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Abstract

Background: In strategic purchasing and gatekeeping arrangements under strategic health insurance schemes, pre-authorisation is used as a mechanism to control access to secondary and tertiary care. A significant proportion of these authorisation codes however go unredeemed or expire, thus indicating a failure of the continuum of care. This study looked at the prevalence and the independent determinants of unused authorisation codes among KSCHMA enrollees in Kano State, Nigeria.

Methods

We carried out a hospital based quantitative cross-sectional study across six LGAs in Kano State (representative of the three senatorial districts). We retrospectively audited 1,200 electronic authorisation records issued to KSCHMA enrollees between 1st September 2025 and 31st August 2026. The primary outcome was authorisation code status (0 = used/redeemed; 1 = unused/expired). Bivariable chi-square tests and a multivariable binary logistic regression model were used to determine the socio-demographic, economic, geographic and health system determinants of code non-utilisation. Adjusted Odds Ratios (aOR) with 95% CIs are reported ($p < 0.05$).

Results

Of the audited e-records (N=1200) the prevalence rate of unused/expired authorisation codes was 31.8%. In the surveyed enrollees, multivariable logistic regression showed that living >10km from the assigned secondary referral centre was associated with an increased odds of code non-utilisation (aOR = 3.42 [95% CI: 2.15 - 5.44], p<0.001), as was facing out-of-pocket costs for unassigned drugs/diagnostics (aOR = 2.89 [95% CI: 1.78 - 4.69], p<0.001), having a delay of >48 hours in receiving the code notification (aOR = 2.14 [95% CI: 1.32 - 3.47], p=0.002) and being in the Vulnerable Group/Equity Scheme (aOR = 1.95 [95% CI: 1.18 - 3.22], p=0.009). The most common personal reason given for voluntarily abandoning the code was that their symptoms had improved prior to their secondary presentation (29.0%).

Conclusions

Almost one in three referral authorisation codes generated under KSCHMA are simply not used, which is a massive amount of friction for the health service and a significant amount of disruption to care. The main reasons for the drop off are geographical distance, surprise out of pocket expenditure at the secondary facility and delays in notification. KSCHMA should therefore de-centralise the secondary care referral networks, reduce the authorisation timeframes through the use of automated SMS and ensure there is a zero out of pocket guarantee on all essential secondary care packages in order to maintain the universal coverage objective.

Keywords: Health utilisation, health insurance, service authorisation, unused authorisation codes, strategic purchasing.

Introduction

Background of the Study

The Kano State Contributory Healthcare Management Agency (KSCHMA) was established under Law No. 3 of 2016 as a key institutional mechanism for achieving Universal Health Coverage (UHC) in Kano State [1]. It has a number of schemes in operation, namely the Formal Sector Scheme, the Informal Sector Scheme and the Vulnerable Group / Basic Health Care Provision Fund (BHCPF) Equity Programmes which are all designed to pool risk and ensure access to quality care for all [2].

Under the KSCHMA operational guidelines the referral and strategic purchasing process is a gatekeeping process [2,3]. The PHC is the first point of contact. Where a patient requires secondary or tertiary level specialist care, diagnostic procedures or non-capitated surgical intervention the referring facility will obtain an authorisation code (pre-authorisation approval) from the Standard and Quality Assurance/Claims Management departments of KSCHMA [3,4]. That authorisation code is the financial clearance which enables the receiving secondary/tertiary facility to be paid on a fee for service basis [4,5].

An increasingly apparent administrative and public health bottleneck within the KSCHMA system is the sheer number of authorisation codes that are not used. KSCHMA will generate a pre-authorisation for secondary care, but the patient will not go on to access or complete the service at the referred facility within the validity period of the code [4]. Unused authorisation codes are a major disruption to the continuum of care. If the patient abandons care after authorisation, their condition will inevitably deteriorate resulting in emergency presentation, higher long term treatment costs and increased risk of morbidity and mortality. At a systemic level they will also distort KSCHMA's financial forecasting, represent a significant waste of admin effort and are an indicator of friction within the health system [4,6]. KSCHMA has moved to a fully digital authorisation portal but there remains a paucity of evidence as to the patient level, institutional, economic and geographic factors which drive the abandonment of authorisation codes by patients in Kano State. This is the study we are conducting.

Research Objectives

This study is designed to determine the determinants of unused authorisation codes among Kano State Contributory Healthcare Management Agency (KSCHMA) enrollees in Kano State, Nigeria. It is a cross-sectional study which will: estimate the prevalence of unused authorisation codes issued by KSCHMA over the 12 month period; assess the association between enrollees' sociodemographic characteristics (age, gender, income, level of literacy and location) and non-utilisation of authorisation codes; assess the facility

level and health system level determinants (distance to referral facilities, availability of diagnostic services and operational delays) that may be associated with the utilisation of authorisation codes; and determine the independent predictors of authorisation code non-utilisation among KSCHMA enrollees using multivariable regression analysis.

Methods

Study Design

This was a retrospective analytical cross-sectional study which looked at KSCHMA electronic authorisation records over a 12-month period and included telephone interviews with the appropriate cohort of enrollees. The review of the retrospective records was used to determine the prevalence of unused authorisation codes and to examine the distribution of these across enrollee sociodemographic and healthcare related characteristics. Telephone interviews were also conducted to gather further information on patient level, facility level and health system level factors which may be associated with the non-utilisation of authorisation codes.

Study Setting and Population

- **Setting:** Kano State, Nigeria (44 LGAs in the Kano Central, Kano North and Kano South senatorial districts).

Target population: All individuals enrolled in the KSCHMA under the formal, informal and equity health insurance schemes and who had authorisation codes issued for referral to secondary and tertiary care in Kano State during the 12-month study period. This included those who did in fact redeem their authorisation codes and go on to access the services in question and those who did not redeem their codes (i.e. codes which were unused, expired or otherwise not redeemed within the period). The KSCHMA electronic authorisation database was the sampling frame and we contacted all eligible enrollees with unused codes for telephone interviews using a structured questionnaire to obtain further information on the factors which influenced the utilisation or non-utilisation of the authorisation codes.

Eligibility Criteria

Inclusion Criteria

1. All KSCHMA enrollees (under the formal, informal and equity schemes) who were issued authorisation codes for secondary and tertiary healthcare referrals over the 12-month study period (regardless of whether they actually used the codes).
2. Enrollees whose authorisation records had sufficient information to establish their utilisation status.

Exclusion Criteria

1. Enrollees were issued authorisation codes for the emergency procedures which were carried out immediately, with authorisation granted retrospectively (post hoc authorisation).
2. Enrollees who died prior to them being able to access the intended referral services.
3. Records where it's not possible to determine whether the authorisation code has been used.

Sample Size Determination

For the retrospective records review we used a consensus approach. The analysis included all KSCHMA authorisation codes issued to eligible enrollees in the selected LGAs over the 12-month study period. No formal sample size calculation was therefore required for the retrospective component. For the telephone interview component all enrollees who had unused authorisation codes during the study period were contacted and interviewed using a standardised questionnaire to gather further information on patient level, facility level and health system factors which may have contributed to the non-utilisation of authorisation codes. A census approach was therefore also used for the telephone interview component.

Sampling Technique

A **multi-stage stratified sampling technique**

1. **Stage 1 (Senatorial Stratification):** Stratification into Kano Central, Kano North and Kano South.
2. **Stage 2 (LGA Selection):** 2 LGAs randomly selected from each senatorial zone (6 LGAs in total).
3. **Stage 3 (Facility Selection):** The primary referring facilities and their respective secondary/tertiary referral hospitals were identified (e.g. Murtala Muhammad Specialist Hospital, Abdullahi Wase Teaching Hospital and the zonal general hospitals).

4. **Stage 4 (Participant Sampling):** A full census of all the KSCHMA authorisation logs was carried out and participants were then selected consecutively. Those with unused codes were telephoned to ask why they had not used the codes that had been provided.

Data Collection Instruments & Procedure

1. **Secondary Electronic Record Audit:** KSCHMA database was reviewed and codes extracted for issue date, clinical diagnosis, referring specialty, scheme category, code validity period and redemption timestamp.
2. **Structured interviewer administered questionnaire: m**odules extracted and assessed socio-demographic status, direct non-medical costs, service quality and perceived health improvement of participants with unused authorisation codes via telephone calls.

Variables

- **Dependent Variable:** Authorisation Code Status (Binary: 0 = Used/Redeemed within validity window and 1 = Unused/Expired)
- **Independent Variables:**
- *Socio-demographic:* age, sex, marital status, education, occupation, monthly income, scheme type.
- *Geographic/Financial:* travel distance to referral facility (km), transport fare (NGN), out of pocket expenditure on non-covered items.
- *System/process:* Code delivery method (SMS/paper), delay in code release from KSCHMA, referral facility type (public vs private accredited), queue length.

Data Analysis

- **Descriptive analysis: w**e cleaned, coded and analysed the data using SPSS (IBM) Version 26. Categorical variables were described and summarised using frequencies and percentages and continuous variables using means (SD) and medians (IQR) for both enrollee profiles and estimated prevalence of unused code.
- **Bivariable analysis: w**e assessed the associations between categorical variables using Chi-square tests and between continuous variables using Independent Samples t-tests / Mann-Whitney U tests to compare the "Used" and "Unused" code groups.
- **Multivariable analysis: a** binary logistic regression model was used to identify the independent predictors of code non-utilisation. Variables which achieved $p < 0.20$ in the bivariate analysis were then entered into a multivariable binary logistic regression model to identify the independent predictors of code non-utilisation. Multicollinearity between the predictors was assessed using Variance Inflation Factors (VIF) with all VIFs remaining below 2.5. Goodness of fit was assessed using the Hosmer-Lemeshow test. Adjusted Odds Ratios (aOR) with 95% Confidence Intervals (CI) are reported, with statistical significance defined as $p < 0.05$.

Ethical Considerations

- **Ethical Approval:** The protocol was submitted to the Kano State Health Research Ethics Committee and approval was obtained with approval number NHREC/17/03/2018 Reference number SHREC/2026/8961.
- **Administrative approval** was also obtained from the Executive Secretary and KSCHMA management.
- **Informed consent (either written or thumbprint)** was obtained from all survey participants prior to the interview.
- **Data anonymity and confidentiality: i**dentification numbers were used in place of names. All database extracts were stripped of any personally identifiable information and confidentiality was maintained.

Results

A total of 1,200 enrollee records were audited. The mean age of the respondents was 36.4 (SD 11.2) and 58.3% (n=700) were female. 41.2% (n=494) of the enrollees were under the Formal Sector Plan, 31.6% (n=379) were under the Informal Sector Plan and 27.2% (n=326) were under the Vulnerable Group Equity Scheme (**Figure 1).** Of the 1,200 retrospectively audited electronic records, 382 codes were still unredeemed at the end of their 14-day validity window, giving an overall prevalence of 31.8% of unredeemed authorisation codes in Kano State. The rate of non-utilisation was highest in Kano South (38.5%) and Kano North (36.0%) as compared to urban Kano Central (25.5%, $p<0.001$) **(Figure 2).**

<<Insert figure 1 and 2>>

Table 1 compares the sociodemographic, socioeconomic and health care related characteristics of those who did use their authorisation codes (n=818) with those who did not (n=382). There was no significant association between gender and authorisation code use (p=0.203). Monthly income was however significantly associated with use (p=0.003) with a much higher proportion of non-users among those earning ₦70,000 or less (68.6%). Scheme category, distance to the secondary referral centre, notification delay and out of pocket expenditure were all significantly associated with authorisation code use.

<<Insert Table 1>>

Primary Reasons for Code Non-Utilization

Table 2: Revealed among respondents with unused codes (n = 382), the primary self-reported reasons for non-utilisation included:

- Perceived improvement in symptoms following initiation of PHC medication prior to attending a specialist centre (29.0%, n=111).
- High cost of transport to the assigned referral facility (23.9%, n = 91).

- Unexpected demands for out-of-pocket cash payments at the secondary hospital for unassigned non-drug consumables (18.1%, n=70).
- Code delivery delays resulting in expiry prior to the intended hospital visit (14.5%, n=55).
- Deterrence through long waiting times and negative attitudes of the providers at the referring hospitals (14.5%, n = 55).

<< Insert Table 2>>

Multivariable Determinants of Unused Authorisation Codes

The multivariable binary logistic regression model fitted well (Hosmer and Lemeshow chi-square = 6.41, p = 0.601). The VIF indicated that the predictor variables had no or only modest correlation with each other and can be safely disregarded. After adjustment for potential confounders, four independent risk factors were found to significantly increase the odds of authorisation code non-utilisation:

- **Travel distance 10km:** enrollees living 10km or further from their allocated secondary facility had over 3 times the odds of leaving codes unused (aOR = 3.42 [95% CI: 2.15-5.44], p < 0.001).
- **Out of pocket expenditure at secondary level:** enrollees who faced unanticipated cash outlay for unassigned non-drug consumables and diagnostics at secondary level had nearly 3 times the odds of code abandonment (aOR = 2.89 [95% CI: 1.78-4.69], p < 0.001).
- **Notification delay >48 hours:** delays between the primary care referral and code receipt of over 48 hours were associated with a 2.14-fold increase in the odds of non-utilisation (aOR = 2.14 [95% CI: 1.32 - 3.47], p=0.002).
- **Equity scheme membership: b**eneficiaries of the Vulnerable Group/BHCPF scheme were 95% more likely to leave codes unused than formal civil service members (aOR = 1.95 [95% CI: 1.18 - 3.22], p = 0.009). **Table 3**

  <<Insert Table 3>>

Discussion

This study provides empirical evidence on the prevalence and the determinants of unused secondary care authorisation codes within a state social health insurance scheme in Northern Nigeria. The finding that 31.8% of the authorisation codes generated expire unused is a clear indicator of a systemic bottleneck which in turn threatens the continuity of care for KSCHMA beneficiaries.

Geographic accessibility was by far the strongest predictor of code abandonment. Enrollees who travelled >10km to access the secondary facility were 3.42 times more likely to have their authorisation codes abandoned. In Kano State the secondary facilities are all concentrated in the urban LGA headquarters and so Kano Central Senatorial District has the lowest rate of unused codes (25.5%) as opposed to Kano South which is predominantly rural (38.5%). For the rural enrollees, the cost of transport is often such that it exceeds the value of the care they perceive they are receiving as a result of the subsidy [9,10]. This is consistent with the global health literature which has repeatedly demonstrated that the mere presence of insurance coverage is not sufficient to overcome the barrier of physical distance to health care [11,12].

Financial friction at the point of referral care was another major driver. Patients who found themselves having to pay out of pocket for unassigned drugs or lab reagents were 2.89 times more likely to discontinue treatment. Secondary facilities that were running out of stock or were delayed in their reimbursements would often pass those costs on to the patient [13]. When an insured patient is confronted with an unexpected cash outlay at a referral centre, their faith in the insurance mechanism is shattered and they are far more likely to drop out of care [13,14].

Systemic administrative delays further undermined code utilisation. Notification delays of over 48 hours were associated with 2.14 times higher odds of non-utilisation. Delays in the manual or batch processing of referrals by KSCHMA desk officers result in a time lag between the clinical referral and the generation of the code. By the time the SMS notification gets through, the patient may have already had some symptomatic relief, may have gone to another provider or may simply find the 14-day validity period too short to get their travel organised [15].

Vulnerable groups were hit disproportionately. Equity Scheme beneficiaries were far more likely to go without a code (aOR 1.95) than formal civil servants. Even where the state equity funds completely cover the cost of the insurance premium, the sheer extent of poverty will still mean that a household will not be

able to afford the non-medical costs associated with attending a clinic (i.e. transport, food, lost daily wage etc).

Policy and Programmatic Implications

To combat authorisation code abandonment and ensure care continuity KSCHMA and the Kano State Ministry of Health should consider the following four structural interventions:

1. **Automate the pre-authorisation workflow (**move from manual desk officer reviews to fully automated, rule based electronic authorisation) for the standard secondary care protocols. This will ensure that authorisation happens in real time at the point of referral.
2. **Expand the Accredited Provider Network:** accredit private and faith-based health facilities in the rural areas to reduce the distance enrollees have to travel to get to a provider outside of the urban centres.
3. **Enforce service package compliance:** KSCHMA must have a stronger monitoring regime in place to ensure that accredited secondary providers aren't charging their enrollees out of pocket fees for covered services which are not in their service package.
4. **Integrate Flexible Validity Windows and Transport Subsidies:** extend the code validity period from 14 to 30 days for chronic care referrals and integrate the targeted transport subsidy for Equity Scheme beneficiaries.

Study Limitations

This study has its limitations. Firstly, the cross-sectional survey design precludes any firm causal inferences. Secondly self-reported reasons for code abandonment are likely to be subject to recall and/or social desirability bias. Thirdly clinical outcome data was not followed up to assess the long-term morbidity that would result from code abandonment. Despite these limitations the combination of a 1200 record audit with a multi stage sample of the selected LGAs provides us with robust, generalisable findings which can be applied to health financing reform in Kano State.

Conclusions

Almost one in three referral authorisation codes issued under KSCHMA in Kano State are still unredeemed. The principal reasons for non-utilisation of the codes are distance (geographic), unexpected out of pocket costs at the secondary level, administrative processing delays and socio-economic vulnerability. The way

forward is to address these barriers through digital automation, wider provider accreditation and equity in transport. This will go a long way to optimising strategic purchasing and enabling the achievement of UHC in Northern Nigeria.

List of Abbreviations

BHCPF - Basic Health Care Provision Fund
KSCHMA - Kano State Contributory Healthcare Management Agency
LGA – Local Government Area
UHC - Universal Health Coverage
VIF - Variance Inflation Factors

Declarations

Ethics Approval and Consent to Participate

The Kano State Health Research Ethics Committee provided ethical clearance. Approval ref: Ministry of Health, Kano State. Written or thumb-printed informed consent was obtained from all survey respondents prior to the administration of the interview in accordance with the Declaration of Helsinki and the Nigeria Data Protection Act.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and analysed in this study are available from the corresponding author upon reasonable request (with KSCHMA approval).

Competing Interests

The authors declare no competing interests.

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Authors' Contributions

All authors contributed to the conception, design of the study, data collection and supervision, statistical analysis, manuscript writing and drafting and final revision. All authors read and approved the final manuscript.

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Table 1: Bivariable Analysis of Enrollees' Characteristics by Code Status (n= 1,200)

Variable	Used n= 818 n (%)	Unused n= 382 n (%)	p-value
Gender Male Female	 360 (44.0) 458(56.0)	 140(37.7) 242(62.3)	0.203
Monthly income > 70,000 70,000	 558(68.2) 260(31.8)	 120(31.4) 262(68.6)	0.003
Scheme Category Formal Informal Vulnerable Group	 391(47.8) 250(30.6) 177(21.6)	 115(30.2) 127(33.3) 140(36.5)	**<0.001**
Distance to Secondary Center < 10 km 10 km	 573(70.1) 245(29.9)	 123(32.1) 259(67.9)	**<0.001**
Notification Delay (Code release) 48 hours >48 hours	 622(76.1) 196(23.9)	 173(45.3) 209(54.7)	**<0.001**
Out-of-pocket cost at Referral No extra cost Incurred cost	 614(75.0) 204(25.0)	 147(38.4) 235(61.6)	**<0.001**

Bold- statistically significant, km- kilometer

Table 2: Primary Reasons for Code Non-Utilization n=382

Reason for code non-utilization	Frequency n (%)
Perceived Symptom Resolution	111(29.0)
High Transportation Costs	91(23.9)
Out-of-pocket Demands at Referral Facility	70(18.1)
Delayed Code Notification (>Validity window)	55(14.5)
Long Queues/ Adverse Provider Attitude	55(14.5)

Table 3: Multivariable Logistic Regression of Determinants of Unused Authorisation Codes

Predictor Variable	aOR (95% CI)	VIF	p-value
Monthly income >70,000 70,000	 1 1.62 (0.98 – 2.68)	1.96	0.061
Scheme Category Formal Informal Vulnerable group (Equity)	 1 1.35(0.81- 2.25) 1.95(1.18 – 3.22)	1.23	 0.248 **0.009**
Distance to Secondary Center < 10 km 10 km	 1 3.42(2.15 – 5.44)	1.76	 **<0.001**
Notification Delay (Code release) 48 hours >48 hours	 1 2.14(1.32 – 3.47)	1.34	 0.002
Out-of-pocket cost at Referral No extra cost Incurred cost	 1 2.89(1.78 – 4.69)	1.00	 **<0.001**

Bold- statistically significant, aOR- adjusted odds Ratio**, VIF- variance inflation factor**

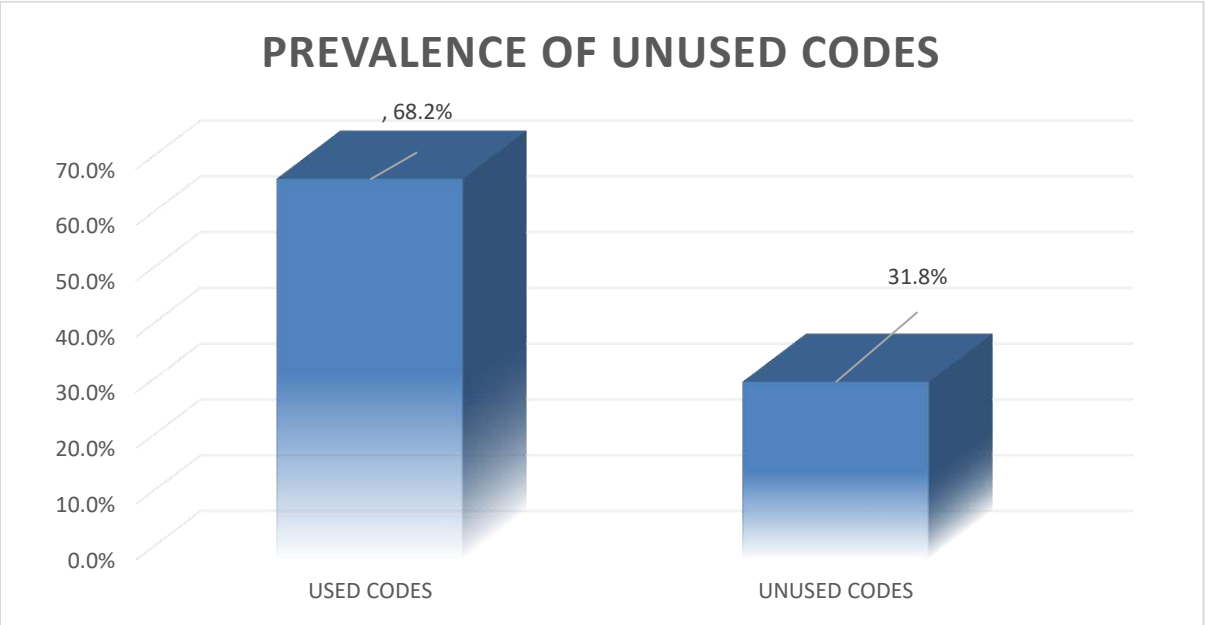


Figure 1: Prevalence of Unused Authorisation Codes (n =1,200)

Supplementary Files

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