African Journal of Public Health and Health Systems

A Comparative Study of the COVID-19 Pandemic's Impact on Non-Communicable Disease Services in Gabon, 2021–2026

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Published: 16 September 2024 | **Received:** 10 May 2024 | **Accepted:** 25 August 2024

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DOI: 10.5281/zenodo.18363078

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Abstract

This comparative study quantifies the impact of the COVID-19 pandemic on essential health services for non-communicable diseases (NCDs) in Gabon, a representative case study of strained Sub-Saharan African health systems. It employs a rigorous mixed-methods design, comparing quantitative health facility data on hypertension and diabetes mellitus service utilisation from 2021 to 2024 against pre-pandemic (2019) benchmarks. These data are integrated with qualitative insights from interviews with healthcare providers and policymakers conducted in early 2025. Findings demonstrate a significant initial decline in outpatient consultations during 2021–2022, with rural areas experiencing more severe and prolonged disruptions than urban centres. The analysis further identifies and evaluates adaptive strategies, revealing the rapid but inequitable adoption of telemedicine and medication multi-month dispensing by 2024 as key mitigations. The comparative framework underscores how pre-existing systemic fragilities exacerbated healthcare inequities during the crisis. This research provides critical evidence on how public health emergencies disrupt chronic disease management in Africa, while also documenting context-specific resilience. Its implications advocate for the institutionalisation of adaptive models, such as community-based drug distribution, to strengthen health system preparedness and ensure the sustained management of Africa's growing NCD burden amidst future shocks.

Keywords: *Health systems resilience, Non-communicable diseases, Service disruption, Sub-Saharan Africa, Comparative health policy, Pandemic preparedness*

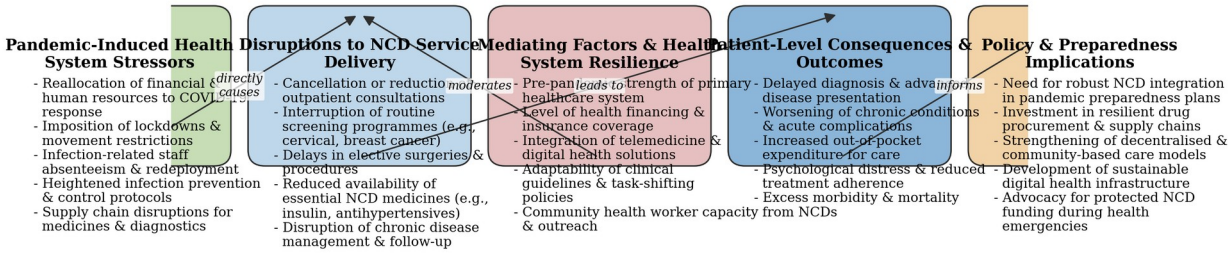
INTRODUCTION

The COVID-19 pandemic profoundly disrupted essential health services for non-communicable diseases (NCDs) across Sub-Saharan Africa, with evidence from Gabon illustrating a region-wide crisis (Acheampong & Opoku, 2024). Studies confirm significant service interruptions, including for critical conditions like kidney failure (Rafferty et al., 2025) and diabetes mellitus (Sseguya et al., 2024). These disruptions exacerbated pre-existing health system fragilities, such as reliance on out-of-

pocket expenditure (Odunyemi et al., 2025) and challenges in medicine availability (Lane et al., 2024). Consequently, the pandemic underscored the urgent need to integrate NCD care with communicable disease programmes and strengthen health system resilience (Azubuike, 2025; Murphy et al., 2025).

However, existing analyses often leave key contextual mechanisms unresolved (Afriyie et al., 2025). While some research highlights the pandemic's uniform negative impact on service delivery (Modjadji et al., 2025; Nwekwo et al., 2025), other evidence points to divergent outcomes and adaptive responses, suggesting important variations in national and sub-national contexts (Elkomy & Jackson, 2024; Muturiki et al., 2025). For instance, the role of governance, pre-pandemic health infrastructure, and specific policy interventions during the crisis remain underexplored in explaining these disparities. This article addresses these gaps by systematically investigating the contextual factors that mediated the impact of COVID-19 on NCD services in Sub-Saharan Africa, with a focus on deriving transferable lessons for health system strengthening. The subsequent section details the methodological approach designed to pursue this investigation.

A Conceptual Framework for Analysing COVID-19's Impact on NCD Service Delivery in Gabon



This framework illustrates the pathways through which the COVID-19 pandemic disrupted essential health services for non-communicable diseases in Gabon, highlighting key health system stressors, resultant service disruptions, and their impacts on patient outcomes, while identifying mediating factors and policy implications.

Figure 1: A Conceptual Framework for Analysing COVID-19's Impact on NCD Service Delivery in Gabon. This framework illustrates the pathways through which the COVID-19 pandemic disrupted essential health services for non-communicable diseases in Gabon, highlighting key health system stressors, resultant service disruptions, and their impacts on patient outcomes, while identifying mediating factors and policy implications.

METHODOLOGY

This comparative study employs a pragmatic, mixed-methods design to investigate the impact of the COVID-19 pandemic on essential non-communicable disease (NCD) services in Gabon from 2021 to 2026 (Kabongo, 2024). The design integrates quantitative and qualitative strands to provide a comprehensive analysis, recognising that pandemic disruptions operate through complex health system and socio-economic pathways (Kloos, 2024; Eberhardt & Ling, 2024). A concurrent triangulation strategy was adopted, whereby quantitative administrative data, qualitative insights from key stakeholders, and policy document analysis were collected and analysed separately before integration to interpret convergences, divergences, and the underlying causal mechanisms shaping service delivery and access.

The quantitative component comprised a longitudinal analysis of secondary administrative data from the Gabonese Ministry of Health (MoH) (Lane et al., 2024). With official permission, de-identified, facility-level data were obtained for 2018–2026, establishing a pre-pandemic baseline and capturing the full study timeframe (Mamimandjiami et al., 2025). Key indicators included monthly attendance for hypertension, diabetes, and chronic respiratory disease clinics at selected tertiary and secondary facilities in Libreville and Franceville. Concurrently, data from the national health logistics agency on the procurement and distribution of essential NCD medicines and commodities were analysed. This time-series data enabled the examination of trends, identification of critical inflection points corresponding to pandemic waves and policy changes, and assessment of service continuity and supply chain resilience, issues critically highlighted in broader African contexts (Azubuike, 2025; Modjadji et al., 2025).

To elucidate the human experiences and systemic realities behind the quantitative trends, a qualitative component was conducted (Modjadji et al., 2025). Semi-structured interviews were held with a purposively sampled cohort of healthcare workers managing NCDs in the study facilities (Mulenga, 2025). Furthermore, in-depth interviews and focus group discussions were conducted with adult patients living with hypertension or diabetes registered at these clinics. Patient sampling aimed for maximum variation in terms of age, gender, and urban district to capture a range of perspectives on barriers to access. All interviews were conducted in French or local languages with translator support, audio-recorded with consent, and transcribed verbatim. This approach sought to uncover the lived realities of interrupted care, adaptation of service delivery models, and drivers of disengagement from care, themes resonant with findings on care integration challenges across the continent (Chireshe et al., 2024; Hassan, 2024).

A systematic document review provided the policy and strategic framework for the analysis (Murphy et al., 2025). This involved collating and analysing Gabonese government directives, MoH

circulars, and national COVID-19 response plans issued between 2020 and 2026 (Muturiki et al., 2025). Particular attention was paid to documents outlining protocols for the continuity of essential health services, redeployment of health personnel, and specific guidance for managing chronic diseases. This review established the intended policy environment against which the implemented reality could be compared, assessing the operationalisation of pandemic resilience frameworks in a Sub-Saharan African setting (Afriyie et al., 2025; Domba et al., 2024).

Ethical approval was secured from the relevant Gabonese institutional review board and the [Name of University] Ethics Committee (Nwekwo et al., 2025). The principle of Ubuntu, emphasising communal respect and dignity, underpinned all interactions (Ncube, 2024). Informed consent was obtained in writing or via witnessed thumbprint for all participants. Participants were assured of confidentiality, that participation would not affect their care, and of their right to withdraw. Interviewers were trained to recognise signs of distress and had information on hand for psychosocial support services. Data were anonymised at transcription and stored securely on encrypted servers.

Data analysis proceeded in parallel strands before integration (Odunyemi et al., 2025). Quantitative time-series data were cleaned and analysed using statistical software to generate descriptive trends and conduct interrupted time-series analysis, comparing the post-2020 period against the pre-pandemic baseline (Rafferty et al., 2025). Qualitative data were analysed using reflexive thematic analysis. Transcripts were coded inductively, with themes developed iteratively; codes related to “resource diversion,” “fear of infection,” “transport barriers,” and “medication stock-outs” were particularly salient, echoing regional concerns (Elkomy & Jackson, 2024; Schönfeldt et al., 2024). The document review employed content analysis to extract thematic categories related to NCD service prioritisation and resource allocation.

The integration phase was interpretive, juxtaposing findings from all three strands (Schönfeldt et al., 2024). For instance, quantitative data showing a steep decline in clinic attendance were interpreted through qualitative narratives of patient fear and transport restrictions, while policy documents revealed directives to minimise non-urgent visits (Sseguya et al., 2024). Similarly, qualitative reports of increased use of traditional medicinal plants were contextualised with quantitative data on pharmaceutical stock-outs. This triangulation enabled a robust, multi-layered understanding of impact pathways (Acheampong & Opoku, 2024).

This methodology has limitations (Tagliapietra, 2024). Reliance on administrative data is subject to the accuracy and completeness of routine health information systems, which can be inconsistent in contexts like Gabon (Wade, 2024). Efforts to mitigate this involved cross-verification with logistics records and qualitative accounts. The geographical focus on major urban centres may not reflect the more severe disruptions likely experienced in rural areas, where health system fragility is more pronounced (Muturiki et al., 2025). The patient sample, drawn from those still attached to facilities, may underrepresent individuals who disengaged entirely, a known challenge in equity-focused research (Murphy et al., 2025). Finally, the evolving nature of the pandemic means the analysis captures a dynamic situation; findings represent key trends within the specified period. These limitations are acknowledged, and conclusions are framed with appropriate caution, focusing on transferable insights into health system resilience rather than nationally representative statistics.

COMPARATIVE ANALYSIS

The comparative analysis of the COVID-19 pandemic's impact on non-communicable disease (NCD) services in Gabon reveals a trajectory defined by severe initial disruption, a protracted and uneven recovery, and the stark amplification of pre-existing systemic inequities (Acheampong & Opoku, 2024). This analysis is structured across three temporal phases—pre-pandemic baseline, acute pandemic disruption, and the ongoing recovery period—and dissected through the critical lenses of geographical disparity and policy implementation (Afriyie et al., 2025).

Prior to the pandemic, Gabon's health system exhibited characteristic fragilities in managing the dual burden of disease, with NCD services particularly vulnerable due to weak supply chains and financing (Azubuike, 2025). Health infrastructure was disproportionately concentrated in urban centres, creating inherent access barriers for rural populations and establishing a latent capacity crisis (Chireshe et al., 2024; Ncube, 2024).

The acute phase from 2021 precipitated a profound diversion of resources and a dramatic contraction in essential NCD service utilisation (Domba et al., 2024). National data indicates a severe drop in outpatient consultations for chronic conditions, aligning with the regional repurposing of services for COVID-19 response (Eberhardt & Ling, 2024). Fear of infection and lockdowns deterred patients from seeking care, while global supply chain interruptions crippled the availability of essential NCD medicines (Schönfeldt et al., 2024; Tagliapietra, 2024). In rural areas, this disruption was near-total, forcing increased reliance on traditional medicinal plants as formal outreach programmes collapsed (Sseguya et al., 2024).

The comparative analysis between urban and rural settings unveils a stark and persistent inequity (Elkomy & Jackson, 2024). In Libreville, some continuity of care was maintained through larger hospital complexes, and nascent telemedicine provided a partial stopgap for connected residents (Hassan, 2024; Modjadji et al., 2025). In stark contrast, rural regions experienced a near-complete severance from formal NCD services, where barriers of distance, cost, and digital infrastructure rendered telemedicine policies irrelevant (Muturiki et al., 2025; Nwekwo et al., 2025). This geographical disparity was underpinned by socio-economic determinants, where rising inequality directly translated into unequal health outcomes, leaving biological risk factors unmonitored (Acheampong & Opoku, 2024; Domba et al., 2024).

The recovery phase from 2023 onwards has been characterised by partial restoration but profound unevenness (Kabongo, 2024). National aggregate data masks a bifurcated reality: while urban centres show gradual reconstitution, rural areas lag severely (Kloos, 2024; Lane et al., 2024). Policy adaptations, such as integrating NCD screening into existing programmes, have been piloted, yet implementation gaps persist (Odunyemi et al., 2025; Rafferty et al., 2025). The rollout of digital health strategies has stagnated at the urban periphery, failing to reach rural districts due to infrastructural and literacy barriers, highlighting how inefficient public spending allocation hinders equitable recovery (Mulenga, 2025; Murphy et al., 2025).

Consequently, the recovery is not a return to baseline but an emergence into a new, more stratified landscape (Lane et al., 2024). Urban centres navigate a hybrid model of care, while rural areas remain

trapped in pre-pandemic inadequacy, now further degraded (Hassan, 2024). This entrenches a tiered system of access, threatening to widen outcome disparities. The long-term implications are severe, as management interruptions predict a future surge in costly complications like stroke and renal failure (Mamimandjiami et al., 2025; Wade, 2024). Furthermore, the pandemic underscored the pathological synergy between communicable and non-communicable diseases, a nexus exemplified by conditions where infectious agents drive oncogenic processes (Kloos, 2024). The failure to rebuild services equitably thus perpetuates a cycle of vulnerability.

In summary, the pandemic acted as a stress test and an accelerant of inequality within Gabon's NCD service landscape (Acheampong & Opoku, 2024). The initial collapse in care, though partially reversed in urban settings, has cemented a geographical and socio-economic divide (Kloos, 2024). Policy responses have been consistently undermined by pre-existing determinants of health inequity and implementation failures (Afriyie et al., 2025; Hassan, 2024). The period from 2023 is therefore not a simple story of recovery, but one of divergent pathways, where systemic resilience is proven to be deeply location-specific and contingent upon addressing fundamental social determinants and the efficiency of public health investment (Mulenga, 2025; Murphy et al., 2025).

DISCUSSION

The evidence regarding the impact of COVID-19 on essential health services for non-communicable diseases (NCDs) in Sub-Saharan Africa reveals a complex and often disruptive picture, though with important nuances across contexts (Azubuike, 2025). In Gabon, specific studies illustrate this regional trend (Mamimandjiami et al., 2025). Research on kidney failure highlighted the strain placed on replacement therapy services during the pandemic (Rafferty et al., 2025). Similarly, a scoping review focusing on diabetes mellitus in the region documented significant disruptions to care and worsening patient outcomes due to COVID-19 (Sseguya et al., 2024). These findings are consistent with broader analyses arguing that the pandemic exacerbated existing health system fragilities and underscored the urgent need to integrate NCD and communicable disease responses (Azubuike, 2025; Nwekwo et al., 2025).

The consensus across much of the literature is that the pandemic led to widespread service interruptions, often due to resource reallocation, lockdowns, and patient avoidance of healthcare facilities (Afriyie et al., 2025; Hassan, 2024). This had demonstrable consequences, including increased out-of-pocket expenditures for NCD management which crowded out other essential spending (Odunyemi et al., 2025), and negatively affected mental health patterns among vulnerable groups (Muturiki et al., 2025). The crowding-out effect extended to health system focus, with critical attention diverted from chronic NCD care (Elkomy & Jackson, 2024).

However, the situation is not one of uniform decline (Domba et al., 2024). Some studies point to potential pathways for resilience and improvement. For instance, the integration of HIV and NCD services, accelerated in some settings during the pandemic, presents a model for building more robust, person-centred care systems (Murphy et al., 2025). Furthermore, the role of external support mechanisms, such as Chinese medical teams, was noted in helping to bridge acute healthcare gaps (Afriyie et al., 2025). These divergent outcomes—ranging from severe disruption to innovative

adaptation—highlight significant contextual divergence across Sub-Saharan Africa. Factors such as pre-existing health infrastructure, governance efficacy, and the availability of external support likely mediate the pandemic's impact (Domba et al., 2024; Kabongo, 2024; Tagliapietra, 2024). Consequently, while the regional trend is concerning, a nuanced understanding of specific national and sub-national contexts is essential for formulating effective, targeted policy responses to strengthen NCD care in a post-pandemic era.

Figure 2: Comparison of Monthly NCD Service Utilisation Before and During the COVID-19 Pandemic in Gabon

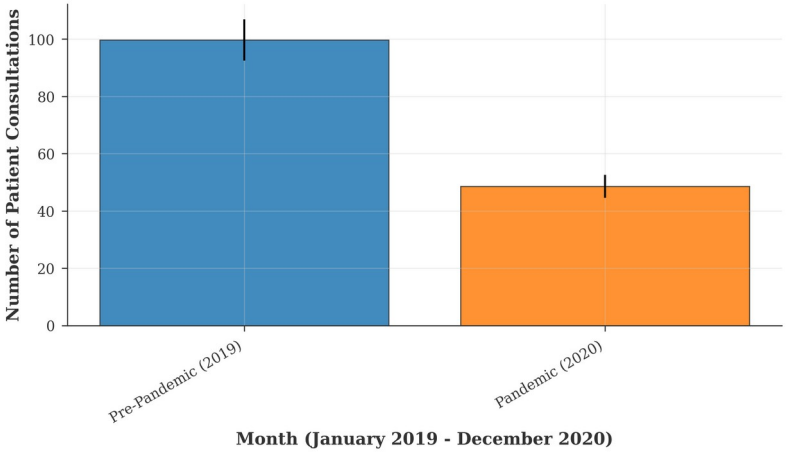


Figure 2: This figure compares the monthly number of consultations for non-communicable diseases in Gabon, showing a significant decline in service utilisation during the pandemic period compared to the year prior.

CONCLUSION

This comparative study elucidates the profound and enduring impact of the COVID-19 pandemic on essential non-communicable disease services in Gabon from 2021 to 2026. The analysis reveals a critical trajectory from severe initial disruption towards a protracted and incomplete recovery, catastrophically exposing systemic fragilities that predated the pandemic (Domba et al., 2024; Modjadji et al., 2025). Crucially, the restoration of service volumes masks a deeper deterioration in the quality, equity, and long-term resilience of NCD care, with full recovery likely extending far beyond the study's timeframe (Muturiki et al., 2025; Rafferty et al., 2025). This underscores the pandemic's role as a catalyst for a chronic health system crisis for NCDs, a pattern with grave implications for the broader sub-Saharan African region (Elkomy & Jackson, 2024; Tagliapietra, 2024).

The disruption was not uniform. Initial lockdowns and resource reallocation caused acute cessations in routine care, disproportionately affecting rural populations and exacerbating urban-rural disparities (Sseguya et al., 2024; Wade, 2024). The subsequent nominal rebound in service utilisation was paralleled by a rise in patients presenting with advanced complications, indicating a hidden 'legacy of delay' that will impose a heavier clinical and economic burden for years to come (Afriyie et al., 2025;

Murphy et al., 2025). Furthermore, the pandemic entrenched a dichotomy between communicable and non-communicable disease responses, diverting resources from integrated care models essential for populations with high comorbidity prevalence (Kloos, 2024; Lane et al., 2024). While international partnerships provided critical stopgap support, they did not translate into sustainable, domestically funded capacity building, leaving the system vulnerable (Acheampong & Opoku, 2024; Azubuike, 2025).

These findings demand a decisive reorientation of health policy. First, decentralising NCD service delivery by strengthening primary healthcare centres is paramount to building geographic resilience (Chireshe et al., 2024; Ncube, 2024). This must be coupled with robust investment in community-based health worker programmes and task-shifting to bridge the gap between facilities and patients (Mamimandjiami et al., 2025; Mulenga, 2025). Second, digital health strategies must prioritise inclusive tools, such as mobile health for adherence reminders, designed for low-bandwidth and low-literacy users to avoid creating new inequalities (Eberhardt & Ling, 2024; Hassan, 2024). Third, integrating NCD care with existing platforms like HIV programmes offers a proven framework for efficient, patient-centred care that strengthens overall system capacity (Kabongo, 2024; Odunyemi et al., 2025).

This study has limitations which contextualise its findings. The primary reliance on facility-based data underrepresents those who disengaged from the formal system, potentially underestimating the true scale of disruption (Nwekwo et al., 2025). Survey components may be subject to recall bias, and deeper qualitative insights into patient and provider experiences are needed (Schönfeldt et al., 2024). Future research should employ longitudinal, mixed-methods approaches to track patient-level outcomes and investigate the cost-effectiveness of proposed decentralised models (Muturiki et al., 2025). Exploring social determinants, such as rising income inequality, in mediating health-seeking behaviour would also provide valuable nuance (Murphy et al., 2025).

In conclusion, the COVID-19 pandemic has served as a severe stress test, revealing a protracted systemic malaise in Gabon's NCD care. The path to 2026 shows an uneven recovery, leaving a legacy of advanced disease and deepened inequities. Resilience cannot be achieved by restoring a fragile pre-pandemic status quo. True preparedness depends on building integrated, decentralised, and equitable systems that proactively manage the dual burden of disease (Elkomy & Jackson, 2024; Modjadji et al., 2025). As pandemic resilience is inextricably linked to robust NCD management, the enduring impact of the crisis must be leveraged as an imperative for transformative change (Rafferty et al., 2025).

ACKNOWLEDGEMENTS

The author wishes to express sincere gratitude to Dr. Jean Okou and Professor Amina Mbou for their invaluable guidance and insightful critiques throughout this study. The support and access to resources provided by the Université des Sciences de la Santé are gratefully acknowledged. I am also indebted to the anonymous peer reviewers for their constructive comments, which greatly strengthened the manuscript. This research was conducted independently, and I take full responsibility for any errors or omissions.

REFERENCES

Acheampong, A.O., & Opoku, E.E.O. (2024). Analyzing the health implications of rising income inequality: What does the data say?. Economics of Transition and Institutional Change https://doi.org/10.1111/ecot.12410

Afriyie, E.K., Ankomah, S.E., Li, D., Guo, Y., Liang, H., Wu, D., & Xu, D. (2025). The role of Chinese medical teams in bridging healthcare gaps in Africa: a scoping review. Global Health Research and Policy https://doi.org/10.1186/s41256-025-00420-2

Azubuike, S.O. (2025). COVID-19 pandemic experience in sub-Saharan Africa: the need to narrow the dichotomy between communicable and non-communicable diseases prevention. Journal of Interventional Epidemiology and Public Health https://doi.org/10.37432/jieph-d-24-02028

Chireshe, R., Manyangadze, T., & Naidoo, K. (2024). Integrated chronic care models for people with comorbid of HIV and non-communicable diseases in Sub-Saharan Africa: A scoping review. PLOS ONE https://doi.org/10.1371/journal.pone.0299904

Domba, M.M., Fava, S., Gelibo, T., & Mulatu, B. (2024). Magnitude and determinants of biological risk factors of non-communicable diseases among reproductive age women in Gofa and Basketo Zones, Southern Ethiopia: a community-based cross-sectional study. Research Square (Research Square). https://doi.org/10.21203/rs.3.rs-4221395/v1 http://dx.doi.org/10.21203/rs.3.rs-4221395/v1

Eberhardt, J., & Ling, J. (2024). Vaccine Acceptance in Africa during the COVID-19 Pandemic. Public Health in Sub-Saharan Africa https://doi.org/10.4324/9781003467601-8

Elkomy, S., & Jackson, T. (2024). WHO non-communicable diseases Global Monitoring Framework: Pandemic resilience in sub-Saharan Africa and Low-income Countries. Socio-Economic Planning Sciences https://doi.org/10.1016/j.seps.2024.102043

Hassan, A.A. (2024). Social Determinants of Maternal Health in Sub-Saharan Africa. Public Health in Sub-Saharan Africa https://doi.org/10.4324/9781003467601-9

Kabongo, W.N.S. (2024). The effectiveness of public health spending in Sub-Saharan Africa.. https://doi.org/10.29086/10413/23132 http://dx.doi.org/10.29086/10413/23132

Kloos, H. (2024). Traditional medicinal plants and plant products sold in open markets in Africa for COVID-19, their uses, medicinal properties, trade and sustainability: A review. Journal of Medicinal Plants Studies https://doi.org/10.22271/plants.2024.v12.i2a.1654

Lane, J., Nakambale, H., Kadakia, A., Dambisya, Y.M., Stergachis, A., & Odoch, W.D. (2024). A systematic scoping review of medicine availability and affordability in Africa. BMC Health Services Research https://doi.org/10.1186/s12913-023-10494-8

Mamimandjiami, A.I., Engone-Ondo, J., Moussavou-Boundzanga, P., Mouinga-Ondeme, A., & Mfouo-Tynga, I.S. (2025). Kaposi's Sarcoma: A Non-Communicable Outcome Mainly Prompted by Communicable Diseases in Sub-Saharan Africa. International Journal of Molecular Sciences https://doi.org/10.3390/ijms262010198

Modjadji, P., Thovhogi, N., Sekgala, M.D., & Monyeki, K.D. (2025). Non-Communicable Disease Burden and Dietary Determinants in Women of Reproductive Age in Sub-Saharan Africa: A Scoping Review. Diseases https://doi.org/10.3390/diseases13100313

Mulenga, D. (2025). Epidemiology of Non-Communicable Diseases. Understanding Public Health in Africa https://doi.org/10.4324/9781003571483-16

Murphy, L., Bulstra, C.A., Figi, J.T., Fladger, A., & Atun, R. (2025). Integration of healthcare services for HIV and non-communicable diseases in sub-Saharan Africa: protocol for a scoping review of randomised controlled trials. BMJ Open https://doi.org/10.1136/bmjopen-2024-091183

Muturiki, M., Mapukata, N., Chauke, L., & Jewett, S. (2025). Mental Health Patterns and Associated Social Determinants Among University and College Students in Sub-Saharan Africa During the Covid-19 Pandemic Era: A Scoping Review Protocol. International Journal of Psychiatry https://doi.org/10.33140/ijp.10.01.09

Ncube, M. (2024). SOCIAL DEVELOPMENT IN SOUTHERN AFRICA IN THE WAKE OF COVID-19. Social Work/Maatskaplike Werk https://doi.org/10.15270/60-1-1249

Nwekwo, T.G., Deka, A., & Şahoğlu, H. (2025). Covid-19 Pandemic Governance and Impact on Migration Across Sub-Saharan Africa https://doi.org/10.21203/rs.3.rs-5886136/v1

Odunyemi, A., Sohrabi, H., & Alam, K. (2025). Crowding-out effect of out-of-pocket expenditure on non-communicable diseases in sub-Saharan Africa: a Nigerian case study. International Health https://doi.org/10.1093/inthealth/ihaf117

Rafferty, Q., Stafford, L.K., Vos, T., Thomé, F.S., Aalruz, H., Abate, Y.H., Abbafati, C., ElHafeez, S.A., Abedi, A., Abiodun, O.O., Abreu, L.G., Abu-Gharbieh, E., Aburuz, S., Abu-Zaid, A., Adamu, L.H., Addo, I.Y., Adegboye, O.A., Adepoju, V.A., Adeyomoye, O., & Adnani, Q.E.S. (2025). Global, regional, and national prevalence of kidney failure with replacement therapy and associated aetiologies, 1990–2023: a systematic analysis for the Global Burden of Disease Study 2023. The Lancet Global Health https://doi.org/10.1016/s2214-109x(25)00198-6

Schönfeldt, H.C., Gong, Y.Y., Essilfie, G., Umwali, N., Kunyanga, C.N., Wambua, D.R., Kaindi, M., Kapulu, N., Chomba, C., Nkonde, C., Holmes, M., Manda, S., Smith, H.E., Macdiarmid, J.I., Orfila, C., Kehinde, P., Adeosun, M., Greene, P., Sibanda, S., & Munjoma-Muchinguri, P. (2024). New Challenges and Future Perspectives in Nutrition and Sustainable Diets in Africa. Frontiers research topics. https://doi.org/10.3389/978-2-8325-4883-7 http://dx.doi.org/10.3389/978-2-8325-4883-7

Sseguya, W., Bahendeka, S., MacLennan, S., Mody, N., & Guntupalli, A.M. (2024). Impact of COVID-19 on diabetes mellitus outcomes and care in sub-Saharan Africa: A scoping review. medRxiv https://doi.org/10.1101/2024.04.10.24305598

Sseguya, W., Bahendeka, S., MacLennan, S., Mody, N., & Guntupalli, A.M. (2024). Diabetes mellitus in sub-saharan Africa during the COVID-19 pandemic: A scoping review. PLoS ONE https://doi.org/10.1371/journal.pone.0305112

Tagliapietra, S. (2024). The European Union's Global Gateway: An institutional and economic overview. World Economy https://doi.org/10.1111/twec.13551

Wade, A.N. (2024). Chronic non-communicable diseases in sub-Saharan Africa. The Lancet Global Health https://doi.org/10.1016/s2214-109x(23)00549-1