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Assessment of diagnostic accuracy and adherence to maternal and child health guidelines as a measure of clinical competence of frontline healthcare workers in Nigeria

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Abstract

Clinical competence of primary healthcare (PHC) workers is important in the delivery of maternal and child health care and services. In this cross-sectional study, we investigated the diagnostic accuracy and adherence to clinical guidelines for the management of some clinical conditions such as malaria, diarrhea, pneumonia, neonatal asphyxia and postpartum hemorrhage, as a proxy to measure the clinical competence of frontline health workers in PHCs in selected states in Nigeria. Ninety PHC facilities were randomly selected in each State and the FCT. Of the 3330 health workers, only 36.0% were able to correctly diagnose the five selected medical conditions. There was a significant difference in the diagnostic accuracy of the health workers with the doctors having highest diagnostic accuracy (65.5%) compared to other health workers ($p<0.001$). Adherence to the management guidelines was generally poor across all cadres of health workers and this pattern appear similar across the geopolitical regions in the country. The highest adherence to guidelines was observed among medical doctors (38.2%). The diagnostic accuracy and adherence to national guidelines for managing patients was poor among health workers, particularly, among other cadres except doctors. PHC workers in Nigeria need continuous training to enhance their clinical competence to improve quality of maternal and child health care. *(Afr J Reprod Health 2022; 26[11s]: 77-85).*

Keywords: National health facility survey, diagnostic accuracy, clinical competence, saving one million lives program-for-results, primary health care

Résumé

La compétence clinique des agents de soins de santé primaires (SSP) est importante dans la prestation de soins et de services de santé maternelle et infantile. Dans cette étude transversale, nous avons étudié la précision du diagnostic et le respect des directives cliniques pour la prise en charge de certaines conditions cliniques telles que le paludisme, la diarrhée, la pneumonie, l'asphyxie néonatale et l'hémorragie post-partum, comme indicateur indirect pour mesurer la compétence clinique des agents de santé de première ligne. dans les SSP dans certains États du Nigeria. Quatre-vingt-dix établissements de SSP ont été sélectionnés au hasard dans chaque État et le FCT. Sur les 3330 agents de santé, seuls 36,0% ont pu diagnostiquer correctement les cinq conditions médicales sélectionnées. Il y avait une différence significative dans la précision du diagnostic des agents de santé, les médecins ayant la plus grande précision de diagnostic (65,5 %) par rapport aux autres agents de santé ($p<0,001$). Le respect des directives de gestion était généralement médiocre dans toutes les catégories d'agents de santé et ce schéma semble similaire dans toutes les régions géopolitiques du pays. L'adhésion la plus élevée aux directives a été observée chez les médecins (38,2 %). La précision du diagnostic et le respect des directives nationales pour la prise en charge des patients étaient médiocres parmi les agents de santé, en particulier parmi les autres cadres à l'exception des médecins. Les agents de SSP au Nigéria ont besoin d'une formation continue pour renforcer leurs compétences cliniques afin d'améliorer la qualité des soins de santé maternelle et infantile. *(Afr J Reprod Health 2022; 26[11s]: 77-85).*

Mots-clés: Enquête nationale sur les établissements de santé, précision du diagnostic, compétence clinique, programme pour les résultats sauver un million de vies, soins de santé primaires

Introduction

In 2018, the World Health Organisation (WHO) and other stakeholders revised the definition of skilled health personnel as a competent maternal and newborn health (MNH) professional educated, trained, and regulated to national and international standards[1]. Health professionals are competent to:

(i) provide and promote evidence and human-rights-based, quality, socio-culturally sensitive and dignified care to women and newborns; (ii) facilitate physiological processes during labour and delivery to ensure a clean and positive childbirth experience; and (iii) identify and manage or refer women and/or newborns with complications[1].

The WHO statement also recognized the individual peculiarities of member nations to adapt the definition of competent skilled health personnel to their specific needs including task shifting roles that are not universally available[1]. Generally, the term "competencies" encompasses the knowledge, skills, and behaviours that support the understanding and provision of appropriate and evidence-based care which are requirements of the health-care professional for safe practice in any setting along the continuum of maternal, newborn and child health care[1,2]. The competencies are acquired through education and training and are supported and monitored through regulation such as respectful care and preservation of dignity, communication, community knowledge and awareness amongst others[1,3].

Over the years, the Nigerian government has initiated a policy of primary healthcare (PHC) under one roof to provide integrated basic essential health services at the community level including maternal, newborn and child health[4-6]. The vision is to ensure that basic healthcare service is available within a reasonable distance to serve as the first point of care at the community[4]. Each PHC facility is expected to be managed by nurses/midwives and or community health officers/community health extension workers, and provides a 24-hour service covering prevention including health promotion and routine vaccination, basic emergency, and treatment of common illnesses[4,6]. Despite this initiative, Nigeria still accounts for 14% of all annual maternal deaths worldwide, second only to India at 17%[7]. Similarly, Nigeria accounts for 13% of all global deaths of children under the age of five years, again second only to India at 21%[7]. To address the challenge of high maternal and child deaths in Nigeria, the Saving One Million Lives (SOML) Programme for Results Initiative focuses on (i) increasing the use of high-impact reproductive and child health and nutrition interventions; (ii) improving the quality of these services; (iii) strengthening monitoring and evaluation systems and measurement data; (iv) encouraging private sector innovation; and (v) increasing transparency in management and budgeting for Primary Health Care (PHC) in the country[8].

The SOML Program for Results (PforR) aims to increase the utilization and quality of high impact reproductive, child health, and nutrition interventions, particularly at the PHC level in Nigeria[5,8]. SOML was originally created in 2012 to address Nigeria's slow progress on improving health status and health services.

Several studies have assessed the impact of SOML on maternal, newborn and child health indicators at the national and in specific states in Nigeria[9]. The outcome of most of these studies showed moderate improvements in some key outcomes such as increased antenatal clinic attendance, presence of skilled birth attendant during childbirth, reduction in the burden of malnutrition and improvement in access to routine vaccination amongst others[5,9]. It is equally important to investigate the impact of SOML on the ability of frontline healthcare providers to correctly make diagnosis of clinical conditions as proxy to measure the clinical competence of these workers at the PHC. Therefore, it is imperative to assess the competence of healthcare providers to manage clients that present with maternal, newborn and child health at PHC.

Methods

Data used for this study were extracted from the National Health Facility Survey (NHFS) conducted in 2016 by the Federal Ministry of Health as part of the statutory mandates of the SOML PforR initiative[9]. NHFS 2016 involved a cross-sectional assessment based on the standard health facility assessment methodology (Service Availability and Readiness - SARA) promoted by the WHO to assist countries to monitor service availability and readiness in health facilities. The SARA questionnaire used for assessing quality of care draws on the indicators and tools being developed by international health system stakeholders and technical experts under the leadership of the WHO. The quality of care tool was adapted to meet the objectives for monitoring quality of care for the Federal Ministry of Health (FMOH) SOML PforR initiative, and to provide information needed to strengthen the health system as well as specific

health services at State and national levels. Details about the sample design and field procedures for the NHFS are available in the published final report[9].

Sampling method

The NHFS used a stratified simple random sampling technique to select the health facilities. All health facilities were disaggregated first by facility ownership (public and private), while public facilities were further disaggregated by facility type (health posts, health centers and hospitals). There was no further disaggregation of private health facilities by type because their classification is not as standardized as for public facilities. The sampling frame included all public PHFs and Secondary Health Facilities (SHFs) as well as private for profit and non-for-profit facilities in each State. The sampling design was such that 6 Health posts (HP), 68 PHCs, 10 Private Health Facilities and 6 SHFs were randomly selected in each State adding up to 90 and bringing the total sample size to 3,330 for all 36 States and the FCT.

Data collection

One pre-announced visit was made to each health facility by a team of enumerators. Each State team was made up of one State Team Leaders (STL) and three teams [consisting of three enumerators each]. Each facility was surveyed by a team of enumerators. On the average, the NHFS team in each state carried out the visits in a minimum of 15 facilities each week and concluded the survey within seven days. Field data quality was assured through the conduct of validation checks which entailed revisiting selected health facility and collecting same data with abridged versions of the questionnaire and comparison with data collected by enumerators. Back checks were conducted on approximately 10% of the sample size per state. The survey instrument comprised three key modules as follows: facility audit, clinician assessment, and facility record review. For this paper, we analysed data collected in the clinician assessment module.

STL monitored the daily work of the teams under his or her supervision by accompanying a team daily to the health facility and ensured strict adherence to the survey guidelines for questionnaire administration. Data was uploaded via the electronic data collection devices daily to designated NHFS server on Survey CTO server.

Quality assurance

Quality assurance was built into every step of the survey process. Selected experienced personnel who resided in the states of survey underwent theoretical and practical training on data collection[9]. The training sessions focused on the survey objectives, item-by-item review of questionnaire and expected responses, interview techniques, and ethical obligations. After the training, field testing/pilot of the survey instrument was done at Kuje Comprehensive Health Centre in the Federal Capital Territory, Abuja.

Assessment of clinical competence

The clinical competence of healthcare workers was assessed using medical case simulations (vignettes). Vignettes were used to measure the knowledge of specific clinical condition. It specifically assesses if a clinician possess the skills necessary to diagnose and manage a patient. Five clinical cases comprising of three common childhood medical conditions (acute diarrhoea with severe dehydration, pneumonia and malaria with anaemia) and two maternal/newborn complications (postpartum haemorrhage and neonatal asphyxia) were presented. One of the field enumerators acted as a case study patient and presented specific symptoms to the clinician while another enumerator acted as the observer. The clinician was expected to evaluate, make a diagnosis, and propose a treatment plan. For each vignette, two indicators were used as measures of clinical competence. First, diagnostic accuracy was measured as the proportion of correct diagnosis for the five case studies. The second diagnostic accuracy was adherence recommended guidelines for history taking, physical examination, and treatment and health education. We calculated proportions of the relevant history, physical examination, investigation, and health education carried out for managing each of the cases presented. Assessment was based on national clinical guidelines for integrated management of childhood illnesses (IMCI) and maternal health.

Data analysis

Background demographic and professional profile of the healthcare providers were summarized with descriptive statistics. The five common vignettes assessed were acute diarrhea with dehydration,

pneumonia, malaria with anaemia, PPH and birth asphyxia. Diagnostic accuracy and adherence to guidelines were dis-aggregated by geopolitical zones, facility types and health workers cadre. Comparisons of clinical competence across cadre, facility types and geo-political was done using Chi square and Analysis of Variance (ANOVA) test with statistical significance set at $p<0.05$. Analysis was done with STATA SE version 14.0.

Results

A total of 3275 healthcare providers (68.2% females) in PHCs across the country was assessed. The mean age of healthcare providers that were assessed was 41.5 (SD=8.3) years and 74.0% were aged above 35 years (Table 1). CHEWs constituted the majority (56.8%) while there were only 33 (1.0%) doctors. There was a near even distribution of healthcare providers across geopolitical zones with proportion ranging from 14.6% in the South-South to 19.8% in the North Central. Nearly 7 out of 10 participants work in rural setting (69.8%). Only a quarter (25.1%) have ever received training on IMCI.

Table 1: Characteristics of healthcare providers at PHCs in Nigeria, 2016 NHFS

Variable (n=3275)	Frequency	Percentage (%)
Age (years): Mean (SD)	41.5 (8.3)	
Age group (years)		
<=35	853	26.1
> 35	2419	73.9
Sex		
Male	1040	31.8
Female	2235	68.2
Cadre/Position		
Doctor	33	1.0
Nurse/Midwife	383	11.7
CHO	202	6.2
CHEW	1859	56.8
Others	798	24.3
Geo-political zone		
North Central	647	19.8
North East	466	14.2
North West	561	17.1
South East	571	17.4
South South	478	14.6
South West	552	16.9
Type of residence		
Urban	440	13.4
Rural	2286	69.8
Peri-urban	549	16.8
Ever-received IMCI training		
Yes	821	25.1
No	2454	74.9

Diagnostic accuracy

Overall, only 36.0% of all healthcare providers were able to correctly diagnose the five simulated medical cases. The average percentage of correct diagnosis is summarized in Table 2. There was a difference in average diagnostic accuracy between males (38.0) and female (35.0). Apart from doctors (65.5%), no cadre of healthcare providers achieved 50% diagnostic accuracy ($p<0.001$). Across the geo-political zones, participants in the North East (44.5) had the highest correct diagnostic accuracy while those in the South West (27.6) had the lowest correct diagnostic accuracy. Healthcare providers with prior training in IMCI also slightly performed better than those without previous IMCI training (Yes- 42.6; No – 34.6).

Table 3 shows the diagnostic accuracy for the five conditions according to the cadre of healthcare providers. Except for PPH (57.2%), the proportion of correct diagnostic accuracy was less than 50% in other four clinical conditions assessed. Malaria with anaemia had the lowest correct diagnostic accuracy (8.7%) and this was found to be very poor among all healthcare providers. Furthermore, doctors performed better than other healthcare providers in accurate diagnosis of acute diarrhoea, pneumonia, PPH and neonatal asphyxia.

Adherence to guidelines for history taking, physical examination, treatment, and health education

The overall level of adherence to guidelines for the five medical cases is shown in Figure 1. The adherence was 38.6% and 25.2% among doctors and nurses/midwives respectively. Other healthcare providers barely attained 20% adherence. Similarly, the level of adherence across the geopolitical zones was about 20% (Figure 2). Prior IMCI training by participants made very little difference in the adherence to the guidelines (Yes- 23.8% vs No – 19.3%).

The results for diarrhoea, pneumonia and malaria are presented in Table 4. Irrespective of the gender of healthcare provider, level of adherence to guidelines for history taking, physical examination, treatment and health education was very low. In terms of cadre of provider, though generally low,

Table 2: Diagnostic accuracy for five MCH outcomes among PHC healthcare providers, 2016 NHFS

Variable (n=3275)	Average Proportion of correct diagnosis	p-value
Age group (years)		
<=35	36.7	
> 35	35.7	0.336
Sex		
Male	38	
Female	35	0.003
Cadre/Position		
Doctor	65.5	
Nurse/Midwife	49.1	
CHO	46.4	
CHEW	33.7	
Others	31.2	p<0.001
Geo-political zone		
North Central	34.8	
North East	44.5	
North West	38.2	
South east	37	
South South	35	
South West	27.6	p<0.001
Type of residence		
Urban	36.3	
Rural	36.3	
Peri-urban	34.4	0.327
Ever-received IMCI training		
Yes	42.6	p<0.001
No	34.6	

doctors fared better than other providers. They attained 51% adherence to guidelines for history taking in malaria with anaemia. There was not much difference across geo-political zones and exposure to IMCI training. Performance in management of PPH and neonatal asphyxia (Table 5) was somewhat poorer compared to the patterns in Table 4 for diarrhea, pneumonia, and malaria.

Discussion

This study examined the diagnostic accuracy and adherence to the national guidelines for the management of selected IMCI by health workers working in primary healthcare facilities that were supported by SOML in Nigeria. Overall, the study showed that only 36.0% of healthcare workers assessed were found to accurately diagnose all the five clinical conditions with the highest proportion among medical doctors. Diagnostic accuracy was associated with being a medical doctor relative to other cadres of healthcare workers, practicing in the Northeast region compared to other regions of Nigeria and a reported history of ever receiving a training in IMCI. The diagnostic accuracy among the study participants was highest in PPH and worst in Malaria complicated by anaemia assessment. The adherence to management guidelines was highest among the medical doctors followed by nurses and midwives among the health workers interviewed. Generally, adherence to medical guidelines was highest in physical examination session of PPH across all the cadres of healthcare providers compared to the history taking and treatment sessions.

Several studies have assessed the knowledge and skills of frontline healthcare workers in Sub-Saharan Africa including Nigeria, most of these studies largely used either self-report or researcher's-based knowledge assessment questionnaire[2,10-12]. Findings from these studies reported low level of knowledge on maternal and child health related interventions. For example, two Nigerian studies – one each in the North and South were conducted among health workers (nurses, CHO and CHEW) in primary healthcare settings[13,14]. Both studies showed that less than a third of study participants had good knowledge of partograph to correctly monitor labour with highest proportion of those with good knowledge being medical doctors[13,14]. Another Nigerian study that assessed the knowledge and confidence of healthcare providers in offering maternal health services showed that medical doctors and nurses performed better than other cadres of healthcare providers such as CHEW. Unlike the previous similar studies that used only knowledge questions

Table 3: Diagnosis accuracy for five conditions according to Cadre of Heathcare provider, NHFS 2016

Cadre/Position	Acute diarrhoea	Pneumonia	Malaria with Anaemia	PPH	Neonatal asphyxia
Doctor	75.8	66.7	24.2	81.8	78.8
Nurse/Midwife	41.5	48	10.2	79.9	66.1
CHO	51	50	15.4	70.8	45.1
CHEW	40	38.1	7.7	52.9	29.4
Others	31.6	32.1	7.9	51.9	32.3
All	39.3	38.8	8.7	57.2	35.9

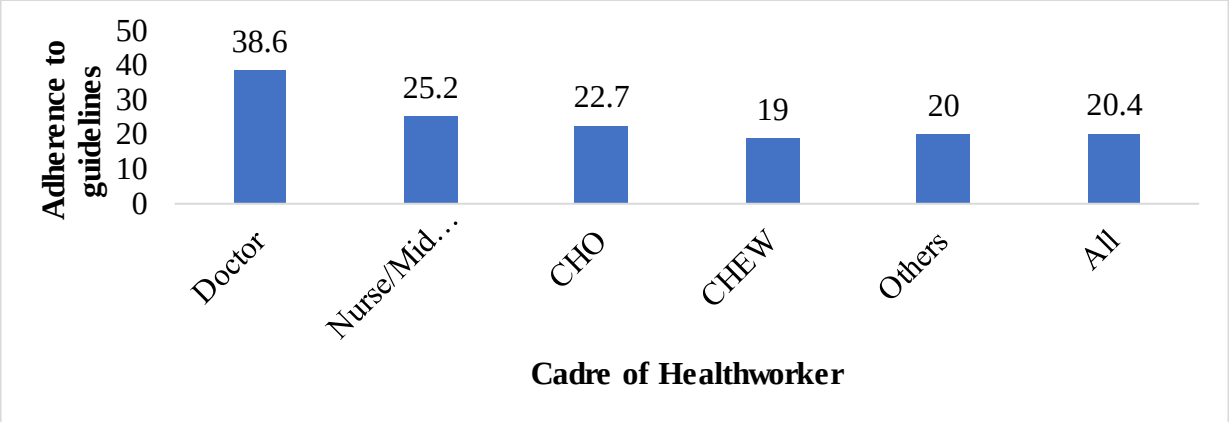

Figure 1: Overall level of adherence to guidelines according to cadre of healthcare provider, NHFS 2016

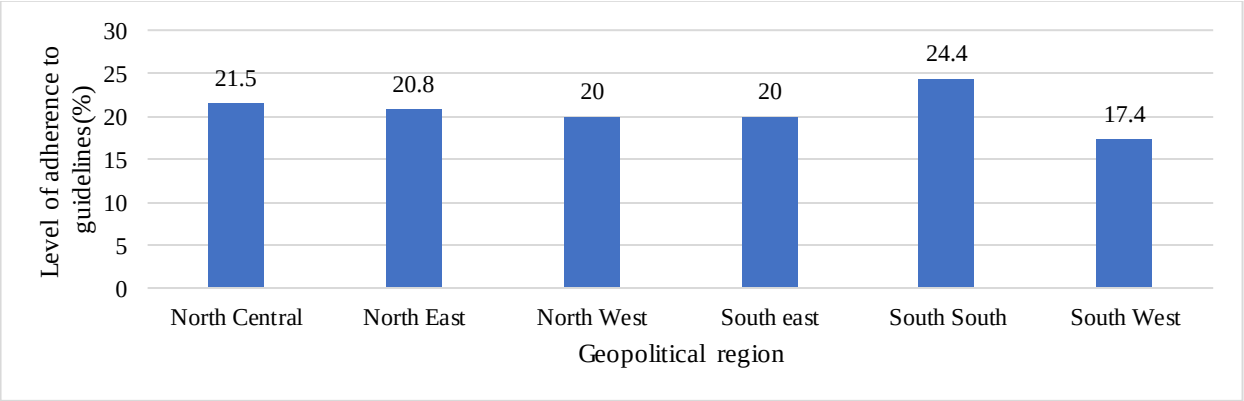

Figure 2: Overall level of adherence to guidelines across geo-political regions, NHFS 2016

to assess the competence of frontline healthcare providers at the primary healthcare levels[10-13], the assessment done in this study used a well-structured checklist that covered history, examination and management to measure knowledge and diagnostic accuracy. In addition, the study also assessed the adherence of these healthcare providers in using the management guidelines; the history, examination and treatment for PPH and examination and treatment for neonatal asphyxia. This approach of assessment of clinical competence helped to identify specific aspects of knowledge and skills that were deficient in health workers or ignored by them while managing patients. Some studies showed that use of supportive supervision by experienced health worker and or mentoring by specialized institutions were associated with improved knowledge and skills, particularly when such support is associated with practical or hands-on training programme[15,16].

The findings from this study should be interpreted with caution. It is possible that the assessment might be fraught with inter-observer variation despite using the same checklist. We used five health conditions to measure clinical competence at primary healthcare, which may not be true for other health conditions. However, the health conditions we used were among the most frequently described consultation at the primary healthcare level. In addition, the assessment of clinical competence was done once, and it is plausible that this approach could have under or overestimated the result. Multiple assessments or visits could provide further insights into the measurement of the diagnostic accuracy. For example, direct questioning of the participating health care providers on why certain actions or inactions happen during the treatment simulations could further help to appropriately grade the health workers' diagnostic accuracy.

Table 4: Adherence to guidelines for history taking, physical examination and treatment of diarrhoea, pneumonia, and malaria with anaemia

Characteristics	**Diarrhea**			**Pneumonia**			**Malaria with anaemia**		
	History taking	**Physical exam**	**Treatment & HE**	**History taking**	**Physical exam**	**Treatment & HE**	**History taking**	**Physical exam**	**Treatment & HE**
Sex									
Male	26.2	16.1	34.9	27.2	18.2	27.5	27	16	25.8
Female	26.1	14.6	36.1	24.5	17.2	25.5	22	15.4	25.1
Cadre/Position									
Doctor	47.9	36.8	42.1	41.9	37.4	28.7	50.9	37.9	27.6
Nurse/Midwife	31.1	19.7	40.7	28.2	20.9	28.8	25.3	18.2	27.5
CHO	28.4	18.3	37.5	27.2	22.3	28.9	25.5	18.6	24.9
CHEW	24.2	13.6	34.8	24.3	15.9	25.9	22.8	14.2	25
Others	26.7	14.7	34.7	25.2	17.4	24.7	23	15.6	25.1
Geo-political zone									
North Central	29.3	19.1	37.9	28.4	23.8	26.9	25.4	18.3	26.5
North East	23.8	14.3	32.8	26.1	16.1	27.8	25.7	14.2	25.4
North West	25	12.8	34.4	25.1	12.6	28.1	24.7	11.6	24.5
South east	24.8	12.8	36.4	23.6	17.9	26	20.3	15.2	25.5
South South	29.6	19.5	38.6	27.5	19.7	28	26.7	22.5	27.3
South West	23.9	11.9	33.9	21.5	13.9	20.5	19.1	11.8	22.4
Ever-received IMCI training									
Yes	29.2	18.6	39.5	28	21.6	28.4	26.6	19.1	26.4
No	25.7	14.3	35.3	25.1	16.5	26	23.1	14.7	25.6

Table 5: Adherence to guidelines for history taking, physical examination and treatment of PPH and Neonatal asphyxia

Variable	**PPH**			**Neonatal asphyxia**	
Characteristics	**History taking**	**Physical exam**	**Treatment & HE**	**Physical exam**	**Treatment & HE**
Sex					
Male	8.5	14.6	13.8	12.7	13
Female	9.9	20.3	16.6	16.2	18.3
Cadre/Position					
Doctor	24.2	50.7	33	40.7	41.4
Nurse/Midwife	12.9	29.1	22.6	21.6	26.6
CHO	10	22.2	17.6	17.5	18.3
CHEW	8.5	15.3	14	13.3	14.3
Others	9.2	18.6	15.2	14.3	15.8
Geo-political zone					
North Central	8.9	17.2	14	12.7	12.4
North East	11.6	17.5	15.7	19.1	20.4
North West	9.3	13.6	17	12.8	13.8
South east	8.4	18.4	15.5	16.2	18.2
South South	13.6	26.9	19	21.3	20.9
South West	6	18.7	13.7	10.1	16
Ever-received IMCI training					
Yes	12	23.9	19.1	20	20.9
No	8.8	17.1	15	13.8	15.6

In conclusion, this study showed selected healthcare providers at the primary health care level in Nigeria demonstrated poor diagnostic accuracy of common health conditions at their respective health stations. The worst diagnostic accuracy and adherence to national guidelines was among CHEW that largely work in the primary healthcare facilities in the country. We recommend more studies that will assess different levels of competencies among frontline healthcare workers in Nigeria using both quantitative and qualitative designs to have a deeper understanding of issues around it. We also continuous training and re-training to ensure satisfactory competencies.

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