Demographic Determinants of Routine Immunization Services Acceptance among Childbearing Mothers in Bauchi State: Implications for Health Promotion

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Abstract

The study investigated demographic determinants of routine immunization services acceptance among childbearing mothers (CBMs) in Bauchi State, Nigeria. Two research questions and two null hypotheses guided the study. The study adopted a descriptive cross sectional survey design. The population of the study comprised 3, 221,528 childbearing mothers in Bauchi State. A sample of 880 respondents was drawn using multi-stage sampling procedure. A structured Demographic Determinants of Routine Immunization Services Acceptance Questionnaire (DDRISAQ) was used for data collection. Frequency count, percentage and binary logistic regression were used for analyses. Results revealed that overall; CBMs had high level of acceptance of routine immunization services based on age (15-24years = 61.7%, 25-34years = 56.7%, 35-44years = 62.9%, 45 + years = 59.2%). Overall, CBMs had high level of acceptance of routine immunization services based on level of education (Tertiary education = 66.3%, Secondary education = 56.4%, Primary education = 59.5%, No formal education = 59.0%). Age and level of education were significant determinants of routine immunization services acceptance among CBMs. This implies that in order to influence acceptance of routine immunization services, there is need for proper education and the use of age of the target population to achieve immunization target of 90 per cent. However, health professionals should enlighten all mothers during antenatal visit on the need for proper acceptance of routine immunization services schedules irrespective of their age and education level.

Keywords: Demographic determinants, Routine, Immunization, Acceptance, Childbearing mothers

Introduction

Over two hundred years after the discovery of vaccines by an English Physician Edward Jenner, immunization has been seen as a proven tool and cost–effective public health intervention to reduce child morbidity and mortality (World Health Organization [WHO], 2O14). According to the Declaration of Alma-Ata International Conference (1978), immunization is one of the key elemenst of primary health care. Immunization of infants and children against vaccine preventable diseases has been regarded as an effective means of disease prevention and health maintenance. Sundar and Adarshi (2012) revealed that immunization services enable every child to reach his or her full physical and intellectual potentials. World Health Organization (2014) estimated that between two and three million child deaths are prevented annually through routine immunization services and many more future deaths prevented in older groups. However, vaccine preventable diseases are still responsible for about 1.5 million deaths occurring annually among children under five years of age. The evidences provided by WHO (2015) estimated that about 18.7 million infants – nearly one in five children worldwide are still missing routine immunization services for vaccine preventable diseases

(VPDs), such as: diphtheria, pertussis and tetanus in developing countries. The need to provide acceptable routine immunization services against vaccine preventable diseases led to the launching of expanded programme on immunization (EPI) in Nigeria in 1978 and its implementation process in 1979 (Loharkar et al., 2018).

Consequently, the federal government of Nigeria restructured EPI and renamed it as National Programme on Immunization (NPI) in 1996 to reflect national consciousness, commitment and ownership to the programme (Ogundeji, Adeniyi, Osungbade, & Arulogun, 2014). NPI aims at reducing drastically the number of deaths from vaccine preventable diseases among children and childbearing mothers. According to the National Primary Health care Development Agency (2013), NPI has successfully attained the universal child immunization (UCI) target of 80 per cent by 2000 in many countries. Global Health Education Consortium (2013) stated that NPI included provision of immunization services against NPI targeted diseases of children and Tetanus toxoid vaccines for pregnant mothers. Immunization according to Ada (2012), is a process of protecting a person from a specific disease through the purposeful introduction into the body of small dose of germ that are killed or extremely weakened or attenuated by means of chemical process. WHO (2019) defined immunization as a process whereby a person is immunized or made resistant to a particular communicable disease. This is done by administration of vaccines. Besides, immunization is a public health intervention, planned out vaccination programmes on children and pregnant women to provide antibodies to resist attack of causing organisms or to build immunity against these organisms. Immunity may be acquired naturally or artificially and both forms can be active or passive. Artificially acquired immunity is the type developed through immunization services. Jelliffe (2004) reported that active immunization against some infectious diseases, such as: Polio myelitis, tuberculosis, haemophilus influenza type b, hepatitis B, diphtheria, pertussis and tetanus among others can go a long way in preventing these VPDs through different methods of deliveries.

Delivery of immunization services according to Awosika (2007), is achieved through two categories, namely: supplementary immunization and routine immunization. Supplementary immunizations are those given to boost the immunity of a person that has been immunized or vaccinated before for a particular or same vaccine preventable disease. When childhood immunization is given at scheduled times or periods, it is called routine immunization. WHO (2005) conceptualized routine immunization as the immunization that is given to children at health centres from birth and at various stages of childhood to protect them from having serious disabilities or possible death from the six killer diseases. Routine immunization according to Zangeneh, Barco, and Towofiq (20012), is the regular provision of immunization services to successive cohorts of infants through the administration of vaccines (antigens) in a scheduled

regimen. Routine immunization is conceptualized as a preventive health services rendered through administration of vaccines to children and women of childbearing age at a specific schedule to prevent the vaccine preventable diseases of childhood. When correctly followed, every child is expected to be fully immunized by first year of life. United States Agency for International Development (USAID) (2009) maintained that routine immunization services are usually provided at fixed post at the health facility and through outreach to remote and hard-to-reach communities. Evidence provided by WHO (2015) stated that routine immunization services remains the cheapest, most cost effective, efficient and sustainable community-based way to reduced child morbidity and mortality. The National Proramme on Immunization (NPI) (2012) has prescribed the following routine immunization services schedules for Nigerians, as: one dose of BCG (Bacilli Calmette Guerin) at birth against tuberculosis, four doses of OPV (Oral polio vaccines) at birth, six weeks, ten weeks and fourteen weeks against polio, three doses of pentavalent vaccines at six weeks, ten weeks and fourteen weeks against diphtheria, pertussis, tetanus, hepatitis B, and haemophilus influenza type b, three doses of PCV (pneumococcal conjugate vaccine) at six weeks, ten weeks and fourteen weeks against pneumococcal diseases and one dose each of measles and yellow fever vaccines at nine months against measles and yellow fever and two doses of Vitamin A at nine months and fifteen months against blindness in children. Routine immunization services were aimed at delivery of complete number of doses of vaccines in a timely, effectively and safely to all childbearing mothers. The importance of routine immunization services has for a long time been emphasized, however, there are still reports of poor acceptance of routine immunization services in some part of Nigeria even in the areas where the services are made available. Olakanmi, Falade, Bukola, and Abiodun (2020) observed that there was still low acceptance of routine immunization in some part of Nigeria and the most recent data indicate that only one in four children are fully immunized, and about 18 per cent of children are not immunized at all due to non-acceptance among the childbearing mothers.

Acceptance of routine immunization services among childbearing mothers was crucial to improving coverage rates and improving immunization status of under five children and mothers in both urban and rural areas of Bauchi State. Acceptance according to Paul (2012), is the act of taking or receiving something offered. Hornby (2013) stated that acceptance is seen as an act of receiving a gift, or something worthy of being accepted because of its inherent importance. Acceptance is the expression of agreement and approval of routine immunization services among childbearing mothers in Bauchi State. According to Aliyu, Mohammed, Ibrahim, and Ghidazuka (2019), acceptance of routine immunization helps to access the effectiveness of these services and when they are effectively accepted, they will be able to

achieve their aim which is to eliminate child mortality resulting from child killer diseases. In view of the above assertion on routine immunization acceptance, Igbokwe (2009) divided levels of acceptance into two, namely: low level of acceptance and height level of acceptance. Low level of acceptance is when less than 50 per cent mothers accepted routine immunization services and high level of acceptance is when more than 50 per cent accepted routine immunization services. The division of acceptance into low and high levels was used in this study to determine demographic variables in acceptance of routine immunization among childbearing mothers in Bauchi State.

Childbearing mothers are mothers in their reproductive age. According to Nigeria Demographic and Health Survey (NDHS) (2008), childbearing mothers are females in the age of 15-49 years. Childbearing mothers are women who are physiologically capable of reproducing young ones, or who are within their reproductive age. (Azubuike, 2014). Pregnancy, childbirth, and child upbringing have become a thing of concern to this group of people, who are exposed to all sorts of responsibilities which include: taking adequate care of children, knowing their needs and taking adequate measures to prevent diseases in them and taking their responsibility of their routine immunization services so as to prevent vaccine preventable diseases among them. However, acceptance of routine immunization services by childbearing mothers is either influenced by certain demographic determinants which may enhance or inhibit it.

Demographic determinants or variables are characteristics in a population distribution which are capable of changing or causing changes in a study. Lakew (2015) asserted that some demographic factors, such as: age, education, gender, location, marital status and ethnicity among others have great influence on the acceptability and the utilization of routine immunization services among the childbearing mothers.

Determinants refer to factors that influence childbearing mothers into activities leading to the acceptance of routine immunization services that guaranteed protection from major killer diseases of children and goes a long way in preventing neonates, infant or children dying in their early years. Determinants are considered as factors that can affect the behaviour and development of an individual. Determinants are the forces and conditions that surround and influence living and non –living things (Olumuyiwa, Odusanya, Alufohai, & Mourice, 2011). Determinants of routine immunization services acceptance are influences, factors or indices that can have influence on childbearing mothers into acceptance of immunization services. These variables can have influence on acceptance of routine immunization services among the childbearing mothers. Therefore, age and education level are explored as demographic determinants of routine immunization services acceptance among CBMs in this study.

Age is an important demographic determinant that may influence health outcome. For instance, Akinsola (2009) is of the view that very young mothers lack the experience to take care of their newly born babies, this could be a factor of not presenting their children for routine immunization services. Again, Mekonenne (2009) asserted that acceptance of routine immunization services among childbearing mothers were dependent on age of the mothers. The author noted that the more advance in age of the mother the more likely she accepts routine immunization services that protect her under five children and are not influenced by traditional and cultural beliefs and poor educational knowledge about routine immunization services.

The education level of childbearing mothers may influence their knowledge, and decision making abilities of accepting routine immunization services. Alfred, Tabu, and Malalu (2012) posited that illiterate mothers lack the knowledge to take care of themselves and even their babies and may not acknowledge or perceive the relevance of routine immunization to the health of their children. Furthermore, Pluka, Barma, and Mahama (2013) stated that education level of mothers showed a positive relationship with childhood immunization. The authors reported that 70 per cent of children whose mothers had higher education were fully immunized while 63 per cent of children whose mothers had only secondary education were also fully immunized. Furthermore, 60 per cent of children whose mothers had only primary education were also fully immunized and only 55 per cent of children whose mothers had low education visit health facility for their routine immunization in Bauchi State.

Bauchi State is one of six states in the North East geopolitical zones of with an estimated population of 4.6 million people according to the 2006 population census (National Population Census NPC, 2006). The inhabitants are mostly farmers, and traders and few civil servants. Bauchi State Primary Health Care Development Agency (BSPHCDA, 2014), records showed a low level of acceptance of routine immunization services less than 20 per cent among the childbearing mothers. For instance, in 2012, NPI coverage rates were 31 per cent, while in 2013 and 2014, it was 42 per cent and 11 per cent respectively, which was far below 80 per cent target by WHO. One would therefore expect that more efforts are needed to persuade families to bring their children to be immunized at the right time and complete the full course of their childhood immunization services. According to Mastuda (2012), childhood immunization provides protection against major killer diseases of children and goes a long way in preventing neonates, infants or children dying in their early years. The first five years of birth is the most dangerous in a child's life, which therefore requires active immunization against the killer diseases of childhood.

Regrettably, its seems most childbearing mothers are not accepting these services effectively. It therefore becomes necessary to study the demographic determinants of acceptance of routine

immunization services among childbearing mothers in Bauchi State. The findings of this study will of benefits to health care providers, health educators, community health workers., health planners, donor agencies such as (WHO, UNICEF, USAIDS) and governments. Consequently, the purpose of the study was to find out the demographic determinants of acceptance of routine immunization services among childbearing mothers in Bauchi State. Specifically, the study determined the level of acceptance of routine immunization services among childbearing mothers in Bauchi State based on age and level of education.

Research Questions

The following research questions guided the study.

1. What is the level of acceptance of routine immunization services among childbearing mothers in Bauchi Sate based on age?
2. What is the level of acceptance of routine immunization services among childbearing mothers based on level of education?

Hypotheses

The following null hypotheses were postulated to guide the study and were tested at .05 level of significance.

1. Age is not a significant determinant of acceptance of routine immunization services among childbearing mothers in Bauchi Sate.
2. Level of education is not a significant determinant of acceptance of routine immunization services among childbearing mothers in Bauchi State.

Materials and Methods

The study adopted a descriptive cross sectional survey design. According to Nworgu (2006), it is a study which aims at collecting data and describing in a systematic manner, the characteristic features or facts about a given population. The rationale for using this design is informed by the fact it would enable the researcher to ascertain demographic determinants of routine immunization services acceptance among CBMs in Bauchi State, hence it is considered appropriate for the study. The population for the study consisted of 3, 221,528 childbearing mothers aged 15-49 years. The sample size for the study was 880 childbearing mothers. This was in line with Cohen, Manion, and Morrison (2011) who suggested that when the population is 1,000,000 and above at 5% interval and 95% confidence level, the sample size should be 663 or above. A multi-stage sampling procedure was employed to draw the sample for the study. The first stage involved the use of simple random sampling technique of balloting without replacement to select two senatorial zones out of the three in Bauchi State. This involved the use of simple random sampling technique of balloting without replacement to select five LGAs each from the two selected senatorial zones. This procedure brought a total of 10 LGAs. The

second stage involved the use of purposive sampling technique to select Abubakar Tafawa Balewa University Teaching Hospital Bauchi (ATBUTH) and Federal Medical Center (FMC) Azare. In addition, non proportional stratified random sampling technique was used to select 32 primary health care centres out of 102 in Bauchi State situated in the two selected senatorial zones, and eight general hospitals out of 20 general hospitals located in Bauchi State. This procedure provided 40 health facilities that carried out routine immunization services in the State. The third stage involved the use convenience sampling technique to select 22 CBMs each in the 40 selected health facilities in the State. Finally, 880 childbearing mothers were utilized for this study.

The instrument used for data collection was a structured questionnaire titled Demographic Determinant of Routine Immunization Services Acceptance Questionnaire (DDRISAQ). The DDRISAQ consisted of two sections (A & B). Section A elicited information on respondents' personal data while section B was on acceptance of routine immunization services among CBMs rated as follows: Unacceptable (UAC), Neutral (NEU), Acceptable (ACP). The respondents were requested to tick (√) as it applied to them. Face validity of DDRISAQ was established by three experts from the Department of Human Kinetics and Health Education, University of Nigeria, Nsukka. The administration and collection of the questionnaire was facilitated by the assistance of the health workers in the facilities sampled. Completed copies of the questionnaire were collected on the spot to ensure maximum return rate. The returned copies of the completed questionnaire were scrutinized thoroughly to determine the adequacy of the responses. Unduly filled out copies of DDRISAQ were discarded while properly filled out copies of DDRISAQ were coded and analyzed using Statistical Package for Social Sciences (SPSS Batch System) version 20. A total of 842 duly filled out copies of DDRISAQ were used for analysis. The CBMs that utilized unacceptable represent "Non acceptance" while those that accepted Neutral and Acceptable were collapsed to represent "Moderately acceptance". Thereafter, frequencies and percentages were used to find out the level of CBMs' acceptance of routine immunization services. Level of acceptance less than 50 per cent was interpreted as low acceptance while a level of acceptance of 50 per cent and above was interpreted as high level of acceptance. The null hypotheses were tested using binary logistic regression model at .05 level of significance.

Results

Table 1: Level of Acceptance of Routine Immunization Services Schedule among Childbearing Mothers in Bauchi State Based on Age (n = 842)

NPI Routine Immunization Services Schedules	Age 15- 24 years			25-34 years			35-44 years			45 yrs. and above		
	UAC f(%)	NEU f(%)	ACP f(%)	UAC f(%)	NEU f(%)	ACP f(%)	UAC f(%)	NEU f(%)	ACP f(%)	UAC f(%)	NEU f(%)	ACP f(%)
1. BCG vaccines at	122(44.0)	5(1.8)	150(54.2)	84(40.2)	3(1.4)	122(58.4)	50(29.8)	6(3.6)	112(66.7)	64(33.6)	6(3.2)	120(63.1

		15-24 years			25-34 years			35-44 years			45 years and above		
		UAC	NEU	ACP	UAC	NEU	ACP	UAC	NEU	ACP	UAC	NEU	ACP
1.	birth												
2.	Oral polio vaccines at birth	91(36.9)	8(2.9)	178(64.2)	77(36.9)	5(2.4)	127(60.8)	42(25.0)	10(6.0)	116(69.0)	75(39.5)	3(1.6)	112(59.0
3.	OPV at 6 weeks of age.	85(30.6)	18(6.5)	174(62.8)	85(40.7)	13(6.2)	111(53.1)	39(23.2)	12(7.1)	117(69.7)	61(32.1)	6(3.2)	123(64.7
4.	OPV at 10 weeks of age.	72(25.9)	21(7.6)	184(66.4)	70(33.5)	18(8.6)	121(57.9)	56(33.3)	4(2.4)	108(64.2)	70(36.9)	2(1.1)	118(62.2
5.	OPV at 14 weeks of age.	97(35.1)	9(3.2)	171(61.8)	80(38.3)	12(5.7)	117(56.0)	74(44.0)	4(2.4)	90(53.6)	77(40.5)	7(3.7)	106(55.8
6.	Pentavalent vaccine at 6 weeks.	86(31.1)	16(5.8)	175(63.2)	81(38.8)	15(7.2)	113(54.1)	60(35.8)	9(5.4)	99(58.9)	77(40.6)	11(5.8)	102(53.7
7.	Pentavalent vaccine at 10 weeks.	100(36.1)	17(6.1)	160(57.7)	62(29.6)	12(5.7)	135(64.6)	52(30.9)	6(3.6)	110(65.4)	70(36.8)	14(7.4)	106(55.8
8.	Pentavalent vaccines at 14 weeks.	76(27.4)	17(6.1)	184(66.4)	72(34.4)	11(5.3)	126(60.2)	60(35.7)	10(6.0)	98(58.4)	74(38.9)	18(9.5)	98(51.5
9.	Pneumococcal conjugate vaccines at 6 weeks of age.	103(37.2)	18(6.5)	156(56.4)	89(42.6)	21(10.0)	99(47.3)	43(25.6)	18(10.7)	107(63.7)	65(34.2)	8(4.2)	117(61.6
10.	PCV vaccines at 10 weeks of age.	72(25.9)	19(6.9)	186(67.1)	79(37.9)	15(7.2)	115(55.0)	39(23.2)	15(8.9)	114(67.8)	62(32.7)	7(3.7)	121(63.7
11.	PCV vaccines at 14 weeks of age.	87(31.4)	18(6.5)	172(62.0)	72(34.5)	12(5.7)	125(59.8)	53(31.5)	15(8.9)	100(59.5)	70(36.8)	18(9.1)	102(53.7
12.	Measles vaccines at 9 months of age.	76(27.5)	20(7.2)	181(65.4)	63(30.1)	26(12.4)	120(57.4)	50(29.8)	8(4.8)	110(65.5)	46(24.3)	13(6.8)	131(69.0
13.	Yellow fever vaccines.	75(27.0)	21(7.6)	181(65.4)	67(32.1)	11(5.3)	131(65.4)	55(32.7)	5(3.0)	108(64.3)	41(21.6)	16(8.4)	133(70.0
14.	Cerebrospinal meningitis vaccines	117(42.3)	15(5.4)	145(52.4)	109(52.1)	7(3.3)	93(44.5)	69(41.1)	8(4.8)	91(54.2)	101(53.2)	4(2.1)	85(44.7
	Cluster %	**32.7**	**5.7**	**61.7**	**37.2**	**6.2**	**56.7**	**31.5**	**5.5**	**62.9**	**35.8**	**4.9**	**59.2**

Key: *UAC = Unacceptable; NEU = Neutral; ACP = Acceptable*
0- 49% = Low Acceptance
50 – 69% = Moderate level of Acceptance
70% and above = High Level of Acceptance

Results in Table 1 show that overall, there was a high level of acceptance of routine immunization services schedules among childbearing mothers in Bauchi Sate based on age (15-24 years = 61.7 %; followed by those between age of 25-34 years = 56.7%; then those between age of 35-44 years = 62.9 %; and the least are those between age 45 years and above = 59.2%). Therefore, childbearing mothers of different age groups had high level of acceptance of NPI routine immunization services schedule in Bauchi State.

Table 2: Level of Acceptance of Routine Immunization Services Schedule among Childbearing Mothers in Bauchi State based on Level of Education (*n* = 842)

	Level of Education											
	Tertiary Education			Secondary Education			Primary Education			Non-formal Education		
NPI Routine Immunization Services Schedules	UAC f(%)	NEU f(%)	ACP f(%)	UAC f(%)	NEU f(%)	ACP f(%)	UAC f(%)	NEU f(%)	ACP f(%)	UAC f(%)	NEU f(%)	ACP f(%)
1. BCG vaccines at birth	60(26.2)	4(1.7)	165(72.1)	136(44.2)	8(2.6)	164(53.3)	76(41.5)	5(2.7)	102(55.8)	48(38.8)	3(2.4)	73(58.9)
2. Oral polio vaccines at birth	66(28.9)	6(2.6)	157(68.6)	114(37.0)	11(3.6)	183(59.4)	71(38.8)	4(2.2)	108(59.0)	34(27.5)	5(4.0)	85(68.5)
3. OPV at 6 weeks of age.	55(24.1)	5(2.2)	169(73.8)	114(37.0)	21(6.8)	173(56.1)	54(29.5)	17(9.3)	112(61.2)	47(37.9)	6(4.8)	71(57.3)
4. OPV at 10 weeks of age.	55(24.0)	8(3.5)	166(72.4)	120(39.0)	13(4.2)	175(56.8)	62(33.9)	11(6.0)	110(60.2)	31(25.0)	13(10.5)	80(64.5)
5. OPV at 14 weeks of age.	80(35.0)	4(1.7)	145(63.4)	131(42.6)	13(4.2)	164(53.3)	74(40.4)	7(3.8)	102(55.7)	43(34.6)	8(6.5)	73(58.8)
6. Pentavalent vaccine at 6 weeks.	71(31.1)	8(3.5)	150(65.5)	122(39.6)	25(8.1)	161(52.3)	67(36.6)	10(5.5)	106(58.0)	44(35.5)	8(6.5)	72(58.1)
7. Pentavalent vaccine at 10 weeks.	74((32.3)	14(6.1)	141(61.5)	105(34.1)	14(4.5)	189(61.4)	66(36.0)	15(8.2)	102(55.7)	39(31.5)	6(4.8)	79(63.6)
8. Pentavalent vaccines at 14 weeks.	67(29.2)	11(4.8)	151(66.0)	114(37.0)	9(6.2)	175(56.8)	61(33.4)	17(9.3)	105(57.4)	40(32.3)	9(7.3)	75(60.4)
9. Pneumococcal	81(35.3)	11(4.8)	137(59.8)	113(36.7)	25(8.1)	170(55.2)	54(29.2)	14(7.7)	115(62.9)	52(42.0)	15(12.1)	57(46.0)

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No.		UAC	NEU	ACP	UAC	NEU	ACP	UAC	NEU	ACP	UAC	NEU	ACP
	conjugate vaccines at 6 weeks of age.												
10.	PCV vaccines at 10 weeks of age.	73(31.9)	5(2.2)	151(65.9)	92(29.9)	20(6.5)	196(63.6)	47(25.6)	23(12.6)	113(61.8)	40(32.3)	8(6.5)	76(61.3)
11.	PCV vaccines at 14 weeks of age.	74(32.3)	10(4.4)	145(63.2)	121(39.3)	23(7.5)	164(53.3)	43(23.5)	21(11.5)	119(65.0)	44(35.6)	9(7.3)	71(57.3)
12.	Measles vaccines at 9 months of age.	58(25.4)	8(3.5)	163(71.2)	88(28.5)	34(11.0)	186(60.4)	53(29.0)	14(7.7)	116(63.4)	36(29.1)	11(8.9)	77(62.1)
13.	Yellow fever vaccines.	64(28.0)	7(3.1)	158(69.0)	86(27.9)	22(7.1)	200(64.9)	55(30.0)	12(6.6)	116(63.4)	33(26.7)	12(9.7)	79(63.8)
14.	Cerebrospinal meningitis vaccines	94(41.1)	8(3.5)	127(55.5)	165(53.6)	10(3.2)	133(43.2)	78(42.6)	8(4.4)	97(53.1)	59(47.6)	8(6.5)	57(45.9)
	Cluster %	**30.3**	**3.4**	**66.3**	**37.6**	**5.9**	**56.4**	**33.6**	**6.9**	**59.5**	**34.0**	**6.9**	**59.0**

Key: *UAC = Unacceptable; NEU = Neutral; ACP = Acceptable*
0- 49% = Low Acceptance
50 – 69% = Moderate Level of Acceptance
70% and above = High Level of Acceptance

Results in Table 2 show that overall, childbearing mothers regardless of education level in Bauchi State had high level of acceptance of routine immunization services schedules (Tertiary education = 66.3 %; followed by those with secondary education = 56.4%; then those with primary education = 59.5 %; and the least are those with non-formal education = 59.0%). Hence, childbearing mothers of different education levels had high level of acceptance of routine immunization services schedules.

Table 3: **Binary Logistic Regression of Age as a Determinant of Routine Immunization Services Acceptance among Women**

	NPI Services Model 1		Routine Immunization Schedule Model 2	
Variable	COR (95% CI)	*P*-value	COR (95% CI)	*P*-value
Age				
15-24 years	1.00		1.00	
25-34 years	0.65 (0.41, 1.04)	0.071	0.99 (0.66, 1.49)	0.959
35-44 years	0.55 (0.34, 0.90)	0.016*	1.18 (0.75, 1.85)	0.474
≥ 45 years	0.53 (0.33, 0.84)	0.007*	1.22 (0.79, 1.88)	0.382

Note. Reference group (1.00) = 15-24 years; COR = Crude odds ratio; CI = Confidence interval
Table 3 shows that women aged 35-44 years (COR = 1.18; 95% CI (0.75, 1.85) and ≥ 45 years (COR = 1.22; 95% CI (0.79, 1.88) were 1.18 times and 1.22 times more likely than CBMs aged 15-24 years to determine acceptance of routine immunization services.

Table 4: **Binary Logistic Regression of Education Level as a Determinant of Routine Immunization Services Acceptance among Women**

	NPI Services Model 1		Routine Immunization Schedule Model 2	
Variable	COR (95% CI)	*P*-value	COR (95% CI)	*P*-value
Level of Education				
NFE	1.00		1.00	
Primary education	0.74 (0.39, 1.41)	0.357	0.75 (0.42, 1.33)	0.316
Secondary education	0.44 (0.24, 0.81)	0.008	0.45 (0.26, 0.76)	0.003*
Tertiary education	0.35 (0.19, 0.65)	0.001	0.59 (0.33, 1.06)	0.077

Note. NFE = No formal education; COR = Crude odds ratio; CI = Confidence interval; 1.00 = Reference group (comparison group).

Table 5 shows that only having a secondary education (OR = 0.45; 95% CI (0.26, 0.76) was a significant determinant of acceptance of routine immunization services among CBMs in Bauchi State. However, the odds of rejecting routine immunization services was 55 per cent less likely among CBMs with secondary compared to CBMs with no formal education.

Discussion

Results in Table 1 revealed that childbearing mothers aged 35-44 years accepted routine immunization services most (62.9%), followed by those aged 15-24 years (61.7%), those aged 45years and above (58.2%) and those aged 25-34 years (56.7%). This is surprising and not expected. Routine immunization services were expected to be mostly accepted by CBMs between ages of 15-24 because this age group are more likely to be experiencing their first order

births and are more interested to use the services than the older ones who have had enough experience about the services. The result agrees with Akinbami et al. (2012) who reported that majority of older CBMs accepted routine immunization services schedules at various health facilities in communities for their children aged 12-23 months' in Nigeria. The findings equally agree with that of Ghaffer and Champman (2015) who reported that CBMs aged 35-40 years in developing countries had 60.2% acceptance of routine immunization services to control childhood cluster diseases and measles through health education promotion. Therefore, younger mothers should be targeted for health education on the importance of Maternal Child Health (MCH) services including routine immunization services schedules.

The results in Table 2 indicated that childbearing mothers with tertiary education accepted routine immunization services most (66.3%), followed by those with primary education (59.5%), those with secondary education (56.4%) and those with no formal education (59.0%). This is expected because education exposes mothers to the importance of routine immunization services and helps to correct misconception about immunization. These findings agree with Alfred, Tabu, Malalu, Too, and Tenge (2015) who concurred that level of education of mothers was significantly associated with acceptance of immunization services compared to mothers with primary or with no formal education. Abuya, Onsomu, and Kimani (2011) who suggested that mothers with higher education had good grasp of health concepts by immunizing their children according to the routine immunization schedules. This finding was at variance with that of Rammohan, Awofeso, and Fernandez (2012) who reported that paternal education of parents was not positively associated with compliance of immunization schedules in some developing countries of the world. Therefore, it is recommended that health education is of utmost necessity to inform mothers on the need of routine immunization services.

Results in Table 3 revealed that there was no significant difference in acceptance of routine immunization services schedule among CBMs based on age. Since their calculated values were less than the probability value of 0.05. The table further showed that CBMs aged 35-44 years and above were less likely to reject routine immunization compared to CBMs aged 15-24 years and 25-34years. However, women aged 35-44 years (COR=1.18, 95%, CI=0.75, 1.85 and >45 years COR=1.22., 95% CI=0. 79,1.88) were 1.88 and 1.22 times more likely than those aged 15-24 years and 25-34 years to accept routine immunization services schedules. The finding was in line with that of Navaneethan and Dharmahingam (2009); and Adamu (2011) who reported that reproductive age group of 15-49 year mothers were significantly more interested in protecting their children from vaccine preventable diseases through routine immunization services schedules at Odds ratio (OR=2.54 95% CI=1.01–6.38). This finding also agreed with that of Adebiyi (2013) who reported that age was a determinant of acceptance of

routine immunization services schedule among 12-23 months old children in Nigeria at (p<0.05). The study is at variance with Abdulraheem, Onajole, Jimohand, and Oladipo (2012) who reported that about 62.6% at adjusted odds ratio 1.132, 1. 109 and 1.178 respectively of children less than one year of age were not fully immunized due poor acceptance of routine immunization services by childbearing mothers in rural areas of Nigeria. The difference in findings could be attributed to difference in study settings. There is need for efforts that will improve the acceptance of all routine immunization services by CBMs irrespective of age.

The results in Table 4 indicated that significant difference existed in the acceptance of routine immunization services schedules by CBMs based on level of education since their calculated values were greater than 0.5 level of significance. Childbearing mothers (CBMs) with secondary and tertiary education were less likely to reject routine immunization services compared to CBMs with no formal education. Additionally, only secondary education (OR=0.45, 95% CI=0.26, 0.76) was a significant determinant of acceptance of routine immunization services. However, the odds of rejecting routine immunization services was 55 per cent less likely with secondary compared to CBMs with no formal education. The finding agrees with that of Nasir and Rahman (2014) which showed that mothers with primary, secondary, higher education were more likely to fully immunized their children than those with no education at all (adjusted odd ratio 1.132, 1.109 and 1.178) in Bangladesh. These findings also agree with Shaikh, Tahir, Kazi, Ahmed, and Fatmi (2015) who reported that mothers' education level of intermediate and above were the strongest determinant (OR=12.19, 95% CI=1.57- 9 .43) for acceptance of routine immunization services in Khaipur Sindh Pakistan. The result disagrees with the finding of Shrestha, Sermsri, and Sillabutra (2014) which showed that no significant impact in acceptance of routine of routine immunization services schedule based on education. The difference in finding could be attributed to difference in the study settings. This calls for more information, education and communication to childbearing mothers on the necessity of routine immunization services of all children.

Implications of the study for health promotion

Health promotion is the process of enabling people to increase control over, and to improve their health. Routine immunization services schedule is a tool for vaccine preventable diseases control and consequently health promotion. Effective health promotion on the need for acceptance of routine immunization services schedules is vital especially in the era of disease prevention and health promotion. An effective use of good governance for health, health literacy and healthy communities can have the potentials of improving the acceptance of routine immunization services especially among childbearing mothers of younger mothers and those of low educational status. It therefore implies that to achieve the acceptance of routine

immunization services of 80-90 per cent against VPDs control which is the NPI target. Therefore, there is the need for public health educators to use age and level of education to create awareness on routine immunization services. This will in turn increase routine immunization services acceptance, reduction in childhood morbidity, mortality, and healthier children.

Conclusion and Recommendations

The study revealed that CBMs had high level of acceptance of routine immunization services schedule based on age 15-24 years (66.7%), 25-34 years (56.7%), 35-44 years (62.9%) and 45 and above (59.2%) respectively. Age and level of education were found to be significant determinants of routine immunization services. However, the odds of rejecting routine immunization services were 55 per cent less likely among CBMs with secondary education compared to CBMs with no formal education. Following from the findings and conclusion of the study, the following recommendations are made: There is need for continuous maternal education in order to reinforce and sustain the effective acceptance of routine immunization services among CBMs irrespective of their age or education level. Health professionals should enlighten all mothers during antenatal visit on the need for proper acceptance of routine immunization services schedules irrespective of their age and education level. The influence of educational status on the acceptance of routine immunization services schedules calls for emphasis on choice of educational materials for routine immunization services to mothers. This is necessary so that adequate health education for proper acceptance of routine immunization services would be provided to all mothers irrespective of their educational status. Health education and communication on the need for adequate acceptance of routine immunization services should be conducted by health educators and other health professionals regularly at the health centres for childbearing mothers. The State Ministry of Health, Local Government Area health authorities and other stakeholders in immunization matters should continuously organize seminars and workshops especially at the grassroots level or community gatherings to correct wrong misconceptions about childhood immunization among the childbearing mothers.

References

Aliyu, I., Mohammed, A., Ibrahim, H. U., & Ghidazuka, Y. B. (2019). Acceptance of immunization by caregivers of children attending a teriary health facility in NorthWestern Nigeria. Acta Medical International, 6(1), 7.

Ada, G. (2012). *Vaccines and vaccination*. Owerri: Abanaheart Publication.

Akinsola, H. A. (2006). *A-Z of community health in medical, nursing health education practices* (2nd ed.). Ibadan Oyo State: College Press and Publishers Limited.

Alfred, R., Tabu, S., Malalu, P, K., Marrete, T., Peter, K., & Tenger, B, (2014). Utilization of essential immunization services among children of under five years old in Kachella Division Protocot, country Kenya. *Science Journal of Public Health, 2*(6), 617-623.

Awosika, A. (2006). Update on polio eradication in Nigeria. *Immunization Watch, 4*, 5.

Egwu, I. N. (2007). *Primary health care system in Nigeria: Theory, Practice, and Perspectives*. Lagos: Elimore Publishers.

Cohen, L., Manion, L., & Marrison, K. (2011). *Research methods in education* (7th ed.) Routledge, 2 Pack Square: Abingdon, Oxon OX144RN.

Global Health Education Consortium. (2013). *Vaccines preventable diseases and immunization programmes.*

Obionu, C. N. (2007). *Primary Health Care for Developing Countries* (2nd ed.). Enugu: Institute for Development Studies.

Olumuyiwa, O., Odusanya, E., Ahonkhai, V., & Maurice, F. P. (2008). Determinants of vaccination coverage in rural Nigeria. *Biomed Central Public Health, 8*, 381. [Pub Med] [Google Scholar].

Ogunmeka, D. A. (2007). Protecting the Nigerian Child against the Common communicable diseases. *Journal of Tropical Medicine*, 29(15), 389-392.

Igbokwe, C. C. (2009). Level of knowledge and practice of childbearing mothers about National Programmes on Immunization (NPI) Nsukka Local Government Areas. Enugu State Official *Journal of the Department Social Education University of Nigeria, Nsukka, 11,* 1.

Jelliffe, D. B. (2004). *Child health in the Tropics* (5th ed). California: Sam-Adex Printing and Publishing Company

Institute of Medicine. (2014). *Health literacy: A prescription to end confusion.* Washington D.C.: National Academic Press.

Lakew, Y., Bekele, A., & Bladgilign, S. (2015). Factors influencing full immunization coverage among 12-23 months age children in Ethiopia: Evidence from the National Demographic and Health Survey in 2011. *BMC Public Health, 15*(1), 728.

Loharikar, A., Mantel, C., Burgess, C., Iskandar, J. K., Thorpe, P., & Laid, S. (2018). *Global introduction of new vaccines delivering more to more.*

Masuda, D. (2012). *Beliefs about immunization and children health among childbearing mothers in Nepal.* Stanford University in Human Biology Senior Honors presented in June 2002.

Plhluka, P. K., Barma, M. P., & Mahatma, J. (2008). Factors associated with immunization coverage of children in Assan, India Over the first year of life. *Journal of Tropical Pediatrics.*

National Programme on Immunization (NPI). (2012). National Programme on Immunization. *Newsletter, 1,* 23–25.

National Primary Health Care Development Agency. (2009). *National immunization policy.* Available at http://www.ihspedu/research/centers-and-institutes/vac/resources/Nigeria-NRISP-Technical-policypdf

Ogundeji, M. O., Adeniyi, J. D., Osungbaden, K. O., Arulogun, O. S. (2014). *Primary health care in Nigeria: History and development.* Ibadan University Press.

Okoro, I. C., Ojimaka, N. C., Ikefuna, A. N., & Onyenwe, N. E. (2015). Socio-demographic influences on immunization of children with chronic neurological disorders in Enugu, Nigeria. *Trials in Vaccinology, 4*(9), 13.

Olakanmi, F. B. A., Ezekiel, A., Olasunkanmi, M., & Olatade, J. (2020). Factors influencing the acceptance of routine immunization among Ebira people in selected areas of Ado Ekiti State. *IOSR Journal of Nursing and Health Science (IOSR-JNHS), 9*(3), 9-10.

Sheik, S., Jay, M., Kazi, A., Ahmed, J., & Fatami, Z. (2015). Coverage and predictors of vaccination among children of 1-4years of age in a rural sub district of Singth. Journal of College of Physicians and Surgeons Pakistan, 20(12), 806-810.

Shresth, Sermsri, & Sillaburta. (2014). Factors affecting utilization of immunization services among mothers with children aged 12-23 months in the rural areas of Lalitpur District Nepal. *Journal Res., 27*, 5.

Sunler, L, Adarshii, & Pankai, J. (2009). *Textbook of Community Medicine, Preventive and Social Medicine* (2nd ed.). India: CBS Publishers & Distributors PVT. Ltd.

USAID. (2012). *For African Immunization basics. Strengthening Immunization services and Sustainable Financing for Immunization.*

Ukpong, L. E. (2012). *Immunization in Nigeria: Challenges and way forward.* Ikeja, Lagos.

WHO. (2014). *World Health Immunization Week 24-30th April, 2014.*

WHO. (2015). Immunization and Vaccines Development. World Immunization. WHO regional office for African week April 24-30.

WHO. (2019). *Health topic: Immunization.I Retrieved from http://www. Who.topics/immunization/en/*

Zangeneh, T. T., Baracco, G., & Towofiq, J. A. (2012). Impact of conjugate pneumococcal vaccines on the changing epidemiology of pneumococcal infections. *Expect Review vaccines, 10*, 345-353.