



EFFECT OF EDUCATIONAL INTERVENTION ON KNOWLEDGE FOR IMMUNIZATION AMONG MOTHERS WITH UNDER-5 CHILDREN IN OYO STATE, NIGERIA

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ABSTRACT: *This study assessed the effects of educational intervention on the knowledge of immunization among mothers with under-5 children in Oyo state, Nigeria. Methods: A quasi-experimental study was conducted among 60 mothers of under-5 children recruited by multistage sampling technique divided into intervention and control groups. There was a baseline assessment of mothers' knowledge in both the intervention and control groups using a structured interviewer-administered questionnaire. Thereafter, immunization education training was given via lectures and demonstrations and another assessment was done post-intervention. Six weeks after the intervention, another assessment of the same mothers was conducted with the same instrument. Mother and knowledge responses were measured on a 33-point rating scale. Data was analyzed using IBM SPSS version 23 to generate descriptive and inferential results. Results: At the baseline, the mother knowledge in the control group had a mean score of 7.70 ± 1.50 while the experimental group had a mean score of 9.6 ± 2.60 . At the immediate post-intervention stage, there was a statistically significant increase in the mean knowledge score of the experimental group (15.67 ± 3.28 ; $p = 0.000$) while there was no increase in the mean knowledge score of the control group (8.83 ± 2.36). This significant increase in the mean knowledge score of the experimental group (21.80 ± 3.50 ; $p = 0.000$) was also observed during a 6-week follow-up period. Conclusion/ Recommendation: The immunization education training was effective in improving the mothers' knowledge. It is recommended that mothers of under-5 children should be trained on the importance of immunization appointment-keeping practice by the government.*

KEYWORDS: Appointment-keeping practice, Educational intervention, Immunization, Knowledge, Mothers of under-5.



INTRODUCTION

Routine vaccination against vaccine-preventable diseases (VPD) is a cost-effective intervention with a significant influence on reducing infant morbidity and mortality. In spite of the benefits of routine vaccination, the acceptance and completion rates of vaccination continue to be low in the Africa Region (Ibraheem, Akintola, Abdulkadir, Ameen, Bolarinwa, & Adeboye, 2021; W.H.O 2018). In Nigeria, the Multiple Indicator Cluster Survey (MICS) in 2016-2017 recognized the percentage of children aged 12-23 months who received all vaccinations recommended in the national immunization schedule by their first birthday was 23% while those that received pentavalent and measles vaccines were 33.0% and 42.0% respectively. (Ibraheem et al., 2021; NBS & UNICEF 2017).

Annually, about 1.5 million children under-5 die due to these diseases worldwide (Orjingene, Olumuyiwa, Oguji, Apiyanteide, Inegbeboh, Audu, Muhammed, & Udah, 2021) and vaccine-preventable diseases account for a significant percentage of child mortality every year (WHO 2018). Vaccine-preventable diseases account for approximately 22% of child mortality in Nigeria every year (Adedire et al., 2019). In order to avert this ugly development, the National Programme on Immunization (NPI) was established with the aim that every child should have access to routine immunization thereby eliminating vaccine-preventable diseases in the country. Through their numerous interventions in child immunisation (measles and polio campaigns, and other immunisation outreaches), development partners have also increased access to routine immunisation (NICS, 2017). Despite these efforts towards increasing the Nigerian child's access to routine immunization thereby improving coverage, full immunization coverage is still very low (23%) and below Global Vaccine Action Plan (GVAP) goals, putting a substantial number of children at risk of vaccine-preventable diseases (NICS, 2017). In 2014, 18.7 million children were not fully immunized; over 60% were from ten countries-Nigeria inclusive (NICS, 2017).

The PRECEDE model was adopted as a guide for the instrument preparation of this study. The acronym; PRECEDE is an abbreviation for "Predisposing, Reinforcing and Enabling, Construction Educational/Environmental Diagnosis and Evaluation" and was developed in the 1970s by Green, Kreuter, Deeds & Patridge (Green & Kreuter, 2005). This model provides a structure for applying theories and concepts systematically and is built on the principle that, just as medical diagnosis precedes treatment plans, so should educational diagnosis precede intervention plans in preventive health.

Health education is a way to empower mothers of under-5 children; it offers them the opportunity to participate in activities that affect them and to access the information and services that they need to protect their health (Kaufman, Ryan, Walsh, Horey, Leask, Robinson, & Hill, 2018). It influences the mother's action by arousing infants' mothers' conscious awareness of the benefits of vaccination of their children in routine immunization that enables them to express willingness and make conscious efforts to adhere to their children's routine immunization schedule (Kaufman et al., 2019). Hence, this study determines the effect of educational intervention on knowledge for immunization among mothers with under-5 children in Oyo State, Nigeria.



METHODOLOGY

Study Design

The study utilized a quasi-experimental design which comprised one experimental group and one control group using the quantitative approach. Health education intervention focused on Immunization-related knowledge was delivered to the one experimental group, and placebo was delivered to the control group. The intervention was for a duration of 2 weeks which was in three sessions, lasting for an average of 120 minutes. At baseline, data were collected before the intervention, at 2 weeks immediately after the intervention, and at 6 weeks post-intervention in both the experimental and control groups.

Study Area

The study was conducted in two (2) primary health centres that were selected from two local government areas (LGAs) in Oyo State, which are Akinyele and Ogo-oluwa local governments respectively. The primary health centre employed for this study were Akinyele PHC and Elega PHC, where the indigenes are mostly traders and farmers.

Study Population

The study population were mothers of infants aged 0-4 weeks attending immunization clinics in the Primary Healthcare Centres (PHCs).

Inclusion and Exclusion Criteria

Mothers of under-5 children who were registered in the antenatal clinic during the study agreed to partake in the study. Mothers who have a cell phone with no underlying medical conditions. Those excluded were mothers of under-5 children who were not registered in the antenatal clinic of the health centres of interest. Mothers who do not have a cell phone. Mothers with underlying medical conditions.

Sampling Procedure

Random sampling technique was used for the selection of mothers of under-5 children in Oyo State. Out of the three senatorial districts in Oyo State, Oyo central was purposively selected. This is because it has the highest under-5 children in Oyo State. Two LGAs were selected using the random sampling technique from Oyo central senatorial district by balloting and were assigned into two groups. Two primary health centres were randomly selected for the intervention group and for the control group from selected LGAs.

Sample Size Determination

The sample size computed for the intervention study was 27 participants each for the two experimental groups and the same applies to the control group. Using 95% level of significance, ($Z\alpha=1.96$) 80% for $Z\beta$ which is equivalent to 0.84, Prevalence level at 50% which is also equal to 0.5, P, which is the desired level of the outcome at 80% (0.8). However, the sample size was increased to 30 participants to minimize the margin of error.

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



N = Minimum sample size

$Z\alpha$ = Normal standard variate at 95% confidence level (1.96)

$Z\beta$ = Statistical Power at 80% confidence level = 0.84

P = Prevalence of immunization = 50%

P_1 = 80% (desired level of outcome variable)

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

$$\frac{7.84 \times 0.25}{(0.3)^2}$$

$$N = 21.77 \approx 22$$

Attrition rate 20% of sample size $22 + 4.4 = 26.4 \approx 27$

Researcher increased the sample size to 30 so as to minimize the margin of error.

Total sample size is $(30 \times 3) = 90$

Based on the computation a total number of 60 participants from the three selected primary health centres were enrolled for this study (representing 30 people per group)

Instrument for Data Collection

A quantitative approach consisting of close-ended questions that covered all aspects of the study was used for this research. The instrument was a semi-structured, participant administered questionnaire that solicited information on socio-demographic characteristics and immunization-related knowledge among mothers with under-5 children from selected primary health centres in Oyo State. The same instrument was administered at baseline, immediate post-intervention, and 8-weeks follow-up.

Study Variables

The educational interventions were the independent variable while knowledge of depression was the dependent variable.

Validity and Reliability of Instrument

Face validity was adopted in validating the questionnaire to be used for the study. This was looked at by the supervisor and lecturers in the department. Item validity was also adopted by ensuring that the items in the instrument were carefully and thoughtfully selected in order for them to operationalize each of the variables they fall under. Construct validity using the conceptual framework (PRECEED Model) was adapted and variables in the instrument were selected based on the objectives of the study using the model.

To ascertain the reliability of the instrument, a pilot test was conducted for internal consistency of the instrument using 10% of the anticipated sample size from another primary health centre not included in the study, but with the same characteristics as the study participants, to check



for clarity and understanding. Twelve of the questionnaires were pre-tested among twelve students. The responses that were provided after the pilot study was fused into the instrument. The data collected from the respondents were statistically analyzed using Cronbach's alpha standard score to test its reliability. The reliability score generated was 0.84.

Ethical Considerations

The study obtained ethical approval from the ethical committee of the university—Babcock University Health Research and Ethics Committee (BUHREC), and also from the Ministry of Health Research Ethics Review Committee, Oyo State, Nigeria, in order to conduct the study. Informed consent was obtained from all respondents and their parents/guardians before administering the questionnaires. Confidentiality of every information provided was duly kept discrete and the instrument was administered to participants anonymously without requiring the names of the respondents.

Statistical Analysis

Data were collected, revised, coded and fed to the statistical software IBM SPSS (Statistical Package for the Service Solution) version 23. Descriptive statistics including frequency distribution and percentages were performed. For quantitative variables, mean and standard deviation were calculated. Inferential statistics include *t*-test and Cohen *d* effect size. The two-tailed tests, alpha error of 0.05, and *p*-value less than 0.05 were considered significant.

RESULTS

Socio-Demographic Characteristics

The participants' mean age at pre-intervention in the experiment and control groups were as follows: 31.9 ± 4.9 years and 32.9 ± 3.8 years. The majority of the participants in the two groups were between the ages of 30-39 years. Most of the participants in all the groups were married. Less than half of the participants in the group were civil servants. For the religion of the participants, most of the participants in all the groups were of the Christian faith. Also, most of the participants in all the groups were from the Yoruba ethnic group. Less than half of the participants in the experimental group had secondary school education while more than half (53.3%) of the participants in the control group had tertiary education (See Table 1).

Baseline Knowledge

The level of knowledge of adolescents about depression was measured on a 33-point rating scale and grouped into poor (0–16.5) and good (16.6–33). The mean \pm SD scores for the mothers of under-5 children's level of knowledge on immunization appointment-keeping practices in the experimental and control groups were 7.7 ± 1.50 and 9.6 ± 2.60 respectively. This implies that the participants across the group had a low level of knowledge related to immunization and appointment keeping at baseline as their mean scores were below the average mean score (See Table 2).



Immediate Post Intervention

The knowledge of the mothers of under-5 children on immunization appointment-keeping practices was assessed after the intervention was administered and completed. The measure was computed on a 33-point rating scale with a mean \pm SD of 15.67 ± 1.56 and 8.83 ± 2.36 in the Experimental and control groups respectively. The results showed that the highest mean was recorded in the Experimental intervention group. All the Mothers in the intervention groups recorded high scores of immunization knowledge after the intervention (see Table 3).

Outcome Evaluation of Knowledge of Adolescents on Depression at 8-weeks Follow Up

The knowledge of adolescents was measured on a 33-point rating scale and measured at 8-weeks follow up. Results showed that the educational intervention and control group had mean \pm SD of 21.80 ± 3.50 and 8.97 ± 2.16 respectively. The results showed that the educational intervention group had the highest mean among the groups. None of the mothers of under-5 children in the intervention groups had low scores of Immunization knowledge during the follow-up evaluation (See Table 4).

Research Hypothesis

There will be no significant difference in the level of knowledge of immunization of mothers of under-5 children at baseline and 8-weeks follow-up period. The paired t-test was used to analyze the effect of the intervention on mothers in the intervention groups. There was a statistically significant difference between scores of knowledge recorded for participants in the Educational intervention. The intervention program had a statistically significant effect on the mothers' level of knowledge intervention group [(effect size) $ES = 4.242$ ($t_{29} = -18.9$; $p < 0.01$), However, in the control group, there was no statistically significant difference in the level of knowledge ($t_{29} = 1.48$; $p = 1.48$). The null hypothesis was therefore rejected. (See Table 4).

DISCUSSION

This section presents the discussion of the study which examined the effectiveness of the intervention on a mother's immunization knowledge. The discussion provides explanations for the findings in the study as well as a brief comparison with results from previous studies conducted. The study focused on the immunization knowledge of mothers of under-five children in selected health facilities in Oyo State, Nigeria and developed an intervention towards improving immunization knowledge.

In this study, the participants were between the ages of 20-49 years and their mean age was 32.9 ± 3.8 years. This is similar to the finding of the study of Awadh et al, (2014) in Malaysia where they reported a similar age range and mean age. This similarity in finding may be because the participants were within the reproductive age. However, this finding is at variance with the mean age reported by Obi-Jeff et al, (2021) in Northern Nigeria where they reported a higher age range and mean age. This difference in result may be due to the fact that this present study focused on mothers of under-5 while their study focused on the general population that comprises both males and females outside the reproductive age. Also, this study revealed that less than half of the participants had secondary education.



This study showed that mothers' knowledge of routine immunization and appointment-keeping was low and this is in line with the study of (Oladepo et al., 2020). This finding was similar to those from other studies in which mothers had limited knowledge of childhood immunization (Larson et al 2018; Rainey et al., 2011). This difference may be because most had given birth to more than one child. This suggests that educational messages from the clinic's health workers may not adequately equip them with adequate knowledge about the different diseases and vaccinations. This study revealed that giving health education intervention to mothers in antenatal clinics is an effective and practical approach to increasing mothers' knowledge about childhood immunization. Some of the barriers to immunization appointment-keeping reported by participants in this study corroborate those results in other studies. These studies equally identified vaccine efficacy, side effects, prior negative experience with vaccination, long-distance walking, and long waiting times at the health facility as major barriers to uptake of immunizations (Abdulraheem et al., 2011; Harmsen et al., 2013).

This study finding showed a significant increase in mothers' level of knowledge about immunizations compared to baseline results, thus indicating that the health education intervention was an effective way to improve mothers' knowledge about childhood immunization. Studies had reported that mothers' knowledge has a great impact on the children's immunization rate, immunization appointment-keeping, and maintaining up-to-date immunization status (Favin et al., 2012; Esposito et al., 2014; Sheikh et al., 2013).

CONCLUSION

The immunization education training led to a significant increase in the mothers of under-5 children's knowledge in the intervention group when compared with the control group. This implies that mothers of under-5 children should be trained on the importance of appointment keeping practice to help reduce the risks of vaccine-preventable diseases.

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REFERENCES

- Abdulraheem, I., Onajole, A., Jimoh, A., Oladipo, A. (2011). Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children. *Journal of Public Health Epidemiology*, 3(4):194–203.
- Adedire, E. B., Ajayi, L., Fawole, O. J., Kasasa, S., Wassawa, P., & Nguku, P. (2019). Immunization coverage and its determinants among children aged 12-13 months in Atak Umosa-west district, Osun state Nigeria. A cross-sectional study. *BMC Public Health*, 16:905
- Awadh, A.I., Hassali, M.A., Al-lela, O.Q. (2014). Immunization knowledge and practice among Malaysian parents: questionnaire development and pilot-testing. *BMC Public Health* 14, 1107. <https://doi.org/10.1186/1471-2458-14-1107>



- Esposito, S., Principi, N., & Cornaglia, G. (2014). Barriers to the vaccination of children and adolescents and possible solutions. *Clinical Microbiology Infection*, 20(s5):25–31.9.
- Favin, M., Steinglass, R., Fields, R., Banerjee, K., & Sawhney, M. (2012). Why children are not vaccinated: a review of the grey literature. *International Health*, 4(4):229–238.
- Green, L. W., & Kreuter, M. W. (2005). *Health Promotion Planning: An Educational and Ecological Approach*. (4th ed.) New York: McGraw-Hill
- Harmsen, I., Mollema, L., Ruiters, R., Paulussen, T., de Melker, H., & Kok, G. (2013). Why parents refuse childhood vaccination: a qualitative study using online focus groups. *BMC Public Health*, 13(1):1183
- Ibraheem, R., Akintola, M., Abdulkadir, M., Ameen, H., Bolarinwa, O., & Adeboye, M. (2021). Effects of call reminders, short message services (SMS) reminders, and SMS immunization facts on childhood routine vaccination timing and completion in Ilorin, Nigeria. *Afri Health Sci.*;21(2). 951-959. <https://dx.doi.org/10.4314/ahs.v21i2.57>
- Kaufman, J., Ryan, R., Walsh, L., Horey, D., Leask, J., Robinson, P., & Hill, S. (2018). Face-to-face interventions for informing or educating parents about early childhood vaccination. *Cochrane Database of Systematic Reviews*, Issue 5. Art. No.: CD010038. DOI: 10.1002/14651858.CD010038.pub3.
- Larson, W., McCloskey, L., Mwale, M., Mwananyanda, L., Murray, K., Herman, A., Thea, D., MacLeod, W., & Gill, C. (2018). "When you are injected, the baby is protected:" assessing the acceptability of a maternal Tdap vaccine based on mothers' knowledge, attitudes, and beliefs of pertussis and vaccinations in Lusaka, Zambia. *Vaccine*, 36(21):3048–53. <https://doi.org/10.1016/j.vaccine.2018.03.081>.
- National Bureau of Statistics (NBS) and United Nations Children's Fund (UNICEF). Multiple indicator cluster survey 2016-17 Survey Findings Report. Abuja, Nigeria: National Bureau of Statistics and United Nations Children's Fund 2017.
- National Immunization Coverage Survey (NICS) 2016/17 National brief.
- Obi-Jeff, C., Garcia, C., Onuoha, O., Adewumi, F., David, W., Bamiduro, T., Aliyu, A. B., Labrique, A., & Wonodi, C. (2021). Designing an SMS reminder intervention to improve vaccination uptake in Northern Nigeria: a qualitative study. *BMC health services research*, 21(1), [844]. <https://doi.org/10.1186/s12913-021-06728-2>
- Oladepo, O., Dipeolu, I. O., & Oladunni, O. (2020). Outcome of reminder text messages intervention on completion of routine immunization in rural areas, Nigeria. *Health Promotion International*, 1–9 DOI: 10.1093/heapro/daaa092
- Orjingen, O., Olumuyiwa, O., Oguji, C., Apiyanteide, F., Inegbeboh, J., Audu, D., Muhammed, K., & Udah, C. T. (2021). Full childhood immunization coverage and incidence of vaccine-preventable disease in Nigeria: a regression analysis. *Int J Community Med Public Health*; 8:5757-64.
- Rainey, J., Watkins, M., Ryman, T., Sandhu, P., Bo, A., & Banerjee, K. (2011). Reasons related to non-vaccination and under-vaccination of children in low and middle-income countries: findings from a systematic review of the published literature, 1999-2009. *Vaccine*, 29(46):8215–21. <https://doi.org/10.1016/j.vaccine.2011.08.096.19>.
- Sheikh, A., Iqbal, B., Ehtamam, A., Rahim, M., Shaikh, H., Usmani, H., Nasir, J., Ali, S., Zaki, M., & Wahab, T. (2013). Reasons for non-vaccination in pediatric patients visiting tertiary care centres in a polio-prone country. *Archives of Public Health*, 71(1):19.
- WHO. Immunization coverage fact sheet. 2018.



APPENDIX

Table 1a: Socio-demographic Characteristics of the Participants Age, Gender, Occupation, Religion and Ethnicity

Variables	CG F (%)	Educational intervention F (%)
Age group		
20-39 years	3(10.0)	3(10.0)
30-39 years	26(86.7)	25(83.3)
40-49years	1(3.3)	2(6.7)
Mean± SD	32.90 ± 3.8	31.97± 4.9
Marital Status		
Single	2(6.7)	2(6.7)
Married	27(90.0)	27(90.0)
Separated	1(3.3)	1(3.3)
Occupation		
Unemployed	9(30.0)	10(33.3)
Self-employed	6(20.0)	8(26.7)
Civil servant/private organization	13(43.3) 2 (6.7)	10(33.3) 2(6.7)
Religion		
Christianity	21(70.0)	19(63.3)
Islam	8(26.7)	10(33.3)
Traditional Belief	1(3.3)	1(3.3)
Ethnicity		
Yoruba	20(66.7)	19(63.3)
Igbo	7(23.3)	5(16.7)
Hausa	3(10.0)	6(20.0)

Table 1b: Socio-demographic Characteristics of the Participants Education, Number of Children

Variables	CG F (%)	Educational intervention F (%)
Number of Children Alive		
One child	8(26.7)	9(30.0)
Two child	15 (50.0)	14(46.7)
More than two	7(23.3)	15(50)
Number of infant loss		
None	25(83.3)	26(86.7)
One	5(16.6)	4(13.3)

**Table 2: Participants Baseline Knowledge towards Immunization**

Variables	Maximum points on scale of measure	Control N=30		Education Intervention N=30	
		\bar{x} (SE)	\pm SD	\bar{x} (SE)	\pm SD
Knowledge	33	9.60(0.74)	2.67	7.70(0.31)	1.46

Table 3: Participants' Knowledge of Immunization at immediate post-intervention

Variables	Maximum points on scale of measure	Control N=30		Education Intervention N=30	
		\bar{x} (SE)	\pm SD	\bar{x} (SE)	\pm SD
Knowledge	33	8.83(0.43)	2.36	15.67(0.28)	1.56

Table 4: Participants Knowledge of Immunization at 8th Follow-up.

Variables	Maximum points on scale of measure	Control N=30		Education Intervention N=30	
		\bar{x} (SE)	\pm SD	\bar{x} (SE)	\pm SD
Knowledge	33	8.97(0.36)	2.16	21.80(0.68)	3.5

Table 5: Paired Sample T-test analysis showing the Mothers' Knowledge on Immunization between baseline and 8-week follow-up

Variables	Groups	Mean Diff	S.D	S.E	df	T	ES(95%CI)	p-value
	Education Intervention	14.16	3.68	0.67	29	-53.4	4.24(-3.70- to-2.78)	0.000
	Control	1.00	1.55	0.28	29	1.44	0.13(-0.25 to 0.51)	0.14

Significant at <0.05