



Influence of Structured Training Programme on Healthcare Workers' Knowledge of Recommended Postnatal Care Services in Nigeria

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Abstract

Introduction: The lack of continuous training of maternal and child healthcare providers has been identified as one of the factors contributing to the poor quality of maternal and child healthcare services in Nigeria.

Objectives: The study aimed to evaluate the level of postnatal care-related knowledge among healthcare workers in Osun State and the impact of a structured training program on their learning.

Method: A quasi-experimental research design using pre-test and post-test control groups was utilized in this study. One hundred and sixty-one healthcare workers were recruited from six Local Government Areas (LGA) and randomized into intervention and control groups. The healthcare workers in the intervention group ($n = 82$) were exposed to a 3-day structured training program. A structured questionnaire was used to collect data before, immediately, and 3-months after the training. Data were analyzed using descriptive statistics, multiple linear regression, t-test, and repeated measure analysis of variance (ANOVA) with posthoc pairwise comparison.

Results: The mean ages of healthcare workers in the intervention and control groups are 40.96 ± 6.91 and 42.52 ± 7.58 , respectively. At baseline, the mean knowledge score of the intervention and control groups were 60.0 ± 11.6 and 63.7 ± 10.4 , respectively. There is a significant difference in the mean knowledge score of healthcare workers in the intervention group compared with those in the control group immediately after the training ($t = 12.04, p < .001$) and after 3-months of data collection training ($t = 5.92, p < .001$). A multivariate linear regression confirmed the positive effect of group membership (intervention vs. control) on the post-test knowledge among respondents ($p < .001$).

Conclusion: An educational training significantly improved the knowledge of healthcare workers on the recommended postnatal care.

Keywords

training program, educational training, healthcare workers, postnatal care, recommended care, knowledge, Nigeria

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Introduction

The postnatal period, defined as the time immediately after the baby's birth and up to six weeks (42 days) after birth, is critical for the newborn and the mother (Finlayson et al., 2020). There are significant changes that happen during this period that have a considerable effect on the well-being of mothers and newborns. Hence, appropriate and timely

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postnatal care (PNC) is essential for safeguarding mother and child's health as it provides an opportunity for health professionals to identify, monitor, and manage maternal and neonatal health conditions that may develop during the postnatal period (Wudineh et al., 2018)

It has been shown that rates of provision, uptake, and quality of skilled postnatal care are generally lower than other maternal healthcare services. More emphasis and resources tend to be focused on antenatal and intrapartum care (Sacks & Langlois, 2016). This may be due to poor infrastructure and equipment, shortage of skilled healthcare workers, poor access to services, and poor knowledge on the part of clients, among others. It has also been reported that PNC services had the lowest median national coverage of relevant interventions among the various maternal and child health services (UNICEF & WHO, 2017)

Most maternal and infant deaths occur during the postnatal period, especially within 48 h of childbirth, predominantly from severe bleeding, hypertensive crises, and infections (Lilungulu et al., 2020; Merdad & Ali, 2018). Sadly, many of these complications are entirely preventable. Whether a woman or newborn dies in the postnatal period often depends mainly on access to timely and competent care (Lilungulu et al., 2020). This skilled care is critical to the achievement of Sustainable Development Goals (SDGs) targets 3.1 and 3.2, which relate to the reduction of the global Maternal Mortality Ratio (MMR) to less than 70 per 100,000 live births and ending preventable deaths of newborns and under-5 children by 2030 (McArthur et al., 2018). Pursuing this SDG through increasing the quantity and quality of maternal healthcare is more critical for countries like Nigeria, where maternal mortality is still high.

In some developing countries, it has been shown that maternal and newborn mortality rates are significantly affected by the scarcity of skilled maternal and neonatal healthcare providers (Acharya et al., 2016). Among other critical maternal and child health interventions, quality PNC services have been shown to improve maternal and child health indices (Lilungulu et al., 2020; Merdad & Ali, 2018). This appears to be one of the bases for the updated recommendation of PNC services guidelines by the World Health Organisation (WHO), that the mother and child should have at least four postnatal contacts (the first 24 h after delivery, 48–72 h, 7–14 days, and 6 weeks after delivery) with healthcare providers within the first six-week postpartum period (World Health Organization, 2014). In Nigeria, the current schedule of visits during the antenatal period is four weeks intervals till 28 weeks, two weeks till 36 weeks, and weekly till delivery while six weeks after delivery for postnatal care.

One of the significant determinants of the quality of PNC service delivery is the respective healthcare providers' level of knowledge and skill (Acharya et al., 2016; Ayiasi et al.,

2014). Therefore, to achieve the third SDG target related to maternal and child health, implementing a standard protocol to ensure adequate knowledge among maternal and child healthcare providers is crucial and needed. This can be achieved through sufficient pre-service and on-the-job training. Improving maternal and child health outcomes requires reinforcing prevailing and recommended evidence-based practices.

Maternal and child health services are essential to the comprehensive primary health care package. Most maternal and child health service delivery in developing countries like Nigeria occurs at the primary healthcare centers (PHC). The PHC is usually the first and often the only point of contact many mothers and newborns have with the healthcare system. In Nigeria, especially in primary healthcare centers, nurses lead the healthcare workers who provide postnatal care services, such as Community Health Officers, Community Health Extension Workers, and Health Assistants.

Studies have documented a significant gap in the knowledge of healthcare workers on maternal and newborn healthcare practices, including postnatal care (Ayiasi et al., 2014; Sethi et al., 2019). A performance needs assessment of maternal and child health service delivery by primary healthcare workers in developing countries – Nigeria, West Africa (Esan & Fatusi, 2014) and Tanzania, East Africa – also identified critical gaps in the knowledge of and services provided by these workers. The lack of provision for continuous training and evaluation of the healthcare providers at this level was highlighted as one of the factors contributing to the poor quality of available maternal and child health services. Regular assessment of the gaps in knowledge and appropriate training was emphasized.

This study, therefore, aimed to evaluate the level of PNC-related knowledge among primary healthcare workers in Osun State and the impact of a training program.

Method

Study Design, Setting, and Population

A quasi-experimental study was conducted among healthcare workers in selected primary healthcare facilities in Osun State, South-west Nigeria. Osun State is one of the 36 states of the Nigerian Federation, and it is divided into 30 Local Government Areas (LGAs). (State of Osun, 2017). There are three levels of the healthcare system in the state which are; primary, secondary, and tertiary. The primary level consists of PHCs, which are spread across all the LGAs in the state. It is the level at which most basic maternal and child healthcare services take place, including antenatal care, postnatal care, and immunizations, among others. Different categories of healthcare workers deliver these services, which include nurses/midwives, community health officers (CHO), community health extension workers (CHEW), and health assistants (HA). Nurses/midwives

provide supervision for CHO, CHEW & HA. They provide care to prevent postpartum complications, attend to clients' complaints, and provide essential treatment, including referrals where necessary. The roles and responsibilities of CHO & CHEW overlap and include vital signs check, basic health check and anthropometric measurement for mother and neonate, and health education, among others. The health assistants help in carrying out nursing procedures. Specific roles relating to patient care are assigned to them, such as weighing, bathing babies, draining urine bags, ensuring that blood and other patients' samples get to the laboratory, etc. However, in some rural areas where nurses and midwives are unavailable, and there is a shortage of CHO/CHEW, these health workers take up some direct care of patients.

Sample Size and Technique

Six LGAs were randomly selected out of the 30 LGAs. Three LGAs were assigned to each intervention group (Ife Central, Ife East, and Ilesa East) and the control group (Osogbo, Olorunda, and Irepodun) of the study. In the selected LGAs, one hundred and sixty-one (161) consenting healthcare workers (82 in intervention and 79 in control) who met the following inclusion criteria participated in the study. Respondents must be fully employed and working in the PHCs that provide essential maternal and child healthcare services and are actively involved in providing care to patients. The flowchart of participants is presented in Figure 1.

Instruments for Data Collection

Data were obtained with the aid of a structured questionnaire which was developed based on the review of related literature. It comprised of two sections – the first had eight items that assessed the demographic characteristics of the respondents. In contrast, the second had 46 items used to evaluate knowledge of the recommended postnatal care services for mothers and neonates (Supplementary 1).

A score of one (1) was given to every correct answer while zero (0) to incorrect answers, yielding a total score of 46. The respondents' full scores were converted to percentages. They were dichotomized into adequate and inadequate knowledge using 70% as the cut-off mark (an adaptation of the Nigerian university grading scale was used, which rates the score of 70% and above as excellent, this was adopted as a cut-off for adequate knowledge). Respondents' level of knowledge was assessed in the intervention and control groups at baseline and after the intervention (immediately after the training and at three months). The aim was to determine the level of retention of knowledge gained by comparing their scores at three months with that of immediate post-intervention scores.

The instrument's content validity was established through face validity, and expert review before the actual study was implemented. The questionnaire was given to Maternal and Child Health and Demography experts to review for completeness and appropriateness. The instrument was pre-tested among healthcare workers in a non-participating local government. The *Cronbach Alpha* yielded a coefficient of 0.8, indicating good *internal consistency*.

Study Intervention

Based on a comprehensive literature review and the WHO's recommended postnatal care for mothers and neonates, an educational package was developed for training respondents in the intervention group. The training was conducted to improve the knowledge of healthcare workers about the recommended standard of care for the mother and neonate during the postnatal period. The training provided in this study is a basic education on the recommended postnatal care services by the WHO, which was targeted at all the categories of healthcare workers who participated in this study. It was also hoped that group of healthcare workers, such as health assistants who help nurses in carrying out specific instructions, would gain insight into the justification for some of the standing orders they implement.

The training manual comprises seven modules of lessons that were delivered over the course of three days in seven sessions. On the first day, the aims and objectives of the study were reviewed followed by a pre-intervention assessment. Also, the first two modules titled; overview of maternal & neonatal mortality and the concept of postnatal care were taught. On the second day, three modules were taught titled mother and baby-centered care, recommended care for mothers & neonates I, and recommended care for mothers & neonates II. The remaining two modules (danger signs for mothers and neonates in the postnatal period and neonate feeding information and advice) were taught on the third day. Each of the sessions, which was led by the principal investigator, lasted between 30 to 60 min. In addition to the lectures, other training modes employed included role-plays, group discussions, and interactive questions and answers. The teaching media used include power-point presentations and flipcharts. A folder that contained the training manual and writing materials was given to each participant. The first post-intervention assessment was conducted immediately after the training and repeated after three months.

Outcome Measure

The primary outcome measure was the total PNC knowledge score obtained by each respondent after the intervention.

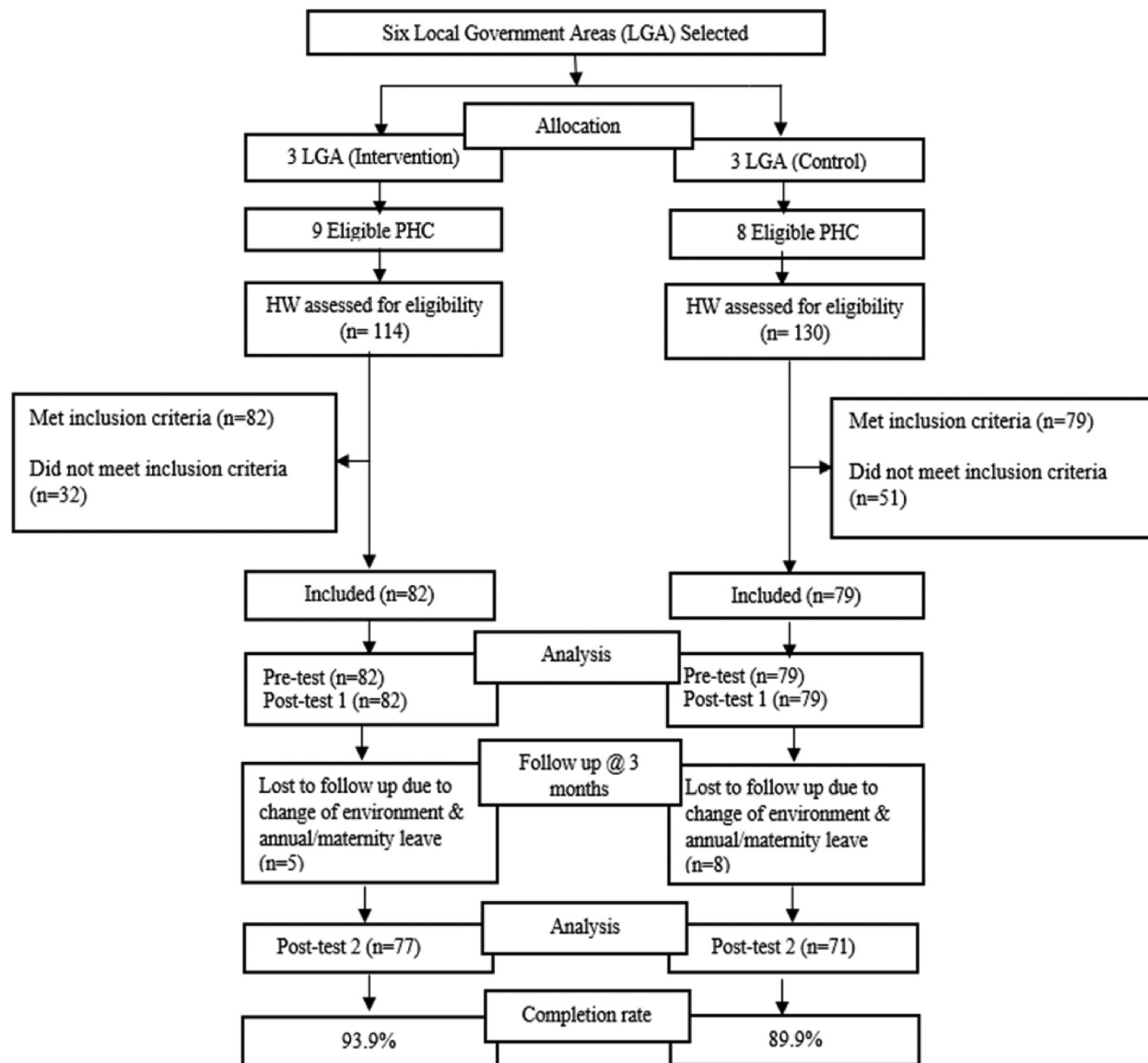


Figure 1. Flowchart of study participants.

Ethical Consideration

Ethical approval for the study was obtained from the Health Research Ethics Committee (HREC) of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife, with the assigned number IPHOAU/12/580. Permission to conduct the study was also secured from appropriate authorities in the state's ministry of health and the LGAs. The respondents gave informed consent for the study.

Data / Statistical Analysis

The data was analyzed using SPSS version 26. The characteristics of the two study groups were compared for their baseline equivalence using chi-square tests. For all the

respondents, irrespective of the study group, the association between their baseline level of knowledge and sociodemographic characteristics was analyzed using Chi-square tests. Various tests for comparing means, i.e., paired-sample T-test, independent-sample T-test, and repeated measure analysis of variance (ANOVA) with posthoc pairwise comparison, were used to analyze the differences in knowledge scores.

Furthermore, multivariate linear regression modeling was performed to evaluate the effect of the intervention on the outcome measure, i.e., the knowledge scores. In order to control the baseline variables that were significantly different between the two groups, such variables were included in the regression model as confounding variables. Given the clustered nature of the data, the regression model was performed

Table 1. Socio-Demographic Characteristics of the Respondents.

Variables	Healthcare Workers		P-value
	Intervention n = 82	Control n = 79	
Age			
Mean age	40.96 ± 6.91	42.52 ± 7.58	
<40 (Young adult)	34 (41.5)	25 (31.6)	.20
≥40 (Middle age adult)	48 (58.5)	54 (68.4)	
Gender			
Male	6 (7.3)	10 (12.7)	
Female	76 (92.7)	69 (87.3)	.26
Years of experience			
Mean year of experience	12.32 ± 6.56	14.95 ± 7.38	
1–10	32 (39.0)	26 (32.9)	.03
11–20	39 (47.6)	29 (36.7)	
21 and above	11 (13.4)	24 (30.4)	
Marital status			
Single	8 (9.8)	3 (3.8)	
Married	74 (90.2)	76 (96.2)	.13
Occupation			
Nursing/Midwifery	9 (11.0)	13 (16.5)	
CHO*	12 (14.6)	15 (19.0)	.59
CHEW*	28 (34.1)	24 (30.4)	
HA*	33 (40.2)	27 (34.2)	
Highest Educational Attainment			
Secondary school	26 (31.7)	12 (15.2)	
Diploma	44 (53.7)	49 (62.0)	.04
Bachelor/Masters	12 (14.6)	18 (22.8)	
Baseline Knowledge score			
(mean ± SD)	60.0 ± 11.6	63.7 ± 10.4	.03

*CHO: Community Health Officer; CHEW: Community Health Extension Worker; HA: Health Assistants.

using the generalized estimating equations (GEE) approach to account for the potential intra-cluster correlation. The cut-off for the level of significance was set at $P \leq 0.05$.

Results

The demographic characteristics of healthcare workers in both study groups, presented in Table 1, show that in both groups greater percentage of healthcare workers were 40 years and above, and the majority were females. Also, in both groups, nurses had the lowest proportion while the health assistants constituted the highest percentage of the respondents.

There were no significant differences in the other sociodemographic characteristics of the two groups except for their years of experience ($p = .03$) and highest educational qualification ($p = .04$). These were considered in subsequent multivariate analyses of post-intervention differences between the groups.

The baseline knowledge scores among all the respondents ranged between 30.4 and 84.8 percent, with a mean of 61.6 ± 11.3 . As shown in Table 1, the mean knowledge score was

significantly higher in the control group at baseline ($t = -2.18$, $p = .03$); this was controlled for in the subsequent analysis.

In the intervention group, the proportion of those with adequate knowledge increased from 20.7% at baseline to 80.5% at post-test 1 and 74% at post-test 2 (Figure 2).

An independent t-test showed that at post-test 1, the mean scores of the healthcare workers in the intervention group (75.2 ± 6.5) were significantly higher than that of the control group (64.5 ± 11.4) ($t = 7.30$, $p < .001$) with a large effect size of more than one standard deviation (1.16). Also, at post-test 2, the difference in mean knowledge scores of healthcare workers in the intervention group (74.9 ± 6.8) compared with those in the control group (65.0 ± 12.4) was significant ($t = 5.92$, $p < .001$) with a large effect size of 0.98. (Table 2).

Table 3 shows the mean, standard deviation, and repeated measure ANOVA test for knowledge scores across the pre-test, immediate post-test 1, and the 3-month post-test 2 evaluation. Results indicated significant mean differences across the 3 points in time [$F(2, 152) = 121.84$; $p < .01$] with a large effect size of 0.62.

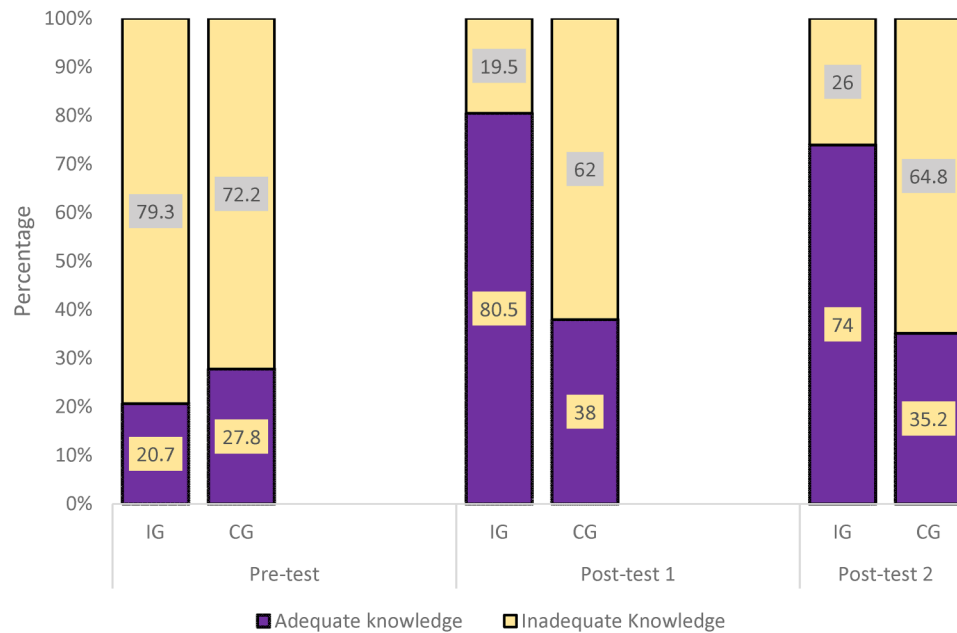


Figure 2. Knowledge of healthcare workers pre and post-intervention.

Table 2. Mean Comparison of Knowledge Scores Between Groups.

	Intervention group Mean (SD)	Control group Mean (SD)	t-test	Sig. ^{Val}	Cohen's d
Pre-test	60.0 (11.6)	63.7 (10.4)	-2.18	.03	
Post-test 1	75.2 (6.5)	64.5 (11.4)	7.30	<.001	1.16
Post-test 2	74.9 (6.8)	65.0 (12.4)	5.92	<.001	0.98

Pairwise comparison shows significant mean differences between the pre-test scores and the post-test 1 and 2 scores, respectively. There was, however, no significant difference between the immediate post-test 1 and the three-month post-test scores. ($p = .36$). This indicates that the healthcare workers retained the knowledge acquired from the training for at least three months afterward.

In the control group, the repeated measure ANOVA did not show any significant mean difference across time [F (2,140) = 1.13; $p = .34$]

Table 4 shows that after controlling for the clustering effect, baseline knowledge, and some other potentially confounding variables, a multivariate linear regression confirmed the positive impact of group membership (intervention vs. control) on the post-test knowledge among respondents ($p < .001$).

Discussion

Achievement of sustainable development goal three (SDG 3) requires the availability of high-quality maternal and child healthcare services, partly determined by the providers' knowledge and abilities. This study assessed the knowledge

of healthcare workers regarding PNC and evaluated the effect of a PNC training program on their knowledge.

At baseline, this study found a sub-optimal level of PNC knowledge among respondents in both groups, which is consistent with findings from previous authors on the knowledge of healthcare workers on prenatal, maternal, and newborn care (Acharya et al., 2016; Ayiasi et al., 2014), especially in the developing countries such as Nigeria. Although the level of knowledge varies across the different categories of healthcare workers in this study, nurses had better knowledge than other healthcare workers, which is corroborated by a previous study (Nishimwe & Mchunu, 2022). Worthy of note is the significant difference between healthcare workers' mean knowledge scores at pre-test in the control and intervention groups, which may reflect the in-service training they were exposed to. However, this was controlled for in the subsequent analysis.

Previous authors have suggested the need for periodic training-needs assessment of these frontline maternal and child healthcare providers, along with mandatory continuing education and the design and implementation of appropriate practice guidelines (Ayiasi et al., 2014; Esan & Fatusi, 2014). These recommendations remain germane

Table 3. ANOVA Test for Comparing Knowledge Scores of HCWs Within Groups.

Group	Pre-test Mean (SD)	Post-test 1 Mean (SD)	Post-test 2 Mean (SD)	Sum of Squares	F test	Sig. ^{Val}	Partial Eta Squared (η^2)
Intervention (n = 77)	59.9 (11.7)	75.8 (6.0)	74.9 (6.8)	12,095.7	121.84	<.001	.62
Control (n = 71)	63.4 (10.2)	64.1 (11.4)	65.0 (12.4)	98.2	1.13	.34	

Table 4. Multiple Linear Regression Showing the Relationship Between Group Membership and Post-Test Knowledge.

	B	SE	P
Group Intervention vs. Control	9.43	1.63	< .001
Education Post-secondary vs. Secondary	1.09	1.59	.53
Profession Nurses vs. Others	4.60	1.37	.01
Year of practice	0.05	0.10	.59
Baseline knowledge	0.24	0.07	.01

and worthy of consideration by the relevant policymakers and administrators in the present study area.

A number of previous studies (Adefolarin et al., 2021; Gavine et al., 2017; Germossa et al., 2018; Ghoshal et al., 2018; Goyal & Chaudhry, 2019) have shown that educational programs and training improve healthcare workers' knowledge of various aspects of care, such as pain management, infection control, maternal and child care, to name a few which is corroborated by the findings in this study. There was a significant increase in the post-intervention knowledge of the intervention group as compared with that of the control group. The difference in the post-test 1 scores between the intervention and control groups remained statistically significant after controlling for the effect of the difference in their baseline knowledge. This implied an increase in the knowledge level of healthcare workers who were trained compared with others who did not receive training. This is consistent with the result in the systematic review by Gavine et al. (2017) on the education and training of healthcare staff in the knowledge, attitudes, and skills needed to work effectively with breastfeeding women. They reported that healthcare workers who received training on breastfeeding promotion and support had significantly higher scores post-intervention than staff who did not receive additional training.

Furthermore, a repeat assessment using repeated measure analysis of variance at three months indicated that the impact was sustained with substantial retention of the knowledge gained from *the educational intervention*. This suggests that periodic in-service training and continuous education can enhance and maintain primary healthcare workers' knowledge and skills.

The ability to generalize these findings beyond the study area is, however, potentially limited because it was conducted in

only one state in the country. It must also be noted that the study combined different categories of healthcare workers whose training backgrounds are diverse. However, they all had sufficient academic capacity to comprehend the primary educational intervention, and its positive impact cut across all the cadres.

However, this paper draws its strength from being the first study in Osun State and Nigeria that evaluated the effect of training on the knowledge of healthcare workers on the recommended postnatal care services by WHO. It also added to the body of knowledge on the impact of training on healthcare workers' competence.

Implications for Administration, Education, Practice, and Policymaking

This study found a significant increase in respondents' knowledge in the intervention group at post-test 1 and post-test 2 compared with those in the control group; this implied a positive impact of educational training on the knowledge of healthcare workers. Hence, there is a need for continuous educational and in-service training for healthcare workers to stay abreast of information that will help them provide quality care to clients and eventually promote better patient outcomes.

To attain Sustainable Development Goals (SDGs) targets 3 in Nigeria, competent and quality care cannot be overemphasized, which is dependent on the level of knowledge of healthcare providers. It is therefore vital to ensure appropriate policies that will mandate continuous in-service training for healthcare workers to provide quality healthcare for their patients/clients. Hospital administrators should also sponsor in-service/on-the-job training for healthcare workers as this will motivate them to acquire more knowledge, eventually translating to better patient care.

Recommendations

From the result of this study, it is evident that healthcare workers will benefit from regular training on PNC service recommendations. However, since a slight decline was observed in the knowledge score after three months, it will be essential to evaluate the retention of knowledge by healthcare workers at three months, six months, and one year to guide on the appropriate time for retraining.

Conclusion

Frontline primary health care workers who provide basic maternal and child health care services in the study area have an overall inadequate level of knowledge regarding postnatal care. Their baseline knowledge was, however, significantly improved through an educational training program. The care rendered by healthcare workers during the postnatal period depends on exposure to regular training. The quality of this care is one of the important steps towards the reduction of maternal and neonatal mortality rate in Nigeria. There is, therefore, a need for appropriate measures to implement periodic assessment and training of these workers. Further studies will be needed to determine if the attendant improvement in knowledge will translate into an increase in the quality of maternal and child healthcare services and an improvement in maternal and child health outcomes.

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.


Ethical Consideration

Ethical approval for the study was obtained from the Health Research Ethics Committee (HREC) of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife with assigned number IPHOAU/12/580. Permission to conduct the study was also secured from appropriate authorities in the State's ministry of health and the LGAs. The respondents gave informed consent for the study.

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References

- Acharya, D., Paudel, R., Gautam, K., Gautam, S., & Upadhyaya, T. (2016). Knowledge of maternal and newborn care among primary level health workers in Kapilvastu district of Nepal. *Annals of Medical and Health Sciences Research*, 6(1), 27. <https://doi.org/10.4103/2141-9248.180266>
- Adefolarin, A. O., Gershim, A., Sola, A. O., & Oye, G. (2021). The effect of training and supervision on primary health care workers' competence to deliver maternal depression inclusive health education in Ibadan, Nigeria: A quasi-experimental study. *BMC Health Services Research*, 21(1), 1–14. <https://doi.org/10.1186/s12913-021-07208-3>
- Ayiasi, R. M., Criel, B., Orach, C. G., Nabiwemba, E., & Kolsteren, P. (2014). Primary healthcare worker knowledge related to pre-natal and immediate newborn care: A cross sectional study in Masindi, Uganda. *BMC Health Services Research*, 14(1), 65. <https://doi.org/10.1186/1472-6963-14-65>
- Esan, O. T., & Fatusi, A. O. (2014). Performance needs assessment of maternal and newborn health service delivery in urban and rural areas of Osun State, South-West, Nigeria. *African Journal of Reproductive Health*, 18(2), 105–116. <https://doi.org/10.4314/ajrh.v18i2>
- Finlayson, K., Crossland, N., Bonet, M., & Downe, S. (2020). What matters to women in the postnatal period: A meta-synthesis of qualitative studies. *PLoS ONE*, 15(4), e0231415. <https://doi.org/10.1371/journal.pone.0231415>
- Gavine, A., MacGillivray, S., Renfrew, M. J., Siebelt, L., Haggi, H., & McFadden, A. (2017). Education and training of healthcare staff in the knowledge, attitudes and skills needed to work effectively with breastfeeding women: A systematic review. *International Breastfeeding Journal*, 12(1), 6. <https://doi.org/10.1186/s13006-016-0097-2>
- Germossa, G. N., Sjetne, I. S., & Hellesø, R. (2018). The impact of an in-service educational program on nurses' knowledge and attitudes regarding pain management in an Ethiopian university hospital. *Frontiers in public health*, 6, 229. <https://doi.org/10.3389/fpubh.2018.00229>
- Ghoshal, A., Talawadkar, P., Palleri, A., Marston, J., & Muckaden, M. (2018). Impact of educational training in improving skills, practice, attitude, and knowledge of healthcare workers in pediatric palliative care: Children's palliative care project in the Indian state of Maharashtra. *Indian journal of palliative care*, 24(4), 411. https://doi.org/10.4103/2FIJPC.IJPC_43_18
- Goyal, M., & Chaudhry, D. (2019). Impact of educational and training programs on knowledge of healthcare students regarding nosocomial infections, standard precautions and hand hygiene: A study at tertiary care hospital. *Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine*, 23(5), 227. <http://dx.doi.org/10.5005/jp-journals-10071-23166>
- Lilungulu, A., Bintabara, D., Mujungu, S., Chiwanga, E., Chetto, P., & Nassoro, M. (2020). Incidence and predictors of maternal and perinatal mortality among women with severe maternal outcomes: A Tanzanian facility-based survey for improving

- maternal and newborn care. *Obstetrics and Gynecology International*, 2020, 1–9. <https://doi.org/10.1155/2020/5390903>
- McArthur, J. W., Rasmussen, K., & Yamey, G. (2018). How many lives are at stake? Assessing 2030 sustainable development goal trajectories for maternal and child health. *BMJ (Online)*, 360(February), k373. <https://doi.org/10.1136/bmj.k373>
- Merdad, L., & Ali, M. M. (2018). Timing of maternal death: Levels, trends, and ecological correlates using sibling data from 34 sub-Saharan African countries. *PLOS ONE*, 13(1), e0189416. <https://doi.org/10.1371/journal.pone.0189416>
- Nishimwe, C., & Mchunu, G. G. (2022). Exploring health providers' knowledge on the home-based maternal and neonatal health care package in Rwanda. *BMC Pregnancy and Childbirth*, 22(1), 1–12. <https://doi.org/10.1186/s12884-022-04435-2>
- Sacks, E., & Langlois, ÉV (2016). Postnatal care: Increasing coverage, equity, and quality. *The Lancet Global Health*, 4(7), e442–e443. [https://doi.org/10.1016/S2214-109X\(16\)30092-4](https://doi.org/10.1016/S2214-109X(16)30092-4)
- Sethi, R., Tholandi, M., Amelia, D., Pedrana, A., & Ahmed, S. (2019). Assessment of knowledge of evidence-based maternal and newborn care practices among midwives and nurses in six provinces in Indonesia. *International Journal of Gynecology and Obstetrics*, 144(S1), 51–58. <https://doi.org/10.1002/ijgo.12735>
- State of Osun. (2017). *The official website of the state of Osun*. <http://osun.gov.ng/about/people/>
- UNICEF & WHO. (2017). *Tracking progress towards universal coverage for women's, children's, and adolescents' health. Countdown to 2030: Maternal, Newborn and Child Survival: The 2017 Report*. <https://data.unicef.org/resources/countdown-2030-tracking-progress-towards-universal-coverage-womens-childrens-adolescents-health/>
- World Health Organization. (2014). *WHO recommendations on postnatal care of the mother and newborn*. World Health Organization. <http://apps.who.int/iris/handle/10665/97603>
- Wudineh, K. G., Nigusie, A. A., Gesese, S. S., Tesu, A. A., & Beyene, F. Y. (2018). Postnatal care service utilization and associated factors among women who gave birth in Debretabour town, North West Ethiopia: A community-based cross-sectional study 11 Medical and Health Sciences 1114 paediatrics and reproductive medicine. *BMC Pregnancy and Childbirth*, 18(1), 1–9. <https://doi.org/10.1186/s12884-018-2138-x>