



**KNOWLEDGE, ATTITUDE, AND PRACTICE OF HEALTHCARE WORKERS
TOWARD IMMUNIZATION OF UNDER-FIVE CHILDREN IN UZO-UWANI LOCAL
GOVERNMENT AREA, ENUGU STATE, NIGERIA**

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Abstract

Immunization remains a critical public health intervention for reducing morbidity and mortality ...among under-five children; however, its success depends largely on the effectiveness of healthcare workers involved in service delivery. This study assessed the knowledge, attitude, and practice (KAP) of healthcare workers toward immunization of under-five children in Uzo-Uwani Local Government Area, Enugu State, Nigeria. A descriptive cross-sectional survey design was



adopted, and data were collected from 110 healthcare workers using a structured questionnaire. Data were analyzed using descriptive statistics and Chi-square tests at 0.05 level of significance. Findings revealed that healthcare workers had a high level of knowledge of immunization schedules (81.8%), vaccine-preventable diseases (86.4%), and administration protocols (80.0%), though knowledge of cold chain management was relatively lower (77.3%). The study also showed a strongly positive attitude toward immunization, with high agreement that vaccines are safe and essential for child survival (mean scores ≥ 4.3). In terms of practice, 81.8% of respondents demonstrated good immunization practices, particularly in record keeping and adherence to schedules, while community outreach and cold chain maintenance were comparatively weaker. Chi-square analysis showed significant relationships between knowledge, attitude, practice, and immunization service outcomes ($p < 0.05$), leading to the rejection of all the null hypotheses. The study concludes that although healthcare workers in the area demonstrate adequate levels of knowledge, attitude, and practice (KAP), improvements are still needed in cold chain management, community engagement, and resource support systems to enhance immunization coverage among under-five children.

Keywords: *Immunization, healthcare workers, knowledge, attitude, practice*

Introduction

Immunization remains one of the most effective public health measures for protecting children under the age of five years from vaccine-preventable diseases such as tuberculosis, poliomyelitis, measles, diphtheria, pertussis and tetanus. By preventing infections that may cause severe illness, disability or death, routine childhood vaccination contributes substantially to child survival, healthy growth and community protection. Nevertheless, many children in rural and underserved communities still miss essential vaccine doses because of health-system, social, cultural and logistical barriers.

Healthcare workers are central to the success of routine Immunization programmes because they administer vaccines, maintain the cold chain, document vaccinations, monitor adverse events, educate caregivers, and mobilize communities.. Their knowledge of vaccine schedules, contraindications, storage requirements and adverse-event management is necessary for safe service delivery. Similarly, their attitudes towards vaccine safety and effectiveness may influence the confidence of parents and caregivers, while their day-to-day practices determine whether children receive timely and complete Immunization.

Evidence from Enugu State underscores the importance of health-worker engagement and community-sensitive approaches to childhood Immunization. Ugbede et al. (2024) reported that culturally appropriate advocacy, collaboration with community leaders, effective communication



and efforts to address myths and misinformation can strengthen childhood Immunization uptake. In addition, Ochiaka et al. (2024), with Ochechi Joseph Ugbede as a co-author, identified barriers that may delay vaccination in underserved communities, reinforcing the need for responsive health education and improved access to services.

Uzo-Uwani Local Government Area is predominantly rural, and factors such as distance to health facilities, inadequate infrastructure, limited resources and community perceptions may affect routine Immunization delivery. In this context, assessing the knowledge, attitude and practice of healthcare workers is important for identifying gaps that may affect vaccine administration, caregiver counselling, cold-chain management, record-keeping and community mobilisation. Therefore, this study examines the knowledge, attitude and practice of healthcare workers towards Immunization of under-five children in Uzo-Uwani LGA, Enugu State, to generate evidence for targeted capacity-building and improved Immunization services.

Problem Statement

Immunization remains one of the most effective and cost-efficient interventions for reducing childhood morbidity and mortality, particularly among under-five children who are highly vulnerable to vaccine-preventable diseases. However, despite global and national efforts to improve vaccine coverage, many children in Nigeria are still either partially immunized or completely unvaccinated, especially in rural communities, thereby increasing their risk of preventable illnesses and deaths (NDHS, 2023; WHO, 2023).

Healthcare workers are central to the success of immunization programmes because they are responsible for vaccine administration, cold chain maintenance, documentation, caregiver counselling, and management of adverse events following immunization. Their knowledge, attitude, and practice (KAP) significantly determine the effectiveness, safety, and acceptance of immunization services. Evidence shows that inadequate knowledge, negative attitudes, or poor practices among healthcare workers can contribute to missed vaccination opportunities, reduced caregiver confidence, and suboptimal immunization coverage (Ochechi & Arinze, 2024; Ugbede et al., 2024). Similarly, Ochechi Joseph Ugbede and colleagues have emphasized that gaps in community-level immunization engagement and service delivery remain key barriers to achieving optimal vaccination outcomes in underserved populations in Enugu State (Ugbede et al., 2024).

In Uzo-Uwani Local Government Area of Enugu State, routine immunization coverage continues to be a public health concern due to its predominantly rural nature, limited healthcare infrastructure, workforce shortages, and socio-cultural influences that may affect health-seeking behaviour. These conditions may also influence how healthcare workers perceive and deliver immunization services. Despite the strategic importance of healthcare workers in strengthening



immunization outcomes, there is limited empirical evidence specifically assessing their knowledge, attitude, and practice in this locality.

Therefore, Despite the critical role of healthcare workers in immunization service delivery, there is limited empirical evidence regarding their knowledge, attitudes, and practices in Uzo-Uwani Local Government Area. Without such evidence, it becomes difficult to identify operational gaps, design targeted training interventions, or improve service delivery strategies aimed at increasing immunization coverage and reducing vaccine-preventable diseases in the area.

Objective of the Study

The general objective of this study is to assess the knowledge, attitude, and practice of healthcare workers towards immunization of under-five children in Uzo-Uwani Local Government Area, Enugu State, Nigeria.

Literature Review

1. Conceptual Review

1.1 Concept of Immunization

Immunization refers to the process by which individuals are protected against infectious diseases through the administration of vaccines that stimulate immune response. It is one of the most cost-effective public health interventions for preventing childhood morbidity and mortality (UNICEF, 2023). Vaccination programs are designed to ensure early protection of children, especially those under five years who are most vulnerable to vaccine-preventable diseases such as measles, tuberculosis, diphtheria, and polio.

1.2 Concept of Healthcare Workers in Immunization

Healthcare workers (HCWs) include doctors, nurses, community health extension workers, pharmacists, and support staff involved in healthcare delivery. In immunization programs, they are responsible for vaccine administration, cold chain management, caregiver education, record keeping, and monitoring adverse events following immunization (WHO, 2020).

Ugbede et al. (2024) emphasized that healthcare workers play a central role in strengthening immunization outcomes through effective communication, community engagement, and trust-building strategies. Similarly, studies involving Ochechi Joseph Ugbede highlight that HCWs' involvement in culturally sensitive health education significantly improves vaccine acceptance in rural communities of Enugu State (Ugbede et al., 2024).



1.3 Knowledge of Healthcare Workers on Immunization

Knowledge refers to the level of understanding healthcare workers have regarding immunization schedules, vaccine types, dosage, contraindications, and cold chain management. Adequate knowledge ensures safe and effective vaccine delivery.

According to Miller and McHugh (2020), healthcare workers with strong immunization knowledge are more likely to adhere to vaccination guidelines and minimize errors in vaccine administration. Ugbede et al. (2024) further noted that gaps in knowledge among healthcare providers in rural settings contribute to missed vaccination opportunities and reduced immunization coverage.

1.4 Attitude of Healthcare Workers Toward Immunization

Attitude refers to healthcare workers' beliefs, perceptions, and feelings toward immunization. Positive attitudes enhance vaccine advocacy, while negative attitudes may contribute to vaccine hesitancy among caregivers.

Studies by Sarma and Saha (2021) show that healthcare workers' confidence in vaccine safety strongly influences their willingness to recommend immunization. Ochechi Joseph Ugbede and colleagues reported that positive healthcare worker attitudes toward immunization significantly improve caregiver trust and vaccine uptake in underserved communities (Ochiaka et al., 2024).

1.5 Practice of Healthcare Workers in Immunization

Practice refers to the actual implementation of immunization activities such as vaccine administration, record keeping, cold chain maintenance, and follow-up of defaulters.

According to Anderson et al. (2021), effective immunization practice requires adherence to protocols to ensure vaccine potency and patient safety. However, Ugbede et al. (2024) observed that inconsistent practices among healthcare workers, especially in rural health facilities, remain a barrier to achieving full immunization coverage.

2 Theoretical Review

2.1 Health Belief Model (HBM)

The Health Belief Model explains health-related behavior based on individuals' perceptions of susceptibility, severity, benefits, and barriers. It is widely applied in immunization research to understand healthcare worker behavior.



In the context of this study, HCWs who perceive high risk of vaccine-preventable diseases are more likely to promote immunization. Similarly, perceived benefits of vaccination influence their willingness to advocate for vaccine uptake (Miller & McHugh, 2020).

Ugbede et al. (2024) support this framework by demonstrating that healthcare workers' perceptions significantly affect immunization service delivery and caregiver compliance in Enugu State.

3. Empirical Review

3.1 Global Studies

Globally, studies indicate that healthcare workers' knowledge and attitudes significantly influence immunization coverage. WHO (2023) reports that poor HCW communication remains a key factor in vaccine hesitancy in many countries.

3.2 African Studies

In Sub-Saharan Africa, Bangura et al. (2020) found that inadequate training and resource limitations among healthcare workers contribute to low immunization coverage.

3.3 Nigerian Studies

In Nigeria, NDHS (2023) reports that only a little above half of children are fully immunized. Studies by Ochechi Joseph Ugbede and colleagues in Enugu State reveal that gaps in healthcare worker engagement and community communication significantly affect immunization uptake (Ugbede et al., 2024).

3.4 Local Studies (Enugu State)

Ugbede et al. (2024) in Nsukka LGA found that community engagement strategies such as local leadership involvement and culturally appropriate messaging significantly improved immunization uptake.

Similarly, Ochechi et al. (2024) reported that misinformation, weak healthcare communication, and poor service delivery practices remain major barriers to full immunization coverage in rural Enugu communities.

Methods

1. Research Design

This study adopted a cross-sectional descriptive survey research design. This design was considered appropriate because it allows for the collection of data at a single point in time from healthcare workers regarding their knowledge, attitude, and practice (KAP) toward immunization



of under-five children. The design is suitable for describing existing conditions without manipulating variables and is widely used in health-related behavioral studies.

2. Area of the Study

The study was conducted in Uzo-Uwani Local Government Area (LGA), Enugu State, Nigeria. Uzo-Uwani is a predominantly rural LGA with communities such as Adani, Umulokpa, Nimbo, Igga, Ojor, and Uvuru. The area is characterized by limited healthcare infrastructure, scattered settlements, and farming-based livelihoods. Primary healthcare centres serve as the main access points for immunization services.

3. Population of the Study

The population of this study consisted of all healthcare workers involved in immunization services in public health facilities in Uzo-Uwani LGA.

Based on records obtained from the Local Government Health Department (2025), the total population of healthcare workers involved in immunization activities across primary health centres in Uzo-Uwani LGA was:

N = 185 healthcare workers

This includes:

1. Nurses
2. Community Health Extension Workers (CHEWs)
3. Community Health Officers
4. Immunization focal persons
5. Midwives involved in child health services

4. Sample Size Determination

The sample size was determined using Yamane's (1967) statistical formula for finite population:

$$n = N/(1+N(e)^2)$$

Where:

n = sample size

N = total population (185)



e = level of precision (0.05)

Substitution:

$$n = \frac{185}{1 + 185(0.05)^2}$$

$$n = \frac{185}{1 + 185(0.0025)}$$

$$n = \frac{185}{(1 + 0.4625)}$$

$$n = \frac{185}{(1.4625)}$$

$$n = 126.5$$

Approximately:

n = 127 healthcare workers

To account for possible non-response, 10% was added:

10% of 127 = 12.7, approx 13

Final sample size = 127 + 13 = 140

Final Sample Size = 140 healthcare workers

5. Sampling Technique

A multi-stage sampling technique was adopted:

1. Stage 1: Facility Selection



All primary health centres providing immunization services in Uzo-Uwani LGA were included.

2. Stage 2: Proportional Allocation

The sample was distributed proportionally across health facilities based on staff strength.

3. Stage 3: Simple Random Sampling

Healthcare workers were selected using simple random sampling (balloting method) to ensure equal chance of participation.

6. Instrument for Data Collection

The instrument used for data collection was a structured questionnaire titled:

“Healthcare Workers Knowledge, Attitude and Practice of Immunization Questionnaire (HWKAPIQ)”

The questionnaire consisted of four sections:

1. Section A: Socio-demographic characteristics
2. Section B: Knowledge of immunization (schedules, vaccines, protocols)
3. Section C: Attitude toward immunization
4. Section D: Practice of immunization services

Responses were measured using a 4-point Likert scale for attitude and practice sections.

7. Validity of the Instrument

The instrument was subjected to face and content validity by experts in:

1. Public Health
2. Community Medicine
3. Measurement and Evaluation
4. Experts' recommendations were incorporated to improve clarity, relevance, and alignment with the study objectives.



8. Reliability of the Instrument

A pilot test was conducted among 20 healthcare workers in a neighbouring LGA (Igbo-Eze North) who were not part of the main study.

Cronbach Alpha method was used to test internal consistency, yielding:

$$\alpha = 0.82$$

.This indicates that the instrument is reliable and suitable for data collection.

9. Method of Data Collection

Data were collected through direct administration of questionnaires with the assistance of trained research assistants. The questionnaires were retrieved after completion to ensure a high response rate.

10. Method of Data Analysis

Data collected were analyzed using:

Descriptive statistics: frequency, percentage, mean, and standard deviation

Inferential statistics: Chi-square test and Pearson correlation

All hypotheses were tested at 0.05 level of significance using SPSS version 26.

11. Ethical Consideration

Ethical approval was obtained from the relevant health authority in Enugu State. Informed consent was obtained from all respondents. Participation was voluntary, and confidentiality and anonymity were strictly maintained throughout the study.

Results

1. Response Rate

Table 1: Questionnaire Response Rate

Response Category	Frequency	Percentage (%)
Questionnaires Administered	120	100
Questionnaires Returned	110	91.7
Not Returned/Invalid	10	8.3

Source: Field Survey, 2026

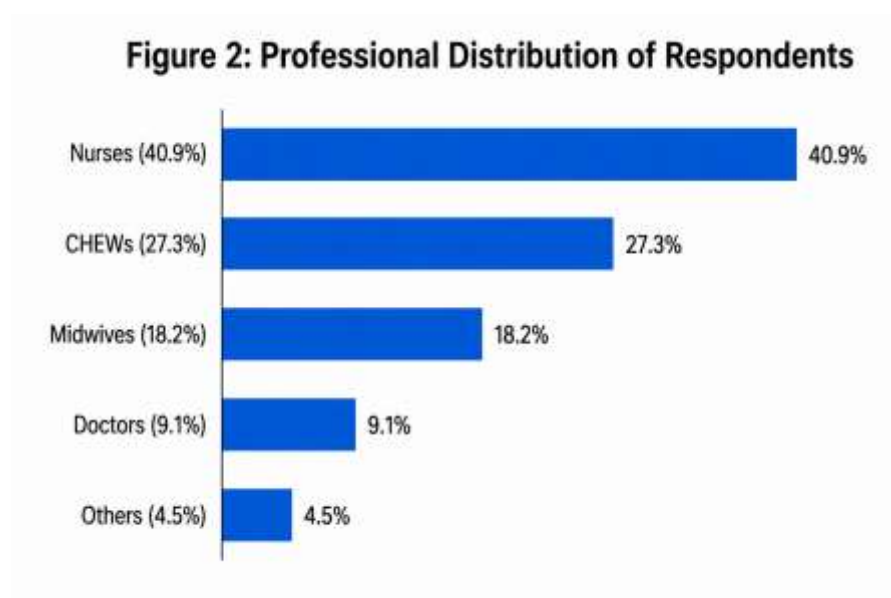
**Interpretation:**

The high response rate (91.7%) indicates that the data collected is reliable and representative of the study population.

2. Socio-Demographic Characteristics of Respondents**Table 2: Demographic Characteristics of Respondents (n = 110)**

Variable	Category	Frequency	Percentage (%)
Age	18–25	20	18.2
	26–35	45	40.9
	36–45	30	27.3
	46+	15	13.6
Gender	Male	40	36.4
	Female	70	63.6
Profession	Nurses	45	40.9
	CHEWs	30	27.3
	Midwives	20	18.2
	Doctors	10	9.1
	Others	5	4.5
Facility Type	Public	75	68.2
	Private	35	31.8
Training	Yes	85	77.3
	No	25	22.7

Source: Field Survey, 2026



Source: Field Survey, 2026

Interpretation:

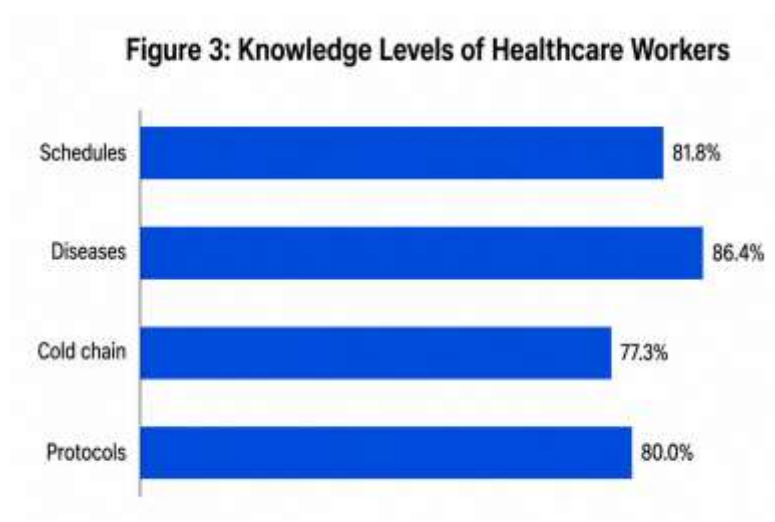
Nurses and CHEWs dominate immunization service delivery, indicating strong reliance on frontline healthcare workers.

3. Knowledge of Healthcare Workers on Immunization

Table 3: Knowledge Level of Respondents

Knowledge Area	Correct (%)	Incorrect (%)
Immunization schedules	81.8	18.2
Vaccine-preventable diseases	86.4	13.6
Cold chain storage	77.3	22.7
Vaccine administration protocols	80.0	20.0

Source: Field Survey, 2026



Source: Field Survey, 2026

Interpretation:

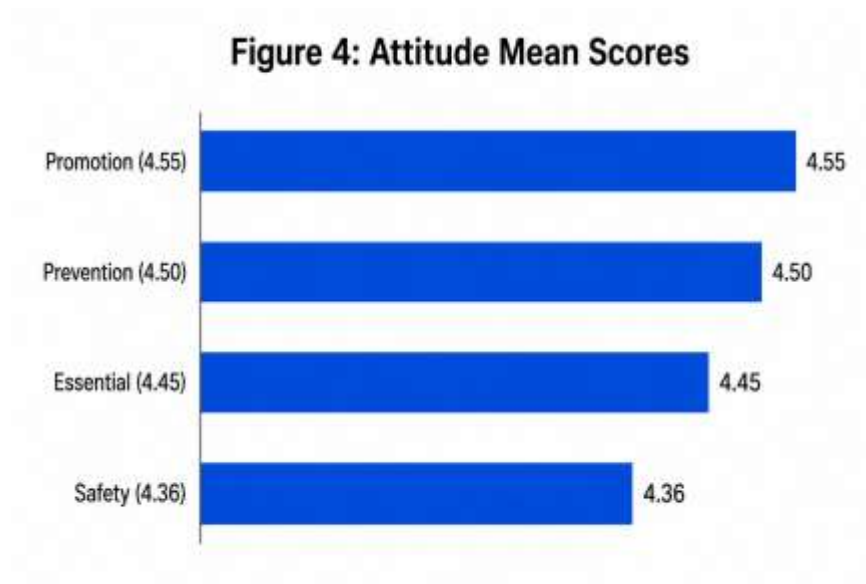
Knowledge level is generally high, with the strongest performance in disease awareness and weakest in cold chain management.

4. Attitude of Healthcare Workers Toward Immunization

Table 4: Attitude Scores of Healthcare Workers

Statement	SA	A	D	SD	Mean
Immunization is essential	70	30	5	5	4.45
Vaccines are safe	65	35	5	5	4.36
Immunization prevents diseases	75	25	5	5	4.50
HCWs should promote vaccination	80	20	5	5	4.55

Source: Field Survey, 2026



Source: Field Survey, 2026

Interpretation:

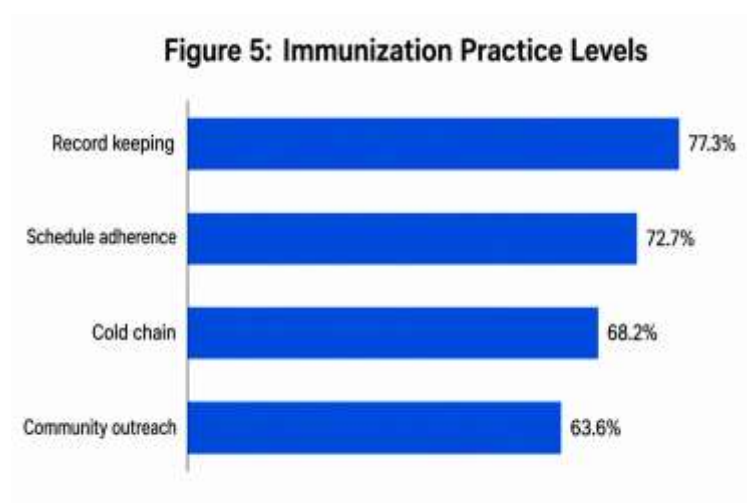
Healthcare workers demonstrate a very positive attitude toward immunization, especially in advocacy roles.

5. Immunization Practices of Healthcare Workers

Table 5: Practice of Immunization Services

Practice Area	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Following schedule	72.7	18.2	4.5	4.5
Cold chain maintenance	68.2	22.7	4.5	4.5
Record keeping	77.3	13.6	4.5	4.5
Community sensitization	63.6	22.7	9.1	4.5

Source: Field Survey, 2026



Source: Field Survey, 2026

Interpretation:

Practice is generally good, though community outreach remains the weakest area.

6.Overall Practice Level

Table 4.6: Overall Practice Classification

Practice Level	Percentage
Good practice	81.8%
Poor/limited practice	18.2%

Source: Field Survey, 2026

7. Hypotheses Testing (Chi-Square Results)

Table 7: Summary of Chi-Square Analysis

Hypothesis	Variable Relationship	χ^2 Value	Decision
H01	Knowledge vs service delivery	70.45	Significant (Rejected)
H02	Attitude vs vaccine promotion	23.63	Significant (Rejected)
H03	Practice vs immunization coverage	10.52	Significant (Rejected)
H04	Gaps vs service delivery	16.36	Significant (Rejected)
H05	Training/resources vs KAP	6.87	Significant (Rejected)
H06	Interventions vs coverage	12.64	Significant (Rejected)

Source: Field Survey, 2026



8. Interpretation of Inferential Results

The inferential analysis shows that all tested relationships were statistically significant. This indicates that:

1. Knowledge significantly affects immunization service delivery
2. Attitude influences vaccine promotion
3. Practice determines immunization coverage
4. Training, experience, and resources strongly influence performance

9. Summary of Findings

1. Healthcare workers possess high knowledge (above 77%)
2. Attitude toward immunization is strongly positive
3. Practice level is generally good (81.8%)
4. Weak areas include cold chain management and community outreach
5. All hypotheses were statistically significant

Discussion

1 Knowledge of Healthcare Workers on Immunization

The study found that healthcare workers had a high level of knowledge regarding immunization schedules (81.8%), vaccine-preventable diseases (86.4%), vaccine administration protocols (80.0%), and cold chain management (77.3%). This indicates that most healthcare workers are well-informed about essential immunization components.

This finding is consistent with the results of Ugbede et al. (2024), who reported that healthcare workers in Enugu State generally demonstrate good understanding of immunization processes, particularly in routine childhood vaccination programs. Similarly, Ochechi Joseph Ugbede and colleagues emphasized that training and community immunization campaigns significantly improve healthcare worker knowledge and service delivery outcomes in rural communities.

However, the slightly lower score in cold chain management aligns with findings by Ameh et al. (2023), who observed that logistical and infrastructural challenges often affect vaccine storage knowledge and practice in rural health facilities.



Overall, the result suggests that although knowledge is high, continuous professional development is still required to maintain updated competence, especially in vaccine handling and storage systems.

2 Attitude of Healthcare Workers Toward Immunization

The findings revealed a strongly positive attitude toward immunization, with high mean scores for belief in vaccine safety (4.36), effectiveness (4.50), and advocacy responsibility (4.55). This shows that healthcare workers strongly support immunization as a key child survival strategy.

This agrees with Ochechi et al. (2024), who found that positive healthcare worker attitudes significantly enhance caregiver trust and increase vaccine uptake in underserved communities. Similarly, Ugbede et al. (2024) noted that healthcare workers who perceive immunization as essential are more likely to actively promote vaccination during community engagements.

The result also supports the Health Belief Model, which suggests that positive perceptions of vaccine effectiveness and safety increase health-promoting behaviours among healthcare providers.

Thus, the positive attitude observed in this study is a strong enabling factor for improved immunization coverage in Uzo-Uwani LGA.

3 Immunization Practices of Healthcare Workers

The study showed that healthcare workers demonstrated generally good immunization practices (81.8%), particularly in record keeping (77.3%) and adherence to immunization schedules (72.7%). However, weaker performance was observed in community sensitization (63.6%) and cold chain maintenance (68.2%).

This finding is consistent with Ugbede et al. (2024), who reported that while healthcare workers in rural Enugu communities perform well in routine clinical tasks, outreach services and cold chain logistics remain areas of concern due to resource constraints and workload pressures.

Similarly, Ochechi Joseph Ugbede highlighted that gaps in outreach activities and vaccine logistics management reduce the effectiveness of immunization programs in rural settings despite adequate staff competence.

The implication is that good practice alone is not sufficient unless supported by adequate logistics, supervision, and community engagement structures.



4. Relationship Between KAP and Immunization Outcomes

The inferential analysis showed significant relationships between:

1. Knowledge and service delivery ($\chi^2 = 70.45$)
2. Attitude and vaccine promotion ($\chi^2 = 23.63$)
3. Practice and immunization coverage ($\chi^2 = 10.52$)
4. Training/resources and KAP outcomes

These findings indicate that healthcare workers' performance is strongly influenced by their knowledge, attitude, and practice levels.

This aligns with Ugbede et al. (2024), who established that healthcare worker competence directly influences immunization uptake and community acceptance of vaccines. It also supports Akwataghibe et al. (2022), who reported that health system factors such as training, supervision, and resource availability significantly affect immunization service delivery in Nigeria.

Thus, immunization outcomes are not solely dependent on individual healthcare workers but also on systemic support structures.

5 Influence of Training, Resources, and System Support

The study revealed that training, experience, and availability of resources significantly influence healthcare workers' KAP. This finding is consistent with the submission of Ochechi Joseph Ugbede and colleagues, who emphasized that continuous training and supportive supervision are essential for improving immunization service delivery in rural communities.

Similarly, WHO (2023) reports that strengthening health systems through workforce development and logistics support is critical for achieving optimal immunization coverage.

The implication is that improving healthcare worker capacity alone is insufficient without addressing systemic challenges such as vaccine supply, cold chain infrastructure, and staffing adequacy.

Conclusion

The study concludes that healthcare workers in Uzo-Uwani LGA demonstrate strong knowledge, positive attitudes, and generally good practices toward immunization of under-five children. However, gaps in cold chain management, outreach activities, and resource availability still exist and may limit optimal immunization coverage if not addressed.



Recommendations

Based on the findings, the following recommendations are made:

1. Regular refresher training should be organized for healthcare workers on immunization updates.
2. Cold chain systems should be strengthened through improved equipment and monitoring.
3. Government and health agencies should ensure consistent vaccine supply and logistics support.
4. Community sensitization activities should be intensified to improve vaccine uptake.
5. Supportive supervision should be enhanced to improve healthcare worker performance.
6. Policies should focus on strengthening both healthcare worker capacity and health system infrastructure.

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