

MODELLING TELECOM-DRIVEN HEALTH INSURANCE FINANCING IN NIGERIA: A TECHNO-ECONOMIC NARRATIVE REVIEW

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ABSTRACT

Background: Nigeria's path to Universal Health Coverage is constrained by high out-of-pocket spending and low health-insurance enrolment. Although the National Health Insurance Authority Act of 2022 strengthened the legal basis for coverage, financing and service-delivery gaps remain. With more than 220 million mobile subscriptions, the telecommunications sector offers a practical route for linking digital payments with health-insurance financing. This review examines how telecommunications can support health-insurance financing in Nigeria through a techno-economic lens, highlighting opportunities, barriers, and policy requirements.

Methods: A narrative literature review was conducted between March and August 2025 using PubMed, Scopus, and Web of Science. English-language publications from 2010 to 2025 focusing on digital health, telecommunications, health financing, and health insurance in Nigeria and comparable low- and middle-income countries were included. Additional evidence from policy documents, regulatory frameworks, institutional reports, and grey literature was integrated. Data were thematically synthesised across five domains: health financing, telecom and fintech infrastructure, techno-economic frameworks, operational models, and governance.

Results: The review found that telecom-supported initiatives, including MTN Yello Health, Airtel-AXA Mansard, and WellaHealth, show potential to improve enrolment, affordability, premium collection, and claims processing through mobile payment systems. These models may strengthen financial inclusion and administrative efficiency, particularly for informal-sector and underserved populations. However, persistent challenges include poor broadband access, high data costs, regulatory overlap, low public awareness, limited benefit coverage, and uncertain long-term sustainability. Techno-economic evaluation highlights the need for interoperability, scalability, equity, and sustainable financing.

Conclusions: Telecom-driven health insurance can contribute to more equitable coverage in Nigeria if embedded within the national health-financing architecture and supported by interoperable data systems, strong consumer protection, affordable benefit design, and inclusive implementation. Adaptive techno-economic evaluation should guide pricing, subsidies, regulation, and scale-up.

Keywords: Nigeria, Digital health insurance, health financing; Mobile money, universal health coverage.

INTRODUCTION

Universal Health Coverage (UHC) remains a major global health goal, aiming to ensure that all individuals receive essential health services without financial hardship. Despite global policy commitments, many low- and middle-income countries (LMICs) continue to face inadequate domestic health financing,

dependence on donor funding, and high out-of-pocket (OOP) payments.^{1,2} The COVID-19 pandemic further exposed weaknesses in health-financing systems by reducing fiscal space and disrupting service delivery.^{3,5} Nigeria illustrates these challenges clearly. More than 90 percent of Nigerians pay directly for healthcare,

while OOP expenditure accounts for approximately 76 percent of total health spending, far above the sub-Saharan African and global averages.^{4,6} As a result, over one million Nigerians are pushed into poverty annually due to healthcare expenses. Nigeria's UHC index of 38 also remains below both the African average of 44 and the global average of 68, highlighting the urgent need for more equitable and sustainable financing strategies.⁸

Several reforms have attempted to address these gaps. The National Health Insurance Scheme (NHIS), established in 1999 and launched in 2005, aimed to promote risk pooling and expand access to healthcare.⁹ However, low enrolment, weak oversight, and limited public trust reduced its impact.¹⁰ In 2022, the National Health Insurance Authority (NHIA) Act replaced the NHIS and introduced mandatory health insurance for all Nigerian residents.¹¹ The NHIA also seeks to promote equity through mechanisms such as the Basic Health Care Provision Fund and the Vulnerable Group Fund.¹² However, affordability constraints, low awareness, and implementation challenges continue to limit progress.¹³

Recent advances in digital infrastructure offer new opportunities for health-financing reform. Expanding mobile connectivity, broadband penetration, and digital payment systems have created innovative pathways for linking individuals, insurers, and healthcare providers.¹⁴⁻¹⁷ Nigeria's telecommunications sector, with over 220 million active subscriptions, provides a strong foundation for digital health-financing models.¹⁸

Telecom-driven health insurance can potentially reduce OOP payments and improve risk pooling by using mobile money, digital communication tools, and telecom payment infrastructure to simplify premium collection, claims processing, and enrolment.^{4,19} However, evidence on the long-term viability, scalability, and regulatory feasibility of such models in Nigeria remains limited.²⁰

This narrative review examines how telecommunications can support health-insurance financing in Nigeria. It explores policy frameworks, operational models, and techno-economic considerations to identify key enablers and barriers to telecom-driven health insurance and proposes a conceptual framework for sustainable implementation.

METHODS

Review design and rationale

This study adopted a narrative literature synthesis to examine how telecommunications and digital financial services can support health-insurance financing in

Nigeria. A narrative approach was selected because the review required the integration of diverse evidence, including peer-reviewed articles, policy documents, regulatory frameworks, institutional reports, and private-sector case examples. This approach was appropriate because much of the evidence on telecom-driven health insurance is located within grey literature and programme reports, which may not fit conventional systematic review protocols. The synthesis followed established guidance on transparent reporting, iterative interpretation, and thematic integration across heterogeneous sources.^{20,21}

Conceptual orientation

The review was guided by a techno-economic systems perspective, which examines how technological innovation, financing mechanisms, regulation, and user behaviour interact to shape service delivery and policy outcomes.¹³ This perspective was suitable for analysing telecom-driven health-insurance models operating at the intersection of digital access, financial inclusion, and health equity. The review was also informed by global frameworks from the World Health Organization, World Bank, and GSMA on digital health, universal health coverage, and mobile financial services.^{8,13,19,22,23}

Search strategy

A structured literature search was conducted between March and August 2025 using PubMed, Scopus, and Web of Science. These databases were selected because of their coverage of health policy, health economics, digital innovation, and health systems research. 24 Search terms combined concepts related to digital health, telemedicine, mobile health, telecommunications, mobile money, fintech, health insurance, health financing, universal health coverage, financial protection, and Nigeria. Searches were limited to English-language publications from 2010 to 2025. Full search strings for PubMed, Scopus, and Web of Science are presented in Supplementary File S1.

Grey literature was also searched through institutional and regulatory websites, including the World Bank, WHO, GSMA, Federal Ministry of Health, Nigerian Communications Commission, and Central Bank of Nigeria. Reports from telecom-health collaborations, including MTN Foundation, Airtel-AXA Mansard, Globacom-AXA Mansard, and WellaHealth, were included to capture real-world operational examples of telecom-supported health-financing initiatives.

Eligibility criteria

The review included publications focused on digital health, telecommunications, mobile financial services, health financing, health insurance, or universal health coverage in Nigeria or comparable low- and middle-

income countries. Eligible sources included peer-reviewed articles, methodological papers, theoretical literature, policy documents, regulatory reports, institutional reports, and relevant corporate or implementation reports published between 2010 and 2025. Sources were excluded if they focused solely on clinical telemedicine without a financing, insurance, or digital payment component; lacked analytical content; or addressed telecom or fintech issues unrelated to health-system financing.

Screening, selection, and data management

All retrieved documents were imported into Mendeley for reference management and duplicate removal. The search initially yielded 152 records, of which 112 remained after de-duplication. Following title and abstract screening, 56 full texts were reviewed, and 48 documents met the inclusion criteria. Included documents were organised into five thematic categories: health financing and UHC; telecommunications and digital financial services; techno-economic frameworks; operational models and case studies; and regulatory and data governance. The thematic categorisation and full list of reviewed literature are presented in Supplementary Files S2 and S4.

Data extraction and narrative synthesis

Data were extracted using a structured form capturing author, year, source type, geographical focus, objectives, and key findings. The synthesis followed three stages: descriptive analysis of findings by theme, development of thematic patterns across documents, and analytical integration to build a conceptual understanding of telecom-supported health-insurance financing in Nigeria.^{20,24} This process informed the conceptual framework presented in Supplementary File S3.

Credibility, ethics and transparency

Formal appraisal tools such as MMAT¹¹ or GRADE were not applied because this was a narrative review. However, all sources were assessed for credibility, relevance, transparency, and alignment with national and global policy frameworks.²⁵ Peer-reviewed studies were prioritised for analytical depth, while grey literature was assessed based on institutional authority, methodological clarity, and policy relevance. Key policy documents, including the NHIA Act 2022, NDHI Strategy 2023, and CBN Open Banking Guidelines 2023, were used to validate the policy context.^{11,18,26}

This review relied exclusively on publicly available secondary data; therefore, ethical approval was not required. Supplementary files were provided to support transparency and reproducibility, including database

search strategies, thematic categorisation, the conceptual framework, and the full list of included sources.

Findings and Thematic Synthesis

1. Nigeria's health financing landscape and the quest for universal health coverage

Achieving Universal Health Coverage (UHC) requires a financing system that protects individuals from financial hardship while ensuring access to quality healthcare. In Nigeria, however, health financing remains heavily dependent on out-of-pocket (OOP) payments, which account for more than 70 percent of total health expenditure.³ This creates serious equity concerns, as healthcare costs continue to push many households into poverty each year.⁷

Nigeria introduced the National Health Insurance Scheme (NHIS) in 2005 to promote prepayment and risk pooling, but the scheme achieved limited coverage because of weak enforcement, low awareness, poor oversight, and limited public trust.^{6,9} By 2020, enrolment remained below 10 percent, leaving most Nigerians, particularly informal workers and rural populations, outside formal insurance protection.^{6,9} The National Health Insurance Authority (NHIA) Act of 2022 was therefore an important reform because it made health insurance mandatory and strengthened the legal basis for universal coverage.¹¹ The Basic Health Care Provision Fund was also designed to support primary healthcare and protect vulnerable groups.⁴ However, implementation challenges remain, including weak coordination between federal and state schemes, delayed fund disbursement, affordability constraints, and limited accountability.^{4,14}

Comparative experience from Ghana and Rwanda shows that compulsory, well-governed, and cross-subsidised insurance systems can expand coverage more effectively than voluntary schemes.¹⁹ In Nigeria, progress toward UHC will therefore require more than legal reform. It will depend on stronger implementation, improved public trust, digital financing mechanisms, and insurance models that are accessible and affordable for informal, rural, and underserved populations.

2. Telecommunications and digital financial services as enablers

Nigeria's telecommunications sector provides a strong foundation for digital health-financing innovation. With more than 220 million mobile subscriptions, mobile connectivity is one of the most widely available infrastructures in the country.¹⁸ This creates opportunities to link telecom platforms with insurance

enrolment, premium collection, claims processing, and communication between users, insurers, and healthcare providers.

Mobile financial services have expanded financial inclusion across many low- and middle-income countries by enabling low-cost transactions for previously excluded populations.²³ However, Nigeria's progress was initially slower than countries such as Kenya because it adopted a bank-led mobile-money model, which limited the direct role of telecom operators and restricted access in rural and unbanked communities.^{33,34} Recent regulatory changes have created new opportunities. The licensing of telecom operators such as MTN and Airtel as Payment Service Banks allows them to provide basic financial services, including mobile-based payment systems that could support micro-insurance contributions.²⁶ These platforms can reduce transaction costs, simplify enrolment, and support real-time data capture for claims and service monitoring.^{13,23}

Despite these opportunities, broadband gaps, high internet costs, poor electricity supply, and network disruptions remain barriers to digital health-financing adoption.^{27,28,35} Therefore, telecom-supported health insurance can improve access, but its impact will depend on affordability, reliable infrastructure, user trust, regulatory clarity, and integration with existing health-financing systems.

3. Techno-economic frameworks for evaluating digital health interventions

Techno-economic frameworks are important for assessing whether digital health-financing interventions are technically feasible, economically sustainable, and socially valuable. In resource-constrained settings such as Nigeria, digital health initiatives must demonstrate affordability, scalability, and value for money.³⁸ International organisations such as the World Bank and WHO emphasise that digital health interventions should be evaluated using multiple dimensions, including cost-effectiveness, implementation complexity, system readiness, equity, and long-term health-system impact.^{13,19}

Traditional economic evaluation methods may be insufficient for digital health interventions because these systems evolve quickly and often operate in fragmented environments.³⁹ Telecom-supported initiatives such as WellaHealth and MTN Y'ello Health should therefore be assessed beyond enrolment numbers. Their effectiveness should also be evaluated in relation to continuity of coverage, claims efficiency, financial protection, user trust, and long-term sustainability.^{27,30,41}

Equity is central to this assessment. Digital interventions may improve access for some groups while excluding others who lack smartphones, digital literacy, stable internet, or affordable data.^{5,28} For this reason, evaluation frameworks should include rural access, gender, income, digital literacy, affordability, and service utilisation among underserved groups. Techno-economic analysis can therefore help policymakers determine whether telecom-driven health-insurance models are affordable, equitable, scalable, and aligned with Nigeria's UHC goals.

4. Operational models and case studies

Telecom-driven health-insurance models have emerged as practical approaches for expanding healthcare access among informal workers and low-income populations in Nigeria. These models use mobile-finance technologies, USSD codes, digital wallets, and telecom networks to simplify enrolment, premium payment, claims processing, and access to care.^{23,30}

MTN Y'ello Health, launched in 2014 through a partnership involving MTN, Salt & Einstein MTS, and the NHIS, enabled subscribers to pay small monthly premiums through mobile channels and access selected services such as malaria treatment, family planning, and minor procedures.^{13,23} Although it reduced enrolment barriers, its dependence on donor and corporate social responsibility funding limited long-term scale.⁴¹ More recent models include the Airtel-AXA Mansard Health Bundle, which integrates insurance with mobile data services and offers teleconsultations, pharmacy discounts, and hospital reimbursement through USSD activation.³⁰ However, limited claim values reduce its ability to protect households from catastrophic costs.⁴³ Similarly, the Globacom-AXA Mansard model uses daily micro-premiums and incentives, but financial incentives alone may not sustain participation without trust, education, and reliable services.³⁷

WellaHealth provides a focused malaria micro-insurance model, offering low-cost coverage and cashless treatment at partner pharmacies.^{27,30} Its disease-specific design improves affordability and predictability, but expansion into broader packages would require stronger risk pooling and regulatory support.³⁹ Internationally, Kenya's M-TIBA shows how mobile wallets, health records, insurers, and government support can be integrated to serve informal-sector populations.²⁹ Nigeria's Payment Service Bank reforms create similar opportunities, provided telecom models align with NHIA and CBN regulations.^{11,26}

5. Regulatory and data governance issues

Regulatory and data governance structures are central to telecom-driven health-insurance models because

they operate across health, finance, and telecommunications sectors. In Nigeria, oversight remains fragmented among the NHIA, Central Bank of Nigeria, and Nigerian Communications Commission, creating overlapping responsibilities and uncertainty for innovators.³⁶

The NHIA Act of 2022 provides an important legal foundation by making health insurance mandatory and strengthening regulation of public and private schemes.¹¹ However, implementation remains uneven across states because of varying institutional capacity, weak coordination, and digital infrastructure gaps.¹⁴ Financial regulation has also evolved through the Payment Service Bank framework and Open Banking Guidelines, which support low-value payments, data sharing, and consumer protection.²⁶ However, integration between telecom payment systems, insurers, and healthcare providers remains limited, reducing opportunities for real-time enrolment, automated claims, and fraud detection.⁴⁴

The Nigeria Digital in Health Initiative offers a pathway for improving interoperability by linking health records, payment systems, and data platforms within a coordinated ecosystem.²⁴ Data privacy is also essential. The Nigeria Data Protection Act 2023 provides protections for personal and health data, but enforcement remains inconsistent, especially among smaller providers.^{28,42} Overall, the success of telecom-driven health insurance will depend on harmonised regulation, interoperable systems, strong privacy protection, and effective cross-sector governance.

DISCUSSION

This review examined how telecommunications and digital financial services can support health-insurance financing in Nigeria. The findings suggest that telecom-driven health insurance has potential to strengthen Universal Health Coverage (UHC), but only if it is embedded within wider reforms addressing financial protection, governance, infrastructure, digital inclusion, and public trust. Across the reviewed literature, the central argument is that digital innovation can improve insurance enrolment, premium collection, and claims communication, but it cannot by itself correct the deeper structural weaknesses of Nigeria's health-financing system.

The persistence of high out-of-pocket (OOP) payments remains the strongest justification for exploring telecom-supported health insurance. This finding is consistent with previous studies showing that OOP spending continues to undermine financial protection and expose Nigerian households to catastrophic health expenditure and poverty.^{1-4,7}

Although the NHIA Act provides a stronger legal basis for mandatory health insurance, this review found that implementation remains constrained by low enrolment, fragmented governance, weak enforcement, and limited public trust.¹¹ This supports earlier policy analyses which argue that legal reform alone is insufficient unless supported by institutional accountability, effective risk pooling, and reliable service delivery.^{2,3} In contrast, evidence from broader insurance literature suggests that mandatory schemes are more likely to expand coverage when governance structures are strong and citizens trust that contributions will translate into accessible care.^{9,39} Therefore, telecom-driven insurance should be seen as a supportive mechanism within national insurance reform, rather than a substitute for stronger public financing.

The review also found that Nigeria's telecommunications infrastructure provides an important opportunity to address some barriers to enrolment and payment collection. Mobile platforms can support micro-premium payments, reminders, claims communication, digital identification, and access to informal-sector populations that are often missed by conventional insurance schemes. This agrees with studies showing that digital health technologies and mobile platforms can improve access, efficiency, and health-system strengthening in Nigeria and sub-Saharan Africa.^{10,14,25} Similarly, GSMA evidence shows that mobile-money systems have supported financial inclusion across the region.²³ However, the Nigerian context differs from more successful mobile-money environments such as Kenya, where telecom-led models were allowed to develop earlier and more widely.^{29,33} Nigeria's earlier bank-led approach limited the role of telecom operators and slowed access for rural and unbanked populations. This contrast suggests that the success of telecom-driven health insurance depends not only on mobile-phone penetration but also on enabling regulation and the ability of telecom operators to participate meaningfully in low-cost financial services.

At the same time, the findings caution against assuming that mobile connectivity automatically produces inclusion. Although Nigeria has over 220 million mobile subscriptions, digital access remains uneven because of broadband gaps, high data costs, unreliable electricity, and low digital literacy.^{18,28,35} This contrasts with more optimistic accounts of digital health expansion that emphasise scale, connectivity, and innovation, but pay less attention to the exclusion of rural, low-income, and digitally marginalised populations.^{24,31,32} If telecom-supported insurance relies mainly on smartphones, data-heavy platforms, or urban digital infrastructure, it may deepen existing

inequities rather than reduce them. Therefore, inclusive models should combine mobile apps with USSD, SMS, agent networks, community health workers, and offline enrolment support.

The operational models reviewed demonstrate both feasibility and limitation. WellaHealth, MTN Y'ello Health, Airtel-AXA Mansard, Globacom-AXA Mansard, and similar initiatives show that insurance can be delivered through familiar telecom platforms using small premiums, simple enrolment, and cashless claims.^{27,30} These findings support evidence that digital insurance management systems can improve administrative efficiency, reduce friction, and make health coverage more accessible to informal-sector users.^{12,27} However, these initiatives also contrast with the broader goals of public insurance because many remain small-scale, disease-specific, commercially driven, or limited in benefit coverage.^{30,43} For example, malaria-focused or low-claim micro-insurance packages may improve short-term access to care but may not provide meaningful protection against catastrophic costs, chronic disease management, surgery, or long-term treatment needs. This supports arguments that digital health-financing models should be evaluated beyond enrolment numbers, using indicators such as continuity of coverage, affordability, claims efficiency, equity, financial protection, user retention, and long-term sustainability.^{37,40,45}

Regulatory and data governance findings further show that telecom-driven insurance cannot scale without stronger cross-sector coordination. These models operate across health, finance, telecommunications, and data-protection systems, yet regulatory responsibilities in Nigeria remain divided among the NHIA, CBN, NCC, and other institutions. This supports studies showing that weak implementation pathways and institutional fragmentation continue to limit health reforms in Nigeria.^{3,41} Although the NHIA Act, Digital in Health Initiative, Open Banking Guidelines, and Data Protection Act provide an enabling foundation, their effectiveness depends on interoperability, enforcement, consumer protection, and clear accountability.^{11,26,42} This contrasts with Kenya's M-TIBA experience, where stronger alignment between mobile money, health financing, government support, and digital infrastructure enabled wider adoption.^{29,33}

Overall, telecom-driven health insurance can contribute to UHC in Nigeria, but only under specific conditions: integration into NHIA's benefit framework rather than parallel products; mandatory cross-sectoral accountability for claims disputes; and deliberate design for digitally excluded populations using USSD, agent networks, and subsidised access. Without these

conditions, telecom-enabled insurance risks not failure but something more insidious – an illusion of coverage that counts enrolments while households remain exposed to catastrophic costs. Its real value will depend on whether digital innovation serves as a tool for inclusive governance and sustainable financing, not a substitute for them.

Limitations of the review

This review should be interpreted in light of some limitations. Since it relied on secondary data, the findings depend on the quality, completeness, and availability of existing peer-reviewed, policy, institutional, and corporate sources. This was particularly important for private telecom-supported insurance initiatives, where public information on enrolment, claims, costs, retention, and long-term outcomes was limited.^{28,30,35} In addition, the narrative review design allowed broad thematic synthesis but did not include formal quality appraisal or statistical pooling.^{20,21} Although evidence from Kenya, Ghana, and Rwanda provided useful comparisons, differences in governance, infrastructure, and financing systems may limit direct transferability to Nigeria.^{29,33}

Future directions

Future research should move beyond conceptual discussion to empirical evaluation of telecom-supported health-insurance models in Nigeria. Pilot programmes should be assessed using real-world data on enrolment, premium continuity, claims processing, user retention, service utilisation, and financial protection. This would help determine whether these models reduce out-of-pocket payments or simply improve short-term access to limited services.^{23,27,30} Future studies should also examine differences by income, gender, location, digital literacy, and employment status to ensure that digital insurance does not exclude the populations most in need of coverage.^{28,35,38}

Policy development should focus on integrating telecom-supported insurance into existing national financing mechanisms, including the NHIA, Basic Health Care Provision Fund, and Vulnerable Group Fund.^{11,12} Stronger collaboration between regulators, telecom operators, insurers, healthcare providers, and community agents will also be needed to support interoperability, data protection, affordability, and public trust.^{26,42,47}

CONCLUSION

Telecom-driven health-insurance financing offers a promising pathway for strengthening Universal Health Coverage in Nigeria, particularly for informal-sector, rural, and underserved populations. However, its

success will depend on more than mobile connectivity. The findings show that digital insurance models must be supported by strong regulation, affordable benefit packages, interoperable data systems, reliable infrastructure, and public trust. While initiatives such as mobile micro-insurance demonstrate practical potential, they must be integrated into national health-financing structures to achieve scale and sustainability. With coordinated governance and inclusive implementation, telecom-enabled insurance can help reduce out-of-pocket payments and improve financial protection in Nigeria.

DECLARATIONS

Ethics approval

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was not required, as the review is based entirely on publicly available secondary data.

Availability of data and materials

All data relevant to this study are included within the article and its supplementary materials.

Competing interests

Afeez Abolarinwa Salami is a member of the Annals of Ibadan Postgraduate Medicine editorial board. To avoid bias, they were excluded from all decisions relating to the review and publication of this article. Other authors have no competing interests.

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