especially.

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Table 1. Descriptive Results for Motivation

S/No	Measurement Statement	N	Strongly disagree (SD)	Disagree (D)	Not sure (NS)	Agree (A)	Strongly Agree (SA)	Measures of Central Tendency				Interpreting the Mean
			%	%	%	%	%	Min	Max	Mean	SD	
1	Overall you are satisfied with your role as a CBD	480	0.6	0.8	1.5	17.7	79.4	1	5	4.74	0.59	Strongly agree
2	The work you are asked to do is worthwhile/ has value	480	0.8	2.3	3.3	26.3	67.3	1	5	4.57	0.74	Strongly agree
3	It's important for you to do a good job so that the ICCM project works well	480	0	0	1.7	22.1	76.3	3	5	4.75	0.47	Strongly agree
4	You are respected in your community because of the work you do	480	0	0.8	2.7	17.9	79.2	2	5	4.75	0.54	Strongly agree
5	You do this job only because of the benefits which comes out of it	480	13.3	7.5	5.6	20.8	52.7	1	5	3.92	1.44	Agree
6	You proud to be working as a CBD	480	0.4	1	2.1	19	77.5	1	5	4.72	0.6	Strongly agree
7	You are willing to do more than is asked of you?	480	1.3	2.1	3.5	34.4	58.8	1	5	4.47	0.77	Strongly agree
8	Sometimes as a CBD you asked to do work which doesn't make sense	480	10.8	10.8	11.7	31.5	35.2	1	5	3.69	1.34	Agree
9	This CBD program provides everything you need to do your job effectively.	480	1.9	5.8	7.3	25.6	59.4	1	5	4.35	0.98	Strongly agree
10	Suggestions you make on how to improve your work are usually considered by supervisors	480	1.5	2.1	5.4	28.1	62.9	1	5	4.49	0.81	Strongly agree

11	You feel you have strong ties with other CBD members	480	0.8	1.3	7.5	20.8	69.6	1	5	4.57	0.76	Strongly agree
Global Mean and Average Standard Deviation										4.5	0.82	Strongly agree

Source: Primary data.

Table 2. Descriptive results for support supervision

S/No	Measurement Statement	N	Strongly disagree (SD)	Disagree (D)	Not sure (NS)	Agree (A)	Strongly Agree (SA)	Measures of Central Tendency				Interpreting the Mean
			%	%	%	%	%	Min	Max	Mean	SD	
1	You receive drug supplies regularly	480	2.1	8.3	6.3	25.2	58.1	1	5	4.28	1.04	Strongly agree
2	The quantities you receive are adequate	480	9.6	8.5	7.3	29.4	45.2	1	5	3.92	1.31	agree
3	You had no stock out for Malaria Rapid Diagnostic Test kits in the last 3 months	480	22.1	11.5	5.6	16.7	44.2	3	5	3.49	1.64	agree
4	Do you feel CBD quarterly meetings are useful	480	2.5	1.9	3.8	29.8	62.1	2	5	4.47	0.86	Strongly agree
5	You receive support supervision by Health workers on a regular basis	480	8.3	7.1	6.3	25	53.3	1	5	4.08	1.28	Agree
6	The supervision of you work is good.	480	0.2	0.2	1.7	15.2	82.7	1	5	4.8	0.48	Strongly agree
7	The support given to you helps you to improve and perform better	480	0.4	0.4	2.1	23.5	73.5	1	5	4.69	0.57	Strongly Agree
8	You feel happy whenever you are visited at your home by a health worker/MC staff	480	0	0	3.1	17.7	79.2	3	5	4.76	0.5	Strongly agree

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9	The community is aware of you work as a CBD		0.2	0.6	2.3	14.8	82.1	1	5	4.78	0.53	Strongly agree
10	You feel the community is supportive when you are doing you work	480	0.6	0.4	1.9	27.1	70	1	5	4.65	0.6	Strongly agree
11	Community leaders mobilize care-givers to seek treatment from you	480	0.8	0.6	2.7	20	75.8	1	5	4.69	0.64	Strongly agree
Global Mean and Average Standard Deviation										4.42	0.86	Strongly agree

Source: Primary Data

Table 3. Descriptive Results for Area of Coverage

S/No	Measurement Statement	N	Strongly disagree (SD)	Disagree (D)	Not sure (NS)	Agree (A)	Strongly Agree (SA)	Measures of Central Tendency				Interpreting the Mean
			%	%	%	%	%	Min.	Max.	Mean	SD	
	The area you serve as a CBD is manageable	480	7.5	2.3	5.4	19.8	65	1	5	4.33	1.67	Strongly agree
	The workload you have is manageable	480	7.5	4.4	2.5	21.7	64	1	5	4.30	1.19	Strongly agree
	The work I do as a CBD allows me to do my other work	480	10.6	3.1	2.7	14	69.6	1	5	4.29	1.31	Strongly agree
Global Mean and Average Standard Deviation										4.31	1.39	Strongly agree

Source: Field Data (2019)

Table 4. Logistic Regression Results on Adherence on mRDT Procedures

	Strict adherence to mRDT procedures				Moderate adherence to mRDT procedures			
	Odds Ratio	P-value	95% Conf. interval		Odds Ratio	P-value	95% Conf. interval	
Variables			**Low**	**High**			**Low**	**High**
Motivation	0.78	0.23	0.52	1.17	1.36	0.16	0.89	2.08
Support Supervision	1.10	0.68	0.69	1.76	1.07	0.76	0.69	1.66
Training	1.46	0.13	0.89	2.39	0.83	0.24	0.62	1.13
Cooperation	0.98	0.95	0.63	1.53	1.47	0.06	0.99	2.19
Area coverage	1.34	0.26	0.81	2.20	1.10	0.61	0.77	1.56
Education (Base: No education)								
Primary	1.52	0.12	0.90	2.57	1.57	0.16	0.83	2.95
Secondary	2.82	0.00*	1.39	5.75	2.30	0.05*	1.02	5.18
Age in years	1.04	0.04*	1.00	1.07	1.03	0.21	0.99	1.07
ICCM experience in years (Base: less than year experience)								
1-4 years	0.43	0.25	0.10	1.81	0.00	0.00*	0.00	0.00
5-8 years	0.62	0.52	0.15	2.63	0.00	0.00*	0.00	0.00
Over 8 years	4.30	0.27	0.32	58.50	0.00	0.00*	0.00	0.00
Gender (Base: female)								
Male	0.97	0.93	0.51	1.84	0.58	0.10	0.31	1.10
Workplace Environment	1.02	0.02*	1.00	1.03	1.03	0.00*	1.02	1.05
Equipment & Supplies	1.02	0.01*	1.00	1.03	1.02	0.00*	1.01	1.04
Documentation & reporting	1.06	0.02*	1.01	1.12	1.02	0.00*	1.01	1.03
Constant	0.00	0.00*	0.00	0.01	1.26	0.00	2.21	1.73

Conclusion

Education and age are associated with adherence to mRDT test procedure among CHWs while managing malaria in children under five. Workplace environment, equipment and supplies and documentation and reporting tool availability are also associated with adherence of CHWs to mRDT test procedure.

Recommendations

Adequate supply of commodities and supplies required by CHWs should be made timely by the program implementers. In addition, CHWs supervision and constant training of CHWs in communities is vital with regard to mRDT and should be timely and promptly done giving chance of practicing mRDT as well as consistent use of job aids use while conducting mRDTs for children below five in the communities. Level of education should be considered as a key selection criterion for CHWs.

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