



Assessment of Knowledge and Attitudes Regarding Adverse Events Following Immunization Among Healthcare Workers in Edo State, Nigeria

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Abstract

Original Research Article

Background: Adverse events following immunization (AEFI) are critical to vaccine safety surveillance, as serious or perceived adverse events can undermine public confidence and threaten immunization coverage. Healthcare workers play a central role in the identification, management, and reporting of AEFIs, yet gaps in knowledge and attitudes may weaken surveillance systems, particularly in low- and middle-income settings.

Methods: A descriptive cross-sectional study was conducted among healthcare workers involved in immunization services in a rural community in Edo State, Nigeria. Data were collected using a structured questionnaire adapted from the World Health Organization AEFI Surveillance Assessment Tool. Knowledge and attitudes toward AEFI were assessed using composite scoring systems. Descriptive statistics summarized findings, while Chi-square tests and logistic regression examined associations between sociodemographic characteristics and AEFI knowledge and attitudes, with statistical significance set at $p < 0.05$.

Results: A total of 98 healthcare workers participated in the study, with females constituting 56 (57.1%). Overall, 60 respondents (67.4%) demonstrated good knowledge of AEFI, while 29 (32.6%) had poor knowledge. Awareness of AEFI was high, reported by 89 respondents (90.8%). Vaccine product-related reactions were the most commonly identified AEFI category, noted by 32 respondents (36.0%), whereas immunization anxiety-related reactions and coincidental events were identified by 10 (11.2%) and 8 (9.0%) respondents, respectively. Proper cold-chain maintenance was recognized as a key preventive measure by 35 respondents (39.3%). A positive attitude toward AEFI prevention was observed in 70 respondents (78.7%). No statistically significant associations were found between knowledge or attitude toward AEFI and sociodemographic or professional characteristics ($p > 0.05$).

Conclusion: Healthcare workers demonstrated generally good knowledge and positive attitudes toward AEFI; however, important gaps remain in specific areas critical to effective surveillance. Strengthening continuous training on AEFI classification, management, and reporting across all healthcare cadres is recommended to enhance vaccine safety monitoring and sustain public confidence in immunization programs.

Keywords: Adverse events following immunization, Attitude, Healthcare workers, Knowledge, Vaccine safety.

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BACKGROUND

Adverse events following immunization (AEFI) are defined as any untoward medical occurrence that follows immunization and does not necessarily have a causal relationship with the vaccine.¹ Although most AEFIs are mild and self-limiting, the occurrence of serious or perceived adverse events can undermine public confidence in vaccines, threaten immunization coverage, and compromise disease control efforts.^{2,3} Effective AEFI surveillance is therefore a core component of global immunization programs and vaccine safety systems.^{4,5}

Globally, the World Health Organization (WHO) emphasizes that a functional AEFI surveillance system should report at least 10 AEFI cases per 100,000 surviving infants annually.⁶ While improvements have been recorded over the years, wide regional disparities persist. High-income regions such as Europe and the Americas consistently achieve higher reporting rates, whereas low- and middle-income countries lag behind due to weak surveillance infrastructure, underreporting, and limited workforce capacity.⁷⁻⁹ These gaps highlight the critical role of healthcare workers, who are the primary observers, managers, and reporters of AEFIs at service delivery points.

In Africa, AEFI surveillance remains suboptimal despite the expansion of immunization schedules and the introduction of newer vaccines. Africa contributes less than 1% of global AEFI reports, even though it bears a substantial share of the global birth cohort.¹⁰ Only a minority of African countries consistently meet WHO AEFI reporting benchmarks, suggesting widespread under-detection and under-reporting.¹¹

In Nigeria, AEFI surveillance is integrated into the National Expanded Programme on Immunization and supported by the National Agency for Food and Drug Administration and Control (NAFDAC).^{12,13} Despite this framework, AEFI reporting rates remain low relative to population size and vaccine uptake. Evidence indicates that while awareness of AEFIs among healthcare workers is generally

high, knowledge gaps and attitudinal challenges persist, particularly regarding identification of serious AEFIs, causality assessment, and timely reporting procedures.^{14,15} These gaps may contribute to underreporting and weaken vaccine safety monitoring at the national level. Given the central role of healthcare workers in immunization delivery and surveillance, assessing their knowledge and attitudes regarding AEFIs is essential for identifying weaknesses in the vaccine safety system. Such assessments provide evidence to inform targeted training, supportive supervision, and policy interventions aimed at strengthening AEFI surveillance and sustaining public confidence in immunization programs.

METHODS

Study Area

The research was conducted in Usen, a rural community in the Ovia Northeast Local Government Area of Edo State, Nigeria, located approximately 35 kilometers from Benin City. Serving a population of roughly 37,500, the local healthcare infrastructure consists of a General Hospital, a primary healthcare center (PHC), and various private clinics.

Study Design and Population

This research employed a descriptive cross-sectional design conducted between January and June 2025. The study targeted healthcare providers (HCPs) actively involved in immunization services across the community's General Hospital, primary health centers, and private clinics. To ensure data quality, the study included physicians, nurses, and community health extension workers (CHEWs) with a minimum of six months of clinical experience. From a total population of 120 providers, a sample size of 101 was calculated using the Leslie Kish formula with a finite population correction. Participants were selected through stratified random sampling to ensure proportional representation across cadres, resulting in a cohort of 13 physicians, 35 nurses,

38 CHEWs, and 15 auxiliary staff.

Data Collection and Instrumentation

Data were gathered using a structured, interviewer-administered questionnaire adapted from the WHO AEFI Surveillance Assessment Tool. The instrument was pre-tested in the neighboring community of Okada to ensure linguistic clarity and technical relevance. This specific publication focuses on three domains:

- **Socio-demographics:** Including age, gender, professional cadre, and prior AEFI training.
- **Knowledge:** Comprising 15 items assessing definitions, classifications, and causality.
- **Attitudes:** Utilizing 10 items on a 5-point Likert scale to measure perceptions of responsibility and barriers such as fear of litigation.

Scoring and Statistical Analysis

A composite scoring system was used to categorize the outcomes. Knowledge was classified as Good (70% or higher), Fair (50–69%), or Poor (below 50%). Similarly, attitudes were categorized as Positive (70% or higher), Neutral (50–69%), or Negative (below 50%). All data were analyzed using SPSS version 26.0. Descriptive statistics were used for demographic characterization, while Chi-square tests and multivariate logistic regression identified significant predictors of knowledge and attitudes. Statistical significance was defined as $p < 0.05$.

Ethical Considerations

The study protocol received formal approval from the Ethics and Research Committee of Igbinedion University Teaching Hospital. Participation was entirely voluntary, and written informed consent was obtained from all respondents. To protect participant identity, all data were anonymized using alphanumeric coding and stored securely.

RESULTS

Sociodemographic Characteristics of Respondents (Table 1)

A total of 98 healthcare workers participated in the study. Most respondents were aged 30–39 years, numbering 35 (35.7%), followed by those aged 20–29 years with 28 (28.6%). Participants aged 40–49 years accounted for 22 (22.4%), while those aged 50 years and above were 13 (13.3%). Females constituted the majority of respondents at 56 (57.1%), compared to 42 males (42.9%).

Nurses formed the largest professional group, accounting for 45 respondents (45.9%), followed by community health extension workers at 28 (28.6%). Physicians were fewer, numbering 8 (8.2%), while auxiliary healthcare staff accounted for 12 (12.2%). Regarding educational attainment, respondents with a bachelor's degree were the most common at 35 (35.7%), followed by diploma holders at 32 (32.7%). Certificate holders accounted for 18 (18.4%), while those with postgraduate qualifications constituted a smaller proportion.

In terms of healthcare experience, most respondents had between 1 and 5 years of experience, accounting for 32 (32.7%), followed by those with 6–10 years at 28 (28.6%). With respect to involvement in immunization services, the majority had between 1 and 5 years of experience, numbering 38 (38.8%). Nearly half of the respondents worked in primary healthcare centers, accounting for 48 (49.0%), while the remainder were distributed across general hospitals, private facilities, and specialized immunization centers.

Knowledge of Adverse Events Following Immunization Among Respondents (Table 2, Figure 1, Figure 2)

Regarding the composite knowledge of AEFI, the majority of respondents, 60 (67.4%), demonstrated good knowledge levels. In contrast, 29 respondents (32.6%) were classified as having poor knowledge. Overall awareness of AEFI was high among the respondents, with 89 of the 98 healthcare workers (90.8%) reporting that they were aware of adverse events following

immunization. Among those aware, knowledge of AEFI categories varied, with vaccine product-related reactions being the most frequently identified at 32 respondents (36.0%), followed by vaccine quality defect-related reactions at 21 (23.6%) and immunization error-related reactions at 18 (20.2%). Fewer respondents identified immunization anxiety-related reactions and coincidental events.

Regarding risk factors for AEFI, improper vaccine storage was the most commonly recognized factor, reported by 28 respondents (31.5%), followed by incorrect administration technique at 22 (24.7%). Other identified risk factors included patients' medical history, previous adverse reactions, and vaccine quality issues, while failure to screen for contraindications was least mentioned. In terms of prevention, proper vaccine storage through maintenance of the cold chain was the most frequently cited method at 35 respondents (39.3%), followed by pre-vaccination screening at 20 (22.5%) and correct administration technique at 15 (16.9%).

Knowledge of AEFI management practices showed that basic first aid for mild reactions was the most commonly identified approach, reported by 28 respondents (31.5%), while 22 respondents (24.7%) identified anaphylaxis management. Fewer respondents were knowledgeable about reporting procedures, investigation processes, patient referral protocols, and documentation requirements. Most respondents, numbering 82 (92.1%), agreed that AEFIs can be prevented through proper immunization practices.

With respect to AEFIs requiring immediate emergency response, anaphylaxis was most frequently identified at 30 respondents (33.7%), followed by seizures at 25 (28.1%) and severe local reactions at 15 (16.9%). Concerning causation, over half of the respondents, 58 (65.2%), indicated that vaccine components do not cause AEFIs, while 25 (28.1%) believed they do. In their self-assessment of overall knowledge of AEFI prevention, most respondents rated their knowledge as good, accounting for 42 respondents (47.2%), while 18 (20.2%) rated it as very good.

Professional training was the most frequent source of AEFI information, identified by 25 respondents (28.1%), followed by health facility guidelines at 18 (20.2%) and workshops or seminars at 15 (16.9%). Other sources of information included colleagues at 12 (13.5%) and internet/online resources at 8 (9.0%). Notably, fewer respondents utilized formal institutional or academic resources such as medical journals, Ministry of Health bulletins, or WHO/UNICEF materials as their primary information channels.

Attitudes Toward Adverse Events Following Immunization Among Respondents (Table 3, Figure 3)

Of the 89 respondents assessed for attitude, 70 exhibited a positive attitude, accounting for just under four-fifths (78.7%), while 19 respondents (21.3%) demonstrated a negative attitude towards AEFI prevention and related practices. Most healthcare workers either strongly agreed or agreed that AEFI prevention is an essential part of immunization services, accounting for 41 (46.1%) and 38 (42.7%) respectively. Similarly, a large majority felt that spending time on AEFI prevention measures is worthwhile, with 35 respondents (39.3%) strongly agreeing and 41 (46.1%) agreeing.

The perception that AEFI prevention is solely the responsibility of physicians was largely rejected, as 43 respondents (48.3%) disagreed and 14 (15.7%) strongly disagreed with this statement. In addition, most respondents expressed confidence in healthcare providers' ability to prevent AEFIs, with 32 (36.0%) strongly agreeing and 43 (48.3%) agreeing. The notion that most AEFIs are inevitable and cannot be prevented was also largely opposed, with 47 respondents (52.8%) disagreeing and 12 (13.5%) strongly disagreeing.

Regarding reporting, more respondents disagreed than agreed that AEFI reporting creates negative perceptions about vaccination programs, although a sizeable proportion remained neutral. There was strong support for integrating AEFI prevention into routine immunization training, as 38 respondents

(42.7%) strongly agreed and 42 (47.2%) agreed. Similarly, most respondents disagreed with the statement that pre-vaccination screening for contraindications is unnecessary, indicating recognition of its importance.

Furthermore, a majority of respondents supported regular evaluation of healthcare providers on AEFI prevention practices and expressed willingness to adopt new AEFI prevention guidelines

Association Between Knowledge of AEFI and Sociodemographic Characteristics (Table 4)

Across age categories, good knowledge ranged from 16 respondents (64.0%) among those aged 20–29 years to 14 respondents (70.0%) among those aged 40–49 years, with no statistically significant association between age and AEFI knowledge ($p = 0.976$). Similarly, good knowledge was reported by 35 female respondents (68.6%) and 25 male respondents (65.8%), and this difference was not statistically significant ($p = 0.778$).

Across professional categories, good knowledge was observed among 5 physicians (71.4%), 29 nurses (70.7%), 18 community health extension workers (66.7%), and 8 respondents in other cadres (57.1%), with no significant association between professional category and knowledge level ($p = 0.844$). With respect to educational qualification, good knowledge increased from 9 certificate holders (56.3%) to 24 respondents with a bachelor's degree (75.0%) and 9 respondents with postgraduate qualifications (75.0%), although this trend was not statistically significant ($p = 0.487$).

Regarding healthcare experience, good knowledge was reported by 4 respondents (57.1%) with less than one year of experience and increased to 20 respondents (74.1%) among those with more than 10 years of experience, with no statistically significant association ($p = 0.663$). A similar pattern was observed for years of involvement in immunization services, where good knowledge ranged from 7 respondents (58.3%) among those with less than one year of involvement to 22 respondents (73.3%) among those with 6–10 years of involvement ($p =$

0.699). By type of health facility, good knowledge was reported by 30 respondents (62.5%) working in primary healthcare centers and 14 respondents (77.8%) in private facilities; however, this association was also not statistically significant ($p = 0.590$).

Association Between Attitude Toward AEFI and Sociodemographic Characteristics (Table 5)

Overall, a positive attitude toward AEFI was common across all sociodemographic and professional groups. Across age categories, positive attitude ranged from 15 respondents (75.0%) among those aged 40–49 years to 10 respondents (83.3%) among those aged 50 years and above, with no statistically significant association between age and attitude toward AEFI ($p = 0.967$). Similarly, positive attitude was observed among 41 female respondents (80.4%) and 29 male respondents (76.3%), and this difference was not statistically significant ($p = 0.644$).

Across professional categories, positive attitude was reported by 6 physicians (85.7%), 34 nurses (82.9%), 20 community health extension workers (74.1%), and 10 respondents in other cadres (66.7%), with no statistically significant association between professional category and attitude ($p = 0.543$). With respect to educational qualification, positive attitude ranged from 11 certificate holders (68.8%) to 27 respondents with a bachelor's degree (84.4%) and 10 respondents with postgraduate qualifications (83.3%), although this difference was not statistically significant ($p = 0.606$).

Regarding healthcare experience, positive attitude was reported by 5 respondents (71.4%) with less than one year of experience and increased to 23 respondents (77.8%) among those with more than 10 years of experience, with no statistically significant association ($p = 0.742$). A similar pattern was observed for involvement in immunization services, where positive attitude ranged from 8 respondents (72.7%) among those with less than one year of involvement to 24 respondents (88.9%) among those with 6–10 years of involvement ($p =$

0.653).

By type of health facility, positive attitude was reported by 36 respondents (83.7%) working in primary healthcare centers, 19 respondents (86.4%) in general hospitals, and 13 respondents

(81.3%) in private facilities; however, this association was also not statistically significant ($p = 0.662$). Overall, none of the sociodemographic or professional characteristics showed a statistically significant association with attitude toward AEFI.

Table 1: Sociodemographic Characteristics of Respondents

Variables	Frequency (n = 98)	Percentage (%)
Age (Years)		
20-29	28	28.6
30-39	35	35.7
40-49	22	22.4
≥50	13	13.3
Gender		
Male	42	42.9
Female	56	57.1
Profession		
Physician	8	8.2
Nurse	45	45.9
Community Health Extension Worker	28	28.6
Auxiliary Healthcare Staff	12	12.2
Others	5	5.1
Level of Education		
Certificate	18	18.4
Diploma	32	32.7
Bachelor's degree	35	35.7
Master's degree	11	11.2
PhD/Professional Fellowship	2	2.0
Experience in Healthcare (years)		
<1	8	8.2
1-5	32	32.7
6-10	28	28.6
11-15	20	20.4
>15	10	10.2

Years of Involvement in Immunization Services



Variables	Frequency (n = 98)	Percentage (%)
<1	12	12.2
1-5	38	38.8
6-10	30	30.6
>10	18	18.4
Type of Health Facility		
Primary Healthcare Center	48	49.0
General Hospital	25	25.5
Private Clinic/Hospital	18	18.4
Specialized Immunization Center	5	5.1
Others	2	2.0

Table 2: Knowledge of Adverse Events Following Immunization Among Respondents

Variables	Frequency	Percentage (%)
Aware of AEFI (n=98)		
Yes	89	90.8
No	9	9.2
Categories of AEFI (n=89)		
Vaccine product-related reaction	32	36.0
Vaccine quality defect-related reaction	21	23.6
Immunization error-related reaction	18	20.2
Immunization anxiety-related reaction	10	11.2
Coincidental event	8	9.0
Risk factors for AEFI (n=89)		
Improper vaccine storage	28	31.5
Incorrect administration technique	22	24.7
Patient's medical history	15	16.9
Previous adverse reaction	12	13.5
Vaccine quality issues	7	7.9
Failure to screen for contraindications	5	5.6
AEFI prevention methods		
Proper vaccine storage (cold chain)	35	39.3
Pre-vaccination screening	20	22.5
Correct administration technique	15	16.9
Post-vaccination observation	8	9.0
Emergency preparedness	6	6.7
Patient education	5	5.6
AEFI management practices		
Basic first aid for mild reactions	28	31.5
Anaphylaxis management	22	24.7
AEFI reporting procedures	18	20.2
AEFI investigation	12	13.5

Variables	Frequency	Percentage (%)
Patient referral protocols	6	6.7
Documentation requirements	3	3.4
AEFI can be prevented through proper immunization practices		
Yes	82	92.1
No	4	4.5
Not sure	3	3.4
AEFI that requires immediate emergency response		
Anaphylaxis	30	33.7
Seizures	25	28.1
Severe local reactions	15	16.9
High fever	10	11.2
Syncope (fainting)	6	6.7
Encephalopathy	3	3.4
Vaccine components cause AEFI		
Yes	25	28.1
No	58	65.2
Not sure	6	6.7
Self-assessment of overall knowledge of AEFI prevention		
Very good	18	20.2
Good	42	47.2
Fair	22	24.7
Poor	6	6.8
Very poor	1	1.1

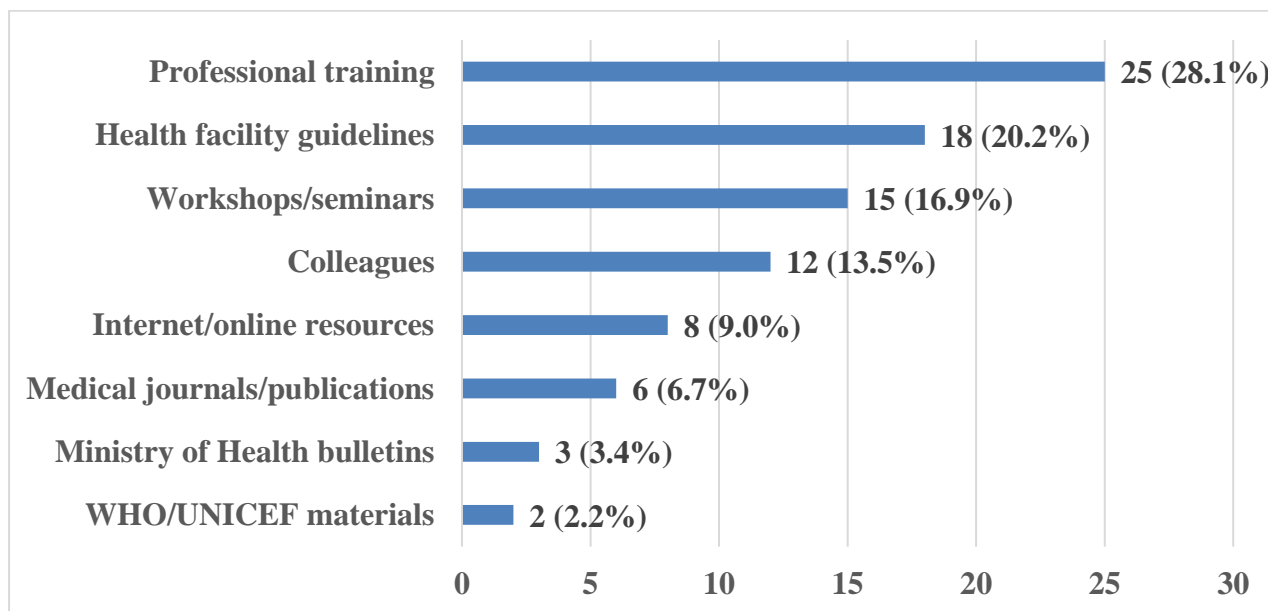


Figure 1: Main source of information regarding AEFIs

Table 3: Attitude towards AEFI among respondents

Variables	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
AEFI prevention is an essential part of immunization services	41 (46.1)	38 (42.7)	7 (7.9)	2 (2.2)	1 (1.1)
AEFI prevention is primarily the responsibility of physicians, not other healthcare providers	7 (7.9)	14 (15.7)	11 (12.4)	43 (48.3)	14 (15.7)
Spending time on AEFI prevention measures is worth the effort	35 (39.3)	41 (46.1)	9 (10.1)	3 (3.4)	1 (1.1)
Healthcare providers should feel confident in their ability to prevent AEFI	32 (36.0)	43 (48.3)	11 (12.4)	2 (2.2)	1 (1.1)
Most AEFI are inevitable and cannot be prevented	5 (5.6)	11 (12.4)	14 (15.7)	47 (52.8)	12 (13.5)
Reporting AEFI may create negative perceptions about vaccination programs	7 (7.9)	20 (22.5)	23 (25.8)	32 (36.0)	7 (7.8)
AEFI prevention should be integrated into routine immunization training	38 (42.7)	42 (47.2)	7 (7.9)	1 (1.1)	1 (1.1)
Pre-vaccination screening for contraindications is unnecessary for most routine vaccines	2 (2.2)	7 (7.9)	11 (12.4)	43 (48.3)	26 (29.2)
Healthcare providers should be regularly evaluated on their AEFI prevention practices	29 (32.6)	47 (52.8)	9 (10.1)	3 (3.4)	1 (1.1)
Healthcare providers should be willing to adopt new AEFI prevention guidelines	36 (40.4)	43 (48.3)	7 (7.9)	2 (2.2)	1 (1.2)

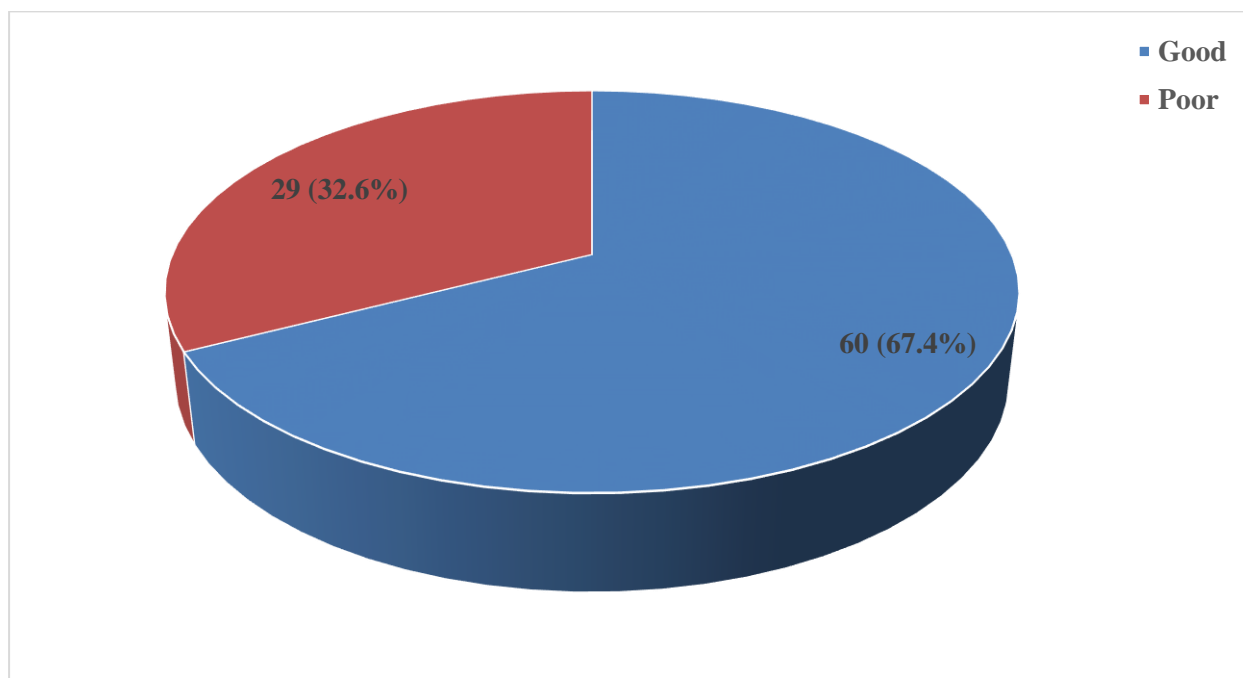


Figure 2: Composite knowledge of AEFI among respondents

Table 4: Association between knowledge of AEFI and sociodemographic characteristics of respondents

Variables	Knowledge		Test statistic	p-value
	Good n = 60 (%)	Poor n = 29 (%)		
Age (years)				
20-29	16 (64.0)	9 (36.0)	0.223 ^b	0.976
30-39	22 (68.8)	10 (31.2)		
40-49	14 (70.0)	6 (30.0)		
≥50	8 (66.7)	4 (33.3)		
Gender				
Male	25 (65.8)	13 (34.2)	0.080 ^a	0.778
Female	35 (68.6)	16 (31.4)		
<i>OR= 1.01 (0.33 – 2.38)</i>				
Professional Category				
Physician	5 (71.4)	2 (28.6)	0.936 ^b	0.844
Nurse	29 (70.7)	12 (29.3)		
Community Health Extension Worker	18 (66.7)	9 (33.3)		
Others	8 (57.1)	6 (42.9)		
Educational Qualification			2.438 ^a	0.487
Certificate	9 (56.3)	7 (43.7)		

Variables	Knowledge		Test statistic	p-value
Diploma	18 (62.1)	11 (37.9)		
Bachelor's degree	24 (75.0)	8 (25.0)		
Postgraduate degree	9 (75.0)	3 (25.0)		
Experience in Healthcare (years)				
<1	4 (57.1)	3 (42.9)	1.493 ^b	0.663
1-5	18 (62.1)	11 (37.9)		
6-10	18 (72.0)	7 (28.0)		
>10	20 (74.1)	7 (24.9)		
Years of Involvement in Immunization Services				
<1	7 (58.3)	5 (41.7)	1.430 ^a	0.699
1-5	24 (63.2)	14 (36.8)		
6-10	22 (73.3)	8 (26.7)		
>10	13 (72.2)	5 (27.8)		
Type of Health Facility				
Primary Healthcare Center	30 (62.5)	18 (37.5)	1.981 ^a	0.590
General Hospital	18 (72.0)	7 (28.0)		
Private Clinic/Hospital	14 (77.8)	4 (22.2)		
Others	4 (57.1)	3 (42.9)		

^aPearsons test, ^bFishers exact

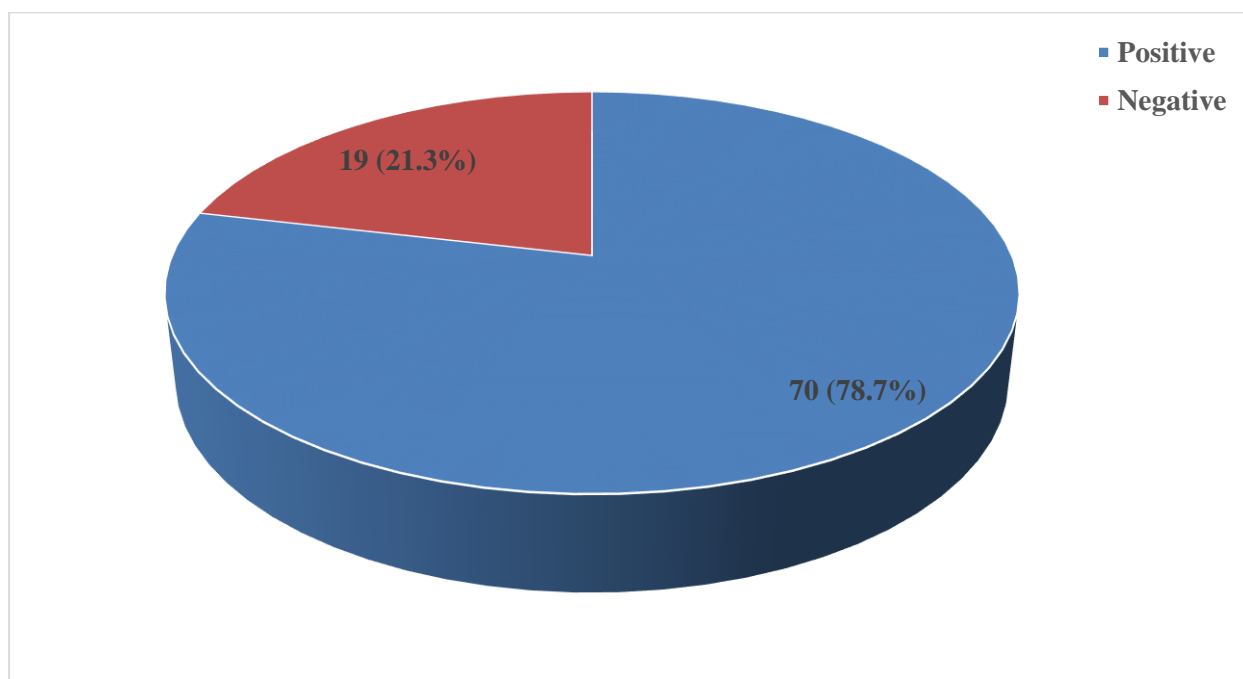


Figure 3: Composite Attitude towards AEFI among respondents

Table 5: Association between Attitude towards AEFI and sociodemographic characteristics of respondents

Variables	Attitude		Test statistic	p-value
	Positive n = 70 (%)	Negative n = 19 (%)		
Age (years)				
20-29	20 (80.0)	5 (20.0)	0.348 ^b	0.967
30-39	25 (78.1)	7 (21.9)		
40-49	15 (75.0)	5 (25.0)		
≥50	10 (83.3)	2 (16.7)		
Gender				
Male	29 (76.3)	9 (23.7)	0.215 ^a	0.644
Female	41 (80.4)	10 (19.6)		
<i>OR= 1.03 (0.25 – 2.50).</i>				
Professional Category				
Physician	6 (85.7)	1 (14.3)	2.170 ^b	0.543
Nurse	34 (82.9)	7 (17.1)		
Community Health Extension Worker	20 (74.1)	7 (25.9)		
Others	10 (66.7)	5 (33.3)		
Educational Qualification				
Certificate	11 (68.8)	5 (31.2)	1.850 ^b	0.606
Diploma	22 (75.9)	7 (24.1)		
Bachelor's degree	27 (84.4)	5 (15.6)		
Postgraduate	10 (83.3)	2 (16.7)		
Experience in Healthcare (Years)				
<1	5 (71.4)	2 (28.6)	1.056 ^a	0.742
1-5	22 (75.9)	7 (24.1)		
6-10	20 (80.0)	5 (20.0)		
>10	23 (77.8)	4 (22.2)		
Involvement in Immunization Services (Years)				
<1	8 (72.7)	3 (27.3)	1.510 ^b	0.653
1-5	28 (82.4)	6 (17.6)		
6-10	24 (88.9)	3 (11.1)		
>10	14 (82.4)	3 (17.6)		
Type of Health Facility				
Primary Healthcare Center	36 (83.7)	7 (16.3)	1.343 ^b	0.662
General Hospital	19 (86.4)	3 (13.6)		
Private Clinic/Hospital	13 (81.3)	3 (18.8)		
Others	4 (66.7)	2 (33.3)		

^aPearsons test, ^bFishers exact

DISCUSSION

This study found that about two-thirds of healthcare workers had good knowledge of adverse events following immunization. This level of knowledge may be explained by routine exposure to immunization services and periodic sensitization activities conducted through national immunization programs. Adequate baseline knowledge among healthcare workers is essential for early detection and appropriate response to vaccine-related events. However, continuous in-service training focused on practical AEFI surveillance is recommended to consolidate and sustain this knowledge.

The study further showed notable gaps in specific knowledge areas, particularly in the recognition of immunization anxiety-related reactions and coincidental events. Similar deficiencies have been documented in similar studies, where healthcare workers often misclassify non-vaccine-related events as true AEFIs.^{16,17} This gap may stem from limited emphasis on causality assessment during training and reliance on experiential learning rather than structured guidance. Such gaps are significant because misclassification can contribute to unnecessary vaccine fear and hesitancy in the community. Strengthening training on AEFI classification and causality assessment should therefore be prioritized.

A largely positive attitude toward AEFI prevention was observed, with over three-quarters of respondents expressing favorable views. This finding is consistent with global evidence indicating that healthcare workers generally support vaccine safety initiatives and preventive practices.^{18,19} This positive attitude may reflect increasing awareness of the importance of vaccine safety in maintaining public trust in immunization programs. From a public health standpoint, positive attitudes provide a strong foundation for effective AEFI surveillance and prevention. Integrating attitude-reinforcing content into routine immunization training could further enhance engagement and compliance.

The finding that most respondents rejected the notion that AEFI prevention is solely the

responsibility of physicians indicates good understanding of shared responsibility in immunization delivery. This may be explained by the task-shifting model commonly adopted in primary healthcare settings, where nurses and community health workers play central roles in vaccine delivery. Recognizing shared responsibility is crucial for ensuring timely identification, management, and reporting of AEFIs. Immunization programs should continue to promote team-based approaches to vaccine safety.

No significant association was found between knowledge or attitude toward AEFI and sociodemographic characteristics such as age, gender, professional category, or years of experience. This finding contrasts with reports from similar studies conducted in Nigeria and Ethiopia, which identified educational level, years of work experience, and prior AEFI-related training as significant positive determinants of good knowledge and favorable attitudes toward AEFIs.^{20,21} The observed difference may be explained by the relatively uniform exposure of respondents in the present study to routine immunization activities and standardized operational guidelines, which may have minimized variations across demographic and professional groups. Additionally, informal on-the-job learning may have played a greater role than formal qualifications in shaping AEFI-related competencies in this setting.

The absence of identifiable subgroup differences suggests that gaps in AEFI knowledge and attitudes are systemic rather than confined to specific cadres. Consequently, AEFI capacity-building interventions should be implemented universally across all healthcare worker categories, with emphasis on regular refresher training and practical surveillance skills rather than selective targeting based on demographic or professional characteristics.

CONCLUSION

This study demonstrated that most healthcare workers involved in immunization services possessed good knowledge of adverse events

following immunization and expressed positive attitudes toward AEFI prevention. High awareness of AEFI was observed; however, important gaps were identified in specific areas, particularly in the recognition of immunization anxiety-related reactions, coincidental events, and formal AEFI reporting and investigation procedures. The absence of significant associations between AEFI knowledge or attitudes and sociodemographic or professional characteristics suggests that these gaps are systemic rather than limited to particular cadres or experience levels. Strengthening continuous professional education, emphasizing practical AEFI surveillance, classification, and reporting across all healthcare workers, is essential for improving vaccine safety monitoring and sustaining public confidence in immunization programs.

LIMITATIONS

This study has some limitations that should be considered when interpreting the findings. The cross-sectional design limits causal inference between sociodemographic characteristics and knowledge or attitudes toward AEFI. Data were collected using a self-reported questionnaire, which may be subject to social desirability and recall biases. Additionally, the study was conducted in a single rural community, which may limit the generalizability of the findings to other settings with different healthcare structures or resource availability. Finally, the study focused on knowledge and attitudes without directly assessing actual AEFI reporting practices or surveillance outcomes, which may differ from reported perceptions.

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