Determinants of Routine Immunization Uptake Among Children Aged 12- 23 Months in Internally Displaced Person Settlements of Bauchi State, Nigeria

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ABSTRACT

Routine Immunization (R.I) has been a cost-effective public health intervention that significantly reduced children's morbidities and mortalities associated with vaccine-preventable diseases (VPDs). Despite the remarkable improvement in its global coverage, Nigeria is far below the WHO recommendation of 90% coverage, which might have contributed significantly to the recent Measles, Pertussis, and Polio epidemics within the country, especially in the Northeastern region where the insurgency has resulted in the displacement of over a million people. There is a paucity of studies conducted in the area to ascertain the R.I uptake among internally displaced persons (IDPs). This study, therefore, aimed at determining the factors affecting R.I uptake among children aged 12-23 months in IDPs of Bauchi, a state reported to have only 14% of fully vaccinated children according to R.I schedule. It was a cross-sectional survey employing a two-stage cluster sampling technique with a validated questionnaire administered to 391 mothers/caregivers of under-fives in Bauchi IDP settlements in 2018. The study found that more than half of the respondents (56.3%) lived in rural areas, with a mean age of 27.9 years (S.D=+/-5.7). Most (63.7%) had good R.I. but poor VPD knowledge. The study found that less than one-third (29.9%) of the children were fully vaccinated, and 22.0% were not vaccinated the uptake of various antigens were found to be BCG (78.0%), PENTA1 (63.7%), PENTA2 (53.5%), PENTA3 (44.2%), and Measles (32.2%). The significant positive predictors of childhood full immunization status after multivariate analysis were living in an urban settlement, ANC attendance more than three times, maternal income above the poverty line, a distance less than 5km to immunization centres, good R.I knowledge, child delivery in health facility, and immunization card availability. The R.I. uptake was low, and more strategies like community outreaches, mobile vaccine posts, and health education should be employed to scale up the coverage.

Keywords: Immunization, Determinants, Coverage, Utilization, Internally Displaced Persons

INTRODUCTION

Routine immunization has been an important and cost-effective public health intervention that is known to have changed the history of morbidities and mortalities associated with vaccine-preventable diseases, especially among the under-five population. Globally, immunization has saved over 20 million lives in the last two decades, and with more than 100 million infants being immunized each year, about 3 million lives are saved annually in the world (Eugene et al., 2015 and CDC., 2018). The lifesaving intervention resulted in a notable decline in the incidence of Polio cases and other vaccine-preventable diseases, with only Afghanistan and Pakistan currently

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known to be polio-endemic globally after the certification of Nigeria as free of wild poliovirus (WPV) in August 2020 (WHO.,2021).

The Global Polio Eradication Initiative (GPEI) put out an urgent call for collective ownership and accountability by governments, communities, and other stakeholders as this will significantly impact achieving a polio-free world by encouraging optimal sustainability among the nations and stakeholders (WHO.,2019). Conducting research on routine immunization coverage, especially among socioeconomically disadvantaged populations like IDPs, will contribute towards identifying the bottlenecks that need to be addressed towards achieving the global polio eradication goal and vaccine-preventable diseases (VPDs) free communities (Oladipo,.and Clara.,2013).

Nigeria still reports cases of vaccine-derived poliovirus (VDPV), which is a strain related to the weakened live poliovirus contained in oral polio vaccine (OPV), which, if allowed to continue circulating in under or unimmunized populations for long enough or replicate in immune-deficient individuals. The virus can revert to a form that causes illness and paralysis; this, therefore, calls for more commitment by countries to ensure total eradication, which can be achieved by promoting routine immunization uptake and utilization, especially among populations like IDPs (WHO.,2021).

Despite the proven benefit of R.I. to humanity, Nigeria is still lagging in achieving the WHO-recommended target of at least 90% coverage in all countries, as it had only 31% of fully immunized children and up to 19% of eligible children who received no vaccination during the survey in 2018 (NPC.,2019). The coverage was notably poorer in the Northern part of the country, especially the northeast, where only 14.1% of the children were fully immunized (Peeter,2016). This might contribute significantly towards averting the recurrent epidemics of VPDs like Diptheria that recently claimed some lives in Northern Nigeria, as well as Measles, Pneumonia, and Pertussis, especially among the vulnerable populations like internally displaced persons. A significant part of the region has been ravaged by Boko-Haram insurgency, ethno-religious crisis, and flooding, which resulted in the internal displacement of over a million people to relatively more peaceful settlements. Bauchi state is relatively the most peaceful state in the Northeastern part of the country, though it has poor R. I coverage, hosted close to 70 thousand IDPs distributed in clusters within over 120 settlements, commonly informal camps (IOM, 2015).

It is well documented in the literature that the IDPs are challenged with poor accessibility to health services, shortage of medicines, poor living conditions, poor nutrition, poor personal hygiene, and poor environmental sanitation among other factors which together work in synergy to promote the epidemic of VPDs like measles, polio, cholera, hepatitis E, Yellow fever and pneumonia that contribute to the already existing under-fives morbidity and mortality in Nigeria (Eme.,2016, Lujan.,2018 and Elhadi.,2015).

Routine immunization studies are paramount in public health as the findings may inform stakeholders on whether the uptake and completion are improving, declining, or stable to guide policymakers to develop strategies for accelerating or maintaining the uptake. This is to ensure optimal achievement of herd immunity and protection of children against the VPDs. Many studies have been conducted in different parts of the country regarding vaccine coverage, but a literature search for this study could not identify work that studied routine immunization knowledge and its uptake among children aged 12-23 months in IDP settlements/camps of Bauchi state.

Therefore, it is paramount to determine the level of RI knowledge, uptake, and completion, as well as the determinants of its utilization in the state IDP settlements. This will provide solutions to the identified problems to bridge the gaps to prevent the re-occurrence of such unfortunate events as the polio cases of 2016 in Borno state IDPs camps, which delayed the country and the African continent from being polio-free certification process (WHO.,2016).

METHODOLOGY

Bauchi state has a population growth rate of 3.4% per annum (USAID/NPC/NBS.,2016). It was estimated that by the year 2018, the total population of the state was approximately 6,950,015 people, projected from the 2006 Population Census. The state had close to 70 thousand IDPs that stayed in over 120 IDP settlements, which are widely distributed in three types of IDP settlements in the state, which include officially recognized IDP camps,

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informal camps, and host communities (IOM, 2015). The type of housing they occupy puts them at risk of contracting many communicable diseases, as most of them occupy incomplete buildings, schools, and temporary houses, and few of them stay in donated houses within the communities. The IDPs have a good leadership structure with a chairman, woman leader, and secretary in every local government, and they often conduct monthly meetings to discuss their challenges for possible solutions. Most of them stayed for an average period ranging from 2 to 5 years in the settlements, and this provided some of them the opportunity to engage in economic activities with some earnings.

The study design was a cross-sectional descriptive study conducted to mothers/caregivers of under-fives in the internally displaced population settlements of the state. Only mothers/caregivers of children aged 12-23 months who had lived in the IDP settlements for at least 12 months consented to the study, and those who did not have obvious mental illness were included. Those who made the inclusion criteria but were seriously sick or physically absent during the study were excluded.

The sample size was determined using the formula n = (Zα2× pq/d2) where; n= the minimum sample size, Z= Standard normal deviate corresponding to 95% confidence interval, the value obtained from normal distribution table is 1.96, P= proportion or prevalence of variable being measured for referenced previous study, q = Complementary probability (1-p) and d = level of precision or acceptable margin of error for mean being estimated 5% would be used for the study (Ogbonna, 2016). The proportion of full immunization coverage among children between 12-23 months was 14% in Bauchi (NBS.,2017). The minimum sample size was calculated to be 185.01, which was multiplied by 2 to address the cluster design effect in conformity with the WHO standard (WHO.,2015). After a 10% non-response rate, the sample size was calculated to be approximately equal to 411.

The WHO two-stage 30 cluster sampling with probability proportionate to size method was applied for the study as follows (WHO.,2015 and Sunder.,2011). In the first stage, thirty clusters were selected from over 120 IDP settlements within the state, and in the second stage, households were selected from which eligible children between 12-23 months were selected by moving in one direction which was selected at random by balloting method till the desired number of children was completed. Selection of the children was carried out according to the 2015 WHO immunization survey guideline that recommends the range of 5-15 respondents per cluster, and since the corrected sample size for this study is 411 when divided by 30, it gave 14 respondents approximately per cluster (WHO.,2015).

Data was collected using a structured interviewer-administered questionnaire, which was adapted from a previous similar study to include the status of vaccination by asking for immunization cards, recall by caregivers, and checking for BCG scars of immunized children (WHO.,2015). Data collection was preceded by two days of training of four research assistants and two supervisors who are already experienced in the administration of vaccines at facilities. The training module included a detailed discussion on the research concept, justification, ethics, data collection tool, and protocol with a practical session also conducted.

The data collection tool was pre-tested among 40 participants which approximately equates to 10% of the calculated sample size they have similar characteristics with the main study participants for validation in two of the IDP settlements that were not selected among the 30 clusters studied, one of them was a rural community and the other one an urban community. Observations from the pretested questionnaire warranted only a little significant revision of the tool but none to the data collection protocol or analysis technique.

Data analysis was carried out using Statistical Package for Social Sciences (SPSS) software version 21 for Windows (IBM Corporation, Armonk, NY, USA), and frequency tables were used to present simple proportions. Relationships between the independent variables and the immunization status were analysed at the bi-variate level by using the chi-square test of association, and to control for confounders and address the multiplicity effect, multivariate analysis was further carried out. A comparison of prevalence/rates within and between IDP camps was performed, assuming children are normally distributed across the IDP settlements.

Scoring of the routine immunization knowledge questions was determined by giving one point for each correct

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answer and zero for an incorrect answer or no response. The maximum possible score was 15 for all the knowledge questions, and the mean (mean=8) was used as the cut-off for those with good knowledge (value> or = mean) and those with poor knowledge (< mean) (Elias,2015; Odusanya et al.,2017). All hypotheses were tested, with significance judged by a 95% confidence interval and $p<0.05$.

Ethical clearance was obtained from the Bauchi State Health Research Ethical Committee in the Ministry of Health with approval No: NREC/12/05/2013/2017/63. Permission was obtained from leaders of the IDP settlements for the study, and informed written consent was obtained from each participant after an adequate explanation of the reasons for the study as well as the benefits that may be associated with the findings before data collection. Recall bias might be a limitation of this study because the data on immunization was collected from vaccination cards, and in cases where these were not available or vaccination was not recorded on the card, the mother's recall of vaccination was accepted, and this might have affected the results obtained.

RESULTS

The questionnaire was administered to 391 participants out of the calculated 420, which is the calculated sample size with a non-response rate of 6.9%. The results are presented below.

Table 1: Maternal/Caregivers Socio-demographic Characteristics in IDPs of Bauchi

Socio-demographic Variables	Frequency (n)	Percentage (%)
Place of Residence (n=391)		
Urban	171	43.7
Rural	220	56.3
Maternal Age		
Less than 20	16	4.1
20-24	91	23.3
25-29	115	29.4
30-34	108	27.6
35-39	42	10.7
40 and above	19	4.9
Maternal Highest Level of Education (n= 391)		
None	120	30.7
Primary	119	30.4
Secondary	77	19.7
Tertiary	12	3.1
Qur'anic	63	16.1
Maternal Religion (n=391)		
Christianity	38	9.7
Islam	353	90.3
Marital Status (n= 391)		
Married	357	91.3
Divorced	23	5.9
Widowed	11	2.8
Ethnicity (n = 391)		
Hausa	136	34.8
Fulani	87	22.2
Kanuri	96	24.6
Others (Bole, Sayawa, Margi, Jarawa)	72	18.4
ANC Attendance with Index Child Pregnancy (n= 391)	96	24.6
None	49	12.5
Once	58	14.8
Twice	59	15.1

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Thrice More than thrice	129	33.0
Family Size (n=391) Less than 3 3-4 5-6 More than 6	 17 99 107 168	 4.3 25.3 27.4 43.0
Maternal Income (n= 391) Less than $57/Month Greater than $57/Month	 274 117	 70.1 29.9
Distance to Facility Less than 5km More than 5km	 209 182	 53.5 46.5

Table 1 above shows that most of the respondents, 56.3% (n=220), live in rural settlements. Most of them were between 20 and 34 years old, which formed 80.3% (n= 314) with a mean age of 27.9 years (SD= +/- 5.7). The proportion of those who did not attain any formal education, 30.7% (n= 120), was found to be almost the same with those that attained primary school level of education 30.4% (119) and together constituted 61.1% of the respondents.

Most of the respondents, 91.3% (357), were married, and most of them belonged to either Hausa (34.8%) or Kanuri (24.6%). Almost one-third of the respondents, 33.0% (n=129), shared that they visited antenatal clinics more than three times during the index child pregnancy; however, up to 24.6% (n=96) of them had no ANC visit with the child pregnancy. The family size among the respondents was more than 6 for the majority 43.0% (n=108) and less than 3 for the minority 4.3 % (n= 17). It was found that most of the respondents earned less than $57/Month (70.1%; n=274). The distance from household to childhood immunization centre was < 5km for most of the surveyed respondents 53.5% (n=238).

Table 2: Children Socio-demographic Characteristics in IDPs of Bauchi

Socio-demographic Variable	Frequency (n)	Percentage (%)
Child's Sex (n=391) Male Female	 187 204	 47.8 52.2
Child's Place of Delivery (n=391) Home Hospital Others (TBA Home)	 203 180 8	 51.9 46.0 2.0
Child's Birth Order (n= 391) First Second Third Fourth and above	 26 62 105 198	 6.6 15.9 26.9 50.6
Source of Immunization (n=305) Health Care Centres Hospitals	 185 120	 60.7 39.3
Immunization Card Availability (n=305) No Yes	 202 103	 66.2 33.8

Table 2 above shows that the proportion of female children, 52.2% (n=204), was found to be slightly more than male children, 47.8% (n=187). The mean age of the surveyed children was 16.9 months, with a standard

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deviation (SD +/- 3.9). The surveyed respondents who delivered their index babies at an orthodox health facility were 46.0% (n=180), while 51.9% (n=204) were delivered at home. Most of the surveyed children, 50.6% (n=198), belonged to fourth and above birth order. Most of the surveyed children that were either fully or partially immunized, 60.7% (n=185), received their immunization at health care centres. Only 33.8% (n=103) of the respondents that had their children either fully or partially immunized presented childhood immunization documentation (immunization cards) for their children, while 66.2% (n=277) presented no evidence of immunization documentation.

Table 3: Maternal/Caregiver Knowledge of Routine Immunization at IDP of Bauchi

Question and Responses	Frequency (n)	Percentage (%)
Awareness of Routine Immunization (n=391)		
Yes	388	99.2
No	3	0.8
Routine Immunization Importance (n=391)		
Agree	371	94.9
Do not agree	20	5.1
Purpose of Routine Immunization (n=391)		
Correct answer	281	71.9
Wrong answer	110	28.1
Diseases Prevented by Routine Immunization		
(Some participants mentioned more than one disease) TB	165	42.2
Poliomyelitis	146	37.3
Hepatitis B	79	20.2
Pertussis	89	22.8
Tetanus	60	15.3
Measles	195	49.9
Yellow Fever	19	4.9
Age at which child start R.I (n=391)		
Correct answer	200	51.2
Wrong answer	191	48.8
R.I schedule (n=391)		
Correct answer	207	52.9
Wrong answer	184	47.1
Ideal age at completion of routine immunization schedule (n=391)	233	59.6
Correct answer	158	40.4
Wrong answer		
R.I schedule (n=391)		
Correct answers	233	60.0
Wrong answers	158	40.0
R.I mentioned as a cause of infertility (n=391)		
Yes	60	15.3
No	331	84.7
Is R.I. safe? (n=391)		
Yes	341	87.2
No	50	12.8
Overall R.I Knowledge (n=391)		
Good	249	63.7
Poor	142	36.3

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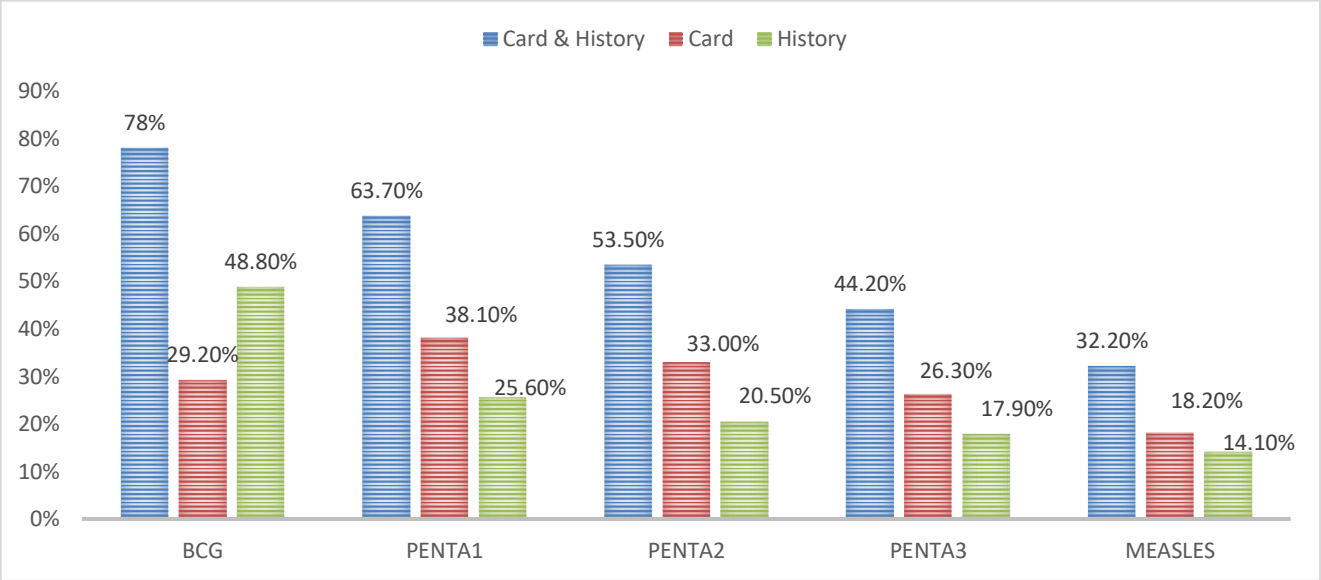
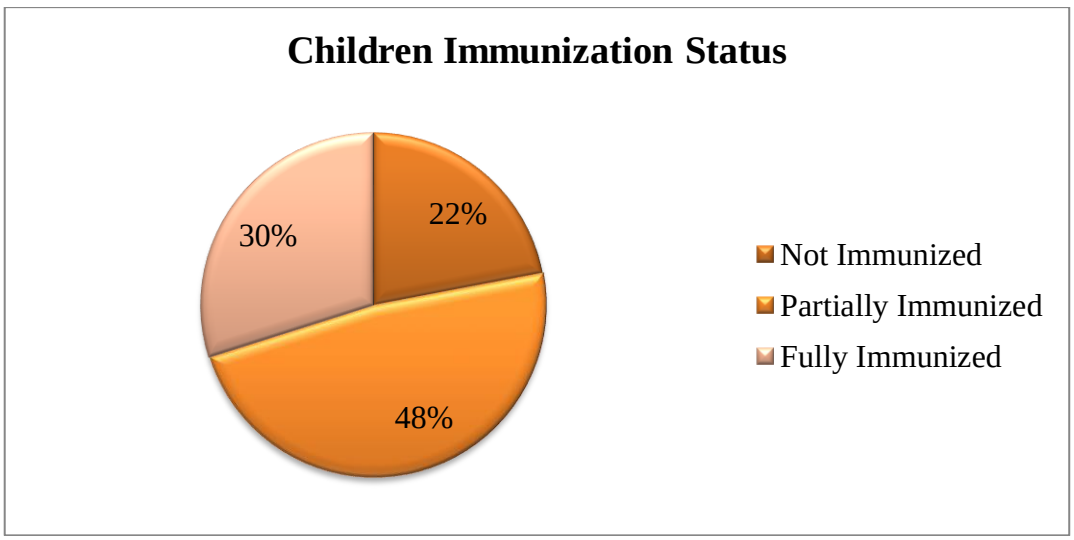
Most of the respondents, 63.7% (n=249), had good knowledge of routine immunization, with up to 36.3% having poor R. I knowledge as shown in table 3 above About knowledge of the basic VPDs covered by the national immunization schedule, Measles was the most mentioned disease by the respondents 49.9% (n= 195) followed by T.B, Poliomyelitis, Pertussis, Hepatitis B, Tetanus and Yellow fever that was mentioned by 42.2% (n=165), 37.3% (n= 146),22.8 % (n= 89), 20.2% (n= 79), 15.3% (n= 60) and 4.9% (n= 19) of the respondents in descending order respectively.

Fig.1. Distribution of Respondents by Immunization Uptake in IDPs of Bauchi



The coverage by card for BCG was 29.2%, PENTA1(38.1%), PENTA2 (33.0%), PENTA3 (26.3%), and Measles (18.2%) among the children aged 12-23 months old. However, when combined with the coverage by history, the values increased to 78.0%, 63.7%, 53.5%, 44.2%, and 32.2 %, respectively as presented in Fig.1 above.

Fig 2: Immunization Coverage/ Completion mong the surveyed children in IDPs of Bauchi



The proportion of fully immunized children aged 12-23 months (that completed their R.I) among the participants was found to be 29.9% (C.I; 23.5% to 36.3%), while 22.0% (C.I; 16.2 to 27.8) were found to be not immunized. In line with the WHO guideline, the immunization access, which is assessed using two indicators (Percentage of children receiving BCG and Penta1) was found to be 78.0% and 63.7%, respectively for the BCG and Penta1. The R.I system utilization (Dropout rates) was found to be a BCG /Measles dropout rate of 58.7%, Penta1/Measles of 49.5%, and Penta1/Penta3 of 30.6%.

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Table 4: Maternal and Maternal-related Predictors of Childhood Immunization Status in IDPs of Bauchi

Socio-demographic Variables	AOR	95% C.I (LCL-UCL)	P-Value
Place of Residence (n=391)			
Urban	1*		
Rural	0.462	(0.235-0.905)	0.024**
Maternal Age			
Less than 20	1*		
20-24	0.631	(0.097-4.640)	0.685
25-29	0.537	(0.070-3.806)	0.516
30-34	0.156	(0.160-1.136)	0.065
35-39	1.578	(0.217-18.874)	0.537
40 and above	0.811	(0.066-9.582)	0.856
Maternal Highest Level of Education (n= 391)			
None	1*		
Primary	0.928	(0.356-2.460)	0.789
Secondary	1.006	(0.350-2.895)	0.887
Tertiary	1.268	(0.197-8.179)	0.577
Qur'anic	0.529	(0.174-1.614)	0.405
Maternal Religion (n=391)			
Christianity	1*		
Islam	0.699	(0.214-2.278)	0.552
Marital Status (n= 391)			
Married	1*		
Divorced	0.076	(0.918-5.335)	0.587
Widowed	0.175	(0.754-4.721)	0.299
Ethnicity (n = 391)			
Hausa	1*		
Fulani	0.076	(0.918-5.335)	0.076
Kanuri	0.175	(0.754-4.721)	0.175
Others (Bole, Sayawa, Margi, Jarawa)	0.266	(0.662-4.449)	0.266
ANC Attendance with Index Child Pregnancy (n= 391)	1*		
None	0.301	(0.067-1.384)	0.124
Once	1.559	(0.425-5.712)	0.503
Twice	2.209	(0.672-7.265)	0.192
Thrice	4.967	(1.779-13.872)	0.002**
More than thrice			
Family Size (n=391)			
Less than 3	1*		4.3
3-4	1.248	(0.137-11.344)	25.3
5-6	2.715	(0.284-25.992)	27.4
More than 6	2.233	(0.236-21.104)	43.0
Maternal Income (n= 391)			
Less than $57/ Month	1*		
Greater than $57/ Month	13.323	(3.611-49.159)	0.000**
Distance to Facility (n=391)			
Less than 5km	1*		
More than 5km	0.459	(0.309-1.203)	0.025**
Maternal Knowledge of R.I (n=305)			
Poor	1*		
Good	2.560	(1.049-6.246)	0.039**

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AOR= Adjusted odd ratio, ** = statistically significant, *= Referent, C.I= Confidence interval

It was observed after multivariate analysis that the maternal-related positive predictors of childhood full immunization status among the studied children in the IDP settlements are; Being from the Urban settlement, having ANC attendance more than three times, having maternal monthly income of more than 1.9 dollars per day, having a distance to immunization centre less than 5km and mothers good routine immunization knowledge as shown in table 4 above.

Table 5: Child-Related Predictors of R.I Utilization in IDPs of Bauchi

Socio-demographic Variable	AOR	95% C.I (LCL-UCL)	P-Value
Child's Sex (n=391)			
Male	1*		
Female	0.610	(0.309-1.203)	0.154
Child's Place of Delivery (n=391)			
Home	1*		
Hospital	2.463	(1.1888-5.104)	0.031**
Others (TBA Home)	1.143	(0.082-15.856)	0.910
Child's Birth Order (n=391)			
First	1*		
Second	0.676	(0.165-2.765)	0.586
Third	0.430	(0.106-1.749)	0.238
Forth and above	0.551	(0.131-2.323)	0.417
Source of Immunization (n=305)			
Health Care Centres	1*		
Hospitals	0.784	(0.374-1.165)	0.521
Immunization Card Availability (n=305)	1*		
No	2.303	(1.170-4.536)	0.016**
Yes			

AOR= Adjusted odd ratio, ** = statistically significant, *= Referent, C.I= Confidence interval

Table 5 above shows that the children-related significant positive predictors of full immunization status in this study were hospital delivery and availability of the child immunization card.

DISCUSSION

Good maternal knowledge of routine immunization (RI) is strongly associated with improved uptake and utilization of immunization services (Osuala, 2015; Kabir et al., 2005; Peeter, 2016 and Odia,2013). This study reveals that 63.7% of respondents demonstrated good knowledge of RI, likely due to awareness campaigns by humanitarian organizations targeting IDP to mitigate the risk of VPDs. However, knowledge of specific VPDs was insufficient, with only 49.9% identifying measles as a covered disease. This finding aligns with previous studies in Nigeria, indicating a trend of poor knowledge of VPDs despite good awareness of R.I (Elias and Worku, 2015).

The immunization uptake rate for basic VPDs was found to decline significantly from the first to the last dose, with card coverage for BCG, PENTA1, PENTA2, PENTA3, and measles at 29.2%, 38.1%, 33.0%, 26.3%, and 18.2%, respectively. When including reported histories, these rates improved to 78.0%, 63.7%, 53.5%, 44.2%, and 32.2%. Similar trends have been observed in other studies (Odusanya et al., 2017; Olwedo and Clara, 2013; Shezina et al., 2016). Factors contributing to the decline in coverage may include barriers identified in the study and poor knowledge of VPDs, a significant predictor of RI uptake.

The proportion of fully immunized children was 29.9%, with 22.0% remaining unimmunized, figures that exceed

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recent state and national averages but still fall short of WHO targets (NBS, 2017; Eme, 2016). This higher coverage may be attributed to consistent reminders from organizations like the International Organization for Migration (IOM) regarding the risks of VPDs for IDPs.

Maternal and caregiver-related positive predictors of full immunization included urban residence, attendance at antenatal care (ANC) more than three times, maternal income, and proximity to healthcare facilities. Urban areas tend to have better access to healthcare resources, enhancing the likelihood of immunization. ANC attendance provides mothers with crucial information about RI, fostering a stronger relationship with healthcare providers and encouraging immunization (Tegbo,2014).

Child-related predictors included hospital delivery and the retention of immunization cards, which serve as reminders for subsequent vaccinations. Notably, good knowledge of RI was a significant predictor of children's full immunization status; children whose mothers had adequate knowledge were 2.56 times more likely to be fully immunized than those whose mothers had poor RI knowledge.

Conversely, maternal age, highest level of education, religion, marital status, ethnicity, and household size showed no statistically significant effects on RI uptake, contrary to findings from other studies (NPC, 2019; Odusanya et al., 2017). Similarly, child-related factors such as sex, birth order, and source of RI did not impact immunization status.

The findings of this study highlight the critical role of maternal knowledge in the uptake of routine immunization. Despite a good overall awareness of RI, the lack of specific knowledge regarding VPDs indicates a gap that needs addressing through targeted educational interventions. Previous research supports the notion that improved knowledge can lead to better health-seeking behaviours (Antai, 2009; Sadoh and Eragie, 2007).

The progressive decline in immunization coverage from the first to the last dose underscores the need for improved strategies to maintain engagement throughout the immunization schedule. The observed higher rates of immunization through history suggest that verbal reminders and community engagement are effective strategies, which should be further explored and implemented in IDP settings.

The socio-demographic factors identified as positive predictors of immunization align with existing literature that indicates urban settings typically enjoy better health infrastructure and access to services (Elias and Worku, 2015; Odusanya et al., 2017). The importance of ANC attendance as a facilitator for immunization suggests that healthcare providers should strengthen their outreach efforts in these settings, ensuring that mothers receive comprehensive information about RI during these visits.

The lack of significant correlation between maternal age and education level with immunization status differs from past studies, indicating that factors influencing immunization uptake may vary within different contexts and populations. This finding highlights the importance of considering local socio-cultural dynamics when designing interventions aimed at increasing immunization coverage.

CONCLUSION

In conclusion, while most respondents exhibited good knowledge of routine immunization, understanding of specific VPDs was lacking. The overall uptake of immunization reflected a concerning trend, with less than one-third of children fully immunized. Positive predictors of full immunization included urban residence, frequent ANC attendance, caregiver income, hospital delivery, retention of immunization card, and good RI knowledge.

RECOMMENDATIONS

To enhance RI uptake among IDPs in Bauchi State, the government should implement strategies such as mobile RI services to address accessibility barriers. Mobile clinics can reach remote areas and ensure that children receive vaccinations promptly. Organizations aiding IDPs must incorporate RI promotion into their agendas, emphasizing the importance of routine immunization and the risks associated with VPDs.

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The Bauchi State Ministry of Health should organize sustainable community awareness campaigns in collaboration with local health agencies. These campaigns should focus on the importance of RI, the retention of immunization cards, and the need for the timely completion of vaccination schedules. Engaging community leaders and utilizing media platforms, such as radio and social media, can significantly enhance public knowledge, dispel misconceptions about immunization, and encourage community participation.

Furthermore, poverty alleviation strategies should be developed to empower women in IDP settlements. This could involve establishing skills acquisition centers where women can acquire valuable skills for economic productivity. Increased financial capability may enable them to make informed decisions regarding their children's health, including accessing immunization services.

Encouraging ANC attendance and hospital deliveries is crucial for improving RI uptake. Healthcare workers and NGOs should actively promote these services among mothers in IDPs, ensuring they understand the benefits of regular health check-ups and the importance of RI. Creating a supportive environment where mothers can receive accurate information about immunization and VPDs will further enhance their engagement in the health system.

REFERENCES

1. Adeleye, O. A., & Mokogwu, N. (2016). Determinants of full vaccination status in a rural community with accessible vaccination services in South-South Nigeria. Journal of Community Medicine and Primary Health Care, 27 (2), 12-19.
2. Antai, D. (2009). Inequitable childhood immunization uptake in Nigeria: A multilevel analysis of individual and contextual determinants. BMC Infectious Diseases, 9 ,181. https://doi.org/10.1186/1471-2334-9-181
3. Centers for Disease Control and Prevention. (2018). Stop Transmission of Polio (STOP). https://www.cdc.gov
4. Eme, O., Obioma, U., Tumininu, O. A., & Eniola, O. C. (2016). Review of the health problems of internally displaced persons in Africa. The Nigerian Postgraduate Medical Journal, 23 (4), 161.
5. Elias, L., & Worku, D. (2015). An assessment of child immunization coverage and its determinants in Sinana District, Southeast Ethiopia. BMC Pediatrics, 15 (1), 31. https://doi.org/10.1186/s12887-015-0361-6
6. Elhadi, F. E., & Ibrahim, A. I. (2015). Measles vaccination among children 12-23 months in internally displaced settlements of Khartoum State, Sudan. Journal of Child Health and Nutrition, 4 (3). https://www.lifescienceglobal.com/pms/index.php/ijchm/article/view/3242
7. International Organization for Migration (IOM). (2018). Displacement tracking matrix (DTM), North-East Nigeria Displacement Report 39, April 2015. http://nigeria.iom.int/dtm
8. Kabir, M., Iliyasu, Z., Abubakar, I., & Gajida, A. U. (2005). Knowledge, perception, and beliefs of mothers on routine immunization in northern Nigeria village. Annals of Nigerian Medicine, 1(1), 1.
9. Lujain, A. A., & Thikra, H. H. (2018). Immunization status of internally displaced Iraqi children. Family Medicine & Medical Sciences Research, 7(1). https://doi.org/10.4172/2327-4972.1000225
10. National Bureau of Statistics (NBS) & United Nations Children Fund (UNICEF). (2017). Multiple Indicator Cluster Survey (2016-2017): Survey findings report. Abuja, Nigeria.
11. National Population Commission (Nigeria) & ICF. (2019). Nigerian Demographic and Health Survey 2018. Abuja: National Population Commission.
12. Odia, O. J., Okafor, I. P., & Roberts, A. A. (2013). Knowledge, attitude, and practice of childhood immunization among mothers of under-fives in Kosofe Local Council Development Area, Lagos State. Journal of Community Medicine and Primary Health Care, 27 (1), 55-63.
13. Oladipo, A., & Clara, L. E. (2013). Socioeconomic status of women and immunization status of under-five children in Northern Nigeria: A case study of poliomyelitis in Kaduna State. In 1st Annual International Interdisciplinary Conference (AIIC), 24-26 April, Azores, Portugal.
14. Olwedo, M. A., Edison, M., Bachou, H., & Orach, C. G. (2008). Factors associated with malnutrition among children in internally displaced persons' camps, northern Uganda. Journal of African Sciences, 8(4), 244-252.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV March 2025 | Special Issue on Public Health

15. Osuala, U. K. (2015). Predictors of full childhood immunization status in Owerri, Nigeria. Walden University. http://scholarworks.waldenu.edu/dissertations
16. Peeter, O. A. (2016). Determinants of routine immunization coverage among 12–23-month-old children of nomadic population in Akwanga L.G.A, Nassarawa State, Nigeria.
17. Shezina, S. A., Ejaz, A. K., Mudassar, M., & Mujb, U. (2016). Childhood immunization among IDPs of under-five years from North Waziristan Agency, Pakistan: A cross-sectional study. Pakistan Journal of Public Health, 6(4).
18. Sadoh, A. E., & Eregie, C. O. (2007). Continuing barriers to optimum immunization uptake in Nigerian children: The role of missed immunization opportunities and inappropriately timed immunizations. Nigerian Journal of Pediatrics, 34 (3 and 4), 57-61.
19. Tegbo, B. N., Christopher, B. E., Babatunde, I. O., Chika, N. O., Edelu, B. O., et al. (2014). Vaccination coverage and its determinants in children aged 11-23 months in an urban district of Nigeria. World Journal of Vaccines, 4 (1), 175-183.
20. United States Agency for International Development (USAID)/Nigeria, Leadership, Empowerment, Advocacy and Development (LEAD). (2016). Bauchi State Government Strategic Health Development Plan (2016-2020).
21. World Health Organization. (2015). Vaccination coverage cluster surveys: Reference manual (Version 3).
22. World Health Organization. (2021). Polio eradication strategy 2022 to 2026. https://polioeradication.org/wp-content/uploads/2022/06/Polio-Eradication-Strategy-2022-2026-Delivering-on-a-Promise.pdf
23. World Health Organization et al. (2016). Polio Global Eradication Initiative: What does Nigeria need to do to become polio-free? https://polioeradication.org