Texila Advanced Journal of Multidisciplinary Health Research
DOI: 10.21522./TAJMHR.2016.05.01.Art006

Impact of Economic Barriers and Health Literacy on Routine Immunization Access in Yola North and South Local Government Areas of Adamawa State, Nigeria

Aishatu Zubairu[1*], Abiodun Olaiya Paul[1], Abiodun Folake Abiodun[2], Abdulfatai Atte Momoh[3]

[1]*Department of Public Health, School of Public Health and Social Works, Texila American University, Guyana*

[2]*Department of Demand Side Inceptives DSI GAVI, Maseru, Lesotho*

[3]*Department of Mathematics, Faculty of Physical Sciences, Modibbo Adama Universit, Yola, Nigeria*

Abstract

Routine immunization (RI) is essential for reducing child mortality and morbidity from vaccine-preventable diseases. However, in Yola, Nigeria, economic barriers and low health literacy hinder RI accessibility and acceptance. This study examines the impact of these factors in Yola North and South LGAs, Adamawa State, using data from 166 mothers and other respondents through surveys, interviews, focus groups, and observations. Statistical analysis (chi-square tests) using SPSS 27.0 revealed significant associations between economic barriers ($\chi^2 = 9.951$) and low health literacy ($\chi^2 = 9.506$) with immunization accessibility. Workforce shortages were identified by 55.9% of participants as a major challenge, while 31.7% and 31.1% cited social and cultural beliefs and lack of awareness, respectively. These barriers contribute to incomplete immunization coverage and increased disease transmission. Addressing them requires community-based education, workforce strengthening, investment in cold chain infrastructure, transparent communication, engagement with community leaders, and continuous monitoring to improve immunization outcomes.

Keywords: *Accessibility, Barriers, Intervention, Routine Immunization, Shortages and Awareness.*

Introduction

Routine immunization (RI) is a critical public health intervention aimed at reducing mortality and morbidity from vaccine-preventable diseases, particularly among children under five. Despite its proven efficacy, the success of RI programs in many parts of Nigeria, including Yola, is hindered by significant economic barriers and low health literacy levels.

Economic barriers play a substantial role in limiting access to routine immunization. Poverty and limited financial resources force many families to prioritize immediate survival needs such as food shelter, and clothing over healthcare services, including vaccination [1]. This financial constraint is particularly pronounced in rural areas where poverty levels are higher, and access to healthcare facilities is limited [1]. The cost of transportation to health centers and potential out-of-pocket expenses for vaccines further restrict children's access to immunization services [2].

Additionally, the inadequate number of healthcare facilities and a weak cold chain system for vaccine storage and transportation contribute to vaccine spoilage and reduced availability, further compromising immunization efforts [2]. The reliance on short-term funding cycles and inconsistent financial

Received: 29.01.2025 ***Accepted: 18.04.2025*** ***Published on: 29.05.2025***

****Corresponding Author: Zubairuaishatu.az@gmail.com***

support also disrupts vaccine supply and delivery, affecting the continuity and effectiveness of immunization efforts [3].

Health literacy, or the lack thereof, is another significant barrier to routine immunization. Many parents lack a comprehensive understanding of the benefits of vaccines, often due to misinformation and myths spread through social media and community leaders [2]. Cultural and religious beliefs also influence decisions regarding vaccination, with some communities refusing immunization due to perceived conflicts with their values [4]. Maternal education plays a crucial role in immunization uptake, as educated mothers are more likely to seek routine immunization services for their children [5]. However, low levels of maternal education contribute to lower immunization rates, particularly in rural areas characterized by early marriage and poor health-seeking behaviors Nigeria Demographic and Health Survey [6]. The lack of awareness regarding full immunization coverage among young mothers further exacerbates the problem [6].

The shortage of healthcare facilities and trained personnel further exacerbates the problem. Many healthcare facilities are understaffed or lack trained personnel, which affects the quality of immunization services and discourages parents from seeking vaccinations for their children [2]. The need for continuous training and capacity building for health workers is essential to improve immunization services and address vaccine hesitancy effectively [2]. Health workers are often unable to reach conflict-affected areas, and many families are displaced, making it difficult to maintain consistent vaccination coverage [4]. The shortage of health facilities, inadequate cold chain systems, and limited transport infrastructure pose significant barriers to the distribution of vaccines, particularly in hard-to-reach communities [2].

Addressing these economic barriers and improving health literacy are crucial steps towards enhancing routine immunization access. Policymakers, healthcare providers, and stakeholders must develop targeted strategies to overcome these barriers. This includes improving healthcare infrastructure, ensuring sustainable financing, and implementing comprehensive health education programs to raise awareness and dispel myths about vaccines [7]. By addressing these challenges, Nigeria can achieve higher immunization coverage, reduce the burden of vaccine-preventable diseases, and improve overall public health outcomes. Coordinated efforts at both the global and regional levels are essential to ensure that vaccines reach all individuals, particularly in resource-limited settings Global Alliance for Vaccines and Immunization [8].

The impact of economic barriers and health literacy on the accessibility of routine immunization is both significant and multifaceted. Addressing these challenges requires a coordinated approach involving policymakers, healthcare providers, and local communities. By improving economic conditions, enhancing health literacy, and strengthening healthcare infrastructure, Nigeria can overcome these obstacles and ensure that all children have access to life-saving vaccines. Furthermore, sustainable financing and the integration of digital health solutions into immunization strategies are key factors to improve both coverage and monitoring [9]. This study aims to investigate how economic barriers and health literacy influence the accessibility and acceptance of routine immunization services in Yola North and South LGAs, Adamawa State.

Research Methodology

Research Design and Site

The study employed a mixed-methods approach, combining qualitative and quantitative methods to provide a comprehensive understanding of the research topic. Qualitative data was collected in real-time from mothers and other patients visiting

hospitals for immunization through interviews, focus groups, and participant observation. This allowed for the exploration of individual perspectives, community dynamics, and contextual factors influencing immunization practices. The qualitative data was then quantified using appropriate statistical tools to explore complex issues and triangulate findings from multiple sources [10].

Method of Data Collection

Primary and secondary data were collected from different wards in Yola North and South Local Government Areas of Adamawa State. Primary data was gathered using structured questionnaires based on the research hypothesis, presented to respondents to express their views, opinions, and observations [11]. Secondary data was sourced from existing data in health facilities, journals, articles, earlier publications, encyclopedias, and dictionaries. The secondary data helped develop a proper conceptual and theoretical framework, while primary data was used to test the research hypothesis and provide answers to the research questions [12].

Population of the Study

The target population included males and females from adolescence onwards residing in Natari community, including health workers, community heads, and NGO employees. The population was chosen due to poor living conditions, educational levels, and religious beliefs. The study population comprised 1,150 respondents, including mothers, guardians, and caregivers who bring their children for routine immunization. Ethical consent was provided, and gender status was considered during the study.

Sampling Procedure and Sample Size

The study used purposive and random sampling strategies. Purposive sampling selected different communities and key informants representing various demographic, socio-economic, racial, population size, religious, belief, and geographic characteristics. For qualitative data collection, snowball sampling identified additional participants with unique insights. Random sampling ensured a level playing field for choosing respondents with different religious beliefs, social classes, and educational qualifications, thereby eliminating bias in Yola North and South Local Government Areas of Adamawa State.

The study sample size was calculated using the Cochrane formula as shown below:

$$n = \frac{Z^2 p(1-p^2)}{d^2}$$

where:

$n =$ Sample size.

$p =$ The proportion of mothers who are aware and have knowledge on childhood immunization which is 20%.

$d =$ Maximum error of the study, which is 0.05.

$Z =$ Standard normal deviation that corresponds to 5% level of statistical significance i.e:1.96.

$$n = \frac{(1.96)^2 0.1(1-0.1)}{(0.05)^2} = \frac{0.345744}{0.0025} = 138.2976 \gg 138$$

Considering a non-response rate of 20%, the sample size was calculated as follows: n=(138×0.20) +138=165.6n= (138×0.20) +138=165.6, approximately 166. Therefore, 166 mothers were considered in this study.

Instruments for Data Collection

Data collection involved obtaining signed consent from the State Ministry of Health and issuing it to willing participants. Qualitative data was gathered using semi-structured questionnaires, interviews, focus group discussions, and participant observation, involving community members, healthcare providers, and stakeholders. Quantitative data was collected through questionnaires focusing on immunization coverage, knowledge, attitudes, and practices. Secondary data, including national immunization databases and

health records, was also used to supplement the analysis.

Measurement of Variables

Socio-economic Characteristics of the Respondents

Various socio-economic variables were measured to assess the personal characteristics of the respondents:

1. **Sex:** Nominal level, coded as male = 1, female = 2.
2. **Age:** Interval level, respondents reported their age in years.
3. **Marital Status:** Nominal level, coded as single = 1, married = 2, divorced = 3, widow = 4.
4. **Household Size:** Interval level, respondents reported the number of people in their household.
5. **Educational Status:** Ordinal level, coded as Secondary = 1, OND/Diploma = 2, B.Sc/HND = 3, M.Sc = 4, PhD = 5.
6. **Religion:** Nominal level, coded as Christianity = 1, Islam = 2, Traditional = 3, Others = 4.
7. **Years of Experience:** Interval level, respondents reported their years of experience in the organization.
8. **Income:** Interval level, measured in actual annual income (Naira).
9. **Rank:** Nominal level, coded as junior staff = 1, senior staff = 2.

Validation of Instrument

To ensure the validity of the research instrument, the questionnaire was reviewed by the supervisor and department lecturers for relevance and clarity. A comprehensive design was developed by consulting literature and experts. Content validity was further confirmed through feedback from a pilot test, which helped refine the instrument for clarity and understanding.

Reliability of Instrument

Reliability was assessed by pre-testing the questionnaire on a small sample, addressing any ambiguities. The internal consistency of the instrument was evaluated using Cronbach's Alpha, which yielded a value of 0.79, indicating strong reliability and consistency in measuring the intended constructs.

Ethical Considerations

Ethical approval was obtained before data collection, ensuring adherence to ethical standards. Informed consent was secured from all participants, with assurances of confidentiality, privacy, and the right to withdraw at any time. Participants' autonomy and well-being were prioritized, and no coercion was involved in the study.

Method of Data Analysis

Data was analyzed using qualitative, descriptive, and inferential statistical techniques, with SPSS version 27.0 as the analytical tool. Qualitative analysis involved thematic coding of interview transcripts, focus group discussions, and field notes, identifying themes and patterns through iterative coding. Quantitative analysis included descriptive statistics and inferential methods, such as chi-square tests, to examine immunization coverage rates and associations with socio-demographic variables. A mixed-methods approach was used to integrate both qualitative and quantitative data, allowing for a comprehensive understanding of the research topic through triangulation of findings.

Chi-Square Test

A chi-squared test (χ^2) is a statistical method used to assess the independence of two categorical variables in contingency tables, particularly when sample sizes are large. It compares observed frequencies with expected frequencies under the null hypothesis. Pearson's chi-squared test is commonly used to determine whether significant differences exist between

observed and expected frequencies in one or more categories of a contingency table. For data analysis, a chi-squared test was adopted and modified from [13]. The formula used in [13] is applied to analyze the data.

$$\chi^2 = \sum \frac{(O_f - E_f)^2}{E_f}$$

O_f = Observed Frequency E_f = Expected Frequency $\sum$ = Summation.

The degree of freedom was obtained using the formula as thus; $df = (r-1)(1-c)$, where: r = row, c = column.

Decision Rule

If the computed chi-squared value is less than the critical value from the table at a 5% significance level (with the appropriate degrees of freedom), the null hypothesis is accepted. If the computed chi-squared value exceeds the critical value at the 5% significance level (with the appropriate degrees of freedom), the null hypothesis is rejected.

Result and Discussion

Socio-demographic Information

Table 1 presents the socio-demographic characteristics of 161 respondents, showing a fairly balanced gender distribution with 57.1% males and 42.9% females. The largest age group is 47-50 years (15.5%), followed by 43-46 years (12.4%), while the smallest group is 18-21 years (2.5%). The majority of respondents are married (75.8%), with 22.4% single and a small percentage divorced or separated. Most respondents are Christian (59%), followed by Muslims (40.4%). In terms of education, 65.8% hold a diploma, 27.3% have a degree, and smaller groups have a master's degree or PhD. The majority (62.7%) are Community Health Extension Workers, with others in various healthcare roles. Income data shows 57.8% earn between ₦35,000 and ₦70,000 monthly, while 32.3% earn above ₦70,000, and 9.9% earn below ₦35,000. Regarding family size, 47.8% have 1-5 children, 25.5% have 6-10 children, and smaller groups have no children or more than 10. Most respondents (64.6%) live in rural areas, with the remaining 35.4% residing in urban areas.

Table 1. Socio-demographic Information

Variables	Groups	Frequency	Percentage
Gender	Female	69	42.9
	Male	92	57.1
	Total	**161**	**100.0**
Age (years)	18 - 21 Years	4	2.5
	22 - 25 Years	12	7.5
	26 - 29 Years	13	8.1
	30 - 34 Years	18	11.2
	35 - 38 Years	18	11.2
	39 - 42 Years	20	12.4
	43 - 46 Years	20	12.4
	47 - 50 Years	25	15.5
	51 - 54 Years	22	13.7
	55 Years and above	9	5.6
	Total	**161**	**100.0**
Marital Status	Divorced	1	.6
	Married	122	75.8

	Separated	2	1.2
	Single	36	22.4
	Total	**161**	**100.0**
Religious Affiliation	Christian	95	59.0
	Islam	65	40.4
	Other	1	.6
	Total	**161**	**100.0**
Highest Educational Qualification	Degree	44	27.3
	Diploma	106	65.8
	Master	8	5.0
	PhD	3	1.9
	Total	**161**	**100.0**
Occupation	CHEW	101	62.7
	CHO	6	3.7
	DOCTOR	1	.6
	EHO	3	1.9
	JCHEW	6	3.7
	NURSE	6	3.7
	OTHERS	34	21.1
	PHARM	4	2.5
	Total	**161**	**100.0**
Monthly Income	₦35,000 - ₦70,000	93	57.8
	Above ₦70,000	52	32.3
	Less than ₦35,000	16	9.9
	Total	**161**	**100.0**
Number of Children	0 Children	26	16.1
	1-5 Children	77	47.8
	6-10 Children	41	25.5
	Above 10 Children	17	10.6
	Total	**161**	**100.0**
Place of Residence	Rural	104	64.6
	Urban	57	35.4
	Total	**161**	**100.0**

Table 2. Major Barriers to Accessing Routine Immunization Services in your Community

Barriers	**Response**	**Frequency**	**Percentage**
Geographic Barriers	No	110	68.3
	Yes	51	31.7
	Total	**161**	**100.0**
Economic Barriers	No	107	66.5
	Yes	54	33.5
	Total	**161**	**100.0**
Healthcare Workforce Shortages	No	71	44.1
	Yes	90	55.9
	Total	**161**	**100.0**

Social and Cultural Beliefs	No	110	68.3
	Yes	51	31.7
	Total	**161**	**100.0**
Lack of Awareness and Health Literacy	No	111	68.9
	Yes	50	31.1
	Total	**161**	**100.0**
Inadequate Cold Chain and Supply Chains	No	133	82.6
	Yes	28	17.4
	Total	**161**	**100.0**
Administrative and Policy Barriers	No	148	91.9
	Yes	13	8.1
	Total	**161**	**100.0**
Language and Communication Barriers	No	141	87.6
	Yes	20	12.4
	Total	**161**	**100.0**
Limited Hours and Inconvenient Locations	No	142	88.2
	Yes	19	11.8
	Total	**161**	**100.0**
Political and Environmental Instability	No	139	86.3
	Yes	22	13.7
	Total	**161**	**100.0**

Table 3. How do these Barriers Affect the Utilization of Routine Immunization Services

Effects	**Response**	**Frequency**	**Percentage**
Decrease the likelihood of families consistently seeking out immunization services	No	84	52.2
	Yes	77	47.8
	Total	**161**	**100.0**
Leading to incomplete coverage	No	69	42.9
	Yes	92	57.1
	Total	**161**	**100.0**
Higher disease transmission rates	No	109	67.7
	Yes	52	32.3
	Total	**161**	**100.0**
Greater need for healthcare interventions	No	104	64.6
	Yes	57	35.4
	Total	**161**	**100.0**

Table 2 outlines participants' perceptions of barriers to accessing routine immunization services in their community. A significant minority identifies geographic (31.7%) and economic (33.5%) barriers as major issues, though the majority do not consider them significant challenges. Workforce shortages are seen as a major barrier by 55.9% of participants. Social and cultural beliefs (31.7%) and lack of awareness (31.1%) are also viewed as obstacles by some, while the majority do not perceive them as major issues. Fewer participants cite inadequate cold chain systems (17.4%) or administrative, policy, language, communication, limited hours, and political instability as significant barriers.

Table 3 presents the impact of these barriers on immunization utilization. A majority (57.1%) believe barriers contribute to incomplete immunization coverage, with nearly half (47.8%) feeling they reduce the likelihood of consistent immunization seeking. Furthermore, 32.3% believe these barriers increase disease transmission, and 35.4% think they raise the demand for healthcare interventions, highlighting the negative effects on immunization outcomes.

Table 4. Factors Influencing the Community's Acceptance of Routine Immunization Programs

Factors	Response	Frequency	Percentage
Addressing Vaccine Myths and Misinformation	No	107	66.5
	Yes	54	33.5
	Total	**161**	**100.0**
Communication and Transparency from Health Authorities	No	83	51.6
	Yes	78	48.4
	Total	**161**	**100.0**
Past Experiences with Vaccination	No	120	74.5
	Yes	41	25.5
	Total	**161**	**100.0**
Accessibility and Convenience of Services	No	109	67.7
	Yes	52	32.3
	Total	**161**	**100.0**
Awareness and Health Literacy	No	89	55.3
	Yes	72	44.7
	Total	**161**	**100.0**
Social Norms and Cultural Beliefs	No	124	77.0
	Yes	37	23.0
	Total	**161**	**100.0**
Influence of Community Leaders and Local Influencers	No	105	65.2
	Yes	56	34.8
	Total	**161**	**100.0**
Perceived Benefits and Risks of Vaccination	No	136	84.5
	Yes	25	15.5
	Total	**161**	**100.0**
Trust in Healthcare Providers and the Health System	No	94	58.4
	Yes	67	41.6
	Total	**161**	**100.0**

Table 4 presents participants' perceptions of factors influencing the community's acceptance of routine immunization programs. A notable minority (33.5%) believe addressing vaccine myths and misinformation is significant, while the majority (66.5%) do not consider it a major factor. Communication and transparency from health authorities are deemed important by 48.4%, but 51.6% disagree. Past vaccination experiences are seen as influential by 25.5%, with 74.5% disagreeing. Accessibility and convenience of services are identified by 32.3%, but 67.7% do not share this view. Awareness and health literacy are considered key by 44.7%, while 55.3% do not agree. Social norms and cultural beliefs are seen as significant by 23.0%, with 77.0% disagreeing. The influence of community leaders and local

influencers is recognized by 34.8%, but 65.2% do not view it as a major factor. Perceived benefits and risks of vaccination are seen as influential by 15.5%, while 84.5% disagree. Lastly, 41.6% believe trust in healthcare providers and the system affects acceptance, while 58.4% do not see it as a major factor.

Table 5 shows the relationship between barriers to immunization and service accessibility in Yola North and South LGAs, Adamawa State. Significant associations were found between economic barriers (Chi-Square = 9.951, P-value = 0.019) and lack of awareness and health literacy (Chi-Square = 9.506, P-value = 0.023) with immunization accessibility. However, other factors, such as geographic barriers, healthcare workforce shortages, social and cultural beliefs, inadequate cold chain systems, and political instability, were not significantly linked to accessibility.

Table 6 shows that none of the obstacles to routine immunization, such as vaccine myths, communication from health authorities, past vaccination experiences, accessibility, awareness, social norms, or trust in healthcare providers, significantly affect the general perception and attitude towards immunization in Yola North and South LGAs, Adamawa State. All the P-values for the factors were greater than 0.05, indicating no significant associations.

Table 5. Association between Identified Obstacles to Routine Immunization Program Implementation and the Accessibility of Immunization Services in Yola South LGAs, Adamawa State.

Obstacles	**Response**	**Accessibility of Immunization Services**				**Total**	**Chi-Square Value**	**P-value**
		Not Accessible	**Moderately Accessible**	**Accessible**	**Very Accessible**			
Geographic Barriers	No	1	9	37	63	110	2.458	0.483
	Yes	1	3	23	24	51		
	Total	**2**	**12**	**60**	**87**	**161**		
Economic Barriers	No	2	9	31	65	107	9.951	0.019*
	Yes	0	3	29	22	54		
	Total	**2**	**12**	**60**	**87**	**161**		
Healthcare Workforce Shortages	No	0	5	25	41	71	2.074	0.557
	Yes	2	7	35	46	90		
	Total	**2**	**12**	**60**	**87**	**161**		
Social and Cultural Beliefs	No	2	11	39	58	110	4.365	0.225
	Yes	0	1	21	29	51		
	Total	**2**	**12**	**60**	**87**	**161**		
Lack of Awareness and Health Literacy	No	2	4	40	65	111	9.506	0.023*
	Yes	0	8	20	22	50		
	Total	**2**	**12**	**60**	**87**	**161**		
Inadequate Cold Chain and Supply Chains	No	2	10	45	76	133	4.208	0.240
	Yes	0	2	15	11	28		
	Total	**2**	**12**	**60**	**87**	**161**		
Administrative and Policy Barriers	No	2	11	53	82	148	1.855	0.603
	Yes	0	1	7	5	13		
	Total	**2**	**12**	**60**	**87**	**161**		
Language and Communication Barriers	No	2	12	53	74	141	2.525	0.471
	Yes	0	0	7	13	20		
	Total	**2**	**12**	**60**	**87**	**161**		

Limited Hours and Inconvenient Locations	No	2	12	50	78	142	3.415	0.332
	Yes	0	0	10	9	19		
	Total	**2**	**12**	**60**	**87**	**161**		
Political and Environmental Instability	No	2	12	49	76	139	3.401	0.334
	Yes	0	0	11	11			
	Total	**2**	**12**	**60**	**87**	**161**		

** Significant at 5% level*

Table 6. Association between Identified Obstacles to Routine Immunization Program Implementation and the Acceptance of Immunization Programs among the Population in Yola and South LGAs, Adamawa State.

Factors	**Response**	**General perception and attitude towards Routine Immunization**					**Total**	**Chi-Square Value**	**P-value**
		Very Positive	**Positive**	**Neutral**	**Negative**	**Very Negative**			
Addressing Vaccine Myths and Misinformation	No	2	0	6	66	33	107	5.211	0.226
	Yes	0	2	4	32	16	54		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Communication and Transparency from Health Authorities	No	2	1	6	52	22	83	3.125	0.537
	Yes	0	1	4	46	27	78		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Past Experiences with Vaccination	No	2	1	7	71	39	120	2.311	0.679
	Yes	0	1	3	27	10	41		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Accessibility and Convenience of Services	No	2	1	9	64	33	109	3.775	0.437
	Yes	0	1	1	34	16	52		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Awareness and Health Literacy	No	2	0	5	52	30	89	5.099	0.277
	Yes	0	2	5	46	19	72		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Social Norms and Cultural Beliefs	No	1	1	9	72	41	124	4.525	0.340
	Yes	1	1	1	26	8	37		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Influence of Community Leaders and Local Influencers	No	2	0	8	65	30	105	6.178	0.186
	Yes	0	2	2	33	19	56		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Perceived Benefits and Risks of Vaccination	No	2	1	8	85	40	136	3.016	0.555
	Yes	0	1	2	13	9	25		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		
Trust in Healthcare Providers and the Health System	No	1	0	5	54	34	94	6.029	0.197
	Yes	1	2	5	44	15	67		
	Total	**2**	**2**	**10**	**98**	**49**	**161**		

Discussion of Findings

Geographic and economic barriers were identified as major obstacles to immunization access. About 31.7% of participants noted geographic distance as a challenge, while 68.3% did not consider it a significant issue. This is consistent with studies that highlight geographic distance as a barrier, particularly in rural areas [14, 5]. Economic barriers were cited by 33.5% of respondents, demonstrating that cost remains a considerable obstacle for some individuals. This aligns with [15] and [5] research, which shows how economic factors significantly influence healthcare access and utilization.

Shortages in the healthcare workforce were a concern for 55.9% of participants, highlighting the critical role that an adequate workforce plays in service availability and quality. A lack of healthcare personnel can severely impact immunization coverage, a concern reflected in the World Health Organization's (2016) findings. Social and cultural beliefs were also identified as barriers, with 31.7% of participants citing them as obstacles to immunization uptake. This is in line with research of [16] and [17], who identified cultural and religious beliefs as significant barriers to vaccination.

Lack of awareness and health literacy were seen as barriers by 31.1% of participants, suggesting that some individuals may lack the necessary information to make informed decisions about immunization. This reinforces the need for targeted health education campaigns to enhance awareness and understanding of immunization's importance, as emphasized by [18] and [5]. Additionally, 17.4% of respondents mentioned logistical issues, such as inadequate cold chain and supply chain systems, as barriers to accessing immunization services.

The community's perception of routine immunization programs is overwhelmingly positive, with 91.3% of participants holding a favorable view. This suggests strong support and appreciation for immunization efforts, aligning with research that highlights the role of community support in the success of immunization programs [16]. Positive community attitudes are crucial for enhancing vaccine uptake and improving immunization coverage rates.

Several factors influence community acceptance of immunization. A notable 33.5% of participants highlighted the importance of addressing vaccine myths and misinformation, indicating that such issues remain a significant concern. This aligns with studies that show misinformation can erode vaccine confidence and fuel hesitancy [16]. Moreover, 48.4% of participants emphasized the need for clear communication and transparency from health authorities. Research supports that effective, consistent messaging from trusted sources can help build trust and improve vaccine acceptance [19].

Past vaccination experiences were seen as influential by 25.5% of participants. Positive experiences tend to enhance vaccine acceptance, while negative experiences can lead to hesitancy, as found by [18]. Accessibility and convenience were also identified as important factors by 32.3% of respondents, underscoring the need for services that are easily accessible. This mirrors research indicating that accessibility is a key determinant of vaccine uptake. Furthermore, 44.7% of participants recognized awareness and health literacy as critical factors in improving vaccine acceptance. This aligns with studies showing that higher levels of health literacy correlate with greater vaccine uptake [20]. Social norms and cultural beliefs were considered significant by 23.0% of participants, supporting the idea that cultural factors can influence vaccine acceptance [16]. The role of community leaders in influencing vaccine acceptance was noted by 34.8% of participants. Research indicates that community engagement and leadership involvement can enhance vaccine uptake [19].

Conclusion

The study provides valuable insights into the barriers affecting the accessibility and acceptance of routine immunization services in Yola North and South LGAs, Adamawa State. A significant minority of participants identify geographic (31.7%) and economic (33.5%) barriers as major issues, but the majority do not consider them significant challenges.

However, economic barriers and lack of awareness and health literacy were found to have a significant association with immunization accessibility, as evidenced by the Chi-Square values of 9.951 and 9.506, respectively. Workforce shortages are seen as a major barrier by 55.9% of participants. Social and cultural beliefs (31.7%) and lack of awareness (31.1%) are also viewed as obstacles by some, but the majority do not perceive them as major issues. Fewer participants cite inadequate cold chain systems (17.4%) or administrative, policy, language, communication, limited hours, and political instability as significant barriers.

The impact of these barriers on immunization utilization is notable. A majority (57.1%) believe barriers contribute to incomplete immunization coverage, with nearly half (47.8%) feeling they reduce the likelihood of consistent immunization seeking. Furthermore, 32.3% believe these barriers increase disease transmission, and 35.4% think they raise the demand for healthcare interventions, underscoring the negative effects on immunization outcomes.

Regarding the factors influencing community acceptance of routine immunization programs, none of the examined factors showed significant associations with general perception and attitude towards immunization, as all P-values were greater than 0.05.

Recommendations

Based on the findings, we recommend the followings:

1. Strengthen community-based educational programs to highlight the importance of immunization and address common misconceptions. Increased awareness can empower families to make informed decisions about immunization.
2. Recruit and retain healthcare workers by offering incentives, improving working conditions, and providing continuous professional development opportunities. A well-trained and motivated workforce is crucial for the effective delivery of immunization services.
3. Invest in infrastructure and training to maintain the cold chain effectively. Ensuring the proper storage and handling of vaccines is essential for their efficacy and safety.
4. Provide regular updates and clear information about immunization programs to build trust and improve community engagement. Transparent communication can help dispel myths and misinformation, fostering a more positive attitude towards immunization.
5. Engage community leaders and local influencers in promoting immunization. Their influence can be harnessed to encourage community members to participate in immunization programs, thereby increasing coverage rates.
6. Continuously monitor and evaluate immunization programs to identify and address emerging barriers. Regular assessments can help in making timely adjustments to strategies and interventions, ensuring that the programs remain effective and responsive to community needs.

Conflict of Interest

The authors declare that there is no conflict of interest.

Acknowledgement

The authors acknowledge Adamawa State Primary Health Care Agency for providing

necessary support during the conduct of this research.

References

[1]. Ophori, E. A., Tula, M. Y., Azih, A.V., Okojie, R. and Ikpo, P. E., 2014, Current Trends of Immunization in Nigeria: Prospect and Challenges. *Tropical Medicine and Health*, 42, 67-75.

[2]. Mahachi, K., Kessels, J., Boateng, K., Jean Baptiste, A. E., Mitula, P., Ekeman, E., Nic Lochlainn, L., Rosewell, A., Sodha, S. V., Abela-Ridder, B., Gabrielli, A. F., 2022, Zero- or missed-dose children in Nigeria: Contributing factors and interventions to overcome immunization service delivery challenges. *Vaccine*. 40(37):5433-5444.

[3]. Yim, V., Cabrera, M., Moore, M. and Lomazzi, M., 2024, Sustainable financing of immunization programs: A narrative review of the literature. *Population Medicine*, 6(January), 1. https://doi.org/10.18332/popmed/177169.

[4]. Arambepola, R., Yang, Y., Hutchinson K, Mwansa, F. D., Doherty, J. A., Bwalya, F., Ndubani, P., Musukwa, G., Moss, W. J., Wesolowski, A., Mutembo, S., 2021, Using geospatial models to map zero-dose children: factors associated with zero-dose vaccination status before and after a mass measles and rubella vaccination campaign in Southern province, Zambia. *BMJ Glob Health.* Dec;6(12):e007479.

[5]. Akwataghibe, N. N., Ogunsola, E. A., Broerse, J. E. W., Popoola O. A, Agbo A. I. and Dieleman, M. A., 2019, Exploring Factors Influencing Immunization Utilization in Nigeria-A Mixed Methods Study. *Front Public Health*. 20:7:392.

[6]. Nigeria Demographic and Health Survey (NDHS) 2018, Abuja: NPC and ICF International; 2018. 2019. Nigeria. Accessed on December 12, 2024.

[7]. Yamey, G., Garcia, P., Hassan, F., Mao, W., McDade, K. K., Pai, M., Saha, S., Schellekens, P., Taylor, A., and Udayakumar, K., 2022, It is not too late to achieve global covid-19 vaccine equity. *BMJ*. 24;376:e070650. doi: 10.1136/bmj-2022-070650.

[8]. Global Alliance for Vaccines and Immunization (GAVI) 2024, Nigeria: big challenges, local solutions. Retrieved from https://www.gavi.org/vaccineswork/nigeria-big-challenges-local-solutions

[9]. WHO 2021, State of the world's vaccines and immunization. Third ed. Geneve,

[10]. Bryman, J., and Alan, D., 2008, "Of methods and methodology". Qualitative Research in Organizations and Management. 3 (2): 159–168.

[11]. Kerry, E., 2012, "13. Methods of Data Collection". An Introduction to the Philosophy of Methodology. *SAGE*. ISBN 978-1-4462-9062-0.

[12]. Howell, B., and Kerry, E., 2012, An Introduction to the Philosophy of Methodology. *SAGE*. ISBN 978-1-4462-9062-0.

[13]. Monga, M., and Katz, A. R., 1999, Acute Fatty Liver in the Second Trimester. *Obstetrics & Gynecology*, 93, 811-813.

[14]. Lee, C., and Robinson, J. L., 2016, Systematic review of the effect of immunization mandates on uptake of routine childhood immunizations. *J Infect.*, 72(6):659-666.

[15]. Andersen, R. M., 1995, Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1-10.

[16]. Larson, H. J., Jarrett, C., Eckersberger, E., Smith, D. M., and Paterson, P., 2014, Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007-2012. *Vaccine*. 17;32(19):2150-9.

[17]. Ogunniyi, T. J., 2024, Revealing the challenges and efforts of routine immunization coverage in Nigeria. *Health Sci Rep*, 7 p. e70000

[18]. Janz, N. K., and Becker, M. H., 1984, The Health Belief Model: a decade later. Health Educ Q. 1984 *Spring*;11(1):1-47.

[19]. Viswanath, K., McCloud, R., Minsky, S., Puleo, E., Kontos, E., Bigman-Galimore, C., Rudd, R., and Emmons, K. M., 2013, Internet use, browsing, and the urban poor: implications for cancer control. *J Natl Cancer Inst Monogr*. 2013 Dec;2013(47):199-205.

[20]. Resnicow, K., Baranowski, T., Ahluwalia, J. S., and Braithwaite, R. L., 1999, Cultural sensitivity in public health: defined and demystified. *Ethn Dis*. Winter; 9 (1):10-21.