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COVID-19 and Public Health in Africa: a call for new Perspectives in Health System Strengthening

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Abstract

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Africa accounts for nearly half of all deaths resulting from communicable diseases globally. A deteriorating health system can be attributed to these deaths. Unfortunately, most African countries have some of the weakest health systems. The World Health Organization (WHO) recommends that strong health systems are critical for the improvement of health outcomes and for accelerating progress towards the achievement of Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs) related to health. This has led to the rise of health system strengthening as a political agenda for countries in the WHO African Region. At a time when countries in this region are facing an economic downturn, the novel coronavirus, "severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)" adds to the challenges faced in health system strengthening. The coronavirus disease 2019 (COVID-19) pandemic has revealed major weaknesses in health systems globally, presenting a major threat to the already fragile health systems in Africa, revealing the urgent need for stronger health systems in Africa. In this paper, we present an updated literature review of the pertinent gaps in Africa's health systems and synthesized the findings by utilizing the six basic building blocks of health system strengthening (health workforce, access to equipment and essential medicines, service delivery, health information systems, leadership & governance) and other related aspects (health policy, health research, health monitoring and evaluation and disaster preparedness) in the context of COVID-19. Finally, the paper identifies priority strategies for health system strengthening in Africa.

Keywords: *COVID-19, Health System Strengthening, Public Health, Health System Building Blocks, Health System Resilience, Pandemic Preparedness*

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INTRODUCTION

The emergence of three coronavirus outbreaks; Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) in 2003, Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in 2012, and the 2019 Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in two decades has caused considerable global consternation [1]. Comparatively, the outbreak of the highly contagious SARS-CoV-2 or COVID-19 [2], has imposed unprecedented demands and revealed weaknesses of global health systems [3,4]. The rapid escalation compounded health resource shortage, with a correlation between mortality and health-care burden [5]. Many high-income countries have been hard hit by SARS-CoV-2, with Guarner [4] describing the effects of COVID-19 as grievous and crippling to health systems because of its toll on health professionals.

Although initially considered as less deadly than "SARS-CoV and MERS-CoV," [6], increasing prevalence and mortality prompted the WHO to raise the level of risk from "high" to "very high" in February 2020 [7] and declared SARS-CoV-2 a Public Health Emergency of International Concern (PHEIC) on March 30, 2020 [2]. It equally recommended widespread testing, and robust contact tracing [7], as well as social distancing, use of masks, case detection and diagnosis, timely upgrading of medical services, and community preparedness [7]. SARS-CoV-2 refocused global attention on national, regional, and pandemic spread through mass gatherings and its implications on global health security (GHS) [4].

The entry of COVID-19 into Africa raised great concerns [6,8,9]. As reported by European centre for disease prevention and control [10], Africa's unique socio-cultural and economic climate, with densely populated townships or congested accommodation, widespread poverty, and high migration, makes it more vulnerable to the novel coronavirus disease 2019 (COVID-19). Co-infections (with HIV, TB, and other pathogens) are most likely to potentiate the severity of COVID-19 [10], with a likelihood of collision between existing epidemics and SARS-CoV-2, thereby increasing the probability of higher morbidity and mortality [9].

The WHO Regional Office for Africa (AFRO) worked with 47 member states and partners in coordination, surveillance, laboratory capacity, case management, operation support, logistics, risk communication and community engagement, and human resources [9]. Faced with this global challenge, African Union member states were advised to release financial resources to support country-specific implementation plans derived from the continent-wide preparedness and response strategy led by the Africa Centre for Disease Control and Prevention (Africa CDC) [8]. With abject poverty, high vulnerability, weak health care systems and a large immunocompromised population, experts predicted the worse impact of COVID-19 on Africa [8]. Although the impact has not been as severe as anticipated, Africa's public health response must be swift and decisive, looking beyond COVID-19 to the future [6,9,10].

COVID-19 therefore presents an opportunity for new perspectives in health system strengthening (HSS) in Africa. With the high burden of diseases, there is need for African countries to look to the future and create an environment where UHC and GHS are in harmony, and allow for synergistic planning, financing, and implementation, through a diagonal investment and service delivery approach, including differentiated, integrated and community-led services. The purpose of this paper was to conduct a critical analysis of health systems in Africa and to discuss future directions. It examines the current state of health systems in Africa, their impact on patient outcomes, and proposes HSS measures to address future health challenges.

METHODS AND MATERIALS

This review involved a critical analysis of secondary data on the impact of COVID-19 and strategies for HSS in African Countries. We searched PubMed and Google Scholar for articles published between March 1, 2020, and June 31, 2020. Search terms included "Health System Strengthening" OR "universal health coverage" AND "COVID-19" AND "preparedness and response" OR "governance" OR "financing" OR "Health information systems" OR "Human resources for health." Published articles (e.g., peer-reviewed research, editorials, and pre-prints) which focused on the impact of COVID-19 and HSS were searched and analysed. Studies were included if they addressed health systems capacities amid the pandemic and/or discussed the steps to close any gaps and strengthen health services. Articles on HSS addressed the six building blocks (Health workforce, access to equipment and essential medicines, service delivery, health information systems, leadership & governance) and other related aspects (health policy, health research, health monitoring and evaluation and disaster preparedness). The gaps were identified and proposals for improvements

in each key area of HSS were suggested for improved health services in Africa.

PERSPECTIVES FOR HEALTH SYSTEM STRENGTHENING (HSS) IN AFRICA

Despite an enormous contribution to the global burden of disease, health systems in many African countries suffer from ineffectiveness, and underperformance. Health indicators remain hugely concerning, with high infant and maternal mortality. Addressing weaknesses in the building blocks of a health system and closely related areas is an imperative step in HSS.

A. Critical Analysis of The Building Blocks of a Health System

1. Health Financing

Financing health care remains a core element in HSS, especially in low resource settings, and contributes to reduced financial burden when accessing health services, improved access to health care and service delivery.

Healthcare financing is critical in Low- and Middle-Income Countries (LMICs) where the burden of disease is higher and resources are most scarce [11,12]. In 2015, for example, per capita health spending in LMICs was $US110 compared to $US5551 for High Income Countries (HICs) [11,12]. While governments in HICs provide 80% of total health expenditure on average, LMICs provide less than 30% [1,11,12]. Moreover, only few African countries have shown commitment to the 2001 Abuja Declaration and WHO Commission recommendation to respectively devote at least 15% and 10% of their annual national budget to the health sector, causing their healthcare systems to be overstretched and underfunded [11,12]. Consequently, the low government spending on health has led to a remarkably high Out-of-Pocket (OOP) expense on health, exceeding 70% of current health expenditure (CHE) in 2017 in Cameroon, Equatorial Guinea, Nigeria, and Sudan [1,11,12]. It was reported that Sub-Saharan Africa (SSA) accounts for the highest global burden of disease but has the least number of resources allocated to healthcare compared with other HICs [11,12]. In view of the waning donor funding for health financing in SSA, there is an urgent need to strategize the financing of health systems in Africa to reduce donor aid dependence and increase sustainability in financing of health care [11]. Moreover, the COVID-19 pandemic should not leave a protracted negative impact on health financing in Africa, but rather offer new perspectives to fund healthcare and respond to the unpredictable shock wave in health spending in the future [12]. Appropriate and sustainable funding will reduce financial barriers, increase access to health care and improve patient outcomes.

2. Health Human Resource (HHR)

HHR is at the heart of the health system and is a prerequisite to improved access to health care, efficiency in service delivery, and improved patient outcomes [13,15]. This entails having the right skill mix and ensuring that the workforce is adequately trained and equitably distributed. Nevertheless, LMICs face a health workforce crisis, relating to availability, distribution, efficiency, and performance [2]. Therefore, increased health workforce, backed by equitable distribution, competency, and motivation for service [16] will lead to improved health service quality, availability, accessibility, and acceptability [14].

According to the WHO, the median level of health workforce density in countries that have achieved or are close to achieving UHC is estimated at 4.45 health workers per 1,000 populations [16]. Africa bears 25% of the global burden of disease but provides only 3% of the global health workforce [16]. This is exacerbated by migration of 70% of this small workforce to HICs [13], with about 65,000 physicians and 70,000 African-born professional nurses working overseas [16]. A global deficit in skilled health professionals (doctors, midwives, nurses, and other health specialists) has been projected, with 34% of the global total shortage in Africa [15]. This is further compounded by international migration (“brain drain”) of an estimated 60 million healthcare workers from LMICs to HICs, thereby weakening the health system of the country of departure [13, 15,16,17].

Researchers have reported the greatest toll of health worker migration and shortage in Zimbabwe, Nigeria, Ghana, Zambia, South Africa, Benin, Ivory Coast, Senegal, Malawi, and South Africa [13,16]. There is an association between health worker migration and shortages, and uneven distribution of health workers [17]. COVID-19 added an extra urgency to build and retain a high cadre of health workforce.

3. Health Technology

Health technology enables access to quality health products and services. Successful health service delivery is a function of the availability of equipment, drugs, vaccines, and other health products.

Increased access to affordable high-quality medicines, equipment, vaccines, and other health products will significantly contribute to increased productivity of health workers [15]. A well-functioning supply chain is needed to ensure effective movement of products from manufacturer to the patient in a cost-effective manner [18]. However, supply chain management in LMICs is hampered by bottlenecks, limiting the gains from massive global health investments to combat malaria, HIV/AIDS, and TB [18]. This has further complicated the supply of quality medicines, leading to the proliferation of substandard medications, and compromising health system's ability to respond to health care demands [18].

Lack of industrialisation and poor research has compromised chances of made-in-Africa health products and equipment. For example, Africa manufactures only 1% of the vaccines it administers [15]. The consequence is the absence of quality medical products and diagnostic equipment, leading to high OOP for users, shortages, or delay in supplies [1,11,12]. Deficiency of medical products demotivates health workers and increases their quest to emigrate [12,15,16]. It is crucial that LMICs significantly reduce the reliance on global health initiatives like the Global Fund, and the President's Emergency Plan for AIDS Relief (PEPFAR) for procurement of health products, invest in health technology, create conducive atmosphere for investors and build a strong inter- and intra-African supply chain to cope with future challenges [19].

4. Health Care Service Delivery

Health care service delivery is an essential component that significantly contributes to the effectiveness of a health care system. It ensures that people are receiving the necessary attention required to maintain and sustain their wellbeing, and function productively in society. Ideally, these services should be provided at optimal levels globally. However, it is unfortunate that challenges still exist in regions such as SSA. Countries like Kenya, Madagascar, Mozambique, Niger, Nigeria, Sierra Leone, Tanzania, Togo, and Uganda have encountered setbacks in some aspects of service delivery relating to the quality, access, availability, and affordability of health care services [20,21]. Researchers demonstrated that political instability could result in an environment of conflict, compromising the capacity for a country's health care system to prevent the potential spread of outbreaks such as the COVID-19 pandemic [21]. Political instability gives rise to a hostile environment whereby the needs of individuals in the community may not be met substantially, increasing the risks of infections like COVID-19 for both health care professionals and the individuals who are supposed to receive health care [20]**.** The dynamics of health care service delivery are variable and complex [20,22]**,** with evidence suggesting that implementation of adequate health care service delivery can be disrupted not only by political instability, but also other factors like inadequate human resource, poor infrastructure, lack of medical and personal protective equipment (PPE), insufficient water and sanitation, and lack of medicines [20,22,23]. Improving health service delivery is crucial in addressing problems of access and quality care beyond the COVID-19 pandemic to ensure that service provision goes on without any disruptions should similar public health emergencies emerge in the future.

5. Health Information Systems (HIS)

The dearth of data in Africa has hindered a coordinated response effort [24]. A recent review found that optimising HIS in Africa still requires stronger HIS governance arrangements that allow priorities to be aligned across global health agendas and which reduce fragmentation of policies and programmes especially in emergencies [24]. COVID-19 outbreak shed light on the barriers to information on access and delivery to guide effective redistribution. This had a significant impact, particularly in countries with dense populations, local conflicts, and vulnerable infrastructures, such as Sudan, Nigeria, and Kenya [25]. Apart from that, Africa, like the rest of the globe, also suffered from "infodemic"; circulation of false and misleading information about COVID-19 prevention and treatment options, especially in rural communities [26].

Integrated Disease Surveillance Response (IDSR) through mobile phone networks, increased broadband internet connectivity, and electronic surveillance systems allowed for better response over the past year, and this had a positive impact on the response to COVID-19 [27]. For example, Uganda, Ethiopia, Zambia, and Malawi deployed a COVID-19 package to the District Health Information Software 2 (DHIS2) to provide real time data for governments [28]. However, for better coordination and less duplication, it has been noted that IDSR systems and DHIS2 need to be synchronized together instead of running parallel to each other [24].

In addition to strengthening surveillance, a critical HIS solution would be to streamline

screening and, build local and national government capacity for informed decision through Electronic Medical Records [24]. Finally, HIS should also be strengthened through community engagement to address rumours and misinformation about COVID-19 transmission, or any other emergency [24]. Improving HIS is needed to provide evidence and guidelines for policy action, improve on implementation, monitoring and evaluation of health programmes and address problems of vaccine hesitancy arising from "infodemic".

6. Leadership and Governance

Leadership and governance guarantee that strategic policy frameworks exist, with efficient oversight, alliances, regulation, attention to system design and responsibility. Poor leadership and governance in largely donor-aid-dependent health systems like Malawi, which saw a decline in donor contribution to the total health expenditure due to several donors pulling out from direct budgetary support limits resources for the provision of quality and equitable health services [29].

In 2017, Malawi committed to UHC through various priority strategies, one of which included improving leadership and governance of the health system [30]. However, the country has faced serious political, structural, and financial challenges to improving governance, which will impact the goal of achieving UHC by 2030 [29,30]. Moreover, a study that investigated UHC gaps in Africa as an indicator of the anticipated challenges in the management of COVID-19 found that Malawi was among the 36 (66.7%) countries that had a UHC index gap of above 50%, which entails glaring gaps in the governance of health systems in Africa [31].

The findings imply that the capacity and efficaciousness of countries in combating COVID-19 through laboratory testing of suspected cases, tracing of contacts to confirmed cases, isolation of confirmed cases and management of patients is likely to be restricted [31]. Therefore, with or without COVID-19, each country should strive to close the gaps in the leadership and governance of the health care system by making both policy and strategic efforts to improve governance at all levels [29].

B. Other Related Aspects of a Health System

1. Health Policy

Health policy plays an indispensable role in the definition of a country's vision, policy directions and strategies for ensuring the health of its population [32]. Although the process of policy development varies from country to country based on historical, political, and socioeconomic parameters prevailing in a particular country, the global consensus is to develop policies that can respond to the growing calls for HSS and the renewal of Primary Health Care (PHC) for UHC [32].

Despite the pledge to foster the health of all citizens through the adoption of the Health for all Policy [32] and recommitting to re-align health policies for the attainment of UHC in the context of sustainable development [31,32] little progress has been made in the implementation of UHC in Africa. This has been attributed to inefficient policies regarding funding of PHC systems, a segmented health insurance fund pool [34] and recently the COVID-19 pandemic resulting in stalling of the re-engineering of PHC, and disruption of essential health services [35].

To operationalise PHC and attain UHC by 2030, it will be important for the policies of African countries to focus on building inherent resilience at all levels in the health systems by investing in health infrastructure, health products, health workforce, health information, service delivery, financial management, governance, and coordination [34,35].

2. Health Research

Evidence from health research is vital in generating knowledge for the improvement of the health of populations [36] and fulfilling the commitments to achieving UHC in Africa [37] Africa has a low UHC Index of 46% compared to other regions (the Americas: 79%, South East Asian: 56%, Europe: 77%, Eastern Mediterranean: 57% and the Western Pacific: 77%) and accounts for nearly half (49%) of total deaths from communicable diseases, regardless of contributing only 16% of the global population [38]. Nevertheless, the sub-optimal health research capacity remains a concern, which can be explained by the lack of investment or inadequate investment in the health research systems. Moreover, a study on national health research systems found that only 47% (22/47) of the countries in Africa had a budget for health research in the Ministry of Health (MOH) [36]. Peradventure, this accounts for the low research output that has for a long time characterised this region, which contributed only 2.3% of the world's research output from 1996 to 2012 [39]. Despite considerable investment in medical education in some African countries over the

years, the circumstances on the ground do not seem to have changed much, with Africans contributing just 3% of the global share of 36,326 indexed publications on SARS-CoV-2 at 10 months into the pandemic which were predominantly done by authors from South Africa, Egypt, and Nigeria [40].

For the situation to change, countries in Africa should consider establishing a conducive environment for research [41], encouraging researchers [41], providing aid to research institutions, and promoting networks and partnerships between research institutions [41]. The efforts to empower researchers and the provision of research platforms should be accompanied by the capacity to implement evidence-based solutions in response to the HSS related gaps [41].

3. Health Monitoring and Evaluation

Monitoring and evaluation (M&E) are paramount to the public health emergency response. The Strategic Preparedness and Response Plans (SPRP) had an M&E component that aimed to strengthen surveillance, rapid response, and case investigation to control the spread of COVID-19. Lack of comprehensive guidance resulted in limited focus on subnational assessments in measuring progress and lack of coordination with other sectors to allow for data-driven decision-making processes at different levels [42].

Furthermore, the deployment of existing electronic field data collection systems was delayed leaving a gap between data collection and management in the continent [43]. Additionally, M&E were void of any case-specific information regarding age, gender, occupation comorbidities, and clinical outcomes for almost all African countries, even amid COVID-19 where the outcomes of daily tests were poorly documented [44].

Reimagining M&E would require novel data collection methods that allow for flexibility in field data collection during public health emergencies that allows for functionality for case investigation, contact tracing, and visualisation of transmission chains [43].

4. Public Health Disaster Preparedness

The purpose of public health disaster preparedness is to plan effective strategies in response to a communicable disease outbreak to minimise transmission, acquisition, and the implications of the disease [22,45]. Inefficient preparation poses a risk to the general population with the propensity to increase morbidities and mortalities [45].

Like other building blocks of a health system and related aspects, the disaster preparedness of countries in SSA has differed from nation to nation. Uganda and Congo already had existing infection prevention measures in place against other endemics that required isolation like Ebola, which made it easier for them to adjust their existing health care systems to accommodate COVID-19 testing, screening, and surveillance in comparison to nations that did not [23]. Evidence showed that collaborators' contributions significantly provided the necessary aid for a substantial number of SSA countries [23]. This highlights that although, the adjustments may have been easier it did not negate the fact that there were still challenges regarding the provision of Intensive Care Unit (ICU) facilities, sufficient oxygen supply in dyspnoeic patients, and lack of testing resources to diagnose and adequately treat patients who tested positive for COVID-19 [23]. Considering the above, African countries should consider maintaining the presence of disaster preparedness teams to better prepare for unforeseen public health emergencies like the COVID-19. Furthermore, there is need to develop a surveillance system for control of disease outbreaks through the ports of entry (air, land, and sea) in Africa in collaboration with organizations like the African CDC. This way, outbreaks can be identified and managed early with little or no exposure of the in-country general population.

PROPOSED STRATEGIES FOR HSS IN AFRICA

Building Block	Proposed Strategies for HSS
Health Financing	○ **Prepaid Pools**: Prepaid pooled resources through revenues from the public sector (government financing), private sector (social health insurance, private insurance), or donor funding (development assistance) to finance key health services will reduce undue financial stress on households resulting from accessing health care [11]. It increases the ability to domestically self-finance essential health services from [14] without recourse to foreign aid. ○ **Primary care financing**: Ensuring allocation of a significant proportion of funds in LMICs to primary health care level where majority of patients are found [11]. ○ **Compliance with international conventions**: Strict measures and advocacy to push countries to comply with conventions (WHO 10% and African Union 15% funding for health, and implementation of

		the Paris Declaration on Aid Effectiveness) [12] are required. ○ **Disaster relief fund**: Establishment of an African disaster relief fund would provide a source from which hard-hit countries could be supported to fight pandemics in its earliest stage, stop its spread and save lives.
Health Resource	**Human**	○ "**Train and Retain**": Population dynamics indicate that one in three births will take place in Africa by 2050. Therefore, addressing the push factors of health workforce migration by instituting effective policy options ("train and retain") aimed at ensuring that health workers receive reasonable financial remuneration and non-financial (career paths/professional development) and free or subsidised housing, family, and health allowances to keep workforce [16,17]. ○ **Primary Level Focus**: Continuous education and skills upgrade programmes to meet up with services delivery challenges and offer opportunities for promotion at work. It is also important to focus investment on community-based health workers: community health workers (CHW), who undergo shorter training and require less pay. ○ **Win-win Diplomacy**: Diplomatic engagements within the framework of the Global Code of Practice adopted by the WHO to tackle competition for scarce HHR is crucial to ensure financial compensation (through health workers tax repatriation) for the financial investments in training and education of the health workers [13,15]. Success stories like that of Norway and Ireland which made health workforce migration a diplomatic issue, with an option of workers' return, provides an opportunity for skills transfer. ○ **Health Education**: Integrating health education at all levels towards shifting the paradigm from viewing the population as clients of a health system to fundamental stakeholders and contributors to the design of an integrated health system is imperative. Beyond improving access to services, such an approach will also improve affordability, sustainability, effectiveness, and acceptability. ○ **Team-based Practice**: The WHO defines team-based practice in health care as occurring "when multiple health workers from different professional backgrounds (interdisciplinary - pharmacists, midwives, nurses, CHWs and physicians), work together with patients, families, caregivers and communities to deliver the highest quality of care". Promoting inter-health professional team service delivery presents a viable strategy to mitigate the shortfall of HHR [13].
Health Technology		○ **Supply Chain Management**: To guarantee quick delivery and improve access to medicines, there is need to invest in digital technologies to boast intra-African supply chains and procurement processes. This will introduce traceability ("track and trace") of medicines through the supply chain and facilitate quick supply of essential high-quality medicines [18]). It will facilitate trade in pharmaceutical products within and between African countries, especially in PHEIC like COVID-19. ○ **Increased access to Quality Medicines**: It is difficult to understand the fact that the best and most effective preventive and curative medicines for some diseases like malaria are rather found where its prevalence is extremely low or inexistent. It would therefore provide value for money if the cost of such medicines is significantly subsidised and provided to LMICs where malaria and other diseases are endemic [18] ○ **Privatisation of Supply Chains**: Privatising the supply chain sector to a network of private distributors and wholesalers of medicines and health products to retail and hospital pharmacies will introduce competition and improve service delivery [18]. ○ **Made-in-Africa Products**: Harnessing Africa's rich medicinal plants to produce "made-in-Africa" pharmaceutical products will reduce the over-dependence on HICs. Africa, being home to raw materials (iron, steel, aluminium, etc.) for the manufacture of medical equipment offers possibility for made-in-Africa health technology equipment and reduction in costs resulting from shipment. ○ **Skills Transfer**: African countries should create an

	enabling environment (dual nationality, tax reduction, reduced bottlenecks, and time to open and operate a business) for Africans abroad to invest in Africa. This will create jobs, transfer technological skills, and increase chances of made-in-Africa products or ability to repair faults with imported equipment without recourse to the manufacturer [19].
Health Service Delivery	○ **Capacity building**: Ensuring that all health care workers are trained on a regular basis to render daily standard of care, and emergencies including endemic and pandemic outbreaks. ○ **Community Satisfaction**: Establishing a community-institutional based approach to ensure the needs of the community are being met adequately.
Health Information System	○ **Improve Existing Regional Surveillance Networks:** This involves improving. ○ **Strengthen local and regional HIS governance and coordination:** This provides vital data for real-time policy decisions, allocate resources, and inform preparedness plans [24] ○ **Integrate PHC strengthening with scale up of HIS** to efficiently direct key resources like PPE and health workers ○ **Identify sources of misinformation and generate targeted evidence for specific communities [24]**).
Leadership and governance	○ **Stakeholder Involvement in leadership and governance at all levels:** Stakeholders' opinion or views may be uncomfortable for African governments, but will help point out weaknesses in health system governance, which if addressed will improve services [29] ○ **Funding for leadership and governance:** The use of such funds goes beyond holdings meetings to result-based HSS, focusing on making institutions stronger and independent. This involves evaluating progress made, and lessons to learn to improve management, decision making and accountability at all levels of the health system [29]. ○ **Training**: Include practical courses on health system leadership and governance for all health care staff in African Countries.
Health Policy	○ **Resilient Policymaking**: Generate policies that promote the building of resilient health systems which are able to continue the provision of essential health services to the population even during a crisis like the COVID-19 pandemic without interruption. Fundraising for health system financing, providing health coverage for the poor, increasing health insurance coverage and improving the quality of health care in the rural areas [34] are prerequisites. These go along with policies that promote investment in health infrastructure and supply of health products [35].
Health Research	○ **Funding for Research:** Investment in research is a key step in discovery and production of health products (medicines and equipment), with huge economic and health benefits on the continent. ○ **Encouraging Researchers:** This can be done by creating career pathways tied to remuneration and promotion of individuals involved in research while the senior scientists can be supported by raising their status to that of research leaders and role models. ○ **Providing aid to research institutions:** Governments can support infrastructure development, provide grants and fellowships in health research to be administered by African Universities and using funding mechanisms as drivers of change at African research institutions. ○ Promoting networks, collaboration and partnerships between research institutions in Africa.
Monitoring and Evaluation	○ **Linkage of the M&E systems with research entities** focused on areas spanning the multi-sectoral response will directly inform areas for improved communication and collaboration [42]. ○ **M&E strengthening:** This goes hand in hand with HIS, by utilising performance intelligence. This aims to use a structured approach, knowledge and information generated by the application of scientific methods to comparable healthcare data to systematically measure indicators of health systems performance to gather comparable data, develop indicators and identify optimal strategies for implementation ○ **Performance intelligence:** This will help to translate indicators into the knowledge

	and information used for governance [36]. ○ **M&E Data Sources:** M&E should combine public health data and data from other sectors, with customisability depending on location-specific needs, a more immediate working priority is the democratisation of data, including the derived analytics and insights [42]
Disaster Preparedness	○ **Disaster Response and Preparedness Prioritisation**: National MOH prioritising disaster response and preparedness by providing and mobilising resources for daily standard of care but also in preparation for endemic and pandemic outbreaks i.e., oxygen supply, ventilators, bed space among others. ○ **Disaster Centres**: Availability and access to isolation centres and health care facilities for all disasters including disease(s) posing a threat to the general population. ○ **Collaboration between stakeholders**: National MOH liaising with the community and health care workers to assess for loopholes in the current health care system with the intent to plan for feasible solutions. ○ **Disaster Surveillance**: establish a surveillance method for pandemic control through major corridors (air, land and sea) in Africa through the African CDC.

CONCLUSION

This study provided a critical analysis of the impact of COVID-19 on HSS in Africa. The analysis ascertained the strengths and weaknesses of health systems and explored potential solutions to tackle challenges faced. COVID-19 points to possibilities of other pandemics in the future and demands preparedness strategies. It is therefore imperative to make HSS a core component of national agendas creating better functional links between programmes and those with health systems as their business. It equally ensures improved capacity to respond to current and future challenges; and ensuring that institutional assets at each level of the organization are used most effectively, constitute major steps to achieving national and international health-related goals.

COVID-19 is a wake-up call to strengthen global solidarity and partnership in surveillance, communication, response, research, and implementation of evidence-based public health and clinical practice [3]. It offers an opportunity to reshape global health at both national and regional levels, build global collaboration to prevent, detect, and respond to future outbreaks [7,46]. Africa's potential and socio-cultural uniqueness needs to be factored into such global agenda. In the interest of GHS, global oneness is needed to confront future health challenges [7]. The policies and guidelines surrounding the declaration of a disease to be a PHEIC [7,9] might require review. Proactive measures and ownership of interventions in Africa will facilitate contextualization and improve acceptability and affordability.

The burden of COVID-19 on health systems is suggestive of the need for a paradigm shift towards global solidarity through action for pandemic preparedness [46], with designed strategies for effective intervention in the future [3]. Considering Africa's susceptibility to infectious diseases (cholera, diarrhoea, dysentery etc.), Africa needs to learn lessons from COVID-19 to be more proactive in the event of future pandemics, while reviewing, re-strategising, and refocusing health system management.

Africa's current health systems should be strengthened and promoted through policy, financing, infrastructure, and human resource development, as well as the expansion of existing preparedness, readiness, and response capabilities [9]. Such HSS measures would offer a timely and more effective response to future pandemics and save human lives right from the onset of any infectious disease.

DECLARATION

Contributors DMJ conceptualized the study and developed drafts on health financing, health workforce, and health technology and the conclusion. BM worked on leadership and governance, health policy, health research and the abstract. MA crafted the initial work on service delivery and disaster preparedness while HKH worked on the initial draft on health information systems, and health monitoring and evaluation. Each author suggested key strategies for health system strengthening pertaining to the area assigned to them and then DMJ put together the contributions from each author into one manuscript. All authors were involved in the subsequent revisions of the manuscript and approval of the final draft.

Competing interests There were no competing interests from all authors in this study.

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