

Assessment of the Role of Health Insurance Schemes in Improving Access to Healthcare in Markets within Adamawa State (A Case Study of Traders in Jimeta Market)

Iyadi, Kingsley C ¹, Otaru, Mary O ² and Evon Ibrahim ³

¹ Centre for Biomedical Research, Technology, and Development, Abuja Nigeria.

*Corresponding Author: iiyadikingsley@gmail.com

² Centre for Biomedical Research, Technology, and Development, Abuja Nigeria.

Email: Asabix236@gmail.com

³ Adamawa State Primary Healthcare Development Agency, Yola, Adamawa State Nigeria.

Email: Ibrahimevon7@gmail.com

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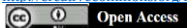
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ABSTRACT

Despite the transition from the voluntary National Health Insurance Scheme (NHIS) to the mandatory National Health Insurance Authority (NHIA) Act of 2022, the informal sector in Nigeria, comprising over 80% of the workforce, remains largely uninsured. In Adamawa State, the Adamawa State Contributory Health Management Agency (ASCHMA) was established to achieve Universal Health Coverage (UHC), yet the transition of market traders from out-of-pocket payers to insured beneficiaries remains a significant challenge. This study assessed the role of health insurance in improving healthcare access among traders in the Jimeta Ultra-Modern Market, Adamawa State, focusing on awareness, enrollment barriers, and the impact of urban renewal activities. A descriptive cross-sectional research design was employed. Using the Taro Yamane formula, a sample of 370 traders was targeted, with 350 valid responses obtained. A multi-stage sampling technique was used to select participants from various market zones. Data were collected via a structured 22-item questionnaire and analyzed using SPSS version 25.0, utilizing both descriptive and inferential statistics. The study reveals a significant "awareness-enrollment gap." While 81.4% of traders are aware of ASCHMA, only 5.3% are actually enrolled in the informal sector health plan. Out-of-pocket (OOP) spending remains the dominant payment mode for 88.7% of respondents, with mean costs per illness episode ranging from N3,820 to N7,863. Financial constraints (85.9%) and a lack of institutional trust (58.3%) are the primary barriers to uptake. Furthermore, the 2024 Jimeta market demolition exercise exacerbated health vulnerabilities, with 74.3% of traders reporting increased medical expenses due to demolition-related environmental hazards. The role of health insurance in improving access for Jimeta traders is currently more theoretical than actualized. Liquidity constraints and systemic disruptions like urban renewal further hinder enrollment. It is recommended that ASCHMA implements a "micro-premium" installment model (e.g., N250 daily) through market unions and integrates social health protection clauses into urban development policies to mitigate "planning blight".

Introduction

The global pursuit of Universal Health Coverage (UHC) is rooted in the principle that all individuals should access essential health services without facing financial ruin. In the Nigerian context, this journey has been characterized by significant legislative shifts and systemic hurdles that have historically favored the formal employment sector while leaving the vast majority of the population vulnerable. For decades, the primary mechanism for health financing was the National Health Insurance Scheme (NHIS), established under Act 35 of 1999 (NHIA, 2022). Although the NHIS was intended to provide a pathway to affordable care, its implementation was marred by a voluntary participation model that failed to capture more than 5% to 10% of the population, primarily federal civil servants (Buhari,

2022). This limited reach meant that for the average Nigerian, particularly those operating in the informal economy, healthcare remained a commodity purchased through out-of-pocket (OOP) payments at the point of service (World Bank, 2022).

The reliance on out-of-pocket spending is recognized as the single greatest obstacle to achieving health equity in sub-Saharan Africa. In Nigeria, statistics indicate that approximately 70% to 90% of total health expenditure is funded directly from the pockets of citizens (The Guardian, 2024). Such high levels of direct payment frequently lead to catastrophic health expenditures, where a single medical emergency can push a household below the poverty line (Aregbesola & Khan, 2018). Recognizing the insufficiency of the 1999 Act, the Nigerian government enacted the National Health Insurance Authority (NHIA) Act in May 2022 (NHIA, 2022). This new legislation marked a paradigm shift by making health insurance mandatory for every citizen and legal resident, while also establishing the Vulnerable Group Fund (VGF) to provide subsidies for the indigent and those in the informal sector (Ajala-Damisa & Agbaoye, 2022).

Adamawa State has been at the forefront of domesticating these national reforms through the establishment of the Adamawa State Contributory Health Management Agency (ASCHMA). Launched in 2020, ASCHMA was designed to serve as the state's vehicle for achieving UHC by providing a structured framework for both formal and informal sector workers to pool risks and resources (Ujulu, 2026). The agency's mandate is particularly critical in urban centers like Jimeta, where the economic lifeblood is dominated by a bustling population of market traders. The Jimeta Ultra-Modern Market, rebuilt in 2009 with over 3,500 shops, represents a major hub of the informal economy in Yola, the state capital (Attah et al., 2019). Despite the presence of ASCHMA, the transition of these traders from out-of-pocket payers to insured beneficiaries remains a complex challenge influenced by income volatility, trust in government institutions, and the physical environment of the marketplace (Johnson et al., 2025).

The socio-economic landscape of Jimeta is further complicated by recent urban renewal efforts. In August 2024, the state government conducted a massive demolition exercise in the Jimeta market area to restore the original master plan and alleviate congestion (Dabari, 2025). While aimed at infrastructure improvement, this exercise disrupted the livelihoods of thousands of traders and created new public health risks due to the mismanagement of demolition waste and the destruction of sanitation facilities (Bakare & Yusuf, 2023). In this environment of heightened health risk and economic instability, the role of a functional health insurance scheme becomes not just a matter of health policy, but a critical tool for socio-economic resilience. This study evaluates how ASCHMA and other health insurance initiatives are performing in their role of improving healthcare access for the resilient but vulnerable trading population of Jimeta.

The fundamental problem facing the healthcare system in Adamawa State is the persistent gap between the theoretical availability of health insurance and its practical utilization by the informal sector. Despite the enactment of the mandatory NHIA Act of 2022, nearly 97% of Nigerians remain uninsured, leaving them exposed to the high costs of private and public care (The Guardian, 2020). For the traders in Jimeta Market, this lack of financial protection is a constant threat. These individuals operate in an environment where daily income is unpredictable, yet the health risks associated with their occupation ranging from respiratory infections due to environmental dust to communicable diseases caused by poor market sanitation are consistently high (Sakiyo et al., 2020).

A critical manifestation of this problem is the "catastrophic health expenditure" cycle. Research in Yola North indicates that over 50% of households earn less than N360,000 annually, a figure that is often insufficient to cover the costs of a single major illness without resorting to selling property or borrowing from relatives (World Bank, 2023). Approximately 72% of people in the region report that the amount of money they have at hand determines whether and where they seek healthcare, often

leading to delayed treatment or reliance on substandard patent medicine vendors (Kakwagh, 2018). This "cash-and-carry" health system reinforces poverty and hinders the economic growth of the trading class.

Furthermore, the recent demolition of the Jimeta Shopping Complex and other "illegal" structures in 2024 has exacerbated the problem by creating an "occupational health emergency" (Bakare & Yusuf, 2023). The demolition generated significant unmanaged construction waste, leading to practices such as open burning and dumping, which have worsened air quality and led to a spike in respiratory ailments among traders operating in the periphery of the rubble (Adebowale & Tanko, 2024). Simultaneously, the destruction of basic urban services like market toilets and public water access has forced traders to incur higher costs for these services while their revenue streams were already fractured by the demolition (Ajayi, 2024).

Operational failures within the insurance scheme itself also contribute to the problem. In Adamawa, enrollees in the state scheme have reported "broken" digital systems that fail to generate service codes, forcing them to pay out-of-pocket despite being registered (HuMangle Media, 2025). This breakdown in the technology intended to facilitate UHC undermines public trust and discourages new enrollment among the informal sector. There is a profound "knowledge and trust deficit," where 60% of residents believe the government cannot be trusted to maintain its end of the insurance bargain (Mustapha Kurfi et al., 2023). Without addressing these systemic and operational barriers, the ASCHMA health plans remain largely underutilized by the very market traders who need them most.

This study is justified by the urgent need to assess the effectiveness of health financing reforms in reaching the "missing middle" of the Nigerian economy the self-employed traders. While the formal sector is easily captured through payroll deductions, the informal sector requires a more nuanced, research-driven approach to enrollment (Aregbesola & Khan, 2018). Understanding the specific barriers faced by Jimeta traders whether they are financial, cultural, or operational is essential for ASCHMA to refine its strategies and fulfill its mandate of protecting 250,000 residents by 2026 (Ujulu, 2026).

The study also provides critical evidence for the intersection of urban planning and health policy. The 2024 Jimeta market demolition represents a significant "shifter" in the health needs of the population. By documenting the health consequences of urban disruption and the failure of existing insurance mechanisms to mitigate these risks, this research advocates for the integration of social protection measures into urban renewal projects (Bakare & Yusuf, 2023). It also highlights the importance of environmental justice, ensuring that the burden of urban redevelopment does not fall disproportionately on the health of marginalized traders (Folami & Adekola, 2023).

Finally, the study is justified by its alignment with the Sustainable Development Goals (SDG 3.8), which aim for universal health coverage. By evaluating the performance of a state-level agency (ASCHMA) using a local case study (Jimeta), this research contributes to the national body of knowledge on how to successfully domesticate health reforms in a way that is sensitive to the unique demographic and economic realities of Northern Nigeria (Essien, 2025). The findings will assist policymakers in Adamawa to transition from a pilot-phase mentality to a sustainable, universal system.

The significance of this study lies in its multi-layered impact on policy, practice, and community welfare. For the Adamawa State Government and the leadership of ASCHMA, the study provides a diagnostic assessment of current enrollment bottlenecks. By identifying that only a negligible number of informal sector traders are currently enrolled compared to thousands in the formal sector, the research underscores the need for "union-based" enrollment models and more flexible premium payment systems (Ujulu, 2026). The study highlights that the standard annual premium of N12,000 often exceeds the willingness-to-pay of the average trader, suggesting a need for more affordable, installment-based options (Nigeria Health Watch, 2025).

For healthcare providers in Jimeta and Yola, the study illuminates the reasons behind the low utilization of formal clinics and the high reliance on self-medication. By pointing out that long waiting times and perceived poor staff attitudes discourage patronage, the research provides a roadmap for quality-of-care improvements (Johnson et al., 2025). It also emphasizes the importance of the referral system, showing that strengthening the link between Primary Healthcare Centers (PHCs) and Specialist Hospitals is vital for handling the chronic respiratory issues resulting from the recent market demolitions (ASCHMA, 2024).

For the traders, the study serves as an advocacy tool. It articulates the hidden costs of urban renewal such as the N7,863 mean out-of-pocket expense per illness episode—and links these costs to the need for better government support (Bakare & Yusuf, 2023). Ultimately, the study aims to empower the Jimeta trading community by demonstrating how a functional, transparent health insurance scheme can protect their livelihoods and ensure their health is not a secondary concern to their economic survival.

Aim/objectives

The primary aim of this research is to evaluate the impact and role of health insurance schemes in enhancing healthcare access for traders in the Jimeta Market, Adamawa State. To achieve this, the following specific objectives have been established:

- To determine the socio-economic profile and common health challenges of traders in the Jimeta Ultra-Modern Market.
- To assess the level of awareness and enrollment rates of these traders in the ASCHMA health insurance plans and other pre-payment schemes.
- To analyze the prevailing health-seeking behaviors and the extent of out-of-pocket spending among Jimeta traders.
- To identify the systemic, economic, and cultural barriers that hinder the adoption and effective use of health insurance among the informal sector in Jimeta.
- To evaluate the effect of the 2024 urban renewal and demolition exercise on the health status and financial health-seeking burden of the market community.
- To propose evidence-based strategies for ASCHMA to improve its outreach and service delivery to market traders and other informal sector participants.

Research questions

The study was guided by the following key research questions:

- What are the predominant socio-economic characteristics (income, education, household size) of the traders in Jimeta Market?
- To what degree are market traders in Jimeta aware of the existence and benefits of the Adamawa State Contributory Health Management Agency (ASCHMA)?
- How much do Jimeta traders currently spend out-of-pocket for common illnesses such as malaria, typhoid, and respiratory infections?
- What specific operational and financial factors prevent traders from enrolling in the "Informal Sector Health Plan" offered by ASCHMA?
- In what ways has the 2024 Jimeta market demolition affected the environmental health risks and the medical expenses of the affected traders?
- What payment models or community-based approaches would most effectively encourage traders to participate in a contributory health scheme?

Methodology

Study Area

The study was conducted at the Jimeta Ultra-Modern Market (JUMM), which is the largest commercial hub in Adamawa State, Nigeria. The facility is located in Jimeta, the administrative and

commercial heart of the Yola North Local Government Area (LGA). Jimeta is a rapidly growing metropolitan area situated approximately 5 kilometers northwest of the old Yola town and lies on the south bank of the Benue River. The market, commissioned in March 2009, covers a significant area and originally contained approximately 1,840 lock-up shops, 1,940 open stalls, and 54 warehouses, along with essential utilities such as a clinic, fire station, and police posts.

Study Design

This study adopted a descriptive cross-sectional research design. In this design, individuals from the trading community are sampled and subjected to predetermined uniform questions via questionnaires at a specific point in time. This design is appropriate for determining the distribution of socio-economic characteristics, health-seeking behaviors, and health insurance utilization patterns among the target population of market traders.

Study Population and Eligibility

The study population consisted of all adult traders operating within the Jimeta Ultra-Modern Market, including both those in formal lock-up shops and those in informal/squatter attachments. Participants were eligible if they were 18 years and above and had actively traded in the market for at least six months. This population was selected because traders represent the core of the informal sector in Adamawa and are the primary decision-makers regarding household healthcare financing and insurance enrollment.

Sample Size Determination

To ensure that the study findings were statistically representative of the population of traders in Jimeta, the Taro Yamane formula for finite populations was utilized to determine the minimum required sample size (n) (Yamane, 1967). The formula is given as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- n = Sample size
- N = Total population (The total estimated population of traders in JUMM is approximately 5,000, based on records of over 3,500 formal shops and previous occupancy assessments.
- e = Margin of error, set at 0.05 (providing a 95% confidence interval). Based on this formula, a minimum sample size of approximately 370 participants was required for statistical significance.

Sampling Technique

A multi-stage sampling technique was employed for this study to ensure representative coverage of the diverse trading groups in the market

- **Stage 1:** Purposive sampling was used to categorize the market into functional zones (e.g., Foodstuffs, Textiles, Electronics, and General Goods).
- **Stage 2:** A systematic random sampling technique was then used to select specific stalls within these zones. Every fifth stall was approached, and if the owner met the inclusion criteria, they were invited to participate.
- **Stage 3:** If a stall was managed by multiple partners, a "balloting" or "yes/no" method was used to select one respondent. This method was chosen for its transparency and effectiveness in reducing selection bias among the diverse group of attendees.

Instrument of Data Collection

The primary instrument for data collection was a self-structured, 22-item questionnaire developed by the researcher based on the specific research objectives and a comprehensive review of literature on health insurance and healthcare access in Nigeria. The questionnaire was divided into four distinct sections:

- **Section A: Socio-Demographic Data:** Contained items capturing the trader's age, gender, educational level, monthly income, and household size.
- **Section B: Knowledge of Health Insurance (ASCHMA):** Assessed awareness of the Adamawa State Contributory Health Management Agency, knowledge of benefits (e.g., surgical coverage), and the mandatory nature of the NHIA Act.
- **Section C: Attitude and Perception:** Explored perceptions of government trust, perceived effectiveness of the scheme, and willingness to pay (WTP) for premiums.
- **Section D: Healthcare Access and Practices:** Focused on actual behaviors, including primary treatment sites (e.g., hospital vs. chemist), out-of-pocket (OOP) costs per episode, and the impact of the 2024 demolition on health costs.

Validity and Reliability of the Instrument

The face and content validity of the questionnaire were established through review by a panel of experts in public health and health economics from the Ministry of Health and the Adamawa State Contributory Health Management Agency. To ensure reliability, a test-retest technique was applied to 20 traders at the neighboring Yola Town Market (a facility with similar demographics). The results of two administrations, spaced one week apart, were analyzed confirming the stability of the instrument.

Data Collection Procedure

Data collection took place on-site at the Jimeta Ultra-Modern Market over a period of four consecutive weeks in 2026. Research assistants distributed questionnaires to selected participants after obtaining informed consent. Respondents were given adequate time to fill out the forms, and for those with limited literacy, the assistants provided interviewer-administered support to ensure accuracy and a high response rate.

Data Analysis

Statistical analysis of the collected data was performed using the Statistical Package for Social Sciences (SPSS) version 25.0. Frequency counts and percentages were used to summarize the socio-demographic profiles and healthcare cost metrics

Ethical Approval

Ethical clearance for the study was sought and obtained from the Adamawa State Health Research Ethics Committee (ASHREC), with further permission granted by the Ministry of Commerce and the leadership of the Jimeta Modern Market Traders' Association. Participants were fully informed about the voluntary nature of the research and were assured of confidentiality and anonymity through the use of numerical codes rather than names on all questionnaires. A staff of Adamawa State Primary Healthcare Development Agency was assigned to this study to enhance community entrance and boost the confidence of respondents.

Results

Findings from this study are presented in tables and charts for clarity as indicated below;

Analysis of Demographic Data

A total of 370 questionnaires were distributed among the traders. After retrieval and screening, 350 questionnaires were found valid and were used for the analysis, representing an effective response rate of 94.6%. Table 1 summarizes the demographic characteristics.

Table 1: Demographic Characteristics of Respondents (N = 350)

Demographic Variable	Frequency (f)	Percentage (%)
Age (years)		
20–29	70	20.0
30–39	123	35.1



40–49	99	28.3
50+	58	16.6
Gender		
Male	256	73.1
Female	94	26.9
Years of Trading		
<1 year	33	9.4
1–5 years	131	37.4
6–10 years	103	29.4
>10 years	83	23.7
Highest Educational Qualification		
None/Primary	128	36.6
Secondary	185	52.9
Tertiary	37	10.6
Monthly Income (Estimated)		
< N30,000	189	54.0
N30,000 – N60,000	115	32.9
> N60,000	46	13.1

The majority of respondents were aged 30–39 years (35.1%), followed by those aged 40–49 years (28.3%). Only 16.6% were aged 50 years and above, indicating that the trading community in Jimeta is relatively young to middle-aged. This demographic profile suggests an active workforce that is likely to be the primary breadwinners for large households (Johnson et al., 2025). The study recorded significantly more male respondents (73.1%) than female respondents (26.9%), reflecting the traditional male dominance in large-scale market trading in Northern Nigeria (Attah et al., 2019). While women are present in the market, they often operate in smaller stalls or as squatter traders, which may affect their ability to pay insurance premiums consistently.

A significant portion of respondents had 1–5 years of experience (37.4%), while 29.4% had 6–10 years and 23.7% had over 10 years. This indicates a stable and permanent trading community that is well-embedded in the market's socio-economic fabric, making them an ideal target for community-based insurance enrollment through their unions (Ujulu, 2026). Also, more than half of the respondents (52.9%) had a secondary education, while 36.6% had primary or no formal education. Only 10.6% held tertiary degrees. Higher educational attainment is often a predictor of health insurance awareness, suggesting that the lower education levels in the market may require more simplified and localized communication strategies (Mustapha Kurfi et al., 2023).

Over half of the traders (54.0%) earned less than N30,000 monthly, matching the "working poor" profile identified in broader Adamawa surveys (World Bank, 2023). This low and often volatile income is the primary hurdle to the current annual premium payment model of ASCHMA.

Analysis of Research Objectives

Objective 1: Knowledge of the ASCHMA Health Insurance Scheme

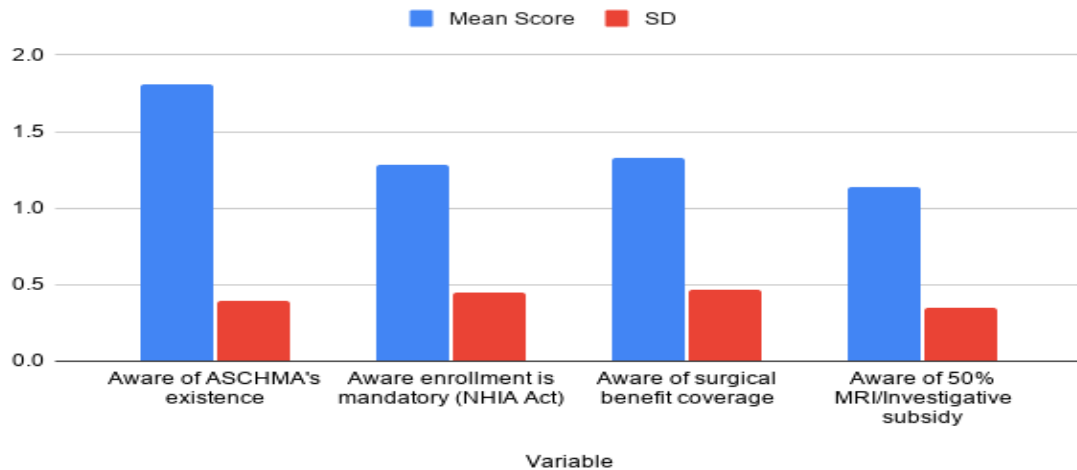


Chart 1: Knowledge of the ASCHMA Health Insurance Scheme

Awareness of ASCHMA's existence was high at 81.4%, reflecting the agency's recent grassroots sensitization campaigns. However, the depth of knowledge was poor; only 33.4% knew that surgical procedures were covered, and a mere 14.3% were aware of high-tech investigation subsidies. The low awareness of the "mandatory" nature of the scheme (28.6%) indicates a gap in public understanding of the 2022 NHIA Act.

Objective 2: Attitude Toward Health Insurance

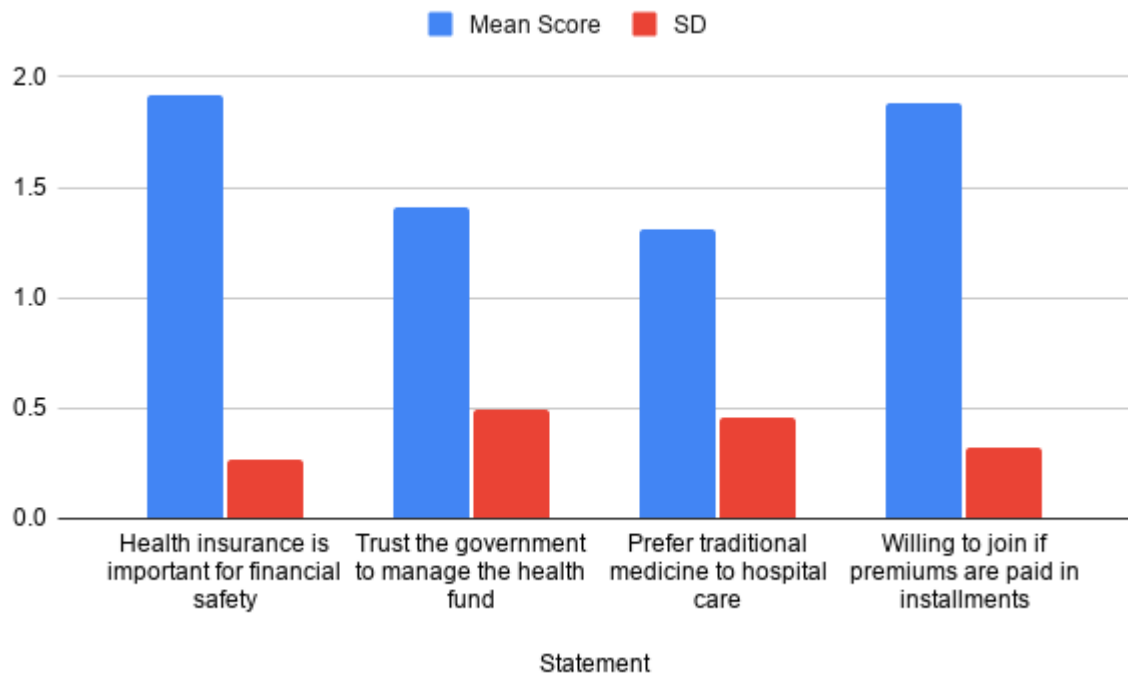


Chart 2: Attitude Toward Health Insurance

Traders overwhelmingly recognized the value of insurance for financial safety (92.3%). However, a significant "trust deficit" was observed, with only 41.7% trusting the government to manage the fund transparently. The strong support for installment-based payments (88.5%) confirms that the "liquidity constraint" is a major psychological and financial barrier.

Objective 3: Practice and Utilization of Healthcare Services

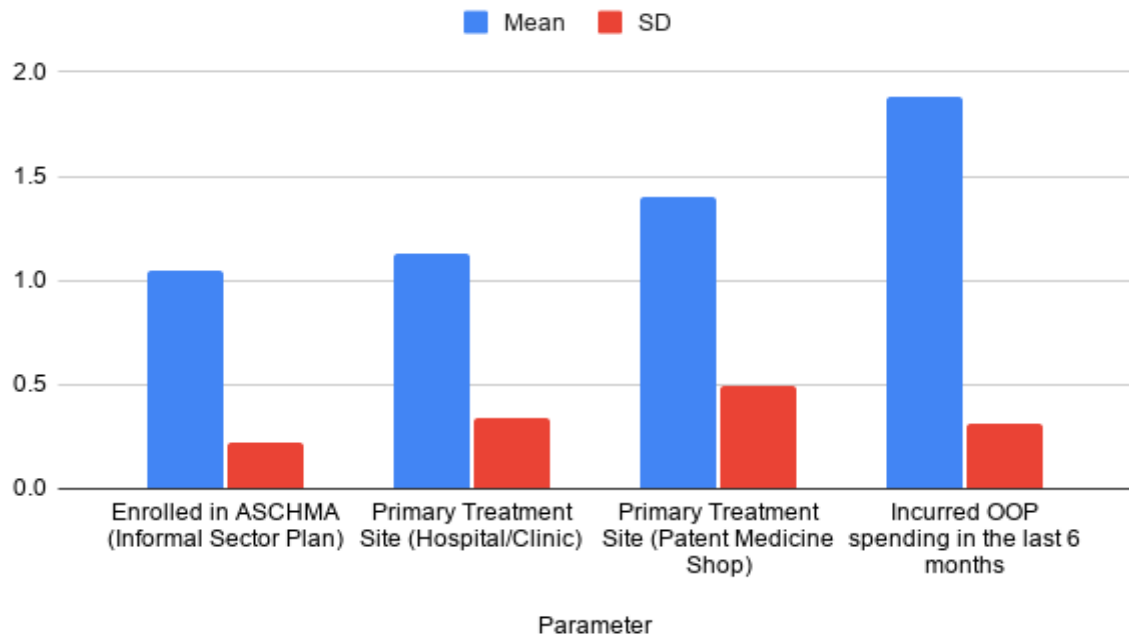


Chart 3: Practice and Utilization of Healthcare Services

The actual enrollment in ASCHMA among the informal sector was extremely low at 5.3%, contrasting sharply with the formal sector. Most traders still patronize patent medicine vendors (40.4%) or traditional healers, driven by the high cost of hospital services (53.0%) and long waiting times (28.5%).

Objective 4: Factors Associated with Utilization and Barriers

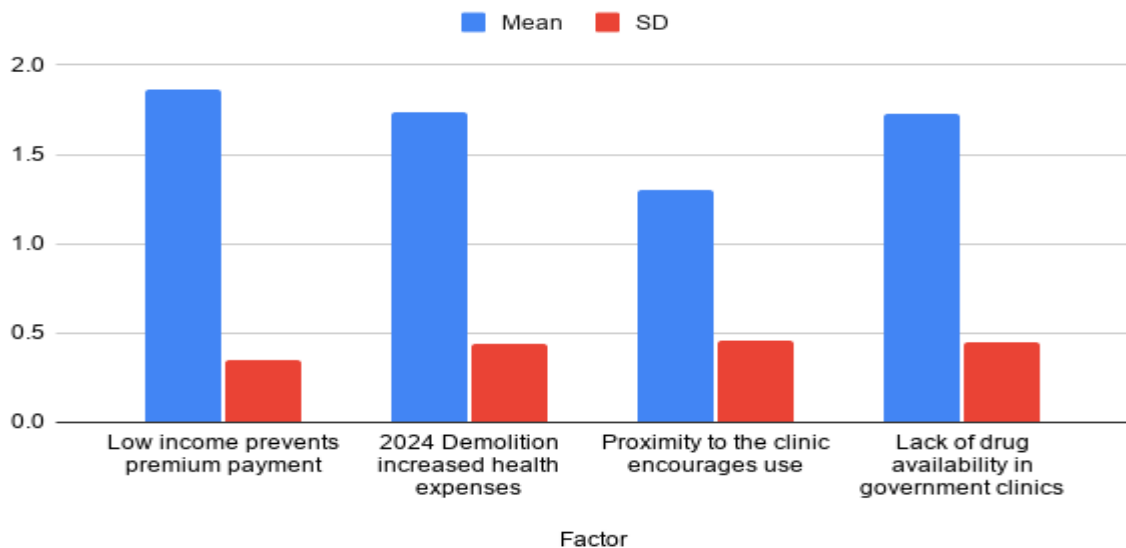


Chart 4: Factors Associated with Utilization and Barriers

The primary factor hindering insurance utilization is financial capacity, with 85.9% citing low income. Additionally, the 2024 Jimeta market demolition was identified as a major stressor, with 74.3% agreeing that the resulting environmental hazards increased their medical bills. Perceived drug stockouts (72.8%) further discourage enrollment, as traders fear paying for insurance only to be forced to buy medications out-of-pocket anyway.

Discussion

The study findings reveal a profound disconnect between administrative awareness and practical enrollment. While 81.4% of the traders are aware of ASCHMA's existence, the 5.3% enrollment rate

confirms that knowledge of a scheme does not automatically translate into participation for the informal sector. The interpretation of this gap lies in the "liquidity constraint" experienced by traders; 54.0% earn less than N30,000 monthly, meaning the annual lump-sum premium competes directly with basic survival needs like food and rent for large households.

The study also explains the high reliance on out-of-pocket (OOP) payments (88.7%) as a result of the perceived unreliability of formal health systems. Traders prefer patent medicine vendors (PMVs) (40.4%) because they offer instant service without the "administrative friction" of service codes and hospital queues. Furthermore, the 2024 demolition exercise in Jimeta acted as a socio-economic catalyst that increased medical burdens (74.3% agreement) while simultaneously fracturing the income streams of the very people who remained uninsured.

The results align with regional trends where poverty and trust deficits are the primary killers of health insurance uptake. The Jimeta enrollment rate (5.3%) mirrors findings in Abia State (5.3%) and Osun State (10.5%), where informal workers also cited irregular income as the main deterrent.

The preference for PMVs (40.4%) matches Johnson et al. (2025) in Uyo and Kakwagh (2018) in Kogi, where high orthodox care costs and poor staff attitudes drove traders to informal providers. Additionally, the validation of the "planning blight" framework in Jimeta confirms Bakare & Yusuf's (2023) theory that urban renewals without social protection create localized public health disaster zones due to waste burning and dust-induced respiratory ailments.

The primary inference is that the "working poor" in Adamawa are not unwilling to join health insurance (88.5% willingness for installments) but are systematically excluded by the current rigid payment structure. Furthermore, the study infers that the 2024 demolition created an "occupational health emergency" that shifted the health profile of the market toward respiratory infections, skin ailments, and increased clinical demand. Without a robust referral and drug supply system, insurance enrollees in the market are likely to face "insurable poverty"—where they pay premiums but still incur OOP costs for drugs due to stockouts.

Conclusion

The study concludes that the current health insurance implementation in Adamawa remains heavily skewed toward the formal sector. For market traders, ASCHMA is currently a "potential safety net" that fails at the point of delivery due to affordability gaps and systemic breakdowns in the digital verification process. The 2024 Jimeta demolition exercise proved that state-led infrastructure projects can inadvertently worsen health indices if not paired with temporary equity-fund subsidies for the displaced trading population. Universal Health Coverage in Jimeta will remain an elusive goal until the insurance model aligns with the daily cash-flow and environmental reality of the marketplace.

Based on the findings of this study, the following recommendations are suggested;

1. **Longitudinal Study on Demolition Health Effects:** Future research should track the long-term respiratory and skin ailment trends among Jimeta traders post-demolition to quantify the "planning blight" health cost.
2. **Actuarial Assessment of "Micro-Premiums":** Research is needed to determine the viability of a N250 daily premium model for the Adamawa informal sector based on market union collection structures.
3. **Impact of Digital Redundancy:** Studies should evaluate how "offline" QR-code verification (manual backups) affects patient satisfaction and enrollment retention in areas with poor connectivity.

Contributions to Knowledge

1. **Evidence of "Renewal-Induced Vulnerability":** This study provides novel empirical data linking urban market demolition directly to increased out-of-pocket medical expenditure for informal traders.

2. **Informal Sector Benchmarking:** The research contributes specific enrollment and awareness metrics for Northern Nigerian urban markets, providing a baseline for ASCHMA's 2026 UHC targets.

3. **Validation of the Installment Model:** By quantifying the 88.5% willingness to join via installments, the study provides a policy-ready justification for a shift in premium collection strategy.

Study Limitations

1. **Cross-Sectional Nature:** The study only captures a "snapshot" of the post-demolition phase and cannot account for seasonal variations in illnesses (e.g., malaria spikes in the rainy season).

2. **Recall Bias:** Respondents may have overestimated or underestimated their out-of-pocket medical expenses over the six-month recall period.

3. **Limited Geographic Scope:** The findings are specific to the Jimeta Ultra-Modern Market and may not reflect the socio-economic realities of smaller, more rural markets in Adamawa State.

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Conflicts of interest

The authors declare that they had no conflicts of interest to report

Authors' contributions

Iyadi, Kingsley C.: Conceptualization, Methodology, Investigation, Data Collection, Writing and Editing

Otar Mary O.: Investigation, Data Collection and Data Analysis

Evon Ibrahim: Investigation, and Data Collection

Data availability statement

All data supporting the findings of this study are available from the corresponding author upon reasonable request and the permission of the Centre for Biomedical Research, Technology and Development, Abuja, Nigeria.

Institutional review board statement

The study protocol was approved by the Health Research Ethics Committee of Adamawa State Ministry of Health (**ADSMHREC-26/ 1785** approved April January 20th 2026). Approval was also obtained from the Adamawa State Primary Healthcare Development Agency, who also assigned a staff on this study to enhance community entrance and boost Respondents' confidence

Informed consent statement

The study protocol was clearly explained to the respondents and their consent obtained before their participation in the study.

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