

Influence of Provider Ownership on Insurance Claims Performance: A 12-month retrospective comparative analysis of KSCHMA accredited public and private facilities in Kano State, Nigeria

Rahila Aliyu Muktar

Kano State Contributory Healthcare Management Agency

Zainab Abdulkadir

zmeena2003@gmail.com

Aminu Kano Teaching Hospital

Abdulgafar Lekan Olawumi

Aminu Kano Teaching Hospital

Jamila Mustapha

Kano State Contributory Healthcare Management Agency

Research Article

Keywords: Claims performance, provider ownership, public, private, KSCHMA

Posted Date: October 13th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11327338/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Efficient claims management is critical for the performance and financial sustainability of health insurance schemes. This study examined whether provider ownership influences claims performance among Kano State Contributory Healthcare Management Agency (KSCHMA) accredited public and private facilities in Kano State.

Methods

We conducted a 12-month retrospective longitudinal comparative study using all the electronic administrative claims submitted to KSCHMA from 1st August 2025 to 31st July 2026. The claims were nested within the accredited facilities. We performed descriptive and comparative analysis of claim approval and rejection rates. We looked at the queries, denials, processing times and the financial approval ratio between the public and private facilities. We conducted multivariable regression to determine whether provider ownership independently predicts claims performance.

Results

We analysed 30,595 claims from 50 KSCHMA-accredited public and private facilities. Public facilities had a higher approval rate than private facilities (91.8% vs 88.2%). Private facilities had higher proportions of pending (9.6% vs 6.9%), denied (1.3% vs 0.9%), and queried claims (0.9% vs 0.5%). Claim status differed significantly by provider ownership ($\chi^2 = 91.738$, $p < 0.001$). After adjusting for facility level, claims resubmission, emergency status, and referral status, claims from private facilities had 26.4% lower odds of approval than claims from public facilities (aOR = 0.736, 95% CI: 0.670–0.808; $p < 0.001$). Claims that were not resubmitted had substantially higher odds of approval than claims that were resubmitted (aOR = 8.474, 95% CI: 4.711–15.241; $p < 0.001$). Non-emergency claims had slightly lower odds of approval than emergency claims (aOR = 0.796, 95% CI: 0.636–0.997; $p = 0.047$). Claim outcomes varied significantly across submission months ($\chi^2 = 19,266.42$, $p < 0.001$; Cramér's $V = 0.397$). This variation was largely attributable to a marked accumulation of pending claims during the latter part of the observation period.

Conclusion

The findings indicate that provider ownership is associated with claims performance. Targeted claims management, particularly in private facilities, may strengthen strategic purchasing, provider reimbursement, and health insurance efficiency.

Introduction

Universal Health Coverage requires health systems to ensure access to appropriate healthcare without financial hardship. Nigeria's health financing reforms increasingly emphasise strategic purchasing, in which purchasers use provider contracting, payment, monitoring, and claims mechanisms to improve efficiency and quality. The National Health Insurance Authority (NHIA) identifies strategic purchasing and access to quality healthcare as central to its mandate. [1]

Claims management is the link between service delivery and provider payment. The NHIA has a formal Standard Operating Procedure covering claims submission, claims review and payment. It's a very significant process in the administration of health insurance[2].

Evidence from Nigeria indicates that weaknesses in strategic procurement, provider payment and reimbursement can have an impact on provider behaviour and the quality of care delivered. There is a well-established body of literature on the importance of provider monitoring, claims auditing and timely payment in health insurance procurement arrangements. [3, 4]

The Kano State Contributory Healthcare Management Agency (KSCHMA) is Kano State's principal strategic purchaser of healthcare and is responsible for the processing of health insurance claims for both formal and informal sector beneficiaries in both the public and private sectors [5]. Efficient claims processing is a vital requirement for the financial sustainability of the agency and for the maintenance of provider liquidity [6]. The public and private sector facilities however operate under very different institutional governance, administrative staffing, financial incentive and operational models [7, 8].

Private facilities will often be running with a very direct commercial imperative to maximise their revenue and get their reimbursement as quickly as possible. Public facilities on the other hand are often hamstrung by administrative delays, under-staffed medical records departments and a very bureaucratic system of operations [9]. The public sector may also have a lower financial risk as their salaries and operational budgets are government subsidised whereas the private provider will be very much exposed to the risk of operational disruption through claims denials and delayed reimbursements [10].

Following KSCHMA's move to the new digital claims' portal in the middle of 2025, the evaluation of claims performance across both ownership groups became paramount. This study provides an empirical benchmark against which to assess the impact of provider ownership on claims accuracy, rejection rates, processing times and loss profiles over a 12-month period (1 August 2025 to 31 July 2026).

Statement of the Problem

Claims processing bottlenecks (high denial rates, long reimbursement lags, coding errors) are a threat to the viability of the state level schemes in sub-Saharan Africa [11, 12]. Unrecovered claims due to provider dissatisfaction can result in balance billing, double billing of the enrollee or the private provider simply

pulling out of the scheme altogether. There is also administrative churn as a result of the sheer volume of claims that are not properly submitted which in turn drives up KSCHMA's operating overhead [13].

Despite the operational risks involved, there is still a lack of comparative evidence from northern Nigeria as to whether the private sector facilities perform significantly better or worse than their public sector counterparts within the formal state social health insurance system. With no disaggregated evidence, any policy interventions, capacity building workshops or claims portal updates will remain fairly generic rather than specifically targeted at the operational weaknesses of the public and private sector facilities [14].

Justification of the study

The study is justified for the following reasons:

- Provide empirical evidence on claims performance.
- Identify potential avoidable causes of claim rejection.
- Determine if there are any public/private differences.
- Identify the facility and claim characteristics which are associated with successful reimbursement.
- Assess trends over time.
- Support evidence-based provider performance management.
- Contribute to the literature on strategic purchasing in Nigeria.

This is particularly relevant because KSCHMA is currently strengthening claims administration, documentation and operational performance among accredited facilities.

Specific Objectives:

- To quantify and compare the **mean claims, turnaround time, and the proportion of claims approval rates** between public and private KSCHMA-accredited facilities over 12 months.
- To categorise and analyse the primary drivers/reasons for claims rejection (e.g., unauthorised care, incorrect tariff selection, missing diagnostic documentation, non-covered services) stratified by facility ownership.
- To estimate the net financial impact of claims approvals on healthcare provider ownership models and facility levels.

Methodology

Study Design & Setting

We carried out a 12-month retrospective longitudinal comparative study using electronic administrative claims data extracted from the KSCHMA centralised portal, supplemented by facility level structural audits across Kano State, Nigeria.

Target Population & Sampling:

- **Inclusion Criteria:** We included all KSCHMA-accredited public and private (clinics, hospitals, and specialist centres) facilities that submitted electronic claims continuously between 1 August 2025 and 31 July 2026.
- **Sampling strategy:** we did a full census of the administrative claims submitted in the 12-month study period.

Data Collection & Management:

- **Primary administrative data:** we batch extracted de-identified secondary data directly from the KSCHMA database. The key variables were Facility ID, Facility Ownership Type (Public/Private), Facility Level (Secondary/Tertiary), Claim Submission Date, Adjudication Date, Payment/Reimbursement Date, Total Claim Value, Claim Status (Approved/Denied/Queried) and Rejection Reason Code.

Data Analysis

- **Descriptive statistics:** for the continuous variables (turnaround days, financial value) we used medians and interquartile ranges (IQRs) due to the skewed nature of the distributions. Categorical variables (approval status, rejection reason) were presented as frequencies and percentages.
- **Bivariate analysis:** was carried out using chi-square tests to look at differences in the proportions of categorical outcomes (denied v approved claims) between the public and private providers. Mann-Whitney U tests were used to assess differences in the non-parametric continuous variables (turnaround days).
- **Multivariable Modeling: Logistic Regression:** We used multivariable logistic regression to estimate adjusted odds ratios (aOR) of claim approval by provider ownership, controlling for confounders including facility level, claim monetary value, and month of submission. Cluster-robust standard errors at the facility level accounted for within-facility correlation.

Monthly Trend Analysis

Monthly claims submission volumes, median days to adjudication and denial rates were all calculated and graphed (using line graphs in SPSS) to look at the trends over time, the monthly variation and the variation in claims processing performance across the 12-month study period.

Ethical Considerations

Ethical approval was obtained from the Kano State Ministry of Health Research Ethics Committee (NHREC/17/03/2018; reference number: SHREC/2026/8334). Patient privacy and data confidentiality were rigorously maintained:

- We did not extract any Personally Identifiable Information (PII) of enrollees (names, contact information, street addresses) from the KSCHMA database.
- We anonymised the data at the point of extraction by assigning unique synthetic alphanumeric keys to the individual claim and facility identifiers.
- The data was stored on encrypted, password protected local drives and access was restricted to the principal research team.

Results

As shown in Fig. 1, out of the KSCHMA-accredited healthcare facilities, 76.5% were public, and 23.5% were private. Among the 30,595 claims analysed, approval was the predominant claim outcome in both ownership groups. However, the approval rate was higher among public facilities than private facilities (91.8% vs 88.2%). Private facilities had higher proportions of pending (9.6% vs 6.9%), denied (1.3% vs 0.9%), and queried claims (0.9% vs 0.5%). The distribution of claim status differed significantly by provider ownership ($\chi^2 = 91.738, p < 0.001$), indicating an association between facility ownership and claims outcomes. Although facility ownership was statistically associated with claim status, the effect size was small (Cramér's $V = 0.055$), indicating a weak overall association. Figure 2

>> Insert Figs. 1 and 2 >>

Among the 30,595 claims analysed, the median total claim value was ₦2,512.29 (IQR: ₦3,102.09) for public facilities and ₦2,810.89 (IQR: ₦4,260.74) for private facilities. This difference was not statistically significant (Mann–Whitney $U = 84,386,975.50; p = 0.840$), indicating comparable claim values across the two ownership groups. This is useful because it suggests that the subsequent differences in processing performance and approval may not simply be explained by differences in the amount being claimed. Significant differences were observed in claims-processing turnaround times. The median time to adjudication was shorter for public facilities than for private facilities (2 days [IQR: 5] versus 4 days [IQR: 13]; $p < 0.001$). Similarly, the median time to payment advice, used as a proxy for payment turnaround, was significantly shorter for public facilities than for private facilities (63 days [IQR: 71] versus 81 days [IQR: 76]; $p < 0.001$). These findings indicate faster claims processing and payment-advice turnaround among public facilities. Table 1

Table 1

Distribution of Claims Processing Performance Indicators: Public vs Private Healthcare Facilities (n = 30,595)

Claims Processing Indicators	Public Healthcare Facilities <i>Median (IQR)</i>	Private Healthcare Facilities <i>Median (IQR)</i>	Mann-Whitney U	p-value
Total Claim Value (₦)	2,512.29 (3,102.09)	2,810.89 (4,260.74)	84,386,975.50	0.840
Days to Adjudication	2 (5)	4 (13)	56,191,380	< 0.001
Days to Payment Advice (proxy)	63 (71)	81 (76)	54,809,700.50	< 0.001
IQR: Interquartile range				

>> Insert Table 1 >>

Table 2 revealed the major reasons for rejection of claims were supporting documents missing, wrongly, incomplete or unclear comparable between both public and private facilities ($p = 0.562$). However, wrong procedure, diagnosis or services selected and improper charge to enrollees were more in private than the public facilities ($\chi^2 = 21.340$ $p = 0.003$ and $\chi^2 = 8.907$ $p = 0.002$ respectively).

Table 2

Reasons for claims rejection based on provider ownership of healthcare facilities with total rejection (n = 501)

Reasons for Claims Rejection	Public n(%)	Private n (%)	Total n(%)	p- value
Supporting documents missing, wrong, incomplete or unclear	114(49.4)	117(50.6)	231(100.0)	0.562
Name mismatch / enrollee identity	32(49.2)	33(50.8)	65(100.0)	0.980
Expired authorisation code	0(00.0)	0(00.0)	0(100.0)	1.200
Duplicate claim	7(58.3)	5(41.7)	12(100)	0.890
Service covered at primary care / capitation	4(57.1)	3(42.9)	7(100.0)	0.765
Wrong code, procedure, diagnosis or service selected	30(38.0)	49(62.0)	79(100)	0.003
Service not rendered / altered record	5(50.0)	5(50.0)	10(100.0)	0.976
Correct and resend (no specific reason)	16(51.6)	15(48.4)	31(100.0)	0.678
Transfusion not claimed / billing item missing	1(50.0)	1(50.0)	2(100.0)	0.754
Late submission (claim overstayed)	6(42.9)	8(57.1)	14(100.0)	0.654
Improper charge to enrollee	1(33.3)	2(66.7)	3(100.0)	0.002
Other / unclear (e.g. abbreviations such as NNSD, DN)	22(47.8)	24(52.2)	46(100.0)	0.876
No reason recorded	0(0.00)	1(100.0)	1(100.0)	0.001
Bold- Statistically significant				

>> Insert Table 2>>

In the multivariable logistic regression analysis, provider ownership was significantly associated with claim approval. After adjusting for facility level, claims resubmission, emergency status and referral status, claims from private facilities had 26.4% lower odds of approval compared with claims from public facilities (aOR = 0.736, 95% CI: 0.670–0.808; $p < 0.001$). Claims from secondary facilities also showed lower odds of approval than those from tertiary facilities, although this association did not reach statistical significance (aOR = 0.341, 95% CI: 0.114–1.021; $p = 0.054$).

Claims that were not resubmitted had substantially higher odds of approval than claims that were resubmitted (aOR = 8.474, 95% CI: 4.711–15.241; $p < 0.001$). Non-emergency claims had slightly lower odds of approval than emergency claims (aOR = 0.796, 95% CI: 0.636–0.997; $p = 0.047$), while referral

status was not significantly associated with claim approval (aOR = 1.026, 95% CI: 0.928–1.135; p = 0.611). Table 3.

Table 3
Determinants of claims approved based on provider ownership of healthcare facilities

Variable	aOR	P-value	95% CI
Facility ownership type			
Private	0.736	< 0.001	0.670–0.808
Public	Reference		
Facility level			
Secondary	0.341	0.054	0.114–1.021
Tertiary	Reference		
Claims resubmission			
No	8.474	< 0.001	4.711–15.241
Yes	Reference		
Emergency claims			
No	0.796	0.047	0.636–0.997
Yes	Reference		
Referred claims			
No	1.026	0.611	0.928–1.135
Yes	Reference		
Bold – significant, Reference category: Denied, 95% confidence interval (CI), aOR = adjusted odd ratio.			

>> Insert Table 3 >>

Monthly analysis demonstrated considerable variation in claims-processing performance over the 12-month study period. The distribution of claim outcomes varied significantly across submission months ($\chi^2 = 19,266.42$, $p < 0.001$; Cramér's $V = 0.397$). This variation was largely attributable to a marked accumulation of pending claims during the latter part of the observation period, particularly from May to July 2026. Consequently, the apparent decline in the proportion of approved claims during these months should be interpreted cautiously, as it may reflect the shorter processing time available for recently submitted claims rather than a true deterioration in approval performance. Figure 3

>> Insert Fig. 3 >>

Monthly trend analysis demonstrated significant temporal variation in claims-processing turnaround. Days to adjudication showed a significant overall downward trend across the 12-month study period (Jonckheere–Terpstra standardised statistic = -29.854 , $p < 0.001$). Similarly, days to payment advice, a proxy for payment turnaround, showed a significant downward temporal trend (standardised statistic = -11.514 , $p < 0.001$). In contrast, total claim value showed no significant ordered temporal trend (standardised statistic = -0.844 , $p = 0.399$), despite substantial month-to-month fluctuations. The apparent reduction in processing times toward the end of the study period should be interpreted cautiously given the substantial accumulation of pending claims during the final months of observation.

Figure 4

>> Insert Fig. 4 >>

Discussion

Our study found a potentially important difference in claims performance between public and private KSCHMA providers. The lower approval rate among private facilities could reflect differences in documentation, coding, claims-management capacity or case mix rather than provider ownership itself. Delayed approvals in private facilities reported reflect over-reporting and unnecessary interventions. Systematic reviews similarly reported that private providers are more likely to inflate through unnecessary testing, over-prescribing, or violations of medical practice standards to maximise their "perverse incentive" structure under fee-for-service or mixed social health insurance payment models, which can reduce relative economic efficiency compared with public facilities [15].

This is consistent with the wider health financing literature which highlights the importance of provider monitoring, claims auditing, payment systems and the purchaser-provider relationship in the context of strategic purchasing [3, 4].

KSCHMA's recent focus on claims processing training, coding and the reduction of admin bottlenecks all point to the very real relevance of an empirical investigation into these factors.

The link between electronic submission and improved claims outcomes in the public sector would also be of policy relevance (again only to be interpreted after adjustment for facility characteristics). Some claims were still unresolved by the end of the observation period (May to July) indicating a delay in reimbursement. The average days to payment advice were 61 and 83 for public and private facilities respectively. This again supports our earlier work which has shown that delayed reimbursement is a threat to financial sustainability and leads to informal out-of-pocket expenditure. [16, 17].

Based on the findings of this study, we recommend that KSCHMA and similar schemes should consider;

- **Provider specific claims dashboard:** facilities could get periodic reports showing the approval rate, the rejection rate, the query rate, the processing time and the financial approval ratio.

- **Targeted training:** sites with ongoing documentation or coding issues could be the recipients of targeted technical assistance.
- **Digital claims validation:** automated validation could pick up the errors prior to the claim even being submitted.
- **Performance based provider support:** rather than just penalising under-performing facilities KSCHMA could use the performance monitoring to provide technical support.
- **Strategic purchasing:** claims data could in the end be used to inform provider contracting, quality improvement and payment policy. That's consistent with the strategic purchasing objective of using the purchasing mechanism to influence provider efficiency and quality.

Limitations and Strengths of the study

The retrospective administrative data may have missed or incorrectly entered information and causal inference will be very limited as provider ownership is not randomly assigned. The claims data is a measure of administrative performance rather than clinical care quality.

Despite the limitations mentioned, the study has a number of strengths. We utilised a large administrative dataset over a 12-month observation period with actual claims rather than self-reported data. We included both public and private providers, we did a longitudinal trend analysis with facility level clustering and we performed multivariable adjustment to help minimised bias and confounders. The study also provides policy relevant financial and operational outcomes for KSCHMA and for other insurance schemes in similar resource limited settings.

Conclusion

Public healthcare facilities performed better in terms of claims under the Kano State contributory scheme with the link being very much mediated by the extent of digital workflow, wrong intervention and improper enrollee charging. To prevent administrative churn and protect provider liquidity in the private sector, the strategic purchasing policy must be focused on the digitalisation of private facility billing workflows, the building of health information management capacity and the embedding of automated pre-submission validation rules within the state claims portal.

Abbreviations

CI

Confidence Interval

aOR

Adjusted Odds Ratio

IQR

Interquartile Range

KSCHMA

Declarations

Ethics Approval and Consent to Participate

The Kano State Ministry of Health Research Ethics Committee approved ethical clearance (NHREC/17/03/2018; Reference number: SHREC/2026/8334). Patient privacy and data confidentiality were strictly maintained and all administrative claims data was fully de-identified prior to analysis.

Consent for Publication

Not applicable.

Competing Interests

The authors declare that they have no competing interests.

Funding

This work received no specific grant from any funding agency (public, commercial or not for profit). The work was fully funded by KSCHMA.

Author Contribution

RAM, ZA and ALO all contributed to the conceptualisation of the study and to the data collection.

ZA, ALO, JM – data analysis, manuscript drafting and review.

AHY, ZA – data extracted, cleaned and securely stored.

All authors approved the final manuscript for publication.

Data Availability

De-identified secondary datasets analyzed as part of this study are available from the corresponding author upon reasonable academic request and with written permission from KSCHMA.

Clinical Trial number

References

1. Bashir SG, Abdi YH, Ibrahim Issack Z, Abdullahi Khalif I, Ahmed A et al. Health financing strategies for achieving Universal Health Coverage in low- and middle-income countries: a narrative review. *Front Public Health*,2026; 14.
2. National Health Insurance Authority. Standard Operating Procedure for Claims Submissions, Review and Payment. Available at <https://www.nhia.gov.ng> accessed 25th Sept 2026.
3. Onwujekwe OE, Mbachu CO, Okeke CC, Ezenwaka U, Ogbuabor DC, Ezenduka CC. Strategic Health Purchasing in Nigeria: Exploring the Evidence on Health System and Service Delivery Improvements. *Health Syst Reform*,2022; 8.(2)..
4. Onoka CA, Onwujekwe OE, Uzochukwu BS, Ezumah NN. Promoting universal financial protection: constraints and enabling factors in scaling-up coverage with social health insurance in Nigeria. *Health research policy and systems*. BioMed Central. London. 2013; 11:1-0.6.
5. Kano State Contributory Healthcare Management Agency Law No. 3 of 2015. Kano: Government of Kano State, Nigeria;; 2015.
6. World Health Organisation. Strategic Purchasing for Universal Health Coverage: A Policy Framework for Low- and Middle-Income Countries. Geneva: World Health Organisation; 2019.
7. Gottret P, Schieber G. Health Financing Revisited: A Practitioner's Guide. Washington, DC: World Bank; 2006.
8. Palmer N, Mueller DH, Gilson L, Mills A, Haines A. Health financing to promote access in low-income settings-how much do we know? *Lancet*. 2004 Oct 9–15;364(9442):1365-70. 10.1016/S0140-6736(04)17195-X
9. Hanson K, Gilson L, Goodman C, Mills A, Smith R, et al. Is private health care the answer to the health problems of the world's poor? *PLoS Med*. 2008;5(11):e233. 10.1371.
10. Lagarde M, Palmer N. The impact of contracting out on health service use, quality and health outcomes in low- and middle-income countries. *Cochrane Database Syst Rev* 2009;(4): CD008133.
11. Sieverding M, Onyango C, Suchman L. Private healthcare provider experiences with social health insurance schemes: findings from a qualitative study in Ghana and Kenya. *PLoS ONE*. 2018;13(2):e0192973. 10.1371/journal.pone.
12. Sodzi-Tettey S, Aikins M, Awoonor-Williams JK, Agyepong IA. Challenges in provider payment under the Ghana National Health Insurance Scheme: a case study of claims management in two districts. *Ghana Med J*. 2012;46(4):189–99. PMID: 23661837; PMCID: PMC3645172.
13. Mathauer I, Dale E, Meessen B. Strategic purchasing for Universal Health Coverage: key policy issues and questions. A summary from expert and practitioners' discussions. Geneva: World Health Organisation; 2017. (Health Financing Policy Paper No. 8).

14. Kazungu JS, Barasa EW, Obadha M, Chuma J. What characteristics of provider payment mechanisms influence health care providers' behaviour? A literature review. *Int J Health Plann Manage.* 2018;33(4):e892–905. 10.1002/hpm.2565.
15. Basu S, Andrews J, Kishore S, Panjabi R, Stuckler D. Comparative performance of private and public healthcare systems in low- and middle-income countries: a systematic review. *PLoS Med.* 2012;9(6):e1001244. 10.1371/journal.pmed.1001244.
16. Muktar RA, Abdulkadir Z, Olawumi AL et al. The impact of the Kano State Contributory Healthcare Management Agency on Emergency Obstetric Care and maternal health: Insights from the Comprehensive Emergency Maternal and Newborn Care implementation in northern Nigeria. 07 September 2026. PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-10898089/v1]
17. Muktar RA, Abdulkadir Z, Olawumi AL et al. Evaluating the Impact of Kano State Contributory Healthcare Management Agency Integration of HIV Prevention, Treatment, and Lifelong Care on Healthcare Access and Financial Sustainability in Kano State, Nigeria: A Mixed-Methods Study, 04 September 2026, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-10914337/v1]

Figures

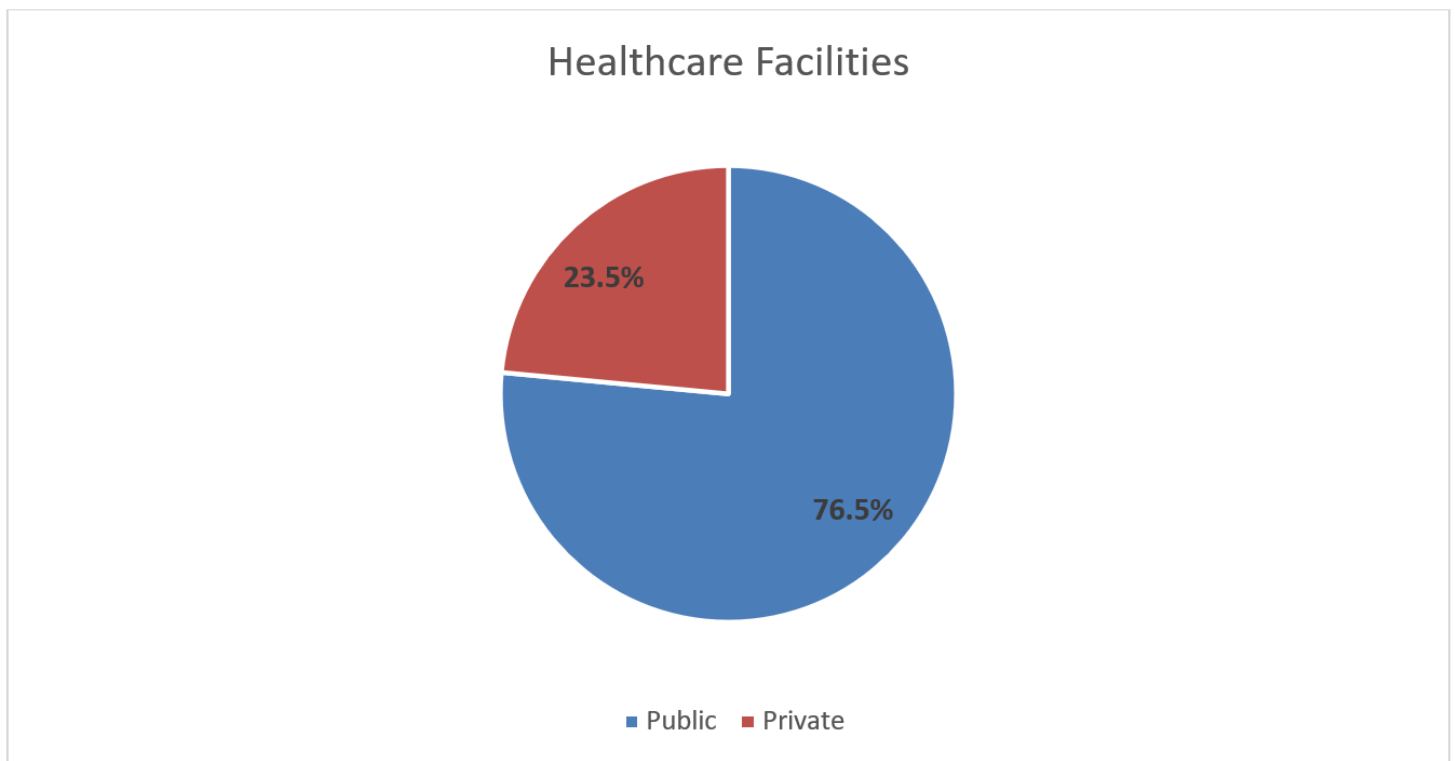


Figure 1

Distribution of KSCHMA accredited public and private facilities in Kano State

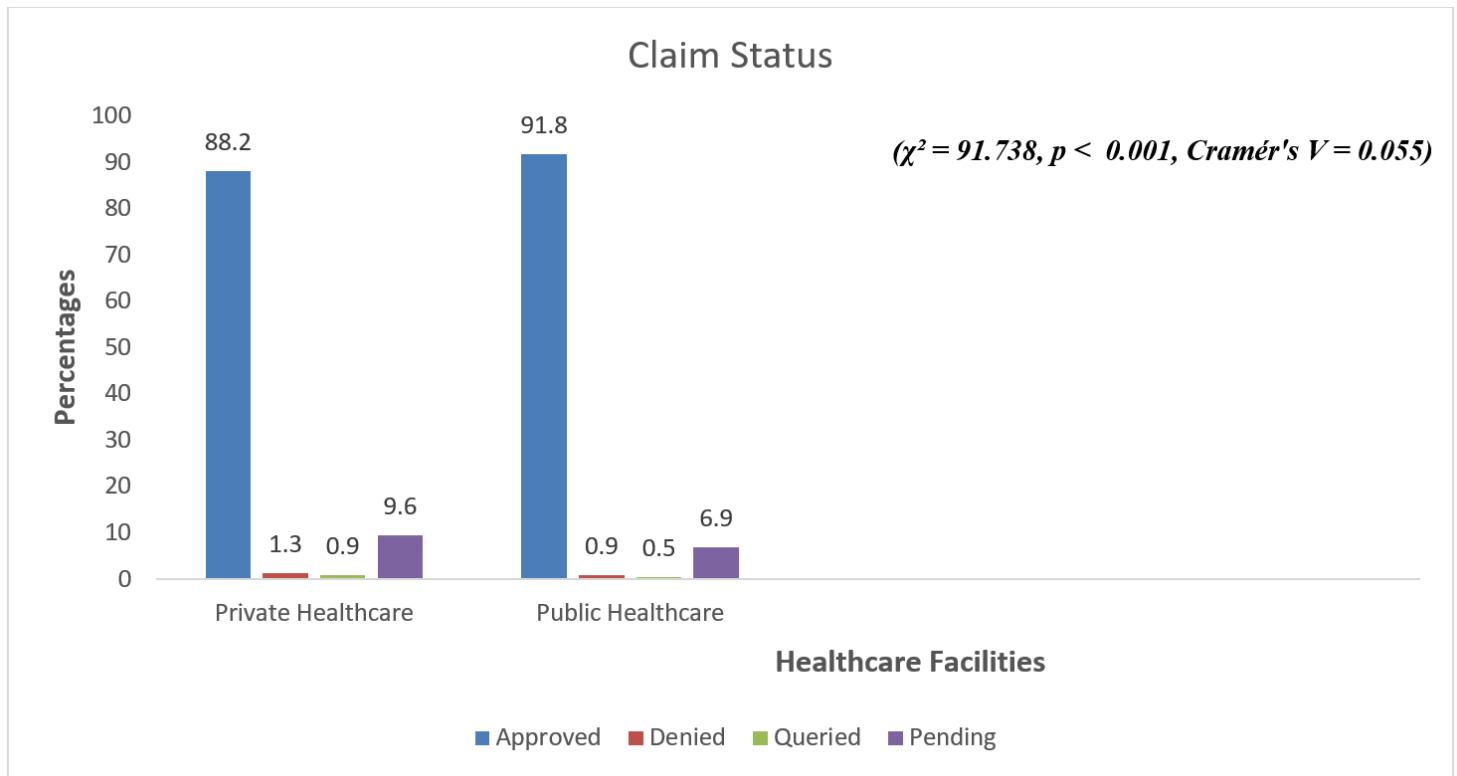


Figure 2

Distribution of claim status across the healthcare facilities (n=30,595)

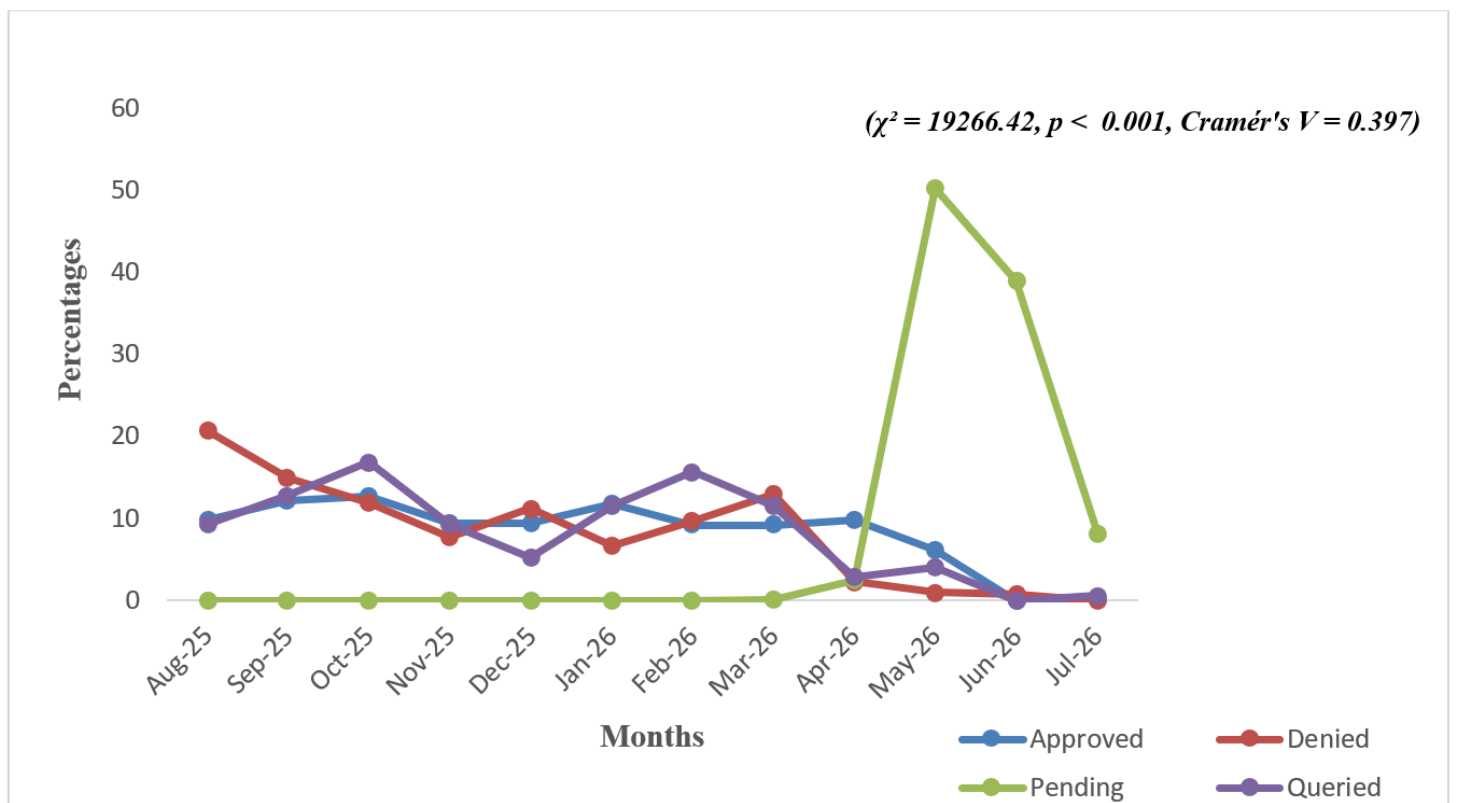


Figure 3

Monthly trend analysis of claims approval, denial rate, Queries and pending

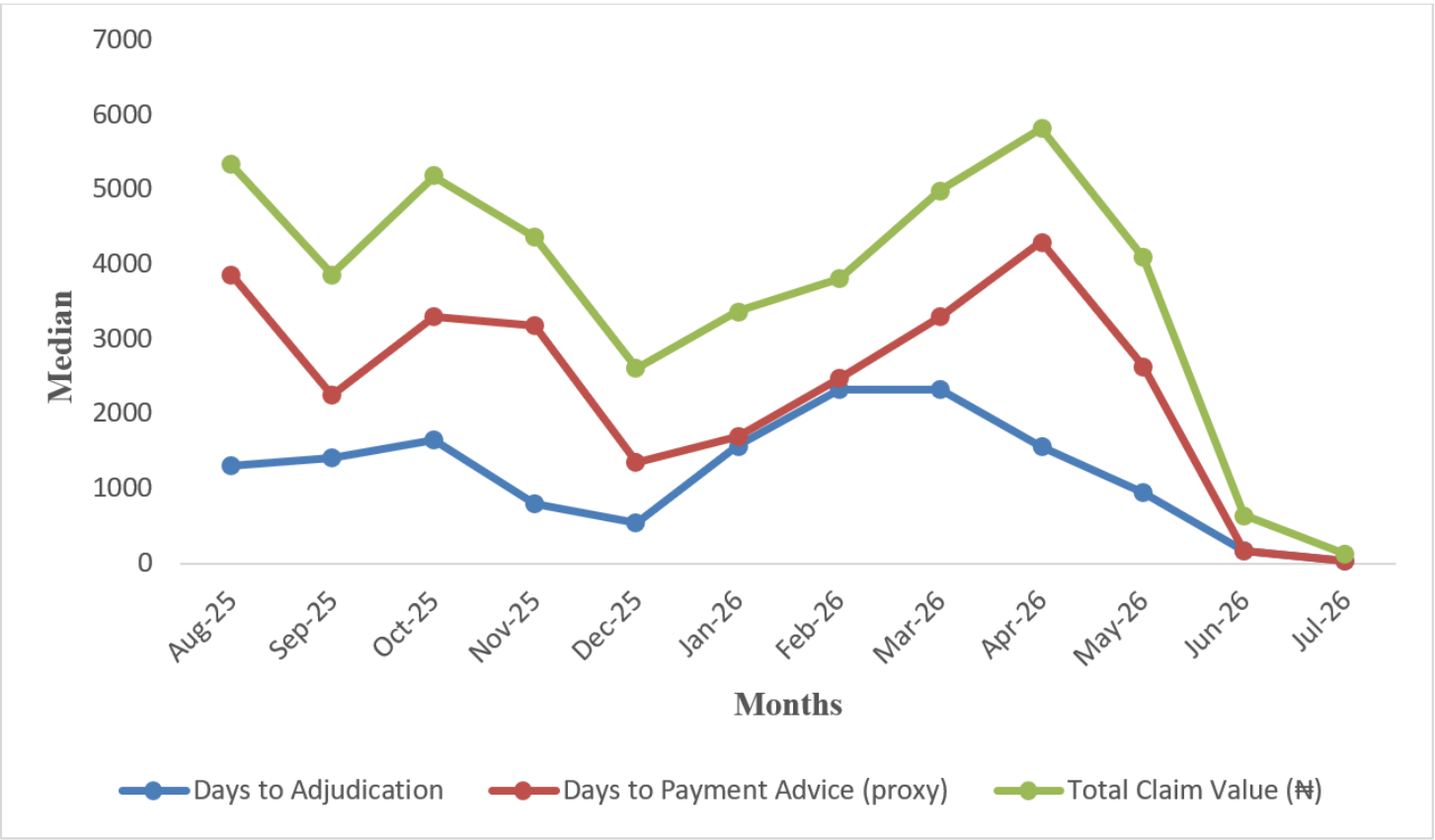


Figure 4

Claims Processing Performance Indicators over 12 months.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [QUESTIONNAIRECLAIMS.docx](#)