

Competence of Community Health Workers in conducting Malaria Diagnostic Test for Children Under-Five for Malaria Management in former Northern Bar El Ghazal-South Sudan

Article by Mubiru Denis
PhD, Public Health, Texila American University
E-mail d.mubiru@yahoo.com

Abstract

By 2012, the majority of malaria cases were diagnosed and treated clinically and only 25% of the health facilities had malaria diagnostic equipment (microscopy or RDTs) in South Sudan (HMIS, 2012). In 2017, the Government of South Sudan and malaria implementing partners started implementation of mRDT at community level. This study sets out to determine the competence of community health workers under ICCM while conducting malaria diagnostic test for children under-five for malaria management in former Northern Bar El Ghazal.

Methods: *A cross sectional study was conducted among 480 randomly selected CHWs. Data was collected using a questionnaire consisting of demographics, case management observation checklist, mRDT assessment checklist and competence factors and a focus group discussion guide. Analysis was done using stata V14 and thematic content analysis.*

Results showed that *competence of CHWs in malaria case management was skewed to right; more than 80 percent of CHWs could rightly assess the danger signs of child, classify patient's illness correctly, gives correct treatment, counsel and records correct relation between classification, diagnosis and treatment. CHWs scored between 75 and 86 percent on the nine important mRDT procedures and a few CHWs (less than 10%) scored below 40 percent on mRDT procedure competence assessment.*

In conclusion, the majority of CHWs were found to be competent in assessing and treating malaria sick children and conducting mRDTs. Therefore, use of mRDTs can be scaled at community level in South Sudan while strengthening competency determinants such as provision of equipment and supplies.

Keywords: *Competence, Community Health Workers, Integrated Community Case Management, Malaria Diagnostic Test for Children Under-Five, Malaria Management, mRDT Procedure, Malaria Case Management, mRDT Competence Assessment.*

Introduction

Malaria remains one of the diseases of public health importance in South Sudan with respect to morbidity and mortality burden as well as economic losses (Malaria Strategic Plan, 2017). By 2012, in South Sudan the majority of malaria cases were diagnosed and treated clinically and only 25% of the health facilities had malaria diagnostic equipment (microscopy or RDTs) (HMIS, 2012). The 2013 Malaria Indicator Survey (MIS) found that only 28% of patients received parasitological confirmation before treatment (MIS, 2013). Most malaria cases are diagnosed and managed based on clinical symptoms because only 40% of the health facilities have capacity to perform malaria diagnostic tests (Health Facility Assessment Report, 2011) despite policy recommendation for parasite diagnosis before treatment at all levels. In order to address the high morbidity and mortality due to malaria by improving case management of fever among children under five and the rational use of valuable anti-malarials at community level, the Government of South Sudan and malaria implementing partners adapted the WHO Policy of testing malaria before treating at community level in 2017 and started implementation of mRDT use at community level through training and equipping community health workers implementing integrated community case management (ICCM) with mRDTs and other tools required to perform a successful mRDT and supportive supervision of the Community Health Workers.

Competences enhance malaria management by community health workers (CHWs) while using Malaria Diagnostic Test for children under-five. Therefore, it is important to understand how CHWs conduct their responsibilities and health tasks in communities especially under the iCCM strategy (USAID, 2015). In a community setting, competence for community health workers while conducting malaria rapid diagnostic tests for children is manifested by safe and effective use of mRDT tools through conducting training and other post training exercises such as competence evaluation (Malaria Consortium, 2014).

With regard to competence of CHWs, focus needs to be on strengthening the community health workers' competences in order to improve their capacity to analyze data, use such data to make health related decisions and planning interventions (Counihan et al, 2014). In addition, competences for community health workers can be reflected by effort to improve febrile illness management among children in remote and resources constrained communities. It is vital to have supplies and other requirements such as gloves to competently manage malaria among children in the community. Community health workers' competence in managing children with malaria under the iCCM strategy can be promoted by training, use of mRDT tools in the management of malaria for children under five years and the use of Artemisinin-Based Combination Therapy-ACT (Gopalan, Mohanty & Das, 2012). However, in some instances community health workers may offer malaria treatment based on assumptions and this can constitute health and professional implications with regard to health services delivery to clients in the community (Hansen et al, 2017).

Studies carried out regarding competence of CHWs in the managing children under five with malaria have indicated varying results. For example, in Denmark, it was found that competence regarding malaria rapid diagnostic test for under-five malaria management was high since there was increased treatment of malaria in relation to transmission setting (Hansen et al 2017). This led to improved ACTs targeting to children with malaria and it was regarded as the cost-effective intervention in place as compared to diagnosis means and results reflected the degree of training that was extended to community health workers before the introduction of Malaria Rapid Diagnostic Test (mRDTs).

With reference to competence of CHWs, it is also important for CHWs to be able to acknowledge mixed infections using Malaria Rapid Diagnostic Test (mRDTs) and achieve set targets in terms of detection (Murray et al, 2008). However, this can be attributed by the nature and quality of training that had been acquired by CHWs, support supervision, documentation and reporting, assessments, equipment and drug supplies that need to be adequate under the iCCM strategy (Kalyango et al, 2012). Therefore, this study was set to determine the competence of community health workers under iCCM while conducting malaria diagnostic test for children under-five for malaria management in Northern Bar El Ghazal.

Methods and material

Study setting

This study was conducted among CHWs in former Northern Bar El Ghazal. The area was one of the 10 states of South Sudan before they were re-organized in 2015. It has an area of 30,543 km². It borders South Darfur to the north, Western Bahr el Ghazal to the west and south, and Warrap and Abyei to the East. The state has an estimated population of one million people with 20.6% being children under the age of five years. Former Northern Bahr el Ghazal is the poorest state in South Sudan with 75.6% of state population living below the poverty line as compared to national figure of 50.6%. Almost 93.0% of the population in the state resides in rural areas as agro-pastoralists, and over 9.0% of the population in NBeG is severely food insecure. The study utilised a cross-sectional research design with quantitative and qualitative data collection approaches. A mixed method approach was adopted to collect data using both questionnaire and focus group discussion-guide.

Sampling

Simple random sampling was used to select respondents (CHWs) and a list of CWHs under iCCM who had worked for at least six months generated and captured into STATA software. The rationale for selecting CHWs who had worked for at least six months was to be able to generated sample

population who had experienced sick children and used mRDT in their areas. Using the STATA software 480 CHWs were randomly selected using STATA command sample which drew random samples of the data in memory without replacement.

Data collection

Data collected from the questionnaire was analysed using both descriptive and explanatory analysis. Quantitative data was collected using a survey questionnaire composed of four sections; where section one focused on demographic characteristics of the CHW, section two about case management (assessment and treatment of sick child) observation checklist, section three was about mRDT competence assessment checklist and four reflected on the factors that may affect competence. A CHW was required to assess a sick child with fever or without fever while being observed by the enumerator who ticked off the different steps being conducted by the CHW. A correctly completed step was ticked as yes and otherwise no. For competence factors, the questions 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 based on what they feel about the factor being assessed.

Qualitative data was collected using focus group discussions that were conducted using a focus group discussion guide to capture an in-depth understanding of the factors associated with competence of CHWs while conducting mRDTs for children under five.

Data management and analysis

For both quantitative and qualitative data collected, the basic data analysis procedure involved conducting separate data analyses for each of the quantitative and the qualitative data, and thereafter triangulation and complementarity in explanation and discussion was done depending on the research questions of the study. Quantitative data obtained from the survey questionnaire was captured by Epidata software for data entry and analysed using STATA Version 14 software.

To ascertain which individual, community and programmatic factors significantly affected competence of CHWs in the management of malaria among under five children, both descriptive and explanatory analysis techniques were employed. At univariate level, the description of the independent and dependent variable of study was done using mean score, frequencies and percentages using tables and graphs. The fact that various question items were used to assess the competence of CHW case management of malaria to mRDT protocols in the management of Malaria among under five children, percentage competence scores were generated. The total score obtained from getting the right steps or procedures as far as assessment of the sick child, conducting an mRDT, and following the mRDT procedures over the total expected times 100 determined the CHWs percentage scores.

Inferential data analysis was carried out using Pearson to examine the relationship between the study variables by showing the statistical significance. Logistic regression was used to reflect the effect of the associated factors to the dependent variable-competence of CHWs and odds ratios were used to show the probability of occurrence between the tested variables.

Qualitative analysis was carried out by use of thematic content analysis where themes were developed basing on study objectives.

Ethical approval

Ethical approval was obtained from University Ethical Committee-Texila American University Guyana, South Sudan Ministry of Health Department of Policy, Planning, and Budgeting Research Institution Review Board as well as from individual respondents.

Findings and discussion

Competence of CHWs in malaria case management

More than 80 percent of CHWs could rightly assess the danger signs of child, classify patient's illness correctly, give correct treatment, counsel and record correctly. Specifically, the biggest proportion of CHWs score were competent in malaria case management based on the five competence assessment questions and most of the CHWs scored more than 80 percent, a few CHWs (less than 20%) scored below average score of 50 percent (Figure 1). The difference among CHWs in terms of

assessing dangers signs counselling, giving correct treatment, among others may be attributed to the training and how they comprehended the training content and this is in agreement with Counihan et al (2014) who revealed that CHWs competence need to be enhanced through training for capacity and decision making improvement to enable CHWs make appropriate interventions in the management of malaria under the iCCM strategy in a given community. The gaps in the CHW's management of malaria cases despite the trainings is attributed to fact that CHWs at times anchor their case management of malaria of under five children on assumptions (Hansen et al, 2017).

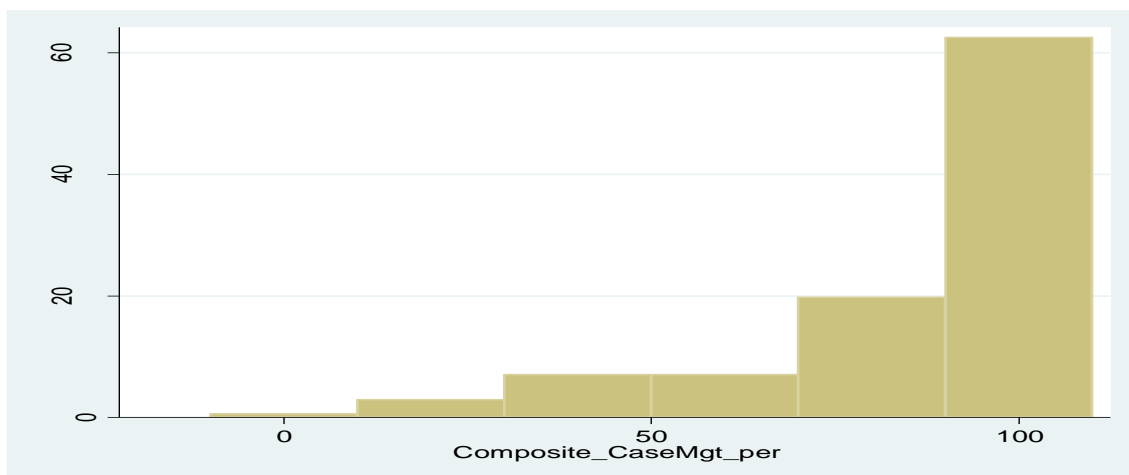


Figure 1. Percentage score of CHWs on malaria case management competence assessment

Source: Primary Data (2019)

CHWs' competence in mRDT procedure

Most of the CHWs scored more than more than 85 percent. A few CHWs (less than 10%) scored below 40 percent, implying that there are few CHWs scored lower than the rest of CHWs on mRDT procedure competence assessment (Figure 2). The results are consistent with Agrawal et al (2012) who argued that competence of CHWs in mRDT procedure is supported by the level of knowledge and competences among CHWs to be able to deliver the right treatment to the community beneficiaries. Therefore, level of knowledge and competence for CHWs reflect how they can rightly perform procedure for mRDT with regard to managing malaria for children under five in a community. In addition, Bagonza et al (2015) expressed that appropriate interpretation of mRDTs results and drug prescription by CHWs influence their competence in the management of malaria among children under five.

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....'

The results are in agreement with World Health Organization-WHO and UNICEF (2012) where it was noted that mRDT competence assessment requires new local-level algorithms for actions to be taken based on mRDT results. Further, Chinbuah et al (2013) revealed that mRDT competence assessment needs to reflect dosing guidelines for childhood treatment. However, in their study Chinbuah et al (2013) observed that there was non-adherence to mRDT procedures by CHWs with negatively affected health services delivery in the communities.

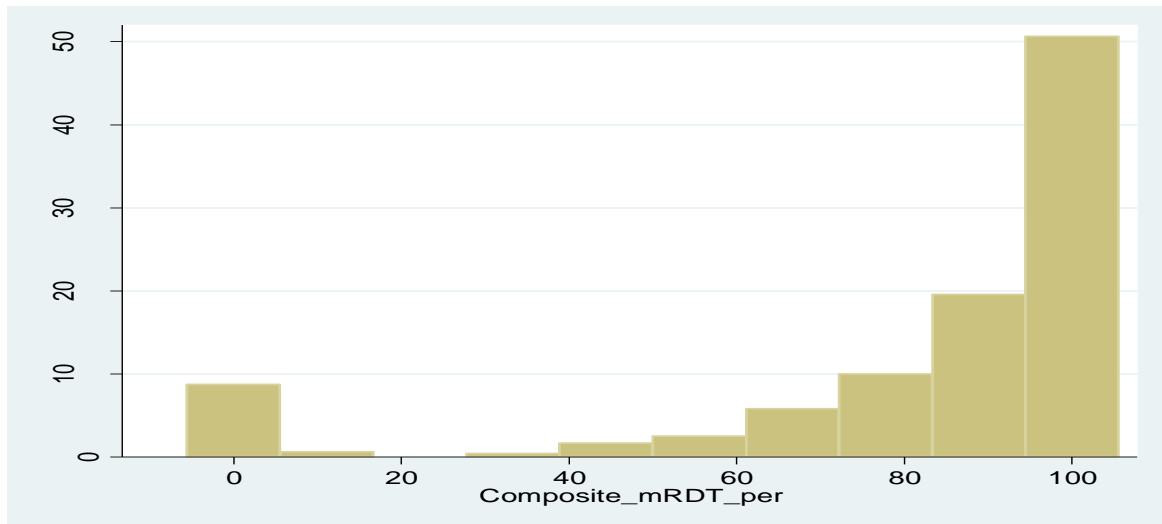


Figure 2. Percentage score of CHWs on mRDT Competence Assessment

Source: Primary Data (2019)

Factors associated with mRDT and case management competence

CHWs who scored 100 percent on competence assessment scale of case management and mRDT were classified into competent =1, 0 otherwise. CHWs who do not achieve 100% in the standard basic activities in case management and mRDT procedures were considered to be incompetent. The Pearson chi-square values are not statistically significant, the Pearson $\chi^2(461) = 478.27$ with p-value of 0.2797 for case management and Pearson $\chi^2(461) = 466.38$ with p-value of 0.4213 for mRDT procedure. Motivation, area of coverage, age of CHWs, and documentation and reporting had statistically significant association with competence of CHWs in Malaria case management.

(Table 1). The results can be attributed to differences in perception of motivation among CHWs and Strachan et al (2014) found motivation as one of the factors that were associated with CHWs' competence. Results with area of coverage implied that CHWs had appropriate distance to cover in order to provide health care services to communities. The results are in agreement with Ngeny (2015) who argued that CHWs' area of coverage depends on the number of homesteads each person is responsible for in relation to the geographical locations of such houses. Therefore, CHWs has appropriate households to operate with in terms of management of malaria among children under five. 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. The association between documentation and reporting; and competence among CHWs imply the CHWs were able to make and deliver quality information regarding malaria case management and mRDT utilisation. The results are in agreement with Hay et al (2011) who noted that document and report information enhance decision making among CHWs while managing malaria among children under five.

Table 1. Logistic Regression Results on Competence of CWHs in Malaria Management

Variables	Competence in Case management					Competence in mRDT procedure				
	Odds Ratio	P-value	95% Conf. interval		High	Odds Ratio	P-value	95% Conf. interval		High
			Low	High				Low	High	
Motivation	1.57	0.009*	1.12	2.21	1.06	0.765	0.73	1.53	1.53	
Support Supervision	0.85	0.346	0.60	1.20	0.94	0.750	0.63	1.39	1.39	
Training	1.12	0.411	0.85	1.49	1.12	0.463	0.82	1.53	1.53	
Cooperation	0.98	0.917	0.71	1.36	1.05	0.773	0.74	1.51	1.51	
Area coverage	0.72	0.009*	0.56	0.92	1.35	0.070*	0.98	1.88	1.88	
Education (Base: No education)										
Primary	0.69	0.122	0.43	1.10	0.89	0.666	0.53	1.50	1.50	
Secondary	0.92	0.811	0.45	1.86	1.82	0.131	0.84	3.94	3.94	
Age in years	0.97	0.069**	0.95	1.00	1.02	0.235	0.99	1.05	1.05	
ICCM experience in years (Base: less than year experience)										
1-4 years	0.33	0.119	0.08	1.33	1.42	0.592	0.39	5.14	5.14	
5-8 years	0.71	0.631	0.18	2.85	1.93	0.313	0.54	6.97	6.97	
Over 8 years	0.61	0.593	0.10	3.66	6.65	0.100	0.70	63.50	63.50	
Gender (Base: female)										
Male	0.86	0.564	0.52	1.43	0.78	0.402	0.44	1.38	1.38	
Workplace environment	1.01	0.271	1.00	1.01	1.02	0.001*	1.01	1.03	1.03	
Equipment & Supplies	1.00	0.755	0.99	1.01	1.02	0.000*	1.01	1.03	1.03	
Documentation & reporting	1.01	0.000*	1.01	1.02	1.03	0.000*	1.01	1.04	1.04	
Constant	1.88	0.491	0.31	11.34	0.00	0.000*	0.00	0.02	0.02	

Note: "*" Statistically Significant at 5% level and "**" Statistically Significant at 10% level
 Source: Primary Data (2019)

Conclusion

Community health workers can competently conduct mRDTs and would correctly assess a child with malaria in former Northern Bar El Ghazal – South Sudan and therefore the intervention can be scaled up across the country to improve case management thus reducing mortality and morbidity among children under five due to malaria. However, factors associated with competence need to be strengthened during the scale up especially ensuring that the CHWs have commodities and supplies for them to treat children adequately.

Recommendations

The government and implementers should consider more sensitisation of communities to utilise and demand for testing before being treated and also have constant availability of commodities for community health workers to test consistently. Furthermore, supervision and on job mentorship should be done given this is a new intervention.

Acknowledgements

I wish to extend my sincere gratefulness to all the people who contributed in different capacities towards the success of my studies right from the inception of the concept paper up to the final draft thesis. I wish to appreciate and thank the CHWs from former Northern Bar El Ghazal, University Ethical Committee-Texila American University Guyana, South Sudan Ministry of Health Department of Policy, Planning, and Budgeting Research Institution Review Board. My appreciation also goes especially to my supervisors Dr. Femi Rufus TINUOLA and Dr. Nnodimele Onuigbo ATULOMAH. I would also appreciate Malaria Consortium-South Sudan and DFID-the donor agency for implementing and funding the iCCM program respectively.

References

- [1]. Agrawal PK, et al. (2012) Effect of Knowledge of Community Health Workers on Essential Newborn Health Care: A Study from Rural India. *Health Policy and Planning*, 27:115-126.
- [2]. Bagonza, et al (2015). *What Influences Availability of Medicines for the Community Management of Childhood Illnesses in Central Uganda? Implications for Scaling Up the Integrated Community Case Management Programme*; Kampala Uganda: Makerere University School of Public Health.
- [3]. Chinbuah, M.A, et al. (2013) Assessment of the adherence of community health workers to dosing and referrals guidelines for the management of fever in children under 5 years: a study in Dangme West District, Ghana. *International Health*, 5:148-156.
- [4]. Counihan, H. Harvey, S. A. Sekeseke-Chinyama, M. Hamainza, B. Banda, R. Malambo, T. Masaninga, F. & Bell D. (2012). Community Health Workers Use Malaria Rapid Diagnostic Tests (RDTs) Safely and Accurately: Results of a Longitudinal Study in Zambia; *American Journal of Tropical Medicine and Hygiene*, 87(1) 57-63.
- [5]. Gopalan, S. S., Mohanty, S., & Das, A. (2012). Assessing Community Health Workers' Performance Motivation: A Mixed-Methods Approach on India's Accredited Social Health Activists (ASHA) programme. *BMJ open*, 2(5), e001557.
- [6]. Hansen, K.S z, Richard Ndyomugenyi, R, Magnussen, P, Sham, L & Sian E C. (2017) *Cost-Effectiveness Analysis of Malaria Rapid Diagnostic Tests For Appropriate Treatment of Malaria at the Community Level in Uganda*; Copenhagen, Denmark: University of Copenhagen.
- [7]. Hay, S.I Hay, C.A Guerra, A.J Tatem, A. M Noor, and R.W Snow (2011). The global distribution and population at risk of malaria: past, present, and future Health Communication Capacity Collaborative (2015) *Factors Impacting the effectiveness of Community Health Workers Behaviour change: A literature review*; USAID: HCCC.
- [8]. Health Management Information System-South Sudan (2012), Juba, South Sudan: Ministry of Health.
- [9]. Kalyango, J.N, Elizeus Rutebemberwa E, Alfvén, T, Ssali, S, Peterson, S & Charles Karamagi (2012). Performance of community health workers under integrated community case management of childhood illnesses in eastern Uganda; Department of Public Health Sciences, Division of Global Health (IHCAR), Karolinska Institute, SE 17177, Stockholm, Sweden.

DOI: 10.21522/TIJPH.2013.07.03.Art014

ISSN: 2520-3134

[10]. Malaria Consortium, (2014) Malaria Consortium's Approach to Malaria Diagnosis; Malaria Consortium, Development House, 56-64 Leonard Street, London EC2R 4LT, UK. Malaria Strategic Plan, (2017). South Sudan, Juba: National Malaria Control Programme.

[11]. Murray, CK, Gasser, R.A. Magill, A. J & Miller, R. S.(2008) *Update on Rapid Diagnostic Testing for Malaria*; Infectious Disease Service, Brooke Army Medical Center, Fort Sam Houston, Texas.

[12]. Ngeny, F.P. (2016). *Factors Influencing the Performance of Community Health Workers in Nandi Hills Sub-County*; Nairobi, Kenya: University of Nairobi.

[13]. USAID (2015). Factors Impacting the Effectiveness of Community Health Worker Behavior Change: A Literature Review.