Healthcare Workers' Knowledge and Factors Associated with Ward Health System Implementation in Andoni Local Government Area, Rivers State, Nigeria: A Cross-Sectional Study

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Abstract
The Ward Health System (WHS) is intended to organize primary healthcare delivery at ward level through defined service, community participation, referral and governance functions. Evidence on how consistently these functions are implemented in riverine local government areas of Rivers State remains limited. This study assessed WHS knowledge, implementation, Ward Development Committee (WDC) perceptions and factors associated with implementation among healthcare workers in Andoni Local Government Area. A quantitative descriptive cross-sectional survey was conducted among 185 healthcare workers in functional primary healthcare facilities in Andoni LGA. Total enumeration was used. Data were collected with an interviewer-administered structured questionnaire covering sociodemographic and occupational characteristics, WHS knowledge, implementation conditions, WDC roles and perceived influencing factors. Data were analyzed in SPSS version 27 using descriptive statistics, chi-square tests and multivariable logistic regression. Because no respondent was classified in the poor implementation category, the multivariable outcome was dichotomized as high versus moderate implementation. Statistical significance was set at $p<0.05$. Mean WHS knowledge was 74.02% (SD=12.39), with 43.2% of respondents classified as having good knowledge, 48.1% fair knowledge and 8.6% poor knowledge. Knowledge was weakest for community participation (35.1% correct), maternal/newborn/child health coverage (45.9%) and referral linkage (52.4%). Mean self-reported implementation was 68.90% (SD=7.76); 64.3% of respondents reported moderate implementation and 35.7% high implementation, with none in the poor category. Implementation varied significantly by ward ($F=2.60$, $p=0.008$), with Ward 3 recording the highest mean score (76.10%) and Ward 4 the lowest (65.97%). Although 85.9% had favourable perceptions of WDC roles, reported WDC functionality was weaker (mean=2.30); 58.4% rated functionality as minimally implemented and 9.2% as not implemented. In multivariable analysis, fair rather than good knowledge (aOR=0.308, 95% CI: 0.130–0.732, $p=0.008$), tertiary rather than postgraduate education (aOR=0.168, 95% CI: 0.046–0.613, $p=0.007$), and practice in Ward 4 rather than Ward 10 (aOR=0.056, 95% CI: 0.005–0.699, $p=0.025$) were independently associated with lower odds of high implementation. WHS implementation in Andoni was

predominantly moderate, with substantial ward-level differences. The findings support targeted strengthening of weak wards, refresher training focused on community participation, maternal/newborn/child health coverage and referral linkage, stronger WDC functionality, and ward-specific supportive supervision. Future assessments should combine worker reports with independent facility observation and routine service data.

Keywords: *Ward Health System; primary healthcare; healthcare workers; implementation; Ward Development Committee; Andoni; Rivers State; Nigeria.*

1. Introduction

Primary healthcare is the principal platform through which health services are expected to reach communities equitably. The Ward Health System (WHS) was developed as an implementation strategy for primary healthcare in Nigeria and uses the political ward as the operational unit for delivering the ward minimum health-care package and promoting community mobilization and participation (Alenoghena & Omuemu, 2022; Ekpo, 2021; Njelita et al., 2023a). The approach is intended to improve access to quality healthcare while promoting equity, local participation and sustainable service delivery.

Implementation, however, depends on more than the formal existence of policies and facilities. Healthcare workers must understand the functions of the system and translate those functions into routine processes such as health education, outreach, immunization, record keeping, referral and community engagement. Evidence from Nigeria indicates that health-system implementation is influenced by contextual and actor-related factors, while facility readiness and workforce capacity also shape the ability of primary healthcare facilities to deliver services (Eboreime et al., 2018; Ekenna et al., 2020; Zurn et al., 2021). The WHO health-system building-block perspective similarly emphasizes the interaction of workforce, financing, information, medicines, governance and service delivery (World Health Organization, 2007; Stockton et al., 2021). Donabedian's structure-process-outcome model provides a complementary basis for interpreting implementation because the availability of structures and resources does not automatically guarantee appropriate care processes or outcomes (Donabedian, 1966, 1988).

Community governance is another important component of the WHS. Ward Development Committees (WDCs) provide a mechanism for community participation, accountability and local ownership of primary healthcare. Their potential contribution includes identifying community health needs, mobilizing resources, supporting health activities, monitoring service delivery and linking facilities with communities (Karuga et al., 2022; Njelita et al., 2023b). However, evidence shows that the effectiveness of community health committees depends on role clarity, capacity, resources, engagement and supportive governance arrangements (Kesale et al., 2022a; Karuga et al., 2022).

Recent Nigerian evidence has highlighted gaps in awareness and understanding of the Ward Health System among health workers and community members (Njelita et al., 2023a, 2023b). Evidence from Rivers State has also described weaknesses in the organization and supervision of Ward Development Committees, including role confusion and limited supervisory coverage (Ibama et al., 2024). National assessment has further shown that compliance with minimum quality standards varies across public primary healthcare facilities, reinforcing the need for local implementation assessment rather than assuming uniform performance (Sampson et al., 2024). These concerns are particularly relevant to Andoni Local Government Area, a riverine setting in which geographical and service-delivery constraints may influence implementation.

1.1 Problem Statement

The existence of a ward-based primary healthcare policy does not establish that the system is functioning as intended. In Andoni LGA, there had been no comprehensive facility-based empirical assessment of the level of WHS implementation, the knowledge of healthcare workers, the functioning of WDC-related processes or the factors associated with implementation. Without a ward-disaggregated baseline, local managers may be unable to identify weak wards or specific implementation functions requiring corrective action.

The problem is therefore not simply whether WHS exists, but whether its component processes are understood and implemented consistently across wards. This study addresses that gap by examining implementation from the perspective of the healthcare workforce and identifying factors independently associated with implementation.

1.2 Aim

The aim of the study was to assess the implementation of the Ward Health System in Andoni Local Government Area, Rivers State, Nigeria.

1.3 Specific Objectives

1. Determine the level of knowledge of the Ward Health System among healthcare workers in Andoni LGA.
2. Assess the level of implementation of the Ward Health System in Andoni LGA.
3. Assess healthcare workers' perceptions of the roles of Ward Development Committees in WHS implementation.
4. Determine factors associated with the level of WHS implementation among healthcare workers.

1.4 Hypotheses

$H0_1$: There is no significant association between healthcare workers' knowledge of the WHS and the level of WHS implementation.

$H0_2$: There is no significant association between healthcare workers' perceptions of WDC roles and the level of WHS implementation.

$H0_3$: There is no significant association between previous WHS training and the level of WHS implementation.

$H0_4$: There is no significant association between healthcare workers' sociodemographic and occupational characteristics and the level of WHS implementation.

2. Literature Review and Conceptual Background

2.1 Ward Health System and Primary Healthcare

The WHS represents a localized approach to organizing primary healthcare around political and geographic wards. The Nigerian literature describes the ward as the operational level through which primary healthcare programmes and community participation are organized (Ekpo, 2021; Njelita et al., 2023a). Alenoghena and Omuemu (2022) further illustrate the relevance of the Ward Health System as an implementation platform for primary healthcare in Nigeria.

2.2 Healthcare Workers and Implementation

Healthcare workers are the principal actors translating policy into routine service processes. The Nigerian study by Njelita et al. (2023a) specifically examined whether health workers in local government areas were adequately informed about the Ward Health System, making worker

knowledge directly relevant to the present study. Broader evidence also shows that workforce capacity and the conditions in which health workers operate are important to primary healthcare performance (Ekenna et al., 2020; Zurn et al., 2021).

2.3 Ward Development Committees

WDCs provide a mechanism for community participation in primary healthcare. Evidence synthesized across sub-Saharan Africa indicates that community-level health committees can facilitate participation in decision-making, monitoring and local priority setting, but their contribution is conditional rather than automatic (Karuga et al., 2022). A systematic review similarly found that committee functionality is influenced by decentralization arrangements, role awareness and resource conditions (Kesale et al., 2022a). Nigerian evidence from Rivers State has documented weaknesses in WDC organization and supervision (Ibama et al., 2024), while research in northwestern Nigeria has examined the contribution of WDCs to sustaining primary healthcare through community participation (Gulma, 2025).

2.4 Theoretical Perspective

The study was informed by an integrated perspective combining Donabedian's structure-process-outcome model, the WHO health-system building blocks and implementation science. Donabedian provides the structure-process logic (Donabedian, 1966, 1988); the WHO framework contextualizes workforce, financing, governance, information and service delivery (World Health Organization, 2007; Stockton et al., 2021); and implementation science emphasizes whether an intervention is delivered as intended and how implementation outcomes should be conceptualized and measured (Proctor et al., 2011; Carroll et al., 2007). This combination supports examination of knowledge, service processes, community governance and contextual variation.

3. Materials and Methods

The study was conducted in Andoni Local Government Area of Rivers State, Nigeria. The council is a riverine area comprising 11 political wards and 26 functional primary healthcare facilities. The General Hospital at Ngo was excluded because it is a secondary-level facility outside the PHC facility tier of the Ward Health System. The setting includes dispersed settlements and geographical access constraints that can influence primary healthcare delivery (Rivers State Primary Health Care Management Board, 2022). Although Andoni has 11 political wards, the final respondent dataset represented 10 wards; the eleventh ward had no eligible respondent at the time of the survey.

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3.2 Study Design

A quantitative descriptive cross-sectional survey design was used.

3.3 Study Population

The study population comprised eligible healthcare workers in functional primary healthcare facilities across the wards of Andoni LGA. The final population enumerated was 185 healthcare

workers.

3.4 Sample Size and Sampling

Total enumeration was adopted because the accessible population of eligible healthcare workers was manageable. All 185 eligible workers were therefore targeted and included in the analysis.

3.5 Instrument for Data Collection

Data were collected with an interviewer-administered structured questionnaire organized into sections covering sociodemographic and occupational characteristics, WHS knowledge, implementation conditions, perceptions of WDC roles and perceived influencing factors. Composite scores were constructed from the relevant items.

The questionnaire was reviewed for content relevance and clarity and was pretested in six health facilities before the main survey. The parent thesis reported low internal-consistency coefficients for the knowledge (KR-20=0.33), implementation (Cronbach's α=0.35) and WDC perception (α=0.33) composites. The influencing-factor items yielded −0.03; these items were intended as a formative list of distinct influences rather than a single reflective scale. The low coefficients for the other composites indicate that their items were not highly homogeneous, so the resulting composite scores are interpreted cautiously as broad summary indices rather than highly unidimensional scales.

The questionnaire was reviewed for content relevance and clarity and pretested before the main survey. The thesis reported relatively low internal-consistency coefficients for the composite scales (knowledge KR-20=0.33; implementation α=0.35; WDC perception α=0.33; influencing factors coefficient=-0.03). These values suggest that the constructs are broad and multidimensional and should be interpreted with caution rather than as evidence of a single homogeneous latent trait.

Data were collected from eligible healthcare workers using the structured questionnaire. Ethical approval was obtained from the Rivers State University Faculty of Basic Medical Sciences Research Ethics Committee (approval number RSU/FBMS/REC/25/465), and administrative permission was obtained through the Rivers State Primary Health Care Management Board and the Andoni Local Government Health Authority. Participation was voluntary and informed consent was obtained before questionnaire administration.

Data were collected from eligible healthcare workers using the structured questionnaire. Ethical and administrative procedures were followed as reported in the parent MSc study, including appropriate institutional permission and informed participation.

Data were analyzed using SPSS version 27. Frequencies, percentages, means and standard deviations were used for descriptive analysis. Knowledge and implementation scores were expressed as percentages. Associations between categorical variables and implementation category were examined using the chi-square test. Multicollinearity was assessed using variance inflation factors from a diagnostic linear regression; all VIFs were below 10, with the largest approximately 2.09. Candidate explanatory variables were entered into a multivariable logistic regression. The intended implementation outcome was poor, moderate or high; however, because no respondent was in the poor category, the fitted multivariable model contrasted high implementation (≥70%) with moderate implementation (50–69%). The poor category was below 50%. Odds ratios were interpreted as associations with the odds of high implementation, not as causal effects. Statistical significance was assessed at $p<0.05$.

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For a score based on k items, the percentage score was calculated as:

$$Score(\%) = \frac{Observed\ Score}{Maximum\ Possible\ Score} \times 100 \qquad (1)$$

For a respondent i with item scores x_{i1}, x_{i2}, …, x_{ik}, the mean composite score was represented as:

$$\bar{X}_i = \frac{\sum_{j=1}^{k} x_{ij}}{k} \qquad (2)$$

where:

- $\bar{X}_i$= mean score for observation or group i
- x_{ij}= observed value of the j_{th} measurement for observation or group I.
- i= index representing the observation, participant, item, or group
- j = index representing each individual measurement
- k = total number of measurements or observations included in the calculation
- $\sum$ = summation operator, indicating that all values from j=1 to j=k are added together.

The odds ratio from the logistic regression model was interpreted as the multiplicative change in the odds of high implementation associated with a predictor, holding other variables constant. Because the study was cross-sectional, these adjusted odds ratios were interpreted as independent associations rather than causal effects.

4. Results

The study included 185 healthcare workers. Females accounted for 64.3% and males 35.7%; 63.2% were married, 88.1% held tertiary qualifications and 90.8% worked in primary health centres. The mean age was 40.91 years (SD=6.70; range 26–59 years) and mean healthcare experience was 13.84 years (SD=6.65; range 3–34 years). Community health extension workers were the largest professional group (36.8%). Previous WHS training was reported by 95.1% of respondents. Respondents were drawn from 10 of the 11 political wards; the eleventh ward had no eligible respondent.
The study included 185 healthcare workers. The workforce represented the cadres and occupational characteristics described in the parent study. The analysis focused on whether knowledge, education, ward location and other worker characteristics were associated with the implementation category.

Table 1. Sociodemographic and Occupational Characteristics of Respondents (N=185)

Variable	Category	Frequency (n)	Percent (%)
Sex	Male	66	35.7
	Female	119	64.3
Marital status	Single	54	29.2
	Married	117	63.2
	Widowed	14	7.6

Educational level	Tertiary	163	88.1
	Postgraduate	22	11.9
Profession	Community health extension worker (CHEW)	68	36.8
	Laboratory staff	43	23.2
	Other	31	16.8
	Junior community health extension worker (JCHEW)	21	11.4
	Community health officer (CHO)	13	7.0
	Nurse	7	3.8
	Doctor	2	1.1
Place of work	Primary health centre (PHC)	168	90.8
	Health post	17	9.2
Age group (years)	30 and below	11	5.9
	31–40	89	48.1
	41 and above	85	45.9
Experience (years)	10 and below	84	45.4
	11–15	37	20.0
	16–20	40	21.6
	21 and above	24	13.0
Previous WHS training	Yes	176	95.1
	No	9	4.9

Source: Field survey (2026). Mean age=40.91 years (SD=6.70; range 26–59); mean healthcare experience=13.84 years (SD=6.65; range 3–34 years). Respondents represented 10 of Andoni's 11 political wards; the eleventh ward had no eligible respondent.

4.2 Knowledge of the Ward Health System

The mean WHS knowledge score was 74.02% (SD=12.39), with scores ranging from 33.33% to 100.00%. Overall, 43.2% of healthcare workers had good knowledge, 48.1% fair knowledge and 8.6% poor knowledge; therefore, 91.3% had fair or good knowledge. Across the 15 knowledge items, the strongest performance concerned recognition of community health extension workers as core providers (96.8%), delivery of the Minimum Health Care Package through the WHS (95.1%) and immunization as a WHS service component (94.6%). The weakest areas were community participation (35.1%), maternal/newborn/child health coverage (45.9%) and referral linkage (52.4%).

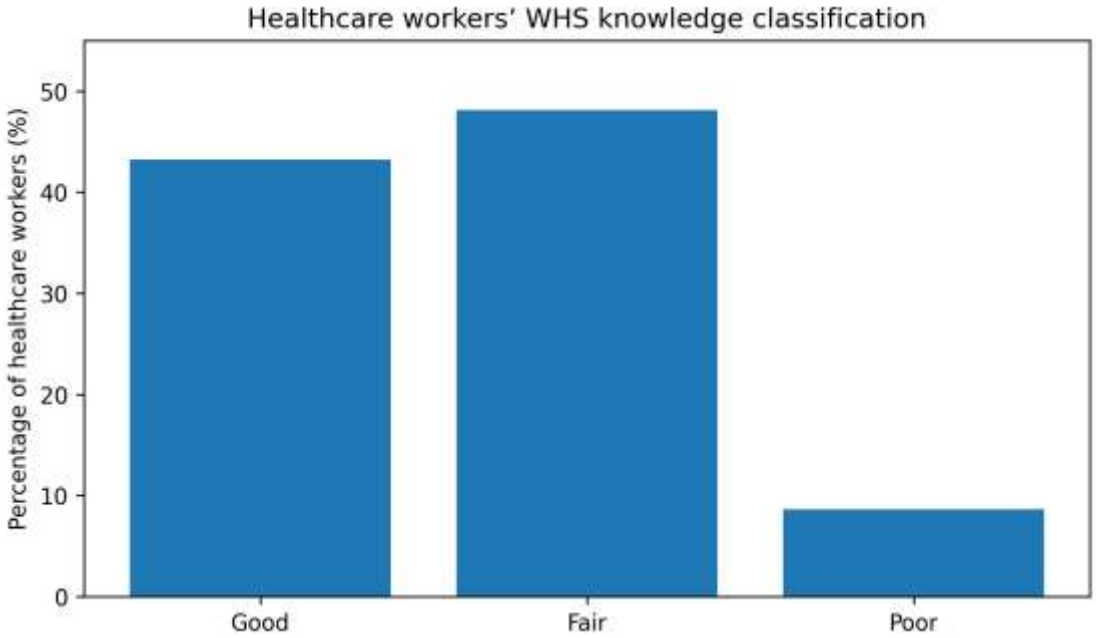
Table 2. Level of Knowledge of the Ward Health System, Ranked by Percentage Correct (N=185)

Item	Knowledge statement	% Correct
B10	Community health extension workers are among the core providers	96.8
B7	The Minimum Health Care Package is delivered through the WHS	95.1
B12	Immunization is a service delivery component of the WHS	94.6
B2	The main goal is universal access to a minimum package of care	91.9
B9	Workers provide services and support community health activities	90.3
B15	The WHS brings healthcare services closer to the community	84.9

B5	The WHS integrates preventive, promotive, curative and rehabilitative care	77.8
B3	Every ward should have at least one functional PHC facility	72.4
B4	The WDC is a recognized structure within the WHS	71.9
B13	Health education and disease prevention are functions of the WHS	69.7
B14	Record keeping and data reporting are worker responsibilities	69.2
B1	The WHS delivers PHC services at the political ward level	62.2
B8	A referral linkage exists between ward facilities and higher care	52.4
B11	The WHS covers maternal, newborn and child health services	45.9
B6	Community participation is an essential component of the WHS	35.1

Table 3. Composite WHS Knowledge Classification (N=185)

Knowledge category	n	%
Good	80	43.2
Fair	89	48.1
Poor	16	8.6
Total	185	100.0



Mean number of correct responses=11.10 of 15 (SD=1.86; range 5–15), corresponding to a mean knowledge score of 74.02% (SD=12.39).

Figure 1. Healthcare workers' WHS knowledge classification

4.3 Level of WHS Implementation

The mean self-reported implementation score was 68.90% (SD=7.76), with a range of 50.00% to 89.29%. No respondent fell into the poor implementation category. Overall, 64.3% reported moderate implementation and 35.7% high implementation. The item-level results showed particularly weak performance for regular community outreach and funding, while routine immunization, health education and record maintenance had higher proportions reporting full implementation.

Table 4. Distribution of the Level of WHS Implementation by Service/Input Condition (N=185)

Item	Service/input condition	Not implemented (%)	Minimally implemented (%)	Partially implemented (%)	Fully implemented (%)
C1	Functional facilities available in the ward	13.0	19.0	31.5	36.4
C2	Adequate healthcare workers deployed	19.6	32.6	35.3	12.5
C3	Essential medicines consistently available	22.2	25.4	37.3	15.1
C4	Basic medical equipment available and functional	15.7	25.9	24.3	34.1
C5	Functional referral system to higher care	25.4	28.6	23.2	22.7
C6	Community outreach conducted regularly	20.5	45.9	25.9	7.6
C7	Health education delivered to community	15.1	16.2	25.4	43.2
C8	Maternal and child health services provided	8.1	29.7	30.3	31.9
C9	Routine immunization provided	0.0	20.7	34.2	45.1
C10	Regular supervision of workers	5.4	33.5	43.2	17.8
C11	Accurate health records maintained	10.3	20.0	29.2	40.5
C12	Monitoring and evaluation conducted	8.6	18.4	36.8	36.2
C13	Adequate funding for ward activities	2.7	45.4	43.8	8.1
C14	Health services physically accessible	3.2	19.5	48.6	28.6

Source: Field survey (2026). Percentages are based on valid responses for each item.

Table 5. Composite Level of WHS Implementation (N=185)

Implementation category	n	%
High	66	35.7
Moderate	119	64.3
Poor	0	0.0
Total	185	100.0

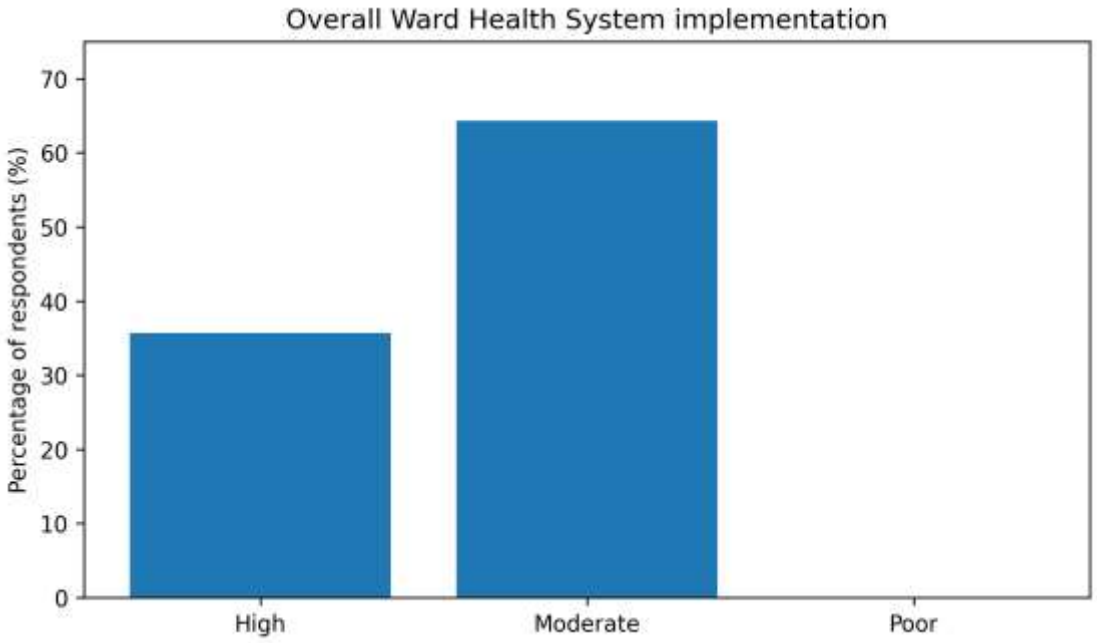


Figure 2. Overall Ward Health System implementation

4.4 Implementation by Ward

Implementation differed across the 10 wards represented in the respondent dataset. Ward 3 had the highest mean implementation score (76.10%), whereas Ward 4 had the lowest (65.97%). The difference was statistically significant (one-way ANOVA F=2.60, p=0.008), indicating meaningful ward-level heterogeneity. Ward 4 also had the smallest proportion of respondents classified as having high implementation (1/18; 5.6%), while Ward 3 had the highest (8/13; 61.5%).

Table 6. Level of WHS Implementation by Ward (N=185)

Ward	Mean implementation (%)	SD	High category, n (%)	Total n
1	70.79	11.31	5 (35.7)	14
2	70.63	9.80	6 (33.3)	18
3	76.10	8.94	8 (61.5)	13
4	65.97	2.90	1 (5.6)	18
5	68.05	8.54	6 (31.6)	19
6	68.57	4.84	8 (32.0)	25
7	67.18	6.23	6 (30.0)	20
8	68.62	8.64	10 (52.6)	19
9	66.07	6.66	8 (32.0)	25
10	71.55	5.26	8 (57.1)	14
Total	68.90	7.76	66 (35.7)	185

Source: Field survey (2026). One-way ANOVA of implementation percentage by ward: F=2.60, p=0.008. The table covers the 10 wards represented in the respondent dataset; Andoni has 11 political wards.

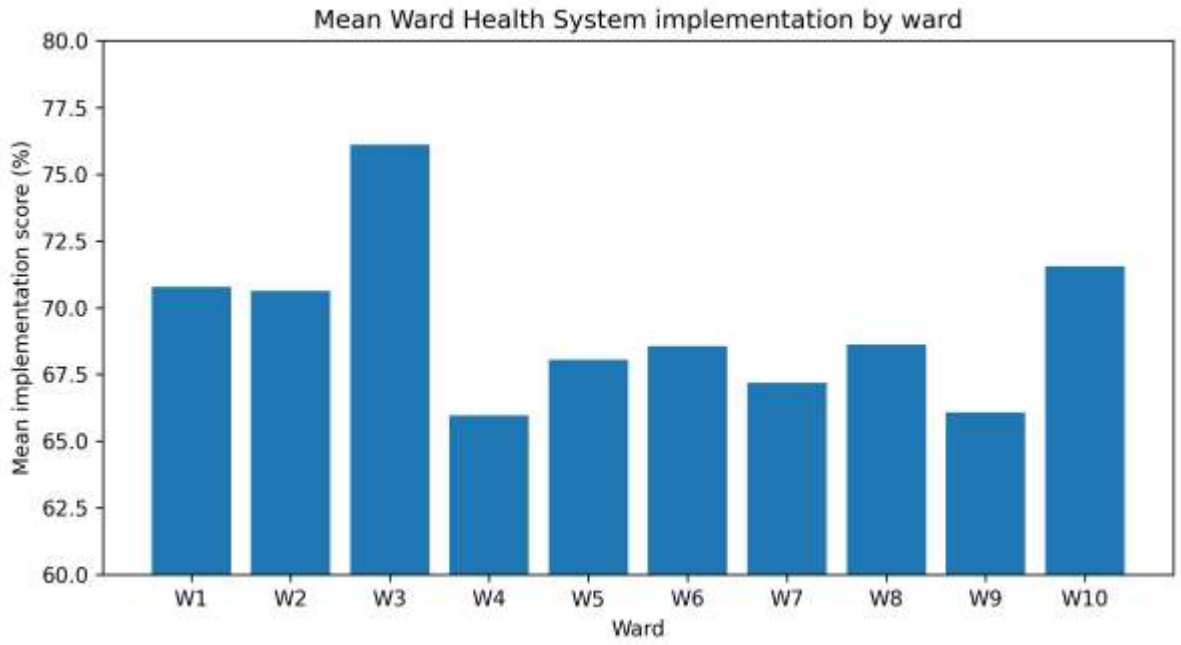


Figure 3. Mean Ward Health System implementation by ward

4.5 Perceptions and Functionality of Ward Development Committees

Most healthcare workers (85.9%) had favourable perceptions of the roles of WDCs, while 14.1% had unfavourable perceptions. The composite perception mean was 2.82 (SD=0.29), equivalent to 70.6% of the maximum. In contrast, the item assessing whether WDCs were functional and active in the ward had a lower mean of 2.30 (SD=0.73); 58.4% described WDC functionality as minimally implemented and 9.2% as not implemented. The specific role items had means ranging from 2.63 for conflict resolution to 2.97 for advocacy for improved health services.

Table 8. WDC Functionality and Perception Summary (N=185)

Item	Committee role	Mean	SD
D1	WDCs are functional and active in the ward	2.30	0.73
D2	Mobilizes community members to participate	2.90	0.77
D3	Advocates for improved health services	2.97	0.82
D4	Mobilises local resources for healthcare	2.85	0.89
D5	Supports health education and awareness	2.80	0.76
D6	Monitors delivery of health services	2.91	0.93

D7	Identifies the health needs of the community	2.91	0.93
D8	Helps resolve conflicts affecting services	2.63	1.00
D9	Provides support to healthcare workers	2.83	0.83
D10	Promotes utilisation of health facilities	2.94	0.92
D11	Participates in planning ward health activities	2.91	0.71
D12	Facilitates community and facility communication	2.84	0.88
D13	Contributes to decision making on priorities	2.90	1.05
	Composite WDC perception	2.82	0.29

Indicator	**Result**
Mean reported WDC functionality	2.30 (SD=0.73)
Not implemented	9.2%
Minimally implemented	58.4%
Composite perception mean	2.82 (SD=0.29; 70.6% of maximum)
Favourable perception	159 (85.9%)
Unfavourable perception	26 (14.1%)

Table 9. Factors Perceived to Influence WHS Implementation (N=185)

Item	**Perceived factor**	**Mean**	**SD**
E6	Effective leadership and coordination	3.01	1.03
E9	Availability of essential medicines and equipment	2.95	0.99
E1	Availability of healthcare workers	2.95	1.05
E2	Regular staff training	2.95	0.97
E7	Adequate health infrastructure	2.94	0.94
E13	Effective communication	2.94	0.80
E5	Community participation	2.90	1.09
E3	Adequate funding	2.88	1.06
E12	Cultural beliefs and practices	2.85	0.71
E10	Regular supervision	2.84	0.88
E8	Transportation and road networks	2.83	0.97
E4	Political support	2.83	1.05
E14	Intersectoral collaboration	2.82	0.78
E11	Security in the area	2.79	0.90
E15	Support from the local government authority	2.75	0.88

Source: Field survey (2026). These 15 items were treated as distinct perceived influences and are reported descriptively rather than as a single reflective reliability scale.

4.6 Factors Associated with WHS Implementation

At bivariate level, healthcare workers' knowledge and educational level were significantly associated with implementation. Knowledge showed χ^2=11.642, df=2, p=0.003, while education showed χ^2=9.946, df=1, p=0.002. Ward of practice approached but did not reach the conventional 0.05 threshold (χ^2=16.854, df=9, p=0.051). WDC perception (p=0.095), previous training (p=0.102), age (p=0.228), sex (p=0.195), marital status (p=0.125), profession (p=0.346), place of work (p=0.068) and experience (p=0.818) were not statistically significant at the bivariate level. Several cross-tabulations contained cells with expected counts below five; those chi-square findings should therefore be interpreted cautiously.

Table 10. Chi-Square Tests of Association with Level of Implementation (N=185)

Explanatory factor	χ^2	df	p-value	Decision
Knowledge category	11.642	2	0.003	Significant
WDC perception category	2.780	1	0.095	Not significant
Previous training	2.667	1	0.102	Not significant
Age group	2.958	2	0.228	Not significant
Sex	1.680	1	0.195	Not significant
Marital status	4.165	2	0.125	Not significant
Educational level	9.946	1	0.002	Significant
Profession	6.740	6	0.346	Not significant
Place of work	3.331	1	0.068	Not significant
Experience group	0.931	3	0.818	Not significant
Ward of practice	16.854	9	0.051	Not significant at 0.05

4.7 Multivariable Logistic Regression

The multivariable model was statistically significant overall (χ^2=60.367, df=27, p<0.001) and had a McFadden pseudo-R^2 of 0.25. Because the poor implementation category contained no respondents, the model estimated the odds of high implementation versus moderate implementation. Three variables showed statistically significant independent associations: fair versus good knowledge, tertiary versus postgraduate education, and Ward 4 versus Ward 10. Fair knowledge was associated with lower odds of high implementation (aOR=0.308, 95% CI: 0.130–0.732, p=0.008); tertiary education was associated with lower odds compared with postgraduate education (aOR=0.168, 95% CI: 0.046–0.613, p=0.007); and Ward 4 had markedly lower odds compared with Ward 10 (aOR=0.056, 95% CI: 0.005–0.699, p=0.025). These findings represent adjusted associations and should not be interpreted causally.

Table 11. Logistic Regression of High versus Moderate WHS Implementation (N=185)

Predictor (reference)	B	S.E.	p	Adjusted OR	95% CI
Constant	1.160	1.159	0.317	3.191	0.33–30.92
Knowledge: Poor (vs Good)	−0.341	0.728	0.639	0.711	0.17–2.96
Knowledge: Fair (vs Good)	−1.177	0.441	0.008	0.308	0.13–0.73
WDC: Unfavourable (vs Favourable)	−1.034	0.627	0.099	0.356	0.10–1.22
Training: No (vs Yes)	1.165	0.888	0.189	3.207	0.56–18.29
Age: 30 and below (vs 41+)	−1.123	0.971	0.248	0.325	0.05–2.18
Age: 31–40 (vs 41+)	−0.615	0.490	0.210	0.541	0.21–1.41
Sex: Male (vs Female)	−0.522	0.447	0.242	0.593	0.25–1.42
Education: Tertiary (vs Postgraduate)	−1.785	0.661	0.007	0.168	0.05–0.61
Profession: CHO (vs Other)	1.654	0.946	0.080	5.228	0.82–33.37
Profession: CHEW (vs Other)	1.270	0.694	0.067	3.562	0.91–13.88
Profession: JCHEW (vs Other)	1.272	0.912	0.163	3.567	0.60–21.30
Profession: Nurse (vs Other)	1.777	1.094	0.105	5.909	0.69–50.46
Profession: Doctor (vs Other)	2.113	2.412	0.381	8.272	0.07–935
Profession: Laboratory staff (vs Other)	1.378	0.716	0.054	3.966	0.98–16.12
Place of work: Health post (vs PHC)	1.152	0.699	0.099	3.166	0.80–12.45
Experience: ≤10 years (vs 21+)	0.572	0.802	0.475	1.772	0.37–8.53
Experience: 11–15 years (vs 21+)	1.476	0.805	0.067	4.374	0.90–21.19
Experience: 16–20 years (vs 21+)	0.552	0.703	0.432	1.737	0.44–6.88
Ward 1 (vs Ward 10)	−1.105	0.986	0.262	0.331	0.05–2.29
Ward 2 (vs Ward 10)	−1.141	0.857	0.183	0.320	0.06–1.72
Ward 3 (vs Ward 10)	−0.110	1.016	0.914	0.896	0.12–6.56
Ward 4 (vs Ward 10)	−2.881	1.287	0.025	0.056	0.005–0.70
Ward 5 (vs Ward 10)	−1.458	0.893	0.103	0.233	0.04–1.34
Ward 6 (vs Ward 10)	−1.137	0.843	0.177	0.321	0.06–1.67
Ward 7 (vs Ward 10)	−1.223	0.913	0.181	0.294	0.05–1.76
Ward 8 (vs Ward 10)	−0.489	0.867	0.573	0.613	0.11–3.36
Ward 9 (vs Ward 10)	−0.994	0.865	0.251	0.370	0.07–2.02

Source: Field survey (2026). Model $\chi^2=60.367$, $df=27$, $p<0.001$; McFadden pseudo-$R^2=0.25$. The outcome was high versus moderate implementation because the poor category was empty. OR=adjusted odds ratio.

WDC perception, previous training, sex, age, marital status, place of work, years of experience and the profession categories did not attain statistical significance in the adjusted model. The wide confidence intervals for several profession and ward categories reflect small cell sizes. The absence of an independent training association should also be interpreted in the context of the high prevalence of previous WHS training: 176 of 185 respondents (95.1%) reported previous training.

4.8 Hypothesis Testing

Table 12. Summary of Hypothesis Testing Decisions

Null hypothesis	Key evidence	Decision
$H0_1$: Knowledge has no significant association with implementation	χ^2=11.642, p=0.003; fair knowledge remained significant after adjustment (p=0.008)	Reject $H0_1$
$H0_2$: WDC perception has no significant association with implementation	χ^2=2.780, p=0.095; adjusted p=0.099	Fail to reject $H0_2$
$H0_3$: Previous training has no significant association with implementation	χ^2=2.667, p=0.102; adjusted p=0.189	Fail to reject $H0_3$
$H0_4$: Sociodemographic/occupational characteristics have no significant association with implementation	Educational level was significant in bivariate and adjusted analyses; Ward 4 was significant in the adjusted model	Reject $H0_4$ in part

4.9 Internal Consistency

Table 13. Internal Consistency of the Composite Scales (N=185)

Scale	Items	Coefficient	Interpretation
Knowledge (KR-20)	15	0.33	Low internal consistency; interpret composite cautiously
Level of implementation	14	0.35	Low internal consistency; broad composite
WDC perception	13	0.33	Low internal consistency; broad composite
Influencing factors (formative)	15	−0.03	Distinct formative influences; not treated as a single homogeneous scale

5. Discussion

The study found that healthcare workers in Andoni LGA generally possessed fair to good knowledge of the WHS. More than nine in ten respondents were classified as having fair or good knowledge, and the mean knowledge score was 74.02%. This finding is broadly consistent with the relevance of worker awareness identified by Njelita et al. (2023a), who examined whether health workers in Nigerian local government areas were adequately informed about the Ward Health System. However, the present study adds a more detailed item-level picture by showing specific weaknesses in community participation, maternal/newborn/child health coverage and referral linkage. The pattern supports the thesis literature's argument that knowledge gaps should be identified so that training can be targeted rather than delivered only as general WHS orientation (Njelita et al., 2023a; Ibama et al., 2024).

The implementation findings were more moderate than the knowledge findings. The mean implementation score was 68.90%, and nearly two-thirds of respondents were in the moderate category. The absence of respondents in the poor category should not be interpreted as evidence of uniformly strong implementation because self-reported measures may overestimate actual delivery. The emphasis on implementation fidelity is consistent with implementation-science literature, which distinguishes between whether an intervention exists and the extent to which it is actually delivered as intended (Carroll et al., 2007; Proctor et al., 2011). The weaker performance in community outreach and funding also corresponds with the wider Nigerian literature identifying resource and implementation constraints in primary healthcare facilities

(Ekenna et al., 2020; Sampson et al., 2024).

The significant variation between wards is one of the most practically important findings. Ward 3 recorded the highest mean implementation score, while Ward 4 recorded the lowest. This indicates that implementation is not uniform within the same local government area. The finding is consistent with evidence that implementation performance can vary with contextual, governance and resource conditions rather than following a uniform pattern across facilities (Eboreime et al., 2018; Ekenna et al., 2020). A council-wide mean could therefore obscure the specific wards in need of additional supervision, resources or workforce development.

The finding that 85.9% of workers had favourable perceptions of WDC roles, alongside a lower functionality score, suggests a gap between normative recognition and operational reality. Workers may understand that WDCs are important while observing limited committee activity, resources or supervision. This interpretation is consistent with evidence that community health committees may have promising roles but weak functionality where mandate, capacity, resources and engagement are inadequate (Kesale et al., 2022a; Karuga et al., 2022). It is also consistent with the Rivers State evidence of role confusion and limited supportive supervision of WDCs (Ibama et al., 2024). The lack of a significant association between perception and implementation therefore supports the view that functionality, rather than attitude alone, may be more relevant to service delivery.

Knowledge remained independently associated with implementation after adjustment. Workers with fair knowledge had lower odds of high implementation than those with good knowledge. This finding is consistent with the study rationale and with Nigerian evidence emphasizing the importance of adequate WHS knowledge among health workers (Njelita et al., 2023a). Educational level was also independently associated with implementation, with tertiary-qualified workers having lower odds of high implementation than postgraduate-qualified workers. Because the study is cross-sectional, these relationships should be interpreted as associations rather than effects. Ward 4 also had markedly lower adjusted odds of high implementation than Ward 10, consistent with its lowest observed mean implementation score.

The absence of an independent association with previous training should be interpreted in the context of the very high training prevalence. Because 95.1% of respondents reported previous training, there was limited contrast between trained and untrained workers. The finding should therefore not be read as evidence that training is ineffective; rather, it suggests that generic exposure to training may be insufficient when the remaining knowledge gaps concern specific implementation functions. This interpretation is consistent with the thesis literature emphasizing the need for orientation and training that address community engagement and WDC roles specifically (Ibama et al., 2024).

6. Implications for Policy and Practice

1. Ward-level monitoring should be used to identify and address implementation gaps that are hidden by council-wide averages.
2. Refresher training should focus on community participation, maternal/newborn/child health coverage and referral linkage rather than repeating only general WHS orientation.
3. Supportive supervision should prioritize weak wards, particularly Ward 4, while documenting practices from stronger wards that may be transferable.
4. WDC strengthening should focus on operational functionality, accountability, role clarity and supportive supervision rather than only improving favourable attitudes.
5. Implementation assessments should combine worker self-report with independent facility

observation and routine service records where feasible.

7. Limitations

1. The cross-sectional design limits causal inference.
2. Implementation and WDC functionality were substantially based on worker self-report and may be affected by social desirability or information bias.
3. The study was conducted in one local government area, limiting statistical generalizability to other settings.
4. The high prevalence of previous WHS training reduced variation in the training variable and may have limited its ability to show an independent association.
5. The low internal-consistency coefficients indicate that the knowledge, implementation and WDC perception items were not highly homogeneous. Their composite scores should therefore be interpreted cautiously as broad indices rather than highly unidimensional scales. The influencing-factor block was a formative list of distinct influences, for which internal consistency is not an appropriate psychometric criterion.

8. Contribution to Knowledge

The study provides a facility-based baseline of WHS implementation in Andoni LGA and demonstrates meaningful ward-level heterogeneity within a single riverine local government area. It identifies knowledge, educational level and ward of practice as factors independently associated with high implementation and highlights the distinction between favourable perceptions of WDC roles and weaker reported committee functionality. The findings provide a practical basis for ward-targeted implementation strengthening and for future studies that combine self-reported data with independent observation.

9. Conclusion

Ward Health System implementation in Andoni LGA was predominantly moderate, with no respondent classified as having poor implementation but with substantial differences between wards. Healthcare workers generally demonstrated fair to good knowledge, although important gaps were evident in community participation, maternal/newborn/child health coverage and referral linkage. Knowledge, educational level and Ward 4 practice were independently associated with the odds of high implementation, while WDC perceptions and previous training were not statistically significant in the adjusted model. Strengthening WHS implementation therefore requires more than general training exposure; it requires targeted capacity development, ward-specific supportive supervision, stronger community governance and attention to operational resources for outreach and referral.

10. Recommendations

1. Target Ward 4 and other low-performing wards with intensified supportive supervision and implementation improvement plans.
2. Reorient refresher training toward community participation, maternal/newborn/child health coverage and referral linkage.
3. Strengthen WDC functionality through clear roles, regular meetings, documentation, accountability mechanisms and supportive supervision.
4. Improve financing and operational support for ward health activities, especially community outreach.

5. Use ward-disaggregated implementation indicators in routine monitoring and management reviews.
6. Sustain workforce development and continuing professional education and, where feasible, improve the distribution of highly qualified personnel.
7. Future assessments should triangulate worker reports with direct observation, facility records and community-level evidence.

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