

ORIGINAL RESEARCH



The knowledge versus self-rated confidence of facility birth attendants with respect to maternal and newborn health skills: the experience of Nigerian primary healthcare facilities

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Date Received: 20-Dec-2016
Revision Received: 01-Feb-2019
Date Accepted: 31-May-2019

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<https://dx.doi.org/10.4314/mmj.v31i3.8>

Abstract

Background

Competent and skilled birth attendants are critical in the reduction of maternal and infant morbidity and mortality at delivery. This study aimed to determine the association between knowledge and self-rated confidence in facility birth attendants affiliated with maternal and neonatal health (MNH) interventions.

Methods

A descriptive cross-sectional study was conducted in 24 primary healthcare facilities in Osun state, Nigeria among 128 consenting facility birth attendants who were selected via a multi-stage sampling technique. Each attendant received a semi-structured interviewer-administered questionnaire. The dependent variables included the respondent's level of knowledge in MNH interventions and their self-rated confidence in MNH skills such as the provision of antenatal care service, normal labour, use of a partograph and the management of obstetric complications and post-partum haemorrhage. Bivariate analysis of factors associated with knowledge and self-rated confidence in MNH skills was performed with statistical significance set at $p < 0.05$.

Results

Only 48 (37.5%) of the respondents had good knowledge of all of the assessed interventions; worse performances were reported with regards to the respondent's knowledge of normal labour and partograph use. However, 96 (75%) of respondents were confident in performing 75% of the skills assessed. Our analysis identified two factors that were significantly associated with a good knowledge of MNH skills: the cadre of the birth attendants ($p < 0.001$) and training in life-saving skills ($p = 0.001$). The knowledge of our respondents relating to most of the MNH interventions assessed was not significantly associated with their self-rated confidence in the required skills.

Conclusion

The confidence of facility birth attendants in MNH skills was not knowledge-based and could frustrate national efforts to reduce maternal and perinatal deaths. We recommend effective and evidence-based training of all cadres of facility birth attendants to ensure that the skills being practiced clinically are based on adequate knowledge.

Key Words

Birth attendants, knowledge, confidence, maternal and newborn health skills

Introduction

In 2007, Nigeria embarked on the Integrated Maternal Newborn and Child Health strategy (IMNCH), which aimed to reduce high maternal and neonatal death rates¹. Since then, the country has mounted a number of other initiatives in line with the original goal of the IMNCH and to meet the Sustainable Development Goal three (SDG 3). One of the target of the SDG 3 is to reduce Nigeria's maternal mortality ratio (MMR) from 576 in 2013, according to the Nigeria Demographic Health Survey (NDHS)² to < 70 per 100,000 live births by 2030³ and also to reduce the neonatal mortality rate from 74 in 2013² to 12 per 1000 live births by 2030³. According to the United Nations Population Fund (UNFPA), Nigeria accounted for 15% of the world's maternal deaths in 2015^{4,5}. Moreover, with a rate of 70 infant deaths per 1000 live births, Nigeria had the 9th highest infant mortality rate (IMR) in the world⁶ and contributes about 13% to the global under-five mortality rate (U5MR)⁷. Considering these facts, Nigeria has a long way to go in meeting the SDG 3 targets,

hence the need to review the health systems in place in our country.

Global evidence has shown that most maternal and newborn deaths are preventable. The lack of access to skilled care, including emergency obstetric care and quality maternal mortality lifesaving commodities, contribute significantly to Nigeria's high maternal and newborn death rates^{3,4}. Indeed, the proportion of births attended by skilled attendants in Nigeria increased from 35.2% in 2003⁸ to 43% in 2017⁹. Furthermore, $< 20\%$ of health facilities offered emergency obstetric care services when surveyed in 2010¹⁰.

The role of skilled care in reducing maternal and newborn deaths has been recognized on a global basis and it is estimated that 16% to 33% of maternal deaths could be prevented by the presence of a skilled attendant at birth¹¹. Clearly the degree to which the presence of a skilled attendant will impact on MMR will depend on how competent they are¹¹. In a previous study, Harvey et al. highlighted that the mere knowledge of a procedure is no guarantee that it can be

performed correctly¹² and training does not always guarantee the acquisition of knowledge and ability until knowledge from the training is applied in practice¹³. It is critical that a birth attendant is appropriately 'skilled', which implies the competent use of knowledge¹¹. Competency can be viewed as 'possessing skills and knowledge sufficient to comply with predefined clinical standards under enabling and supportive environments'¹². In 1999, the Joint United Nations agencies referred to 'skilled attendants at birth (SBA)' as 'exclusively people with midwifery skills (for example, doctors, midwives, nurses) who have been trained to proficiency in the skills necessary to manage normal deliveries and diagnose, manage or refer complications'¹⁴. A competent health provider is expected to elicit a high level of confidence when faced with emergencies. In this study, we assessed the self-rated confidence of selected respondents to serve as a proxy for their level of competence.

In 2016, the Lancet Maternal Survival Series Steering Group reviewed various reports and studies and noted that despite the pre-service or in-service knowledge received by SBAs, the quality of facility-based maternal services was poor and that the knowledge and skills of health professionals was inadequate¹⁵. Health centres in Nigeria scored low with regards to technical quality¹⁵. The Lancet Group also found that the inappropriate management of complications and untimely care in hospitals was common, even for life-threatening emergencies¹⁵.

These findings raise a number of questions, including the roles and interplay of knowledge and competence of facility birth attendants (both the skilled clinical care providers and the community health workers based in the health facilities) in managing obstetric complications. These questions formed the basis for our present study. It is believed that in the face of an emergency, a healthcare provider will be prompted to react and would respond based on his or her level of confidence in managing such emergencies¹⁶. This level of confidence is expected to be based upon their competence, defined as the application of knowledge and experience in managing such cases¹⁶. If a healthcare provider's knowledge base is inadequate, it presupposes that the healthcare provider may have confidently but wrongly managed the clients over a long period of time. This might explain the persistently high maternal and neonatal mortality indices in Nigeria despite the presence of facility birth attendants at deliveries.

Our study aimed to determine the relationship between the knowledge and self-rated confidence of facility birth attendants in performing maternal and newborn health (MNH) skills and to identify specific factors associated with their knowledge and self-rated confidence.

Methodology

Study setting

The study was descriptive and cross-sectional in design and was conducted in primary healthcare (PHC) facilities in Osun State, South-west Nigeria. The PHC facilities in Nigeria are under the jurisdiction of the Local Government Area (LGA) authority, which is the lowest of the country's three-tier level of governance. A PHC service in each LGA is now also referred to as the Director of Primary Healthcare or Medical Officer of Health for that LGA. There are 30 LGAs and one Area Council in Osun State, spread across six administrative zones (which also constitute the three Senatorial districts). Osun State had 52 secondary health facilities and 693 PHC

facilities at the time of this study. Collectively, these facilities featured 1822 healthcare providers involved in maternal and neonatal care services. These providers consist of doctors, nurses, midwives, community health officers and community health extension workers (known as 'facility birth attendants'). These providers constituted the study population for this study. At the time this study was carried out, there were 31 doctors at the primary level of healthcare delivery in Osun state. In line with the 2008 approach of the Nigeria Demographic and Health Survey¹⁷, the term 'skilled attendant at delivery' included doctors, nurses, nurse-midwives and auxiliary nurses.

Selection of study participants

A total of 128 skilled birth attendants participated in this study. Attendants were selected through a multi-stage sampling technique, with administrative zones as the sampling frame at the first level, and two LGAs selected from each zone using a simple random approach (amounting to 12 LGAs). Next, two PHC facilities were selected per LGA using a simple random sampling technique. The facility birth attendants were also selected per health facility using a simple random sampling technique. These facility birth attendants were categorized into skilled clinical care service providers and community health officers. The group of skilled clinical care providers included physicians, midwives and nurses while the group of community health workers included community health extension workers (CHEWs) and community health officers (CHOs). This classification was based on the initial job description of the health workers involved. Those referred to as being skilled are expected to carry out the core clinical services and require high levels of proficiency in skills to perform in the health facility. In contrast, community health workers were expected to provide support in the community and act as a liaison between health facilities and the community, thus providing preventive health services under supervision. We included all 12 physicians responsible for the selected health facilities in the 12 LGAs as PHC Directors or Medical Officers of Health. Only consenting facility birth attendants were included in this study.

Data collection and management

A semi-structured questionnaire was used to select facility birth attendants. Trained assistants then assessed their self-rated confidence with regards to antenatal care services, counselling women on how prepared they were for birth and their readiness for complications, the partographic monitoring of labour, immediate newborn care, manual removal of the placenta, by bimanual compression of the uterus, the repair of cervical tears, the repair of first and second degree perineal tears and the management of post-partum haemorrhage. Subsequent sections in the tool then assessed the knowledge of participants with regards to the provision of antenatal care, normal labour and delivery, the partographic monitoring of labour, care of the newborn, and the management of obstetric complications and post-partum haemorrhage. These areas of focus were selected as they represent the basic skills needed to provide antenatal care, normal labour and delivery services and emergency obstetric care services. These skills are crucial in ensuring safe maternal and newborn health outcomes. The instruments used were adapted from the JHPIEGO/ Maternal and Neonatal Health program tool¹⁸ and the tool used for a previous study of maternal health by Ijadunola et al.¹⁰. The

questionnaires were pre-tested in a PHC facility outside of the study area.

For the questions assessing knowledge, every correct answer earned a score of 1. The maximum score possible was 62. We then calculated the sum total of scores and the percentage of scores. The Nigerian University Education Scoring system, as used by Ijadunola et al. in a similar study¹⁰, was adopted for the present study, in which $\geq 70\%$ is excellent, 50–69% is good, 40–49% is fair and $< 40\%$ is poor. For this study, $\geq 50\%$ was judged to be good while $< 50\%$ was judged to be poor. When scoring the self-reported level of competence when performing specific MNH skills, 'Very confident' was given a score of 3, 'Not very confident, need more coaching' was given a score of 2, and 'I cannot perform the skill' was given a score of 1. To obtain a dichotomized response, 'Not very confident' and 'Cannot perform skill' were recoded as 'Not confident' while 'Very confident' was left as 'Confident'. This is because an inability to perform the skill is believed to also imply a lack of confidence in performing it. All categories of the healthcare providers studied are expected to perform these skills based on their pre-service training and designated job descriptions. Variable age was recoded based on the derived median age.

Data were analysed at the univariate level by determining the frequency distribution, measures of central tendency and dispersion for the socio-demographic characteristics of respondents, their knowledge scores and their perceived competence with regards to the various MNH skills assessed. Bivariate analysis involved the comparison of means among different cadres of healthcare providers, as well as the determination of factors associated with their level of knowledge and confidence in the MNH skills assessed. We also assessed how their level of knowledge correlated with their level of confidence with regards to these MNH skills using the chi-square test with the latter as the outcome variable. SPSS statistical software (version 20) was used for all data analysis and statistical significance was set to a p-value < 0.05 .

Ethical approval was obtained from the Research and Ethical Committee of the Obafemi Awolowo University Teaching Hospitals' Complex, Ile-Ife, Osun state. Permission to conduct the study within Osun state primary healthcare facilities was obtained from the Department of Public Health in the Osun State Ministry of Health. Written informed consent was also obtained from the skilled birth attendants themselves and confidentiality of the data provided was assured.

Results

The mean age (\pm standard deviation) of our respondents was 37.0 ± 8.9 years, with a median age of 35 years and a semi-interquartile range of 3.75 years. We studied 114 (89.1%) females and 14 (19.1%) male skilled birth attendants, with a female to male ratio of 8 to 1. There was a higher proportion of nurse-midwives 50 (39.1%) studied; these are nurses with an additional qualification in midwifery. Skilled clinical service providers constituted 71.1% of the study population. The median period of professional experience of the healthcare providers studied was 6 years, with an interquartile range of 4.6 years. Only 41 (32.0%) and 47 (36.7%) of the respondents had received training on Life Saving Skills (LSS) or on any other refresher course during the course of their work, respectively. Only 54 (43.2%) of these skilled birth attendants reported using a partograph

routinely when managing their clients. The majority of respondents (103, 80.5%) indicated that 'patient care' takes most of their professional time at work compared with the amount of time they spend on other activities (Table 1).

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (n=128)	Percentage (%)
Age		
≤35 years	65	52.4
>35 years)	59	47.6
Total	124	100.0
Sex		
Male	14	10.9
Female	114	89.1
Total	128	100.0
Professional type		
Physician	7	5.5
Nurse	34	26.6
Nurse/midwife	50	39.1
Community Health Officer (CHO)	10	7.8
Community Health Extension Worker (CHEW)	27	21.1
Total	128	100.0
Professional categories		
Skilled clinical service providers	91	71.1
○ Physician		
○ Nurse		
○ Nurse/midwife		
Community service providers	37	28.9
○ Community Health Officers		
○ Community Health Extension Workers		
Total	128	100/0
Years of professional experience		
<6 years	58	49.6
≥7 years	59	50.4
Total	117	100.0
Ever participated in Life Saving Skills (LSS) course		
Yes	41	32.0
No	87	68.0
Total	128	100.0
Ever had other refresher courses		
Yes	47	36.7
No	87	63.3
Total	124	100.0
Distribution of professional time at work		
Predominantly patient care	103	80.5
Predominantly other tasks, besides patient care	25	19.5
Total	128	100.0

Knowledge of skilled birth attendants with regards to selected MNH interventions

Having categorized the level of knowledge into good and poor groups, we found that only 48 (37.5%) of these skilled birth attendants scored above 50%, which represented a good knowledge of all interventions assessed. A higher

proportion of the respondents had a good knowledge of antenatal care (78.1%) and the management of post-partum haemorrhage (74.2%). Performances were worse with regards to knowledge relating to normal labour (33.6%) and use of a partograph in monitoring labour (21.9%) (Table 2).

Table 2: The performance of facility birth attendants with regards to their knowledge of selected MNH interventions

MNH interventions	Good level of knowledge	Poor level of knowledge	Total (Frequency)
	Frequency (%)	Frequency (%)	
Antenatal care	100 (78.1)	28 (21.9)	128 (100.0)
Normal labour and delivery	43 (33.6)	85 (66.4)	128 (100.0)
Immediate newborn care and resuscitation	79 (61.7)	49 (38.3)	128 (100.0)
Use of partograph	28 (21.9)	100 (78.1)	128 (100.0)
Management of obstetric complications	65 (50.8)	63 (49.2)	128 (100.0)
Management of post-partum hemorrhage	95 (74.2)	33 (25.8)	128 (100.0)
Overall interventions	48 (37.5)	80 (62.5)	128 (100.0)

The overall mean percentage score relating to knowledge of all of the maternal and newborn interventions included in our survey was $44.2 \pm 16.9\%$, with a median score of 43.4% and a semi-interquartile range of 11.5%. Based on the median percentage scores, knowledge of the management of post-partum haemorrhage received the highest score (66.7%), with a semi-interquartile range of 25%. This was closely followed by knowledge of antenatal care with a score of 65% and a semi-interquartile range of 10%. Knowledge of the use of a partograph showed the lowest median percentage score (26.7%) with a semi-interquartile range of 23.3% (Table 3). There was a significant difference between and within the cadres of healthcare providers with regards to the mean scores of their overall knowledge of MNH interventions ($F\text{-test}=9.753; p<0.001$) and the mean number of skills they were competent in ($F\text{-test}=3.417; p=0.011$). The differences in the means of their overall knowledge of MNH interventions between and within the groups of skilled birth attendants who had received LSS training and those who had not was also significant ($F\text{-test}=8.375; p=0.004$). However, the differences in the mean number of skills they reported confidence and competence in, both within and between these two categories, were not significant ($F\text{-test}=0.181; p=0.672$).

Self-rated confidence of healthcare workers with regards to select MNH skills

More than half of the respondents reported being confident in most of the skills assessed and did not need any further coaching except for partograph utilization (62; 48.4%), bimanual compression of the uterus (56; 43.8%) and repair of cervical tears (51; 39.8%) (Table 4). Only 43 (33.6%) of healthcare providers reported that they were confident in all of the selected MNH skills. However, 96 (75%) of the healthcare providers reported that they were confident in at least 9 (75%) of the 12 selected MNH skills.

Factors associated with the overall knowledge score of respondents with regards to MNH interventions

Only 48 (37.5%) of the respondents scored $\geq 50\%$ and were therefore judged as having a good knowledge when all of the MNH interventions were assessed collectively. Age was not significantly associated with the level of knowledge for MNH interventions ($p=0.124$). However, several factors were significantly associated with having a good knowledge

of all MNH interventions (Table 5), including being a skilled clinical service provider ($p<0.001$), in particular, being a physician or a nurse-midwife, being trained in LSS ($p=0.001$) and application of partographs in the respondents health facilities ($p=0.013$).

Table 3: Mean percentage scores of facility birth attendants with regards to their knowledge of selected MNH interventions

Variables	n	Means	Standard deviation	Median	Semi-interquartile range	Direction of skewedness
Knowledge of antenatal care	128	59.8	21.7	65.0	60.0	Negatively skewed
Knowledge of normal labour and delivery	128	37.6	20.2	35.0	35.0	Positively skewed
Knowledge of immediate newborn resuscitation	128	48.5	18.1	50.0	50.0	Negatively skewed
Knowledge of the partograph	128	29.2	28.1	26.7	23.4	Positively skewed
Knowledge of the management of obstetric complications	128	44.7	25.7	50.0	45.0	Negatively skewed
Knowledge of the management of post-partum haemorrhage	128	58.5	32.8	66.7	58.3	Negatively skewed
Overall knowledge of all interventions	128	44.2	16.9	43.4	26.0	Normally distributed

The manner in which facility birth attendants distributed their professional working time was not significantly associated with them possessing good or bad knowledge of all interventions ($p=0.274$). Indeed, a higher proportion of those who spent more time on ‘patient care’ scored less than 50% in the overall score relating to knowledge (Table 5).

Factors associated with self-rated confidence in selected MNH skills

Compared with females, a higher proportion of males rated themselves as being confident in at least 75% of the skills; however, this finding was not statistically significant ($p=0.515$). More than 75% of physicians, nurse-midwives and nurses rated themselves as being confident in 75% or more of the MNH skills assessed compared with CHOs and CHEWs; this difference was statistically significant ($p=0.007$). Therefore, professional types ($p=0.002$), as well as receiving training in LSS ($p=0.019$), were significantly associated with self-rated confidence in at least 9 (75%) of the MNH skills. Other factors, such as age, years of experience, receiving training in LSS, the proportion of professional working time distributed across various assignments, and the

use of partographs for normal labour, were not significantly associated with self-rated confidence (Table 6).

Table 4: Self-rated level of confidence of respondents in MNH skills

MNH skills	Very confident, do not need coaching	Not very confident, need coaching	Not confident, cannot perform skill	Total
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Managing antenatal patients	101 (84.4)	13 (10.2)	7 (5.4)	121 (100.0)
Counselling pregnant women on birth preparedness and complication readiness	105 (82.0)	14 (10.9)	9 (7.0)	128 (100.0)
Managing normal labour & delivery	95 (74.2)	21 (16.4)	12 (9.4)	128 (100.0)
Use of the partograph	62 (48.4)	24 (18.8)	42 (32.8)	128 (100.0)
Active management of the third stage of labour	97 (75.8)	17 (13.3)	14 (10.9)	128 (100.0)
Newborn resuscitation	88 (68.8)	25 (19.5)	15 (11.7)	128 (100.0)
Post-partum care	101 (78.9)	12 (9.4)	15 (7.7)	128 (100.0)
Manual removal of the placenta	71 (55.1)	12 (9.4)	15 (11.7)	98 (100.0)
Bimanual compression of the uterus	56 (43.8)	21 (16.4)	36 (29.1)	113 (100.0)
Repair of cervical tear	51 (39.8)	31 (24.2)	46 (35.9)	128 (100.0)
Repair of 1st and 2nd stage perineal tear	67 (52.3)	30 (23.4)	31 (24.2)	128 (100.0)
Management of post-partum haemorrhage	70 (54.7)	25 (19.5)	33 (25.8)	128 (100.0)

Table 5: Factors associated with the knowledge of respondents with regards to MNH interventions

Independent variables	Good knowledge	Poor knowledge	Total	Test of statistical significance and degrees of freedom (dfs)
	Freq. (%)	Freq. (%)	Freq. (%)	
Sex				
Male	5 (35.7)	9 (64.3)	14 (100.0)	$\chi^2=0.021, (1), p=0.884$
Female	43 (37.7)	71 (62.3)	114 (100.0)	
Age (by median age of 35 years)				
≤35 years	21 (32.3)	44 (67.7)	65 (100.0)	$\chi^2=2.360, (1), p=0.124$
>35 years	27 (45.8)	32 (54.2)	59 (100.0)	
Professional type				
Physician, Nurse only, Nurse-midwife.	43 (47.3)	48 (52.7)	91 (100.0)	$\chi^2=12.776, (1), p<0.001$
CHO & CHEW	5 (13.5)	32 (86.5)	37 (100.0)	
Individual professional cadres				
Physician	5 (71.4)	2 (28.6)	7 (100.0)	LR=31.158, (4), p<0.001
Nurse-midwives	31 (62.0)	19 (38.0)	50 (100.0)	
Nurse only	7 (20.6)	27 (79.4)	34 (100.0)	
CHO	2 (20.0)	8 (80.0)	10 (100.0)	
CHEW	3 (11.1)	24 (88.9)	27 (100.0)	
Years of professional experience				
≤6 years	19 (32.8)	39 (67.2)	58 (100.0)	$\chi^2=2.073, (1), p=0.150$
≥7 years	27 (45.8)	32 (54.2)	59 (100.0)	
Ever heard of LSS				
Yes	37 (45.1)	45 (54.9)	82 (100.0)	$\chi^2=5.656, (1), p=0.017$
No	11 (23.9)	35 (76.1)	46 (100.0)	
Ever trained in LSS				
Yes	24 (58.5)	17 (41.5)	41 (100.0)	$\chi^2=11.390, (1), p=0.001$
No	24 (27.6)	63 (72.4)	87 (100.0)	
Ever attended any refresher course				
Yes	20 (42.6)	27 (57.4)	47 (100.0)	$\chi^2=0.809, (1), p=0.368$
No	28 (34.6)	53 (65.4)	81 (100.0)	

Table 6: Factors associated with the self-rated confidence of facility birth attendants in MNH skills

Independent variables	Self-rated confidence in ≥9 (75%) MNH skills	Self-rated confidence in <9 (75%) MNH skills	Total	Test of statistical significance and degrees of freedom (dfs)
	Freq. (%)	Freq. (%)	Freq. (%)	
Sex				
Male	12 (85.7)	2 (14.3)	14 (100.0)	Fishers exact, p=0.515
Female	84 (73.7)	30 (26.3)	114 (100.0)	
Age (by median age of 35 years)				
≤35 years	49 (75.4)	16 (24.6)	65 (100.0)	$\chi^2=0.011, (1), p=0.917$
>35 years	44 (74.6)	15 (25.4)	59 (100.0)	
Professional type				
Physician; Nurse & Nurse-midwife.	75 (82.4)	16 (17.6)	91 (100.0)	$\chi^2=9.238, (1), p=0.002$
CHO & CHEW	21 (56.8)	16 (43.2)	37 (100.0)	
Individual professional cadres				
Physician	6 (85.7)	1 (14.3)	7 (100.0)	LR=14.030, (4), p=0.007
Nurse-midwives	43 (86.0)	7 (14.0)	50 (100.0)	
Nurse only	26 (76.5)	8 (23.5)	34 (100.0)	
CHO	3 (30.0)	7 (70.0)	10 (100.0)	
CHEW	18 (66.7)	9 (33.3)	27 (100.0)	
Years of professional experience				
≤6 years	44 (75.9)	14 (24.1)	58 (100.0)	$\chi^2=0.026, (1), p=0.872$
≥7 years	44 (74.6)	15 (25.4)	59 (100.0)	
Ever heard of LSS				
Yes	67 (81.7)	15 (18.3)	82 (100.0)	$\chi^2=5.475, (1), p=0.019$
No	29 (63.0)	17 (37.0)	46 (100.0)	
Ever trained in LSS				
Yes	31 (75.6)	10 (24.4)	41 (100.0)	$\chi^2=0.012, (1), p=0.913$
No	65 (74.7)	22 (25.3)	87 (100.0)	
Ever attended any refresher course				
Yes	39 (83.0)	8 (17.0)	47 (100.0)	$\chi^2=2.522, (1), p=0.112$
No	57 (70.4)	24 (29.6)	81 (100.0)	
Provider routinely use partograph				
Yes	41 (75.9)	13 (24.1)	54 (100.0)	$\chi^2=0.116, (1), p=0.733$
No	52 (73.2)	19 (26.8)	71 (100.0)	

The association between the knowledge of health workers with regards to MNH interventions and their self-rated confidence in the required MNH skills

Knowledge scores for each of the interventions were compared with MNH skills that were related to and expected to be dependent on this knowledge. Findings revealed that having a good or poor knowledge of most of the interventions assessed was not significantly associated with their perceived confidence in the required skills. This, however, was not the case for their knowledge assessment, for ‘normal labour’ and ‘use of a partograph’ as having good knowledge in these areas was significantly associated with confidence in the partographic monitoring of labour (p=0.021 and p<0.001, respectively) (Table 7).

The knowledge of facility birth attendants with regards to the management of obstetric complications was assessed and compared with their self-rated confidence for the required skills to prevent post-partum haemorrhage. There was no significant association between the respondents’ knowledge of managing obstetric complications and their self-rated confidence in each of the skills required to repair first- and second-stage perineal tears (p=0.635), repairing cervical tears (p=0.657), bimanual compression of the uterus (p=0.424) and manual removal of the placenta in cases of placenta retention (p=0.813).

Table 6 Cont...

Institution have WHO manuals for managing obstetric complications				
Yes	28 (71.8)	11 (28.2)	39 (100.0)	$\chi^2=0.307, (1)$
No	68 (76.4)	21 (23.6)	89 (100.0)	$p=0.579$
Institution has other guidelines/ protocol for managing complications				
Yes	16 (80.0)	4 (20.0)	20 (100.0)	$\chi^2=0.340, (1)$
No	79 (73.8)	28 (26.2)	107 (100.0)	$p=0.560$
Type of work taking highest proportion of time				
Patient care	78 (75.7)	25 (24.3)	103 (100.0)	$\chi^2=0.149, (1)$
Others aside from patient care	18 (72.0)	7 (28.0)	25 (100.0)	$p=0.699$
Knowledge of healthcare provider on all MNH interventions studied				
Good	40 (83.3)	8 (16.7)	48 (100.0)	$\chi^2=2.844, (1)$
Poor	56 (70.0)	24 (30.0)	80 (100.0)	$p=0.092$

Table 7: Association between the knowledge and self-rated confidence of respondents in antenatal, normal labour and newborn care skills

Independent variables	Confident in performing skills	Not confident in performing skills	Total	Test of statistical significance, degrees of freedom (dfs) and p-value
	Freq. (%)	Freq. (%)	Freq. (%)	
Self-rated confidence in managing antenatal patients				
Knowledge of antenatal care				
Good	86 (86.0)	14 (14.0)	100 (100.0)	$\chi^2=0.916, (1)$
Poor	22 (78.6)	6 (21.4)	28 (100.0)	$p=0.339$
Self-rated confidence in counselling on birth preparedness and complication readiness				
Knowledge of antenatal care				
Good	85 (85.0)	15 (15.0)	100 (100.0)	$\chi^2=2.733, (1)$
Poor	20 (71.4)	8 (28.6)	28 (100.0)	$p=0.098$
Self-rated confidence in normal labour, childbirth and immediate newborn care				
Knowledge of normal labour				
Good	33 (76.7)	10 (23.3)	43 (100.0)	$\chi^2=0.216, (1)$
Poor	62 (72.9)	23 (27.1)	85 (100.0)	$p=0.642$
Self-rated confidence in the use of the partograph				
Knowledge of normal labour				
Good	27 (62.8)	16 (37.2)	43 (100.0)	$\chi^2=5.341, (1)$
Poor	35 (41.2)	50 (58.8)	85 (100.0)	$p=0.021$
Self-rated confidence in the active management of the third stage of labour				
Knowledge of normal labour				
Good	32 (74.4)	11 (25.6)	43 (100.0)	$\chi^2=0.066, (1)$
Poor	65 (76.5)	20 (23.5)	85 (100.0)	$p=0.798$
Self-rated confidence in the use of a partograph for monitoring labour				
Knowledge of the use of partograph				
Good	23 (82.1)	5 (17.9)	28 (100.0)	$\chi^2=16.302, (1)$
Poor	39 (30.0)	61 (61.0)	100 (100.0)	$p< 0.001$
Self-rated confidence in newborn resuscitation				
Knowledge of newborn care				
Good	54 (68.4)	25 (31.6)	79 (100.0)	$\chi^2=0.015, (1)$
Poor	34 (69.4)	15 (30.6)	49 (100.0)	$p=0.902$
Self-rated confidence in the management of the immediate post-partum				
Knowledge of newborn care				
Good	64 (81.0)	15 (19.0)	79 (100.0)	$\chi^2=0.550, (1)$
Poor	37 (75.5)	12 (24.5)	49 (100.0)	$p=0.458$

Table 8: Association between knowledge and self-rated confidence of respondents in the management of obstetric complications and post-partum haemorrhage

Independent variables	Confident in performing skill	Not confident in performing skill	Total	Test of statistical significance, degrees of freedom (df) and P-value
	Freq. (%)	Freq. (%)	Freq. (%)	
Self-rated confidence in performing manual removal of the placenta				
Knowledge of the management of obstetric complication				
Good	35 (53.8)	30 (46.2)	65 (100.0)	$\chi^2=0.141, (1)$
Poor	36 (57.1)	27(42.9)	63 (100.0)	$p=0.708$
Self-rated confidence in the repair of 1st and 2nd stage perineal tear				
Knowledge of the management of obstetric complications				
Good	36 (55.4)	29 (44.6)	65 (100.0)	$\chi^2=0.490, (1)$
Poor	31 (49.2)	32 (50.8)	63 (100.0)	$p=0.484$
Self-rated confidence in repair of cervical tear				
Knowledge of the management of obstetric complications				
Good	28 (43.1)	37 (56.9)	65 (100.0)	$\chi^2=0.576, (1)$
Poor	23 (36.5)	40 (63.5)	63 (100.0)	$p=0.448$
Self-rated confidence in performing bimanual compression of the uterus				
Knowledge of the management of obstetric complication				
Good	28 (43.1)	37 (56.9)	65 (100.0)	$\chi^2=0.024, (1)$
Poor	28 (44.4)	35 (55.6)	63 (100.0)	$p=0.876$
Self-rated confidence in the management of post-partum haemorrhage				
Knowledge of the management of obstetric complications				
Good	38 (58.5)	27 (41.5)	65 (100.0)	$\chi^2=0.759, (1)$
Poor	32 (50.8)	31 (49.2)	63 (100.0)	$p=0.384$
Self-rated confidence in the management of post-partum haemorrhage				
Knowledge of the management of post-partum haemorrhage				
Good	53 (55.8)	42 (44.2)	95 (100.0)	$\chi^2=0.181, (1)$ a
Poor	17 (51.5)	16 (48.5)	33 (100.0)	$p=0.671$

The knowledge of respondents with regards to the management of post-partum haemorrhage was not significantly associated with how confident they were in the clinical management of post-partum haemorrhage ($p=0.196$) (Table 8). Table 9 shows how facility birth attendants (categorized by professional type) fared when their overall knowledge of MNH interventions was compared with their self-rated confidence for selected MNH

skills. A high proportion of physicians, nurses, and nurses with dual qualifications as midwives who rated themselves as either good or poor in terms of their knowledge rated themselves as very confident with regards to the selected MNH skills. The CHEWs had a much higher proportion of those who performed poorly but rated themselves as very confident in the MNH skills. The only exceptions to these were the CHOs. From these findings it was evident that there were no statistically significant associations between the knowledge of facility birth attendants with regards to selected MNH interventions by professional type and their self-rated confidence in the performance required for MNH skills (Table 9).

Table 9: The professional type of respondents and the association between overall knowledge and self-rated confidence in MNH skills

Professional types and knowledge performance	Self-rated confidence in ≥ 9 (75%) MNH skills	Self-rated confidence in < 9 (75%) MNH skills	Total	Test of statistical significance and degrees of freedom (dfs)
	Freq. (%)	Freq. (%)	Freq. (%)	
Physicians				Fishers exact, $p=1.000$
Good knowledge	4 (80.0)	1 (20.0)	5 (100.0)	
Poor Knowledge	2 (100.0)	0 (0.0)	2 (100.0)	
Nurse-midwives				Fishers exact, $p=0.089$
Good knowledge	29 (93.5)	2 (6.5)	31 (100.0)	
Poor Knowledge	14 (73.7)	5 (26.3)	19 (100.0)	
Nurse only				Fishers exact, $p=1.000$
Good knowledge	5 (71.4)	2 (28.6)	7 (100.0)	
Poor Knowledge	21 (77.8)	6 (22.2)	27 (100.0)	
Community Health Officers				Fishers exact, $p=1.000$
Good knowledge	1 (50.0)	1 (50.0)	2 (100.0)	
Poor Knowledge	2 (25.0)	6 (75.0)	8 (100.0)	
Community Health Extension Workers				Fishers exact, $p=0.250$
Good knowledge	1 (33.3)	2 (66.7)	3 (100.0)	
Poor Knowledge	17 (70.8)	7 (29.2)	24 (100.0)	
All facility birth attendants				$\chi^2=2.844, (1)$ $p=0.092$
Good knowledge	40 (83.3)	8 (16.7)	48 (100.0)	
Poor Knowledge	56 (70.0)	24 (30.0)	80 (100.0)	

Discussion

Skilled care at delivery has been proven to be a key intervention for reducing maternal and neonatal morbidities and mortalities¹⁹. The need to ensure that healthcare providers have adequate knowledge of managing MNH issues with the ease of translating this knowledge into a truly competent clinical practice is critical. This study set out to determine if the self-rated confidence reported by facility birth attendants in maternal and newborn care was based upon knowledge or not. Our findings showed that the proportion of skilled birth attendants who had good knowledge of all interventions when assessed overall was disturbingly low. This was the same for most of the specific interventions, particularly with regards to knowledge on attending to normal labour and delivery (35%) and their use of the partograph to monitor labour (23.4%).

Similarly, Oladapo et al.²⁰ assessed the knowledge of healthcare providers in peripheral primary health facilities and delivery units in one of the states in Nigeria and

found that only 54.5% of their respondents were aware of a partograph and only 28.2% had good knowledge of the partograph. This trend, observed in 2006, persisted through to 2010 when Fawole et al. further revealed that only 37.3% of healthcare providers could correctly mention at least one component of the partograph^{21,22}. This performance, as observed by Fawole et al., was worse for healthcare providers in primary and secondary healthcare facilities in Southwest Nigeria, a study population that was similar to the one investigated in our current study²¹. The poor knowledge of skilled birth attendants with regards to the partographic monitoring of labour may have contributed to the findings of Bulatao et al. in 2003 who rated maternal health services using the maternal and neonatal program index (MNPI) in 49 developing countries²³. These authors concluded that a trained attendant at delivery did not significantly contribute to a reduction in maternal mortality.

Interestingly, the healthcare providers assessed in our present study perceived that they were confident in most of the skills assessed that were needed for the MNH interventions studied. However, a higher proportion of our respondents made an exception to the use of the partograph for normal labour and delivery and the prevention of post-partum haemorrhage with the repair of cervical tears and the bimanual compression of the uterus. This further shows that there is a gap in knowledge and confidence with regards to the use of the partograph in particular.

The skilled care providers (doctors, nurses, and midwives) performed significantly better in terms of their knowledge of the interventions assessed. This finding is similar to that obtained by Harvey et al. in 2007 who sought to identify whether skilled birth attendants were truly skilled. The physicians and nurses performed better in their knowledge assessment compared to the nursing auxiliaries¹². However, this finding was in stark contrast to the findings of Ariff et al. in which medical officers in Pakistan performed poorly in their knowledge of maternal, newborn and child health compared to the community health workers and nurses assessed²⁴.

Also, having heard about the training for LSS for maternal and neonatal health or ever being trained on it were associated with a better performance in the overall knowledge for all interventions. The LSS course trains birth attendants to manage obstetric emergencies. Unfortunately, this course is not delivered regularly and very few facility birth attendants have ever been exposed to it. The training and retraining of facility birth attendants on these skills is therefore critical in achieving a reduction in maternal and neonatal mortality rates. However, an effective model for conducting effective training either as offsite, that is, outside the healthcare provider's organization or onsite, such as on the job training, will need to be ascertained in further studies.

Unsurprisingly, more physicians and nurse-midwives reported that they were confident in at least 75% of the MNH skills assessed compared with the other cadres of health professionals interviewed. Consequently, the capacity of these health professional cadres needs to be built further in order to enhance their confidence, as they are the personnel that are most commonly available, especially in rural communities providing maternal and neonatal care. Interestingly, even hearing about the LSS course was also significantly associated with the self-rated confidence of respondents in at least 75% of the skills, whereas receiving

training on the LSS was not. The reasons underlying this observation were not explored.

The performance of respondents on their overall knowledge of interventions in all categories of facility birth attendants was compared with their self-rated confidence in MNH skills. A higher proportion of the populations who performed well, and those who performed poorly in terms of their knowledge reported that they were confident in at least 75% of the MNH skills assessed. This clearly shows that their self-rated confidence for these skills was not based upon their knowledge.

In order to investigate further, we compared our respondents' knowledge of specific MNH interventions with the specific skills required by these interventions. Both those who performed well and those who performed poorly in the knowledge of antenatal care, normal labour and newborn care reported that they were confident in the skills required. However, the use of the partograph was a skill in which a high proportion of the facility birth attendants showed a significant weakness, both in their knowledge scores and in their self-rated confidence. Collectively, our data indicate that knowledge of obstetric complications was not significantly associated with self-rated confidence in terms of the skills needed to prevent or manage obstetric complications or post-partum haemorrhage. These findings reiterate that the perceived confidence of facility birth attendants in skills needed to manage their clients is not necessarily based on an adequate knowledge of these skills.

Conclusion

The proportion of facility birth attendants with a good knowledge of all MNH interventions was very low and was particularly poor with regards to knowledge of managing normal labour and the partographic monitoring of labour. Furthermore, a high proportion of respondents with good or poor knowledge of these interventions reported that they were confident in the skills required and that they needed no further coaching. The professional cadre of skilled birth attendant involved, and whether they had ever heard or had ever been trained in LSS, were significantly associated with their level of knowledge for MNH interventions. The professional cadre of skilled birth attendant, as well as if they had ever heard about the LSS course, were significantly associated with their self-rated confidence in at least nine of the MNH skills assessed.

Therefore, we recommend that the effective capacity of all cadres of facility birth attendants should be enhanced for MNH skills. There is a clear need for more objective assessments of the competence of facility birth attendants. This will assist healthcare providers in providing a more accurate rating of their confidence. Where gaps are identified, an effective and evidence-based training model should be developed and adopted to ensure that the skills being practiced clinically are based on adequate knowledge. It is expected that these practices will enhance the MNH skills of facility birth attendants and lead to an improvement in maternal and child health indices, both in Nigeria and beyond.

Funding

No funding was received for this research.

Availability of data and materials

The dataset and survey tool is available from the

corresponding author and can be shared on request.

Ethical considerations

Ethical approval was obtained from the Research and Ethical committee of the Obafemi Awolowo University Teaching Hospitals' Complex, Ile-Ife, Osun state. Permission to conduct the study at the Osun state primary healthcare facilities was obtained from the Department of Public Health in the Osun State Ministry of Health. Written informed consent was also obtained from the skilled birth attendants themselves and confidentiality of the data provided was assured.

Authors' contributions

OE and AF designed the study. OE coordinated the data collection, analysed the data and wrote the first draft of the manuscript. AF and TO reviewed and contributed to the manuscript. All authors contributed to the final manuscript and approved its submission for publication.

Competing interests

The authors declare that they have no competing interests.

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