Received: 02 January 2026 Accepted: 10 January 2026 Published Date: 19 January 2026

ScienceFrontier
OPEN ACCESS

Biomedical Research and Clinical Advancements
ISSN Online: 3065-341X

Research ARTICLE

African Healthcare Systems - Resilience in The Face of a Lockdown: Lessons from The Covid-19 Shutdown

Henry Kofi. Bosompem*

Department of Sociology, Faculty of Social Science and Humanities, University of Fort Hare, Alice Campus, Alice, South Africa

***Corresponding Author:** Henry Kofi. Department of Sociology, Faculty of Social Science and Humanities, University of Fort Hare, Alice Campus, Alice, South Africa

Citation: Henry Kofi. Bosompem (2026). African Healthcare Systems - Resilience in The Face of a Lockdown: Lessons from The Covid-19 Shutdown, J *Biomedical Research and Clinical Advancements*; 3 (1) 38, **DOI:** BRCA-RA-25-38

Copyright: Henry Kofi. Bosompem, et al © (2025). This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract:

The COVID-19 pandemic and the associated lockdowns posed an unprecedented shock to health systems worldwide. Africa's health systems entered the pandemic with well-documented structural vulnerabilities, yet responses and outcomes across the continent were heterogeneous. This article synthesises peer-reviewed literature, institutional reports, and country case studies to examine how African health systems coped with strict lockdown measures during the COVID-19 pandemic, identifies features of resilience that emerged, and draws practical lessons for future epidemic responses and health-system strengthening. Key findings are: (1) lockdowns caused substantial disruptions to routine health services (maternal and child health, HIV, TB, immunisation), largely through reduced access, transport restrictions, and fear-driven avoidance; (2) resilience was enabled by adaptable governance (rapid coordination via Africa CDC and WHO AFRO), repurposing of resources (labs, staff, telemedicine), strong community health-worker networks, and targeted social-protection measures; and (3) persistent weaknesses—chronic underfunding, supply-chain dependence, and inequities—limited system recovery and exposed tradeoffs between epidemic control and essential care. We offer policy recommendations to institutionalise resilience: invest in primary health care and community health workers, formalise regional supply platforms, expand integrated digital health and surveillance, and build flexible financing mechanisms for surge capacity. The African experience provides instructive strategies for combining containment with maintenance of essential services in future lockdowns or large-scale disruptions.

Key words: health system resilience; COVID-19; lockdown; Africa; Africa CDC; essential health services; community health workers

Introduction:

When novel SARS-CoV-2 spread globally in early 2020, governments implemented non-pharmaceutical interventions including stay-at-home orders, school closures, and broad lockdowns to limit transmission. Observers warned that African countries—ranked low on pre-pandemic preparedness metrics—would be particularly vulnerable (Lone & Ahmad, 2020; Gilbert et al. in early assessments). Yet, the course of the pandemic in many parts of Africa did not always match early catastrophic projections; responses were varied and, in several cases, showed rapid local adaptation informed by previous epidemic experience (Tessema et al., 2021; Africa CDC, 2021). Lockdowns, while useful for slowing transmission, also disrupted routine care, supply chains, and livelihoods, raising urgent questions about how health systems can remain resilient—i.e., maintain core functions and adapt—under such shocks (Haldane et al., 2021). This paper synthesises available evidence on the effects of COVID-19 lockdowns on African healthcare delivery, documents resilience strategies that mitigated harm, and draws lessons for policy and practice.

Literature review:

Conceptualizing resilience and lockdown-related shocks

Health-system resilience is widely defined as the capacity of health systems to absorb, adapt and transform in response to shocks while maintaining essential functions (Haldane et al., 2021). The COVID-19 pandemic challenged both the surge capacity (ability to absorb COVID caseload) and the continuity capacity (ability to sustain routine services) of health systems globally; lockdowns as a non-pharmaceutical intervention created complex, multifactorial disruptions that tested these resilience functions in particular ways (Haldane et al., 2021). Arsenault et al. (2022) and related frameworks stress that resilient performance during COVID-19 required parallel attention to crisis response and maintenance of essential services (the "two tasks" of resilient systems), with equity and governance central to durable outcomes.

Empirical evidence from Africa: scope and patterns

A continent-wide scoping review found that African countries entered the pandemic with marked heterogeneity in preparedness, and that the evidence base on impacts and responses is broad but uneven. Tessema et al. (2021) synthesised studies on preparedness, impact and response and highlighted: (a) extensive service disruptions early in the pandemic (antenatal care, immunisation, HIV/TB testing and treatment), (b) adaptive responses (task shifting, repurposing labs, community health strategies), and (c) the critical role of regional coordination (Africa CDC, WHO AFRO).

Country and subnational studies documented declines in specific indicators. For example, facility-level monitoring and national reporting identified declines in first antenatal visits, contraceptive access, HIV/TB testing and child consultations in several contexts (Pillay, 2021; Opoku-Boateng et al., 2024). These declines were driven by transport restrictions, fear of infection, diversion of facility space/staff to COVID care, and supply-chain interruptions. Quantitative household-level studies confirm the access problem: longitudinal evidence from Uganda found the lockdown increased the probability of

being unable to access care and raised unaffordability as a barrier during the strict phase of lockdowns (Bose et al., 2023). Similar patterns were documented across many low- and middle-income settings in Africa.

Pathways of disruption during lockdowns

The literature identifies several proximate pathways by which lockdowns lowered utilisation and compromised care continuity:

- **Mobility and transport restrictions**: curfews and bans on public transport reduced patients' ability to reach facilities and constrained outreach services (e.g., immunisation campaigns).
- **Fear and demand-side avoidance**: perceived infection risk at facilities reduced care-seeking, especially for non-urgent visits.
- **Supply-side repurposing and workforce shortages**: staff reallocation to COVID wards, absenteeism due to illness, and redeployment of primary-care spaces impeded routine service delivery.
- **Global supply-chain shocks**: shortages of PPE, diagnostics, oxygen and essential drugs were documented early in the pandemic and constrained safe service delivery. Regional procurement mechanisms (AMSP) partially mitigated this.

Enablers of resilience identified in African studies

A crosscutting theme in the literature is that resilience during lockdowns hinged on systems that were already connected to communities and to regional coordination mechanisms:

- **Community health worker (CHW) networks** sustained outreach, contact tracing and medication delivery in many settings (Haldane et al.; Tessema et al.). Where CHWs had formal support (supplies, supervision, pay) they buffered service losses.
- **Rapid governance and information flows** — national EOCs, crisis taskforces and Africa CDC coordination improved testing scale-up and policy coherence across countries.
- **Digital and logistics innovations** — telemedicine, phone follow-ups, and last-mile delivery (e.g., drones in Ghana/ZIPLINE) emerged as adaptive mechanisms when mobility was constrained.

Gaps and unresolved questions in the literature

The literature still lacks: (1) standardized cross-country metrics for lockdown-specific service disruption; (2) long-term outcome data linking temporary service interruptions to morbidity/mortality; and (3) rigorous evaluations of which adaptive measures are most cost-effective in low-resource settings. Several authors call for systematic after-action reviews and investment in data systems for real-time monitoring.

Methods:

Methodology

This paper uses a mixed-methods explanatory synthesis designed to (i) aggregate peer-reviewed and grey literature on lockdown impacts and adaptation in Africa, and (ii) illustrate contextualized learning through three country case vignettes (Ghana, South Africa, Uganda) informed by published country studies, policy reports and a set of anonymized composite interview excerpts.

Data sources

- **Literature and documents** — systematic searches of PubMed/PMC, Scopus, WHO AFRO and Africa CDC portals for studies (2020–2025) using keywords: "COVID-19", "lockdown", "health services", "Africa", "Ghana", "South Africa", "Uganda". Key syntheses (Tessema et al., Haldane et al., Arsenault et al.) and country studies (Pillay 2021; Bose et al. 2023; Opoku-Boateng 2024) were included.
- **Policy and operational reports** — Africa CDC annual reports, WHO AFRO COVID bulletins, national COVID-19 response plans and health-service monitoring reports.
- **Composite interview material** — to provide grounded illustration we constructed anonymized, representative interview excerpts synthesised from themes and direct anonymised interview quotations reported in country studies, news reports and government briefings (sources cited where relevant). These composites are explicitly labelled as such.

Rationale for using composite excerpts

Ethical and practical constraints prevented new primary fieldwork for this manuscript. To provide granular, humanized insights without fabricating specific individuals, I constructed anonymized composite excerpts that reflect recurrent themes in the empirical literature and public sector reports. These composites are a research device commonly used in qualitative syntheses when primary data collection is not feasible — they must be read as illustrative rather than literal transcripts.

Selection and analytic approach

© 2026 Henry Kofi. Bosompem, et al.

- **Document screening:** documents were screened for relevance (impact of lockdowns on essential services, adaptation/innovation, governance lessons). Priority was given to higher-quality systematic/scoping reviews, country case studies with empirical data, and WHO/Africa CDC operational reports.
- **Country vignette selection:** Ghana, South Africa and Uganda were selected to represent West, Southern and East African subregions and because each has documented analyses of lockdown impacts and notable adaptive strategies (e.g., Ghana — drones/logistics; South Africa — rigorous facility monitoring and strict early lockdown; Uganda — long school and movement shutdowns and strong CHW/PHC response literature).
- **Qualitative synthesis:** thematic coding of literature findings (NVivo style approach) into major resilience themes: governance/coordination, community platforms, supply/logistics, digital health, workforce, equity/financial protection.

Ethics and limitations

- No new human subjects research was conducted; composite interview excerpts are anonymized and explicitly synthetic. Limitations include potential selection bias (published literature is uneven), variable data quality across countries, and inability to infer causal effect sizes for interventions without primary evaluation data.

This is a narrative, policy-oriented synthesis drawing on: (1) peer-reviewed reviews and empirical studies (scoping reviews, country case studies) on COVID-19 impacts and health-system responses in Africa; (2) institutional analyses and strategic documents from Africa CDC and WHO AFRO; and (3) selected country reports and studies illustrating service disruptions and adaptation strategies. Sources were identified using targeted searches of PubMed/PMC, BMJ Global Health, Lancet journals, WHO and Africa CDC web portals, and thematic searches (e.g., "lockdown AND health service utilization Africa"). The goal was analytic synthesis rather than systematic meta-analysis: we emphasise recurring themes across high-quality reviews and representative empirical studies (Tessema et al., 2021; Haldane et al., 2021; Pillay, 2021; Haider et al., 2020; Africa CDC, 2021).

Results

Magnitude and nature of service disruptions during lockdowns

Across countries, lockdowns were associated with measurable declines in utilisation of essential services: antenatal visits, immunisation, child consultations, TB case referrals, and HIV testing all fell during stringent restriction periods (Pillay, 2021; Tannor et al., 2023; Tessema et al., 2021). For example, a multi-country facility survey found large declines in first antenatal visits (≈43%) and under-5 consultations (≈74%) during 2020 compared with 2019 in some settings; reasons included transport barriers, fear of infection, and health-facility repurposing for COVID care (Pillay, 2021). Country-level analyses (e.g., Uganda) similarly show increased odds of patients being unable to access care during lockdowns (Bose et al., 2023). These disruptions risked excess mortality and morbidity from non-COVID conditions, reversing gains in maternal and child health and in infectious-disease control (Tessema et al., 2021; Tannor et al., 2024).

Lockdown design and implementation shaped health impacts

Lockdown measures varied markedly in timing, strictness, and enforcement (Haider et al., 2020). Where restrictions were abrupt, poorly targeted, or strictly enforced without social-safety nets, essential health access fell more steeply (Haider et al., 2020; UN policy brief). Enforcement practices (e.g., curfews, movement bans) sometimes impeded health workers' mobility and disrupted supply deliveries (news and field reports from South Africa and elsewhere), compounding access problems.

Enablers of resilience during lockdowns

Despite constraints, several resilience features mitigated impacts:

- **Regional and national coordination:** Rapid activation of Africa CDC, WHO AFRO coordination, and national emergency operation centres improved information-sharing, laboratory expansion, and resource pooling (Africa CDC, 2021; WHO AFRO strategic response). Early institutional coordination allowed for faster testing scale-up and joint procurement initiatives (e.g., the Africa Medical Supplies Platform) that reduced critical shortages.
- **Adaptive governance and repurposing:** Health systems repurposed laboratories, reallocated staff, and established isolation centres while maintaining essential services through triage and infection-control measures (Tessema et al., 2021). Countries that integrated COVID-19 response with primary-care platforms preserved more routine services.
- **Community health workers (CHWs) and outreach:** CHWs played critical roles for contact tracing, community education, and delivery of medication and maternal-child interventions—reducing the need for facility visits (Lone & Ahmad, 2020; Haldane et al., 2021). Countries with established CHW networks (e.g., Rwanda, Ethiopia) used these cadres to sustain service continuity.
- **Digital/remote care solutions:** Telemedicine, SMS appointment reminders, and phone-based follow-ups expanded during lockdowns to maintain chronic disease management and adherence support (Tessema et al., 2021). While digital divide issues limited reach, such solutions provided a flexible mechanism to deliver care when mobility was restricted.
- **Local learning from past epidemics:** Prior experience with Ebola and other outbreaks improved surveillance, community engagement, and rapid public-health mobilisation in some countries—an important resilience asset (Resolve to Save Lives analysis; Lone & Ahmad, 2020).

Persistent vulnerabilities and trade-offs

Key weaknesses constrained resilience: chronic underinvestment in health financing and workforce shortages limited surge capacity; dependence on

© 2026 Henry Kofi. Bosompem, et al.

international supply chains led to PPE and reagent shortages early in the pandemic; inequities in service access were exacerbated during lockdowns, especially for urban informal settlements and rural areas (Tessema et al., 2021; Pillay, 2021). Further, measures to protect health systems from COVID-19 sometimes came at the expense of routine prevention and care, illustrating difficult trade-offs in crisis governance.

Discussion:

Interpreting resilience in the African lockdown context

Resilience is not mere robustness (withstanding shocks unchanged) but the ability to adapt, learn, and transform while maintaining core functions (Haldane et al., 2021). In Africa, resilience during lockdowns was heterogenous and context-dependent. Countries with prior epidemic experience, functional CHW programs, and rapid coordination through Africa CDC/WHO AFRO documented better capacity to maintain essential services while scaling COVID-19 responses (Africa CDC, 2021; Haldane et al., 2021). Nonetheless, system-level fragilities—funding gaps, workforce shortages, and reliance on external supply chains—limited the depth and durability of adaptive measures.

Policy implications and lessons learned

- **Prioritise primary health care and CHWs.** Strong PHC systems and formalised CHW programmes acted as the first line of continuity during lockdowns; investment in these platforms should be central to resilience policy (Haldane et al., 2021; Tessema et al., 2021).
- **Establish flexible surge financing.** Contingency funds or rapid-response financial mechanisms are needed to avoid reallocations that cripple routine services. National budgets, donor agreements, and regional pooled funds (e.g., African Health Financing Facility concepts) can provide rapid liquidity.
- **Build regional supply infrastructures.** Institutionalised platforms like the Africa Medical Supplies Platform (AMSP) and local manufacturing for PPE, oxygen, and diagnostics reduce vulnerability to global market shocks (Africa CDC, 2021; KFF analysis).
- **Integrate digital health with equity safeguards.** Telemedicine and remote monitoring should be scaled alongside investments to bridge digital divides (affordable data, device access) so that remote modalities do not exacerbate inequities (Tessema et al., 2021).
- **Design lockdowns with essential-service corridors.** Movement restrictions must explicitly protect health-seeking behaviour and supply logistics—clear exemptions, transport passes for patients and staff, and communication strategies reduce unintended access barriers (Haider et al., 2020; Pillay, 2021).
- **Institutionalise after-action learning.** Systematic evaluation (including service-utilisation monitoring and community feedback) should guide adaptive policy and preparedness plans (Haldane et al., 2021).

Limitations of this synthesis:

This paper synthesises high-quality reviews and illustrative empirical studies but is not a systematic review or pooled quantitative analysis. Country heterogeneity and evolving pandemic dynamics mean some findings (e.g., service recovery timelines) may differ across contexts and over time. Where possible, we cite recent empirical reviews and institutional reports to ground claims.

Country case vignettes with anonymized composite interview excerpts

Note: each excerpt is **composite**, anonymized, and clearly labeled as such (synthesized from published interviews, government briefings, NGO reports and media accounts).

Ghana — logistics innovation and community outreach

Summary of evidence. Ghana rapidly scaled testing and leveraged innovative logistics (drones) and task-shifting. Studies report early disruptions to routine services followed by rapid outreach to recover immunisation and maternal services in many districts (Ofori et al.; national monitoring). Ghana used the private sector (Zipline) for sample and supply transport in remote areas, easing diagnostic turnaround and maintaining supply chains for selected commodities.

Composite interview excerpt — GHANA (composite: district public health nurse):

“When the lockdown came, we lost many mothers from coming for ANC in the first two weeks — people were scared and taxis were not running. We re-organised outreach teams and used community volunteers to call and remind women about safe times to come. Zipline deliveries of test swabs and oxygen concentrators helped; results came back faster than before so staff felt safer doing deliveries and outpatient work. The challenge was that outreach required extra reimbursement for CHWs, which was hard to find at first.”

© 2026 Henry Kofi. Bosompem, et al.

(Composite excerpt based on multiple Ghanaian field reports and government briefings.)

Key learning from Ghana: public-private logistics innovation + supported CHWs can restore critical diagnostic and supply links under mobility restrictions, but require predictable financing for personnel incentives.

South Africa — strict lockdown, facility surveillance, and equity trade-offs

Summary of evidence. South Africa implemented one of Africa's strictest early lockdowns and simultaneously operates relatively strong facility reporting systems. Studies documented significant early declines in some routine services (e.g., immunisation in pockets, antenatal visits) and highlighted inequities intensified in informal settlements where social distancing and access were harder (Pillay; Gauteng MNCH study). Enforcement practices sometimes impeded access but national surveillance allowed rapid detection of service gaps and corrective measures.

Composite interview excerpt — SOUTH AFRICA (composite: provincial health manager):

"…We saw cases spike and the first instinct was to redirect staff and beds for COVID. But our routine reporting flagged big drops in child visits: we had to set a ministerial instruction to protect immunisation clinics and allow maternal care movement passes for community health workers. In some townships, enforcement was rough and people avoided health centres; our outreach teams went door to door with PPE, but PPE shortages in month one were real."
(Composite excerpt synthesised from provincial briefings, SAMJ case reports and press accounts.)

Key learning from South Africa: when strong monitoring exists, targeted policy corrections (movement exemptions for health, protected immunisation sessions) help — but enforcement and inequities can blunt health-seeking behavior unless accompanied by social protections and policing reforms.

Uganda — prolonged restrictions, affordability barriers, and community resilience

Summary of evidence. Uganda's long school and movement shutdowns plus phased lockdowns had measurable effects on service access and affordability, especially during the strict initial period (Bose et al., Musoke et al.). Studies catalogued decreased outpatient visits, increased unaffordability, and creative coping strategies (permission letters for travel, herbal remedies). Uganda's large CHW and village health team (VHT) network was leveraged for continuity in many locales.

Composite interview excerpt — UGANDA (composite: facility in-charge, peri-urban health centre):

"…Transport stopped and many clinics were quieter. People said they could not afford taxis, or feared fines from police. Our VHTs went into the community with masks and medication refills. Sometimes people used traditional remedies because they could not get to the clinic. We issued letters for critical patients but it was ad hoc — a real lesson is to make movement passes routine for chronic patients next time."
(Composite excerpt synthesised from interviews and qualitative studies from Uganda.)

Key learning from Uganda: affordability and enforcement features matter — community health platforms provide crucial continuity but must be formally resourced and movement exemptions institutionalized.

Figure / Table (textual) — comparative summary

Country	Most disrupted services (early lockdown)	Key resilience/adaptation measures	Persistent gap
Ghana	ANC first visits, immunisation in remote areas	Drones/logistics (Zipline), CHW outreach, rapid testing scale-up	Sustainable financing for CHW incentives, rural transport
South Africa	ANC visits, some immunisations, HIV/TB testing	Strong facility reporting, protected immunisation sessions, movement exemptions	Inequities in informal settlements; enforcement harms
Uganda	Outpatient visits, maternal & child services, chronic care	VHT/CHW medication refills, permission letters, targeted outreach	Affordability during strict lockdown; ad-hoc pass systems

Figure 1 (table): Comparative snapshot - service disruptions and resilience measures (Ghana, South Africa, Uganda)

Discussion:

Synthesis across sources and vignettes

The three vignettes illustrate common themes from the literature: lockdowns produced rapid declines in routine service utilisation via mobility, fear, and supply-side repurposing; yet resilience emerged where community platforms (CHWs/VHTs), logistical innovation (e.g., drones in Ghana), and strong surveillance/governance (South Africa's facility reporting, Africa CDC coordination) were present. These findings align with broader syntheses that emphasise adaptability, community connection, and governance as key resilience levers.

Policy implications (operational and financing)

© 2026 Henry Kofi. Bosompem, et al.

- **Institutionalise community health platforms** — formal contracts, predictable pay, PPE and supervision for CHWs/VHTs so they can scale continuity functions during movement restrictions. Evidence suggests CHWs were decisive in maintaining adherence and outreach.
- **Pre-specify essential-service corridors and movement exemptions** in pandemic preparedness plans — standardized passes for chronic patients, immunisation outreach staff, and supply deliveries reduce ad-hoc barriers and avoid inequitable outcomes. Uganda and South Africa examples show ad-hoc solutions worked but were uneven; codifying these is low-cost and high-value.
- **Invest in regional procurement and local manufacturing** — the Africa Medical Supplies Platform and pooled procurement reduced early shortages; building local manufacturing for oxygen, PPE and diagnostics will attenuate future global shocks.
- **Scale digital health with equity safeguards** — telemedicine is promising (and used in Ghana and elsewhere), but digital exclusion risks worsening inequities. Investments must include subsidized data, low-tech options (SMS), and telephone-based follow-up.
- **Surge financing and contingency funds** — establish rapid disbursal mechanisms to support CHW incentives, transportation vouchers, and temporary staffing so routine services are not cannibalized by crisis budgets. Documented shortfalls in Ghana/Uganda show these needs.

Research and monitoring priorities

- Create standardized indicators to monitor essential service continuity in real time (facility visits, vaccine sessions, ART/TB treatment continuity). The absence of comparable, high-frequency metrics hampers evaluation.
- Rigorous impact evaluations of specific resilience measures (CHW pay structures, telemedicine, regional procurement) are needed to establish cost-effectiveness.

Limitations (reiterated)

- This synthesis relies on published and grey literature through 2025 and on composite interview excerpts (constructed for illustration). It does not present new primary qualitative interviews; therefore, the vignettes are illustrative rather than empirical case studies based on original fieldwork.

Short methodological appendix — interview excerpt construction (transparency)

To be explicit about how composite excerpts were made: I extracted recurrent qualitative themes from published country reports, peer-reviewed qualitative studies and news/government briefings, and rephrased them into short, anonymized vignettes representing typical frontline experiences (e.g., district nurse in Ghana; provincial manager in South Africa; clinic in-charge in Uganda). Each composite is labeled and should be treated as synthesized illustration rather than a primary data transcript.

Conclusion

Lockdowns produced predictable but avoidable disruptions to essential services. Africa's experience shows resilience is achievable when systems have community reach, logistical creativity, and coordinated governance — but resilience must be institutionalized through financing, legal movement exemptions for health, CHW investment, regional supply platforms, and equity-centred digital health strategies.

The African experience of lockdowns during COVID-19 shows that—even in resource-constrained settings—health systems can exhibit important adaptive capacities when governance is coordinated, community platforms are leveraged, and innovations (digital, repurposing, regional procurement) are rapidly deployed. Yet resilience was partial and unequally distributed; chronic underfunding, supply-chain vulnerability, and social inequities limited the ability to safeguard essential services across populations. Policymakers should embed the lessons of COVID-19 into long-term health-system strengthening: invest in primary care and CHWs, formalise regional supply mechanisms, create surge financing, and design public-health measures that protect both epidemic control and essential care. These investments will improve readiness for future pandemics and enhance everyday health system performance.

References:

1. Africa Centres for Disease Control and Prevention (Africa CDC). (2021). Africa CDC Annual report 2021. Africa CDC. Retrieved from Africa CDC website.
2. Bose, B., et al. (2023). Impacts of the COVID-19 lockdown on healthcare access: evidence from Uganda. [Article]. PubMed Central. dOI: https://doi.org/10.4269/ajtmh.23-0144
3. Haldane, V., et al. (2021). Health systems resilience in managing the COVID-19 pandemic: lessons from 28 countries. Nature Medicine, 27(6), 964–975. doi: https://doi.org/10.1038/s41591-021-01381-y .
4. Haider, N., et al. (2020). Lockdown measures in response to COVID-19 in nine sub-Saharan African countries. BMJ Global Health, 5(10), e003319. doi: https://doi.org/10.1136/bmjgh-2020-003319
5. Lone, S. A., & Ahmad, A. (2020). COVID-19 pandemic – an African perspective. Emerging Microbes & Infections, 9(1), 1300–1308. doi: https://doi.org/10.1080/22221751.2020.1775132 .
6. Pillay, Y. (2021). Impact of COVID-19 on routine primary healthcare services in Africa: evidence and implications. South African Medical Journal (and related analyses). doi: https://doi.org/10.7196/SAMJ.2021.v111i2.15056
7. Salyer, S. J., et al. (2021). The first and second waves of the COVID-19 pandemic in Africa: a cross-sectional analysis. The Lancet, 130, 2741–2744. doi: https://doi.org/10.1016/
8. Tannor, E. K., et al. (2023). Impact of COVID-19 on health service utilisation in sub-Saharan Africa: a scoping review. BMC Global Health,

2024 (online). doi:http://dx.doi.org/10.1136/bmjopen-2023-074769
9. Tessema, G. A., Kinfu, Y., Dachew, B. A., et al. (2021). The COVID-19 pandemic and healthcare systems in Africa: a scoping review of preparedness, impact and response. BMJ Global Health, 6(12), e007179. doi: *http://dx.doi.org/10.1136/bmjgh-2021-007179* .
10. UN Secretary-General. (2020). Policy brief: The impact of COVID-19 in Africa. United Nations. UN Sustainable Development Goals
11. World Health Organization Regional Office for Africa (WHO AFRO). (2022). Strategic Preparedness and Response Plan for the WHO African Region, 1 Feb 2022–31 Mar 2023. WHO AFRO. Retrieved from WHO AFRO. WHO | Regional Office for Africa
12. Resolve to Save Lives / analysis. (2021). COVID-19 in Africa: Epidemics that didn't happen — lessons from previous outbreaks.
13. Kaiser Family Foundation (KFF). (2023). Africa CDC: Its evolution and key issues for its future. Issue brief.
14. Alam, U., & others. (2021). Redesigning health systems for global health security. The Lancet Global Health.
15. Haldane, V., et al. (2021). [Resilience framework perspective]. Nature Medicine.
16. Pillay, Y., et al. (2021). Impact of COVID-19 on routine primary healthcare services in Africa and Asia (evidence cited). SAMJ and Global Fund reviews. doi: https://doi.org/10.3389/fpubh.2022.992481
17. Haider, N., et al. (2020). Lockdown design and implications for sub-Saharan Africa. BMJ Global Health, 5:e003319. doi: https://doi.org/10.1136/ bmjgh-2020-003319
18. Tannor, E. K., et al. (2024). Updated scoping review: health service utilisation in sub-Saharan Africa during COVID-19. BMC Global Health.
19. Tessema, G. A., Kinfu, Y., Dachew, B. A., et al. (2021). The COVID-19 pandemic and healthcare systems in Africa: a scoping review of preparedness, impact and response. BMJ Global Health 6:e007179.
20. Haldane, V., De Foo, C., Abdalla, S. M., et al. (2021). Health systems resilience in managing the COVID-19 pandemic: lessons from 28 countries. Nature Medicine. doi: *https://doi.org/10.1038/s41591-021-01381-y*
21. Africa Centres for Disease Control and Prevention (Africa CDC). (2021). Africa CDC Annual Report 2021; Africa Medical Supplies Platform.
22. Pillay, Y. (2021). Impact of COVID-19 on routine primary healthcare services in Africa: evidence and implications. South African Medical Journal. doi: *https://doi.org/10.7196/SAMJ.2021.v111i2.15056*
23. Bose, B., et al. (2023). Impacts of the COVID-19 Lockdown on Healthcare Inaccessibility and Unaffordability in Uganda. (longitudinal household analysis). PMC article. doi: *https://doi.org/10.4269/ajtmh.23-0144*
24. Opoku-Boateng, Y. N., et al. (2024). Effect of Covid-19 on maternal and newborn care (Ghana). PLOS One / national analyses.
25. Moyo, S., et al. (2024). Impact of the COVID-19 pandemic on routine child immunisation in South Africa. PMC article. doi:*https://link.springer.com/article/10.1186/s12889-024-20591-w*
26. Arsenault, C., et al. (2022). COVID-19 and resilience of healthcare systems in ten countries. Nature Medicine. doi:*https://www.nature.com/articles/s41591-022-01750-1*

Submit your next manuscript to ScienceFrontier and take full advantage of:

• Convenient online submission
• Thorough peer review
• No space constraints or color figure charges
• Immediate publication on acceptance
• Research which is freely available for redistribution
• Submit your manuscript at: https://sciencefrontier.org/submit-manuscript?e=2

© The Author(s) 2026. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license,