

Determinants of compliance with child immunization among mothers of children under five years of age in Ekiti State, Nigeria

Compliance
with child
immunization

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Abstract

Purpose – Vaccine preventable diseases are major threats to the health and well-being of children under five years of age. They contribute a great deal to childhood illnesses and disabilities, and are accountable for a high percentage of childhood mortality worldwide. In Nigeria, the government has made a lot of effort to provide immunizations against these childhood diseases. It is however sad to note that many children still do not complete their routine immunization. The purpose of this paper is to determine factors which influence mothers' compliance with childhood immunization.

Design/methodology/approach – This was a descriptive study carried out among 600 mothers of under-five children randomly selected from nine postnatal clinics in Ekiti State between January and August 2016. A self-structured validated questionnaire containing items to explore demographic characteristics of respondents, compliance with child immunization (Cronbach's $\alpha=0.92$) and determinants of compliance (Cronbach's $\alpha=0.83$) was the instrument for data collection. Multiple regression analysis was used to identify determinants of mothers' compliance with childhood immunization.

Findings – The level of compliance of mothers with childhood immunization was high (80 percent). The two factors which contributed significantly to mothers' compliance were the mothers' knowledge of childhood immunization (β weight = 0.243) and mothers' educational status (β weight = 0.169). Mothers with tertiary education had the highest level of compliance (76.8 percent).

Originality/value – Having good knowledge of childhood immunization and a high educational status positively influence a mothers' compliance with child immunization.

Keywords Determinants, Compliance, Nigeria, Mothers, Immunization, Children under five

Paper type Research paper

Introduction

The adverse effect of vaccine preventable diseases on the health of children cannot be overemphasized. These diseases are major causes of illness, disability and death in childhood [1], and account for 17 percent of global total under-five mortality per year and



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22 percent of child mortality in Nigeria[2]. There have been several reports of health issues like brain damage, intellectual disability and birth defects among others due to infectious diseases like mumps, measles, chicken pox and rubella[3]. Children are particularly vulnerable to attacks of infectious diseases due to low immunity that often characterizes the childhood period.

As the name implies, vaccine preventable diseases can be prevented by the use of vaccines. Vaccines are among the most cost-effective clinical preventive services and are a core component of any preventive services package[1] which has led to the improvement of child health over the years[4]. Childhood immunization is a key method of reducing childhood morbidity and mortality[5], and reducing the number and severity of communicable disease outbreaks[6]. In addition, when childhood vaccines are delivered at the right time, they increase the protection of children from vaccine preventable diseases, minimize the risk of children getting infected and decrease the chance of outbreaks of the disease[7].

In order to ensure that children are fully protected against vaccine preventable diseases, such children need to be subjected to the provided vaccines at the right time. The CDC recommends that children should be fully immunized against 14 potentially deadly diseases before the age of two years[8]. These include polio, hepatitis, rubella, measles, tuberculosis, yellow fever, tetanus, pertussis and rotavirus among others. It has been observed that when the childhood recommended immunization schedule is not followed, the children will not receive timely protection from vaccine preventable diseases especially at the time when they are most susceptible, and at the same time, they will be at an increased risk of never completing the full vaccination series[9].

Many factors have been reported to be associated with compliance of mothers to routine childhood immunization. Among these factors are client factors such as age of mothers[10], parental health literacy, knowledge of the importance of immunization, socioeconomic status, employment status, family size and birth order. Other factors include provider factors such as waiting time, motivation of service providers, suitability of the timing of immunization sessions, attitude of service providers, reaction to side effects and charges for the services. The external or environmental factors include logistic barriers, limited accessibility to health care due to poor roads or inadequate public transportation, preparedness of the community for immunization sessions, information dissemination among the community and inter-sectoral collaboration[11].

As beneficial as vaccines are in the prevention of childhood diseases, and despite the efforts by governments in making provision of vaccines, many children still die of vaccine preventable diseases in Nigeria. This is likely due to the fact that many mothers do not subject their children to the appropriate immunizations. There is a dearth of information regarding factors determining the compliance of mothers in respect of childhood immunization in south west Nigeria especially Ekiti State. This study was therefore carried out to investigate factors that determine the compliance of mothers of children under five years in Ekiti State, Nigeria, with routine childhood immunization.

Methodology

A descriptive research design was adopted for this study. This design helped in describing the existing situation as it relates to determinants of mother's compliance with childhood immunization without manipulating the data. The study was carried out in Ekiti State between the period of January and August 2016. A total of 600 mothers of under-five children (aged 15-45 years) selected through multistage sampling procedure from 9 health facilities within the 3 senatorial districts in Ekiti State constituted the sample for this study. First, two local government areas were selected randomly from each of the three senatorial districts in Ekiti State. Second, three health facilities were selected from the two LGAs

(one tertiary health facility from one of the LGAs and two primary health institutions from the second LGA. In all, nine health facilities were selected. In the third stage of sample selection, 100 nursing mothers attending postnatal clinic were selected from each of the tertiary health institutions while 50 nursing mothers were randomly selected from each of the primary health facilities, making a total of 600 nursing mothers.

A self-structured validated questionnaire was the instrument for data collection. The questionnaire consisted of four sections. The first section consisted of items to explore demographic characteristics of respondents (age, educational status, number of children). The second section contained 16 items to assess the mothers' child immunization-related knowledge (Cronbach's $\alpha = 0.82$). The items included in this section included: babies should be subjected to routine immunization at birth; newborn babies should be given the BCG vaccine within 14 days of birth; and babies should be brought for a second dose of immunizations at 6 weeks of birth among others. The items for testing knowledge were responded to using a yes or no response format. The third section consists of a list of vaccines that are available for Nigerian children as at the time of study (OPV0, BCG, HB0, OPV1, Penta1, OPV2, Penta2, OPV3, Penta3, IPV, Measles and Yellow fever). Assessment of compliance to the above listed vaccines was used to determine mothers' of compliance with child immunization. The last section of the questionnaire consisted of 34 items to measure determinants of mothers' compliance with child immunization (Cronbach's $\alpha = 0.83$). The determinants of compliance with childhood immunization assessed in the study were classified into six subthemes including: adverse events following immunization (excessive crying of babies, hotness of the baby's body, permanent scar on the baby's body, body pain, etc.), hours spent in the clinic to obtain the vaccine (long queue experienced, long hours spent on health talk, long hours spent in the clinic before vaccine is administered, long hours awaiting the arrival of the vaccine, etc.), attitude of health workers (health workers unfriendly manner, poor communication skill of health workers, use of abusive language of health workers, health workers shouting down on mothers, etc.), unavailability of vaccines (few competent health workers available to administer vaccine, available vaccine not enough for the available babies, vaccine not available at all, etc.), involvement of community leaders and distance of health facilities. The items used to identify determinants of compliance had a four point Likert-type scale response format of strongly disagree, disagree, agree and strongly agree. Completed questionnaires were collected on the spot. Data analysis was done using SPSS version 16. Frequency counts and percentages were used to analyze the demographic attributes, while multiple regression analysis was used to identify the factors that determine mothers' compliance with routine immunization.

Ethical considerations

This study was approved by the review panel of the Department of Human Kinetics and Health Education, Ekiti State University, Ado-Ekiti, Nigeria. In addition, the permission to carry out this study was obtained from matrons or heads of health facilities used. Only the respondents who willingly agreed to participate in the study were involved.

Results

A total of 600 mothers of under-five children were involved in this study. Many of the respondents (51.4 percent) were between 27 and 38 years, 71.9 percent had above secondary school certificate and 26.2 percent had more than three children (Table I).

Descriptive analysis of the level of knowledge of mothers on immunization shows that an appreciable number of mothers (373) representing 62.1 percent of the mothers involved in this study had good knowledge of the immunization-related items tested. The analysis of level of compliance of mothers with childhood immunization shows that majority of

Table I.
Demographic
attributes of
respondents and
descriptive analysis of
mothers' knowledge
and compliance with
childhood
immunization

Variable	Freq	Percent
<i>Age (years)</i>		
15-26	194	32.2
27-38	308	51.4
≥39	98	16.4
<i>Educational status</i>		
None	20	2.3
Primary	29	4.8
Secondary	120	20.0
Tertiary	431	71.9
<i>Number of children</i>		
1	98	16.3
2	174	29.0
3	171	28.5
≥4	157	26.2
<i>Mothers' knowledge</i>		
Poor (less than 20)	61	10.2
Fair (20-25)	166	27.7
Good (26-32)	373	62.1
<i>Mothers' compliance</i>		
Low (less than 50%)	48	8.0
Moderate (50-69%)	118	19.7
High (70-100%)	434	72.3
Note: n = 600		

the mothers (72.3 percent) have a high level of compliance, indicating that they have consistently followed and obtained between 9 and 12 (70-100 percent) of the appropriate immunization for their children. In total, 118 participants, representing 19.7 percent of the mothers, have obtained between 6 and 8 (50-69 percent) of the appropriate immunizations for their children, while 48 participants, representing 8 percent of the mothers, have completed less than 50 percent (0-5) of the appropriate immunization for their children (Table I).

The analysis of determinants of mothers' compliance with childhood immunization (Table II) shows that the educational status of mother and the mothers' knowledge in relation to childhood immunizations are the only two significant determinants of compliance with childhood immunization. Table II further reveals that a one unit increase in the

Table II.
Determinants of
Mothers' compliance
with routine
Immunization

Model	Unstandardized coefficients		Standardized coefficients		t	Sig.
	B	SE	β			
(Constant)	6.049	0.796			7.598	0.000
Age	0.141	0.155	0.039		0.912	0.362
Educational status	0.323	0.080	0.169		4.059	0.000
Number of children	0.101	0.093	0.044		1.089	0.277
Knowledge	0.114	0.018	0.243		6.213	0.000
Adverse events	0.010	0.016	0.027		0.585	0.559
Attitude of health workers	0.035	0.020	0.101		1.782	0.075
Availability of vaccine	-0.034	0.043	-0.043		-0.801	0.424
Distance to health facility	-0.083	0.061	-0.060		-1.370	0.171

educational status of mothers will increase the level of compliance with childhood immunization by 16.9 percent, while one unit increase in knowledge will increase level of compliance by 24.3 percent.

The findings of this study on completion of immunization based on mothers' educational status shows that 76.8 percent of mothers who have tertiary education have completed the appropriate immunizations for their children compared to those who have no formal education (50 percent), primary education (62.5 percent) and secondary education (62 percent).

The analysis of variance in mothers' immunization-related knowledge based on their educational status (Table III) shows a significant difference in mothers' knowledge. Further analysis revealed that mothers who have completed their tertiary education have better immunization-related knowledge than their counterparts having a lesser educational status (Table IV).

Discussion

Findings of this study show that mothers with a higher level of education had significantly higher levels of knowledge of childhood immunization than those having a lower level of education, and many of such mothers have completed the appropriate immunizations for their children. This finding is in line with that of previous studies[12, 13] where it was also reported that the educational status had a significant influence on the level of knowledge of mothers on childhood immunization issues. This finding is also consistent with the submission of Lee and Mason[14] that increased literacy and school enrollment of girls and women promotes their health seeking behavior and enhances their ability to process and evaluate relevant information, especially those that will benefit their health and that of their children.

The significant influence maternal educational status had on mothers' immunization-related knowledge and compliance with child immunization in this study is worthy of note. According to previous researchers[12, 13], education influences a mother's knowledge, attitudes and behavior, which, in turn, impacts the health outcomes of their children. In addition, the knowledge, personal and social skills provided through education can better

Table III.
Analysis of variance
in mothers'
immunization-related
knowledge based
on their
educational status

	Sum of squares	df	Mean square	F	Sig.
Between groups	855.824	3	285.275	9.290	0.000
Within groups	18,301.374	596	30.707		
Total	19,157.198	599			

Table IV.
Post-hoc analysis of
source of significant
difference in
immunization-related
knowledge of mothers
based on their
educational status

Educational status	No formal education	Primary education	Secondary education	Tertiary education	n	Mean
No formal education		0.006	0.003	0.000	20	19.80
Primary education	0.006				32	25.31
Secondary education	0.003				121	24.82
Tertiary education	0.000				427	26.07

equip individuals to access and use information and services to maintain and improve their own and their family's health[15]. Through education, therefore, a healthy behavior can be promoted and the use of health services can be enhanced.

A high level of compliance with childhood immunization was observed amongst the mothers who constituted the respondents for this study. This is similar to that of a previous study[16]. This finding is commendable and needs to be further encouraged among mothers. This high level of compliance is likely due to the high level of knowledge of the mothers on childhood immunization. Mothers in this study like those reported in a previous study[17] displayed high levels of knowledge on childhood immunization-related issues, and this reflected in their level of compliance with child immunization. There is a high tendency of individuals to follow a given practice when they have adequate knowledge about that particular issue. Knowledge is a great resource. Good knowledge of any given issue will go a long way in helping people to make wise decisions even in the face of challenges that, ordinarily, could have hindered the acceptance or practice of a particular habit.

The two significant determinants of compliance with childhood immunization are: knowledge of mothers on childhood immunization issues and educational status. As the educational status of mothers and their knowledge of childhood immunization increases, the level of compliance with childhood immunization also increases. This finding is similar to that of previous studies[13, 18] where it was reported that the maternal highest educational level was significantly associated with knowledge of reason for immunization and acceptance of immunization. This finding corroborates the submission of Feinstein, Sabates, Anderson, Sorhaindo and Hammond[19] that education is strongly linked to health and to determinants of health such as health behaviors, risky contexts and preventative service use. Education is an important mechanism for enhancing the health and well-being of individuals. It is an essential tool in the acquisition of knowledge, promotion and sustenance of healthy lifestyles and positive choices for supporting and nurturing human development, human relationships, personal, family and community well-being[19].

Limitation of the study

The major limitation of this study is that compliance with childhood immunization was assessed using mothers' self-reported compliance to the 12 vaccines available for Nigerian under-five children as at the period of study rather than using the hospital records for each child. This might have made the mothers to have either underrated or overrated their compliance with the routine immunization for their children.

Conclusion and recommendations

Based on the findings of this study, it can be concluded that having a high educational status achieves a high level of knowledge of childhood immunization that, in turn, leads to a high level of compliance with childhood immunization. It is therefore recommended that educational programs which will improve mothers' knowledge of childhood immunization issues should be put in place. In addition, enlightenment campaigns on the health benefits of childhood immunization, and other childhood immunization issues should be arranged for public consumption from time to time so that even the less educated can have access to childhood immunization-related knowledge. Governments should strengthen primary health care so that immunizations can be brought to the attention of all people. Governments should also enforce and enhance girl child education beyond primary school level.

References

1. Healthy people 2020. Immunization and childhood diseases. 2017 [cited 2017 Jun 20]. Available from: www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases
2. PAN Advisory Committee on Immunisation. Paediatric Association of Nigeria (PAN) recommended routine immunization schedule for Nigerian children. *Niger J Paediatr*. 2012 Apr; 39(4): 152-8, Available from: <http://dx.doi.org/10.4314/njp.v39i4.1>
3. Arc. Facts about childhood immunizations. 2011 [cited 2017 Jun 20]. Available from: www.thearc.org/what-we-do/resources/fact-sheets/facts-about-childhood-immunizations
4. American Academy of Pediatrics. Vaccine preventable diseases. 2017 [cited 2017 Jun 20]. Available from: www.healthychildren.org/english/health-issues/vaccine-preventable-diseases/pages/default.aspx
5. Bondy JN, Thind A, Koval JJ, Speechley KN. Identifying the determinants of childhood immunization in the Philippines. *Vaccine*. 2009 Jan; 27(1): 169-75, doi: 10.1016/j.vaccine.2008.08.042
6. Stevenson AM. Factors influencing immunization rates. 2009 [cited 2017 Oct 10]. Available from: www.clinicaladvisor.com/features/factors-influencing-immunization-rates/article/156897/
7. McNair CM. Factors influencing vaccination decisions in African American mothers of preschool age children. 2014 [cited 2017 Oct 10]. Available from: <http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=6269&context=etd>
8. CDC. Protect your babies with immunization. 2017 [cited 2017 Oct 10]. Available from: www.cdc.gov/Features/InfantImmunization
9. Guerra FA. Delays in immunization have potentially serious health consequences. *Paediatr Drugs*. 2007 May; 9(3): 143-8, Available from: <https://doi.org/10.2165/00148581-200709030-00002>
10. Luthy KE, Beckstrand RL, Peterson NE. Parental hesitation as a factor in delayed childhood immunization. *J Paediatr Health Care*. 2009 Nov-Dec; 23(6): 388-93, Available from: <http://dx.doi.org/10.1016/j.pedhc.2008.09.006>
11. Shamsul AS, Nirmal K, Nazarudin S, Rohaizat H, Azimatun NA, Rozita H. Factors influencing childhood immunization defaulters in Sabah, Malaysia. *The Int Med J Malaysia*. Jun, 2012; 11(1): 17-22, Available from: <http://iiuimed.net/imjm/v1/download/Volume%2011%20No%201/IMJM%20Vol11No1-2012-p17-22.pdf>
12. Abuya AB, Kimani KJ, Onsomu OE. Influence of maternal education on child health in Kenya. 2010; [cited 2017 Oct 10]. Available from: <http://paa2010.princeton.edu/papers/100182>
13. Yousif MA, Albarraq AA, Abdallah MAA, Elbur AI. Parents' knowledge and attitudes on childhood immunization, Taif, Saudi Arabia. *J Vaccine Vaccin*. 2013 Dec; 5(1): 1-5, Available from: <http://dx.doi.org/10.4172/2157-7560.1000215>
14. Lee S, Mason A. Mother's education, learning by doing and child health care in rural India. *Comp Educ Rev*. 2005 Nov; 49(4): 534-51, Available from: <https://doi.org/10.1086/454372>
15. Claire Higgins C, Lavin T, Metcalfe O. Health impact of education: a review. 2008 [cited 2017 Oct 10]. Available from: www.publichealth.ie/files/file/Health%20Impacts%20of%20Education.pdf
16. Adokiya MN, Baguune B, Ndago JA. 13 Evaluation of immunization coverage and its associated factors among children 12-23 months of age in Techiman Municipality Ghana, 2016: *Arch Public Health*. The Official Journal of the Belgian Public Health Association. 2017; 75(6): 28-37, Available from: <https://doi.org/10.1186/s13690-017-0196-6>
17. Yaiphakonbi L, Thapa R, Parmar N, Siddhpuria K. Assessment of the level of knowledge on immunization schedule among the mothers of under five children with a view to develop an information booklet. *Indian J Res*. 2015 Oct; 4(10): 33-7, Available from: www.worldwidejournals.com/paripex/file.php?val=October_2015_1445327477__95.pdf

18. Tagbo BN, Uleanya ND, Nwokoye IC, Eze JC, Omotowo IB. Mothers' knowledge, perception and practice of childhood immunization in Enugu. *Niger J Paediatr.* 2012 Jan; 39(3): 90-6. Available from: <http://dx.doi.org/10.4314/njp.v39i3.1>
19. Feinstein L, Sabates R, Tashweka M, Anderson, Sorhaindo A, Hammond C. What are the effects of education on health? 2006 [cited 2017 Oct 10]. Available from: www1.oecd.org/edu/innovation-education/37425753.pdf

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