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Community health education intervention to improve knowledge of maternal healthcare services among Hausa women in selected rural LGAs, Ogun State

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Abstract
Objective: The study determined the effect of community health education intervention in improving the knowledge of maternal healthcare services among Hausa women in selected rural LGAs in Nigeria.
Methods: The study adopted a quasi-experimental design involving 2,800 Hausa women. One experimental group (EG) and one control group (CG) were drawn from LGAs with high Hausa populations. Using a power formula, 26 participants were recruited for each group through snowball sampling. Data were collected at baseline, post-intervention, and 4th-week follow-up. Data were analysed using inferential and descriptive statistics.
Results: The mean age for the EG was 27.46 ± 4.37 years, while the mean age for the CG was 28.23 ± 5.46 years. The ANCOVA result showed the intervention had a significantly large effect on knowledge after controlling for baseline differences ($F(1, 49) = 120.71$, $p < 0.001$, $\eta 2 = 0.711$). Furthermore, there was an effect size of $d = 0.07$ (95% CI: -0.67 to 0.81) that was not statistically significant ($p = 0.81$) in the EG from 6 weeks post-intervention to 4th-week follow-up, which showed that the knowledge gained was sustained at 4th-week follow-up. The CG showed no change, $d = 0.00$ (-0.90 to 0.90) $p = (1.00)$.
Conclusion: The community health education intervention improved knowledge of MHS among Hausa women in Ogun State. The study recommended that the Ogun State Primary Healthcare Development Board should embed community health education interventions into MHS to improve MHS utilisation among resident Hausa women.

Keywords: Antenatal care, Community health intervention, Knowledge, Maternal healthcare services, Post-natal care

Plain English Summary
The study looked at how community health education programmes can improve the knowledge of maternal healthcare services among Hausa women in selected LGAs in rural Ogun State, Nigeria. The study involved two groups of women; one group received the health education intervention while the other group did not. The group of Hausa women who received the health education intervention had improved knowledge that was sustained for at least four weeks compared to the other group of Hausa women who did not.

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Background

Maternal Health Services (MHS) include antenatal care, post-natal care and skilled birth delivery that a woman receives during the process of pregnancy and childbirth. A woman needs to utilise these basic services to prevent and manage pregnancy-related complications so that the burden of maternal healthcare services can be reduced (1). However, studies have shown low utilisation despite the positive benefits of utilising MHS (2). In sub-Saharan Africa (SSA), many women still lack access to quality MHS, with SSA alone contributing to 70% of all global maternal mortality (3, 4). The global report revealed that Nigeria has the highest estimated maternal death rate, accounting for 28.3% of all estimated global maternal deaths, with approximately 8,200 maternal deaths and a maternal mortality ratio of 1,047 per 100,000 livebirths (5).

Across Nigeria, the incidence and prevalence of maternal mortality vary across the regions. In the Southern region, the maternal mortality rate is 365/100,000 live births, which is lower than the northern region of 709/100,000 live births. As such, across Northern Nigeria and among the Hausas, the data on maternal mortality remains high with consistently low levels of antenatal care (ANC) services utilisation and skilled birth delivery (SBD) (6). Although the Hausa are predominantly found in Northern Nigeria, migration in search of better economic opportunities has led to the establishment of Hausa communities in Southern Nigeria, including Ogun State, since the colonial period (7, 8). Despite this relocation, they have maintained a strong cultural identity through shared religious practices and traditional customs, which may hinder the utilisation of health facilities for childbirth among Hausa women (9, 10).

Several research has identified inadequate knowledge of the importance of antenatal and skilled delivery, preference for home delivery, family-related/personal factors, perceptions relating to costs and distance to services, having male medical personnel attend to pregnant women, preferences for cultural/traditional/religious forms of care, and perceptions about poor quality services as barriers to utilization of maternal health services among women (11, 12, 13, 14). This low knowledge about maternal healthcare services is associated with higher maternal mortality rates as seen in developing countries, particularly in rural areas, despite the availability, affordability, and accessibility of such services (10, 15, 16, 17). This highlights how important it is to increase awareness through community health education interventions.

Community health education intervention provides the framework through which knowledge is communicated effectively to promote and enhance maternal health care utilisation and sustainable health-seeking behaviours among Hausa women. Maternal education offers countless benefits, including raising awareness about health concerns, promoting health, and shaping healthcare knowledge and behaviour among women, particularly in maternal health (17, 18). Increased awareness of preventive health practices, utilisation of antenatal care services, and skilled attendance during childbirth have been linked with higher levels of education, which means that when a woman is educated, the likelihood of seeking timely maternal healthcare for themselves and their female children is higher, leading to a better maternal health outcome (18). Several studies have reported positive benefits of health education on knowledge and utilisation of maternal healthcare services (17, 19, 20), which is why this study was conducted to determine the effect of community health education intervention on knowledge of maternal healthcare services among Hausa women in the selected rural LGA, Ogun state, Nigeria.

Materials and Methods

Research Design

The study utilised a quasi-experimental study design with one experimental group and one control group. By this, the researcher assessed the effect of the intervention on the study participants by comparing their outcomes before and after the intervention, and also compared the outcomes of the experimental group with the control group, who did not receive the education on the subject matter. This approach allowed for evaluating the effectiveness and potential benefits of the intervention in a controlled setting.

Description of the Study Area

The study was conducted in Ogun State. The study area was Hausa-dominated rural areas in Ogere-Remo, Ikenne Local Government and Sabo, Odogbolu Local Government. Ogere-Remo host the highest number of Hausa migrants in Ogun State, who are involved in petty trading, farming, cattle rearing, and other informal occupations (21). Odogbolu Local Government Area is also home to a few Hausa migrants, especially in the Sabo area of Odogbolu, who are involved in petty trading, farming, cattle rearing, and other informal occupations.

Population
The study population comprised Hausa women within the reproductive age (15-49years) as classified by WHO (3). According to the city population (22), Ogere's total population is approximately 14,000 people, and Hausa individuals make up to 10%–20% of the total population size, which results into 1400 to 2,800 Hausa individuals. Odogbolu local government has a population of about 127,123 from the 2006 census.

Inclusion Criteria
Hausa women who are currently Pregnant
Nursing mothers with one child/children
Hausa women within the age range of 15 to 49 years
Willingness to participate

Exclusion Criteria
Women who were not willing to participate in the study
Sample Size Determination
The sample size for this study was derived using the normal distribution formula.

$$N = \frac{(Z_\alpha + Z_\beta)^2 \times P_0 (1 - P_0)}{(P_1 - P_0)^2}$$

where:
N = Sample size
Z_α = Standard normal deviation at 95% confidence interval (1.96)
Z_β = Statistical power at 80% confidence interval (0.84)
P_0 = Prevalence at 50% was assumed since no prior study provided a reliable estimate of maternal healthcare knowledge among Hausa women in Ogun State (23)
P_1 = 80% (desired level of outcome variable)

$$N = \frac{(1.96 + 0.84)^2 \times 0.5 (1-0.5)}{(0.8 - 0.5)^2}$$

$$N = \frac{7.84 \times 0.25}{0.09}$$

N = 21.77
N = 22
20% attrition added 22 x 1.2 = 26.4
N = 26
Twenty per cent of the size was added to take care of attrition and unforeseen dropouts. Hence, 26 participants each for the two groups. Therefore, the total sample size for this study was 52.

Sampling Technique
The purposive sampling technique was used to select Ogere-Remo in Ikenne local government and Sabo in Odogbolu local government because of the high number of Hausa women predominantly residing there. Snowball sampling was used to recruit the participants until the desired sample size was obtained.

Instrument for Data Collection
In this study, a semi-structured self-administered and interviewer-administered questionnaire and a teaching guide were developed by the researcher to collect data. The participant-administered questionnaire collected information on the socio-demographic characteristics and knowledge of maternal healthcare services. The same instrument was administered at baseline, immediate post-intervention and follow-up. The questionnaire was translated into the Hausa language by a professional translator for the respondents who do not understand English, and it was translated back into English.

Description of the Intervention
The intervention phase was the implementation of a health education intervention programme that was conducted once a week for 6 weeks for both the experimental and control groups. One group received the health education intervention to increase knowledge of maternal healthcare services, while the other group did not, but received a different programme on oral hygiene to keep them engaged throughout the period.
The intervention teaching guide focused on knowledge about maternal healthcare services, and items in the guide captured information about antenatal care, skilled birth delivery, post-natal care, recognising dangers in pregnancy, the importance of skilled birth delivery and dangers of having a home delivery.
The health education programme was done in the English language and was interpreted in Hausa by the research assistant using the translated Hausa health education package that was developed. The experimental group and control group were exposed to 6 weeks of 1hour 30 minutes of training per week. They were encouraged to be present throughout the education programme and also informed not to share the information among themselves. Written consent to participate in the study was obtained from each participant.

Validity and Reliability of Instrument
The face and content validity of the instrument were established through the judgment of my supervisor, and modified based on the inputs. A pilot study was conducted among 10% of the sample size in Ilisan-Remo among Hausa women of reproductive age. A Cronbach's Alpha reliability test was conducted after the pilot study. The

Cronbach's Alpha coefficient was 0.94, indicating that the instrument had good internal consistency and was considered reliable for the study

Method of Data Collection

Data collection was carried out using the instrument that was designed for the study. Proper community entry was done on the 18th of September 2025, through the Hausa community leader to seek consent to conduct the research study. Informed consent forms were read and signed by the participants. Participants were assured that participation in the study posed no foreseeable risk of harm, and they were free to withdraw from the study at any time without penalty. One female research assistant was trained and incorporated into this study. The research assistant holds an M.Sc in Library and Information Science. The research assistant speaks both English and the Hausa language fluently. The research assistant is from Kaduna State, Nigeria, and her competency in the Hausa language was validated through the pilot test conducted in the study, as she demonstrated high linguistic proficiency and the interpersonal skills necessary for the target population.

During data collection, the research assistant was not aware of which group was the intervention or the control to reduce bias. All participants were treated uniformly during data collection to ensure consistency across study groups. The procedure for data collection during the intervention was divided into three distinct phases: the pre-intervention phase, immediate post-intervention (at the end of the 6th week of intervention) and at the 4th-week follow-up.

Method of Data Analysis

The completed questionnaires were collected and validated. The data was collated, entered and coded using the statistical package for the social sciences (SPSS) version 23. Frequency analysis on each item was done to ensure that there were no missing values. Descriptive and inferential statistics were used for data analysis. Results were presented with frequency count; percentages were used for descriptive statistics, and the statistical level of significance was set with the p-value at 0.05. Means and standard deviations were computed for items between and within groups. An independent t-test was used to compare proportions and mean scores between intervention and control groups at baseline, post-intervention and 4th-week follow-up stages. Cohen's effect size was also used to measure the difference between two means. Analysis of covariance was also conducted to compare means while controlling for covariates.

Result

Socio-Demographic Result

The socio-demographic characteristics of the respondents between the experimental and control groups at baseline showed no statistical differences, except for education. (See Table 1a and 1b). This means that the socio-demographic characteristics of both groups were comparable at baseline, except for education.

Table 1a: Socio-Demographic Characteristics of the Participants in the study for Group: Age, Marital status, Religion, Educational qualification and currently pregnant

Variable	Experimental N=26 N (%)	Control N=26 N (%)	Total N=52 p-value
Age			
20-25	12 (46.2)	9 (34.6)	0.578[b]
26-31	10 (38.5)	10 (38.5)	
32-37	3 (11.5)	5 (19.2)	
38-43	1 (3.8)	2 (7.7)	
Total	26 (100)	26 (100)	
Mean ± SD	27.46 ± 4.37	28.23 ± 5.46	
Marital Status			
Single	0	0	
Married	26 (100)	26 (100)	
Divorce	0	0	
Separated	0	0	
Widowed	0	0	
Total	26 (100)	26 (100)	
Religion			
Islam	26 (100)	26 (100)	
Christianity	0	0	

Total	26 (100)	26 (100)	
Educational Qualification			
Primary	11 (42.3)	7 (26.9)	0.010[a]
Secondary	6 (23.1)	0	
Tertiary	0	2 (7.7)	
None	9 (34.6)	17 (65.4)	
Total	26 (100)	26 (100)	
Currently Pregnant			
Yes	12 (46.2)	9 (34.6)	0.39[a]
No	14 (53.8)	17 (65.4)	
Total	26 (100)	26 (100)	

[a]p-value obtained by Chi-Square; [b]p-value obtained by an independent sample t-test; *significant at < 0.05

Table 1b Socio-Demographic Characteristics of the Participants in the study for each group: Number of children, and I have a child(ren) under one

Variable	Experimental N=26 N (%)	Control N=26 N (%)	Total N=52 p-value
Number of Children			
1	6 (23.1)	4 (15.4)	0.46[a]
2	3 (11.5)	2 (7.7)	
3	12 (46.2)	11 (42.3)	
4 and above	4 (15.4)	9 (34.6)	
None	1 (3.8)	0	
Total	26 (100)	26 (100)	
I have a child(ren) who is/are under 1 year old			
Yes	14 (53.8)	10 (38.46)	1.00[a]
No	12 (46.15)	16 (61.54)	
Total	26 (100)	26 (100)	

p-value obtained by the Chi-Square test; *significant at < 0.05

Baseline Result

Baseline Level of Knowledge on Maternal Healthcare Services

Table 2 below shows the baseline comparison of knowledge level on maternal healthcare services among participants in the experimental and control groups. At baseline, the two groups' knowledge levels were not comparable, as statistically significant differences were observed. Analysis of Covariance (ANCOVA) was further conducted to compare groups while controlling for pre-intervention differences (See Table 3).

Table 2: Distribution of the Participants' Level of Knowledge on Maternal Healthcare Services among Participants at Baseline in the Control and Experimental Group

Variables	Maximum Points on the Scale of Measure	Experimental Group N=26 $\bar{X}$ (SE)	±SD	Control Group N=26 $\bar{X}$ (SE)	±SD	P-value
Level of Knowledge regarding Maternal Health Care	19	10.00(0.65)	3.32	6.84(0.71)	3.62	0.002*
Scale Category		F (%)			F (%)	
Low (0- 9)		13(50)			20(76.9)	
High (10-19)		13(50)			6(23.1)	

*p-value obtained by an independent t-test
*significant at < 0.05

Post-Immediate Result

Post-Immediate Intervention Level of Knowledge on Maternal Healthcare Services

An analysis of covariance (ANCOVA) was conducted to examine the effect of the intervention on post-intervention knowledge while controlling

for baseline knowledge. The result showed that baseline knowledge had a significant effect on post-intervention scores ($F(1,49) = 30.51$, $p < 0.001$, $\eta 2 = 0.384$). After adjusting for baseline differences, there was a statistically significant effect of the intervention on knowledge ($F(1, 49) = 120.71$, $p < 0.001$, $\eta 2 = 0.711$). This indicates a very large effect size, suggesting that the community health education intervention accounted for a substantial proportion of the variance in knowledge scores (See Table 3). The overall model was significant and explained 83.4% of the variance in post-intervention knowledge ($R^2 = 0.834$) (See Table 3).

Table 3: ANCOVA Showing Distribution of the Participants' Level of Knowledge on Maternal Healthcare Services among Participants at Baseline and Post-Intervention in the Control and Experimental Group

Source	Type III SS	df	Mean Square	F	p-value	Partial η2
Baseline Knowledge	176.21	1	176.21	30.51	0.000	0.384
Group	697.21	1	697.21	120.71	0.000	0.711
Error	283.01	49	5.77			
Total	9236.000	52				
Corrected Total	1699.923	51				

$R^2 = 0.834$ (Adjusted $R^2 = 0.827$)

4th Week Follow-Up Result

4th-Week Follow-up Result on the Level of Knowledge on Maternal Healthcare Services

The respondents' knowledge of maternal healthcare services was assessed at the 4th-week follow-up on a 19-point rating scale. The results of the analysis showed that respondents in the experimental group had the highest mean score and standard deviation, 16.92 ± 2.49, while the control group had the lowest mean score, 7.15 ± 3.48 (See Table 4). In addition, in the experimental group, almost (96.2%) of the respondents had a high level of knowledge. In the control group, most respondents (80.8%) had low knowledge of maternal healthcare (See Table 4). Also, the *p* - value of 0.000 and effect size of 3.09 (95% CI: 2.24-3.93) indicate a highly significant improvement in the knowledge of maternal healthcare services in the experimental group due to the intervention (See Table 4).

Table 4: Evaluation of the Participants' Level of Knowledge on Maternal Healthcare among Participants at 4th-Week Follow-up in the Experimental and Control Groups

Variables	Maximum Points on the Scale of Measure	Experimental Group N=26		Control Group N=26		ES (95%CI)	P-value
		X̄(SE)	±SD	X̄(SE)	±SD		
Level of Knowledge regarding Maternal Health Care	19	16.73(0.59)	3.05	7.15(0.64)	3.27	3.09(2.24-3.93)	0.000*
Low (0- 9)		1(3.8%)				22(84.6%)	
High (10-19)		25(96.2%)				4(15.4%)	

*p-value obtained by an independent t-test; *significant at < 0.05; *Effect Size

Evaluation of Immediate Post-Intervention and 4th-Week Follow-up of Knowledge of Maternal Healthcare Services in the Experimental and Control Groups

The effect size computations for 6 weeks immediate post-intervention and 4-week follow up level of knowledge of maternal health services within the experimental group revealed that the experimental group had an effect size of 0.07(95% CI: -0.67 to 0.81) (See Table 4) which was not statistically significant with a mean difference of 0.19 and a p value of 0.81 which suggests that the knowledge of the participants in the experimental group was maintained or sustained at follow-up period (See Table 5).

Table 5: Evaluation of the Participants' Level of Knowledge on Maternal Healthcare among Participants at Immediate Post-Intervention and 4th-Week Follow-up in the Experimental Group

Variables	Maximum Points Scale	Immediate Post Intervention Experimental Group N=26 X̄ (SE)	±SD	4th-Week Follow-up X̄ (SE)	±SD	ES (95%CI)	P-value
Knowledge	19	16.92(0.48)	2.49	16.73(0.59)	3.05	0.07(-0.67 to 0.81)	0.81
Low (0- 9)		1(3.8%)		1(3.8%)			
High (10-19)		25(96.2%)		25(96.2%)			
Mean Difference 0.19							

*p-value obtained by paired sample t-test; *significant at < 0.05; *Effect Size

Moreover, when compared with the control group, there was an effect size of 0.000(95% CI: -0.90 to 0.90) and a mean difference of 0.00 and a p-value of 1.00, which was not statistically significant (See Table 6). This showed that there was no significant change in the level of knowledge between post-intervention and follow-up in the control group.

Table 6: Evaluation of the Participants' Level of Knowledge on Maternal Healthcare among Participants at Immediate Post-Intervention and 4th-week Follow-Up in the Control Group

Variables	Maximum	Control Group N= 26 Immediate Post-Intervention Points Scale X (SE)	±SD	4th-Week Follow-up X̄ (SE)	±SD	ES (95%CI)	P-value
Knowledge	19	7.15(0.68)	3.48	7.15(0.64)	3.27	-0.00(-0.90 to 0.90)	1.00
Low (0- 9)		22(84.6%)		21(80.8%)			
High (10-19)		4(15.4%)		5(19.2%)			
Mean Difference 0.00							

*p-value obtained by paired sample t-test; *significant at < 0.05; *Effect Size

Discussion

The Level of Knowledge on Maternal Healthcare Services

Before the intervention, participants had a low mean knowledge score of 10.00 ± 3.32, reflecting a gap in the understanding of maternal health services. This is consistent with previous studies reporting poor knowledge of postnatal complications, limited awareness of available postnatal services and recommended visits, inadequate understanding of the appropriate timing for antenatal care initiation, and insufficient recognition of pregnancy-related complications (24, 25, 26, 27, 28). The findings of this study demonstrated that the health education intervention had a statistically significant and large effect on participants' knowledge after controlling for baseline differences ($F(1,49) = 120.71$, $p < 0.001$, $\eta^2 = 0.711$). This indicates that the intervention was highly effective in improving knowledge of maternal healthcare services among the participants. This finding is consistent with previous intervention studies, which reported significant improvements in maternal health knowledge following health education interventions (17, 29).

Conclusion

The findings of this study revealed that the community health education intervention was effective in improving maternal health outcomes among Hausa women in Ogun State. Participants demonstrated a higher knowledge level regarding antenatal, post-natal and skilled delivery after being exposed to the health education intervention. Therefore, the community health education intervention programme can be used by public health practitioners and the Ogun State primary healthcare board in other communities with similar socio-cultural characteristics to improve knowledge of maternal healthcare services.

Limitations of the Study

The study was conducted in just one location in Ogun state which may make the findings not to be generalizable to all Hausa women in other regions The sample size of fifty-two participants limits the generalizability of the results

The sample size was calculated based on an assumed large effect size; however, this assumption suggests that the study may not be sufficiently powered to detect smaller or more modest effects.
The use of snowball sampling may have limited the generalizability of the study findings, as participants were likely to be socially connected and may share similar perspectives. This could also have introduced potential contamination of the intervention effect if participants discussed the intervention among themselves, despite being advised not to do so.
The study was conducted during a short period of time. Therefore, could not determine the long-term sustainability. A study with a longer follow-up period might show higher sustainability and utilisation of maternal health services.
The large effect size ($\eta^2 = 0.711$) may not be generalizable to routine implementation settings
The use of a single female research assistant from Kaduna (Hausa-speaking) may have introduced social desirability bias; participants may have over-reported knowledge gains to please her.

List of Abbreviations

ANC: Antenatal Care
ANCOVA: Analysis of covariance
BUHREC: Babcock University Health Research Ethics Committee
CG: Control group
EG: Experimental group
LGA: Local Government Area
MHS: Maternal Healthcare Services
SBD: Skilled Birth Delivery
SPSS: Statistical Package for the Social Sciences
SSA: Sub-Saharan Africa

Declaration

Ethical approval and consent to participate
Ethical approval was obtained from Babcock University Health Research Ethics Committee (BUHREC 676/25). A letter of introduction from the Department of Public Health was presented to the community Head to gain access to conduct the study. Informed consent was duly signed by the participants before data were collected, and the confidentiality of research participants was ensured. When participants cannot sign, they were asked to thumbprint. Verbal consent was obtained from all participants. Participants were duly informed that participation is voluntary and they can opt out with no penalty attached. The nature of the study, benefit, and objectives were explained to the participants, and they were assured that the information supplied would be treated with utmost confidentiality.

Consent for Publication
All authors gave explicit consent for the publication of this work under the Creative Commons Attribution Non-Commercial 4.0 International license.

Data Availability
Available from the corresponding author upon reasonable request

Competing Interests
The authors declare that they have no competing interests.

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Author contributions
AVU and LSA conceptualised the study. AVU and LTA conducted the study. AVU and LTA wrote the manuscript. LSA supervised the work. All authors reviewed, edited, and approved the final manuscript.

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Clinical Trial Registration
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