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# Urban health nexus with coronavirus disease 2019 (COVID-19) preparedness and response in Africa: Rapid scoping review of the early evidence

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## Abstract

**Introduction:** Severe acute respiratory syndrome coronavirus 2 also called coronavirus disease 2019 was first reported in the African continent on 14 February 2020 in Egypt. As at 18 December 2020, the continent reported 2,449,754 confirmed cases, 57,817 deaths and 2,073,214 recoveries. Urban cities in Africa have particularly suffered the brunt of coronavirus disease 2019 coupled with criticisms that the response strategies have largely been a ‘one-size-fits-all’ approach. This article reviewed early evidence on urban health nexus with coronavirus disease 2019 preparedness and response in Africa.

**Methods:** A rapid scoping review of empirical and grey literature was done using data sources such as ScienceDirect, GoogleScholar, PubMed, HINARI and official websites of World Health Organization and Africa Centres for Disease Control and Prevention. A total of 26 full articles (empirical studies, reviews and commentaries) were synthesised and analysed qualitatively based on predefined inclusion criteria on publication relevance and quality.

**Results:** Over 70% of the 26 articles reported on coronavirus disease 2019 response strategies across Africa; 27% of the articles reported on preparedness towards coronavirus disease 2019, while 38% reported on urbanisation nexus with coronavirus disease 2019; 40% of the publications were full-text empirical studies, while the remaining 60% were either commentaries, reviews or editorials. It was found that urban cities remain epicentres of coronavirus disease 2019 in Africa. Even though some successes have been recorded in Africa regarding coronavirus disease 2019 fight, the continent’s response strategies were largely found to be a ‘one-size-fits-all’ approach. Consequently, adoption of ‘Western elitist’ mitigating measures for coronavirus disease 2019 containment resulted in excesses and spillover effects on individuals, families and economies in Africa.

**Conclusion:** Africa needs to increase commitment to health systems strengthening through context-specific interventions and prioritisation of pandemic preparedness over response. Likewise, improved economic resilience and proper urban planning will help African countries to respond better to future public health emergencies, as coronavirus disease 2019 cases continue to surge on the continent.

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## Keywords

Coronavirus disease 2019, pandemic preparedness, response strategies, Africa, urban health

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## Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) also called coronavirus disease 2019 (COVID-19) was first reported in China in the latter part of 2019 and has so far infected over 73 million people, killed over 1.6 million victims globally as at 17 December 2020<sup>1</sup> and rapidly overwhelmed health systems globally. COVID-19 was first reported in the African continent on 14 February 2020 in Egypt.<sup>1</sup> As at 18 December 2020, Africa reported 2,449,754 confirmed cases, 57,817 deaths and 2,073,214 recoveries.<sup>2</sup> Southern Africa region remains the worst affected with over 1 million cases followed by North Africa with over 848,500 recorded cases; Eastern Africa with 304,400 cases and West Africa with approximately 224,000 recorded cases. The least affected region being central Africa with approximately 69,900 recorded cases.<sup>2</sup> Figures 1–3 show details of the COVID-19 pandemic situation in Africa, at the time of writing this article. Urban cities in this era of globalisation face a triple health burden of non-communicable and communicable diseases, including COVID-19.<sup>3,4</sup> Evidence suggests that most emerging infectious diseases either originate in urban settings (e.g. the emergence of COVID-19 in Wuhan, China) or they rapidly propagate because of urbanisation.<sup>5,6</sup>

Urban cities easily become epicentres of global pandemics due to several factors, key of them being overcrowding, poor housing and urban sanitation. In the early COVID-19 literature, poor housing has been a major cause of COVID-19 spread due to poor ventilation and communal living.<sup>7</sup> Strict adherence to personal hygiene practices and social distancing among urban dwellers is also low because of insufficient social amenities.<sup>8,9</sup> It is estimated that barely 56% of urban populations in Africa have access to pipe water,<sup>10,11</sup> making routine handwashing practically impossible especially among the urban poor.

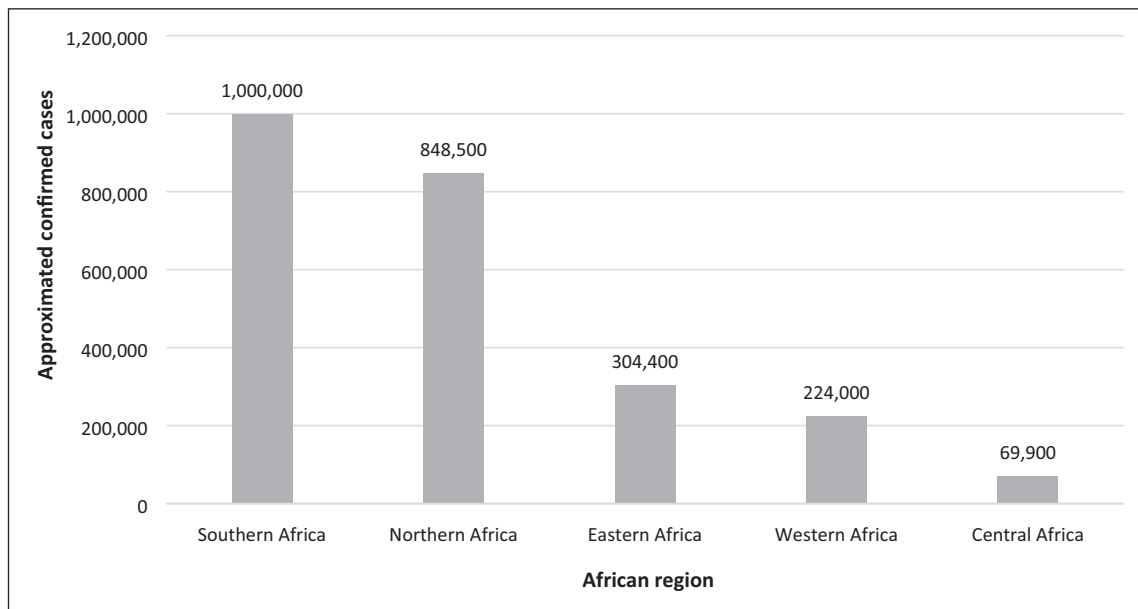
Similarly, population density in urban cities impedes strict adherence to social distancing in the wake of COVID-19.<sup>7–9,12</sup> The situation is aggravated by the inability of health authorities to effectively trace the routes and circulation of infected people in urban settlements because of poor street naming and address systems even in national capitals. Consequently, contact tracing under these circumstances has largely been unsuccessful, thus resulting in early and unabated community spread of COVID-19.<sup>12</sup> Alegbeleye<sup>8</sup> intimated that observing social distancing in many urban communities in Africa is virtually not feasible. This challenge according to Alegbeleye<sup>8</sup> is due to high urban population densities coupled with contrary African societal and cultural norms, which are inherently communal and do not respect social distancing protocols.

Furthermore, in many African countries, urban poverty, illiteracy, ignorance, misconceptions and cultural belief systems have negatively affected the fight against global

pandemics, including COVID-19. In most cases, these conditions promoted the easy spread of these pandemics. Spiritual dimensions to global pandemics have also reversed gains made by African countries on COVID-19 and during Ebola outbreak in Liberia,<sup>13,14</sup> Sierra Leone<sup>15,16</sup> and Guinea,<sup>17,18</sup> where index cases and families preferred seeking care from faith healers and spiritualists instead of mainstream healthcare systems.

In addition, rural–urban labour mobility historically promotes the rapid spread of pandemics in urban settings.<sup>19</sup> In the case of COVID-19, partial lockdown in the two biggest cities in Ghana witnessed huge labour migrants escaping these cities to rural areas on the eve of the lockdown. This migrant mobility raised concerns on the effectiveness of the lockdown measure since carriers of the virus probably escaped with it into other parts of the country.<sup>20,21</sup> Similarly, unabated rural–urban migration for better health, social and economic opportunities in urban cities has resulted in overstressing existing health infrastructure in many African countries. It was predicted in the early days of COVID-19 that, in the United States, at least 200,000 intensive care unit (ICU) beds were needed in the case of a moderate outbreak of the pandemic.<sup>22</sup> Uganda, on the contrary, had 55 ICU beds in 12 operational units<sup>23</sup> with 80% of these ICU beds were located in the capital Kampala.<sup>24</sup> Likewise, in Ghana, the number of isolation and quarantine centres remain inadequate, given the COVID-19 case counts<sup>25</sup> and the fact that the country is only second to Nigeria in terms of case count in the West-African subregion.<sup>2</sup> Similarly, in an international survey by Tabah et al.,<sup>26</sup> on personal protective equipment (PPE) and ICU workers' safety, it was found that out of the 2711 respondents, 52% of them indicated at least one piece of standard PPE was unavailable for use, while 30% reported reusing single-use PPE. In addition, Tabah et al.<sup>26</sup> found that over 50% reported at least one PPE item missing or out of stock, while 80% reported adverse effects of PPE. These empirical studies, among others, elucidate the existing challenge of limited health infrastructure in fragile health systems in Africa as the continent continues the battle against COVID-19. See Table 1 on index COVID-19 cases in selected African countries.

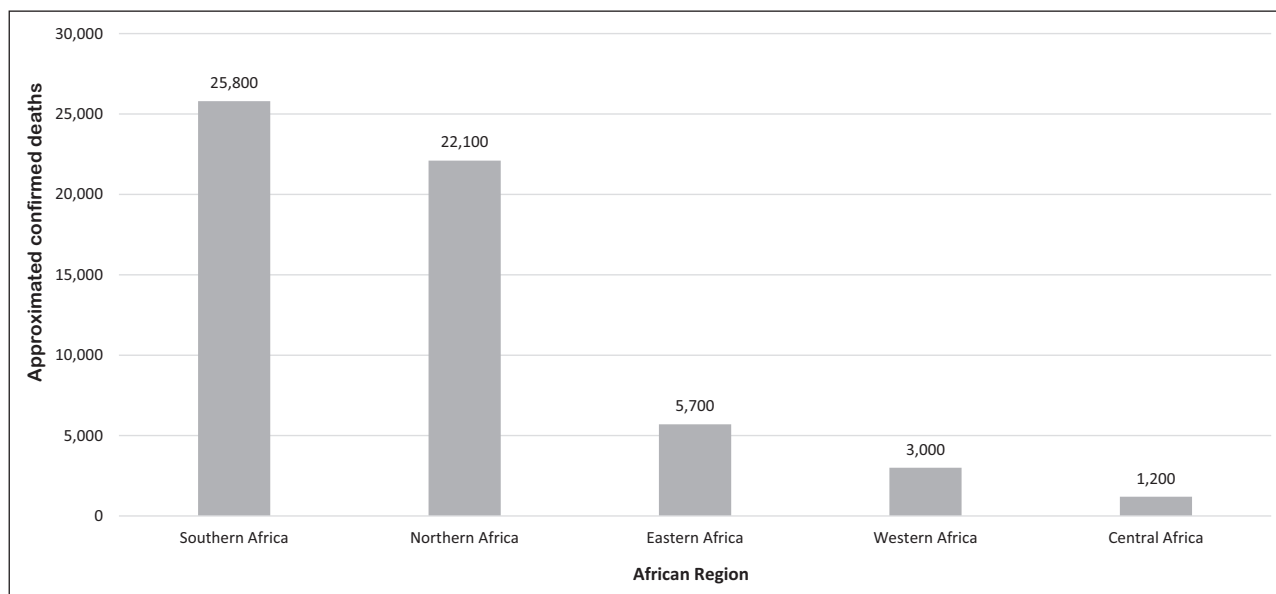
This scoping review synthesised and analysed available evidence on urban health nexus with COVID-19 preparedness and response by African countries. This rapid review is expected to contribute to early scientific evidence on the COVID-19 pandemic and further inform public health policy dialogues on post-COVID-19 interventions to improve health systems resilience against future public health emergencies in Africa and across the globe.



**Figure 1.** African COVID-19 situation: cases.

Source: CDC Africa Official Website.<sup>2</sup>

Total confirmed cases = 2,449,754; total recoveries = 2,073,214; total deaths = 57,817. Reported figures are all rounded off.



**Figure 2.** African COVID-19 situation: deaths.

Source: CDC Africa Official Website.<sup>2</sup>

Reported figures are all rounded off.

## Methods

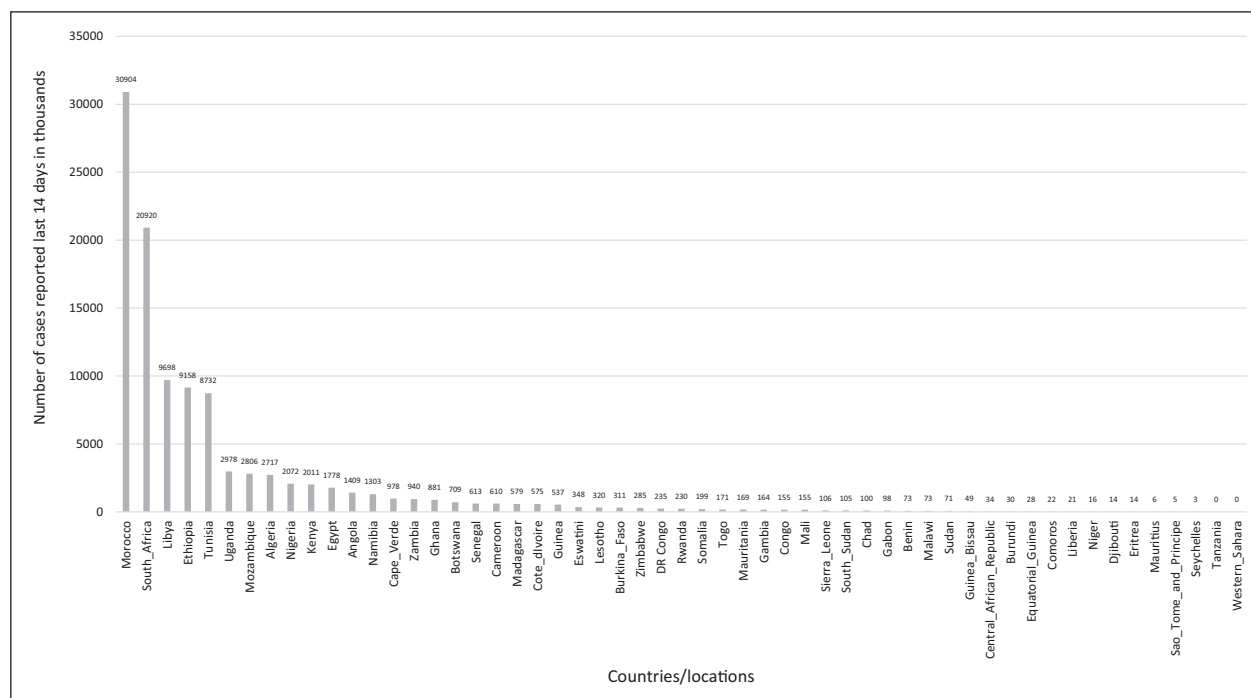
### Review rationale and justification

This is a rapid scoping review aimed at understanding the scope and existing body of evidence on urbanisation nexus with COVID-19 preparedness and response in Africa. This review will therefore adduce broad evidence on urbanisation nexus with COVID-19 preparedness and response in Africa. Consequently, this evidence will help inform the formulation

and implementation of effective policies that are specific to the African region as a whole.

### Review question development

In line with Joanna Briggs Institute (JBI) guideline for comprehensive systematic reviews (see Supplementary File 1), the review questions and components were based on population, concept and context (PCC) principles since



**Figure 3.** African COVID-19 situation: Cases in the last 14 days.

Source: European CDC Official Website (accessed on 29 September 2020) from <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>.

**Table 1.** Index cases of COVID-19 in selected African Countries.

Country	Date	Case history
China (Global index)	17 November 2020	55-year-old from Wuhan in the Hubei Province
Algeria	25 February 2020	Italian national who travelled to Algeria
Egypt	14 February 2020	Chinese national
Ethiopia	13 March 2020	Japanese national travelling from Japan to Burkina Faso
Ghana	12 March 2020	Two cases imported from Norway and Turkey
Ivory Coast	11 March 2020	Ivorian travelling from Italy
Kenya	12 March 2020	Kenyan travelling from the United States via the United Kingdom
Nigeria	27 February 2020	Italian citizen from Milan to Lagos

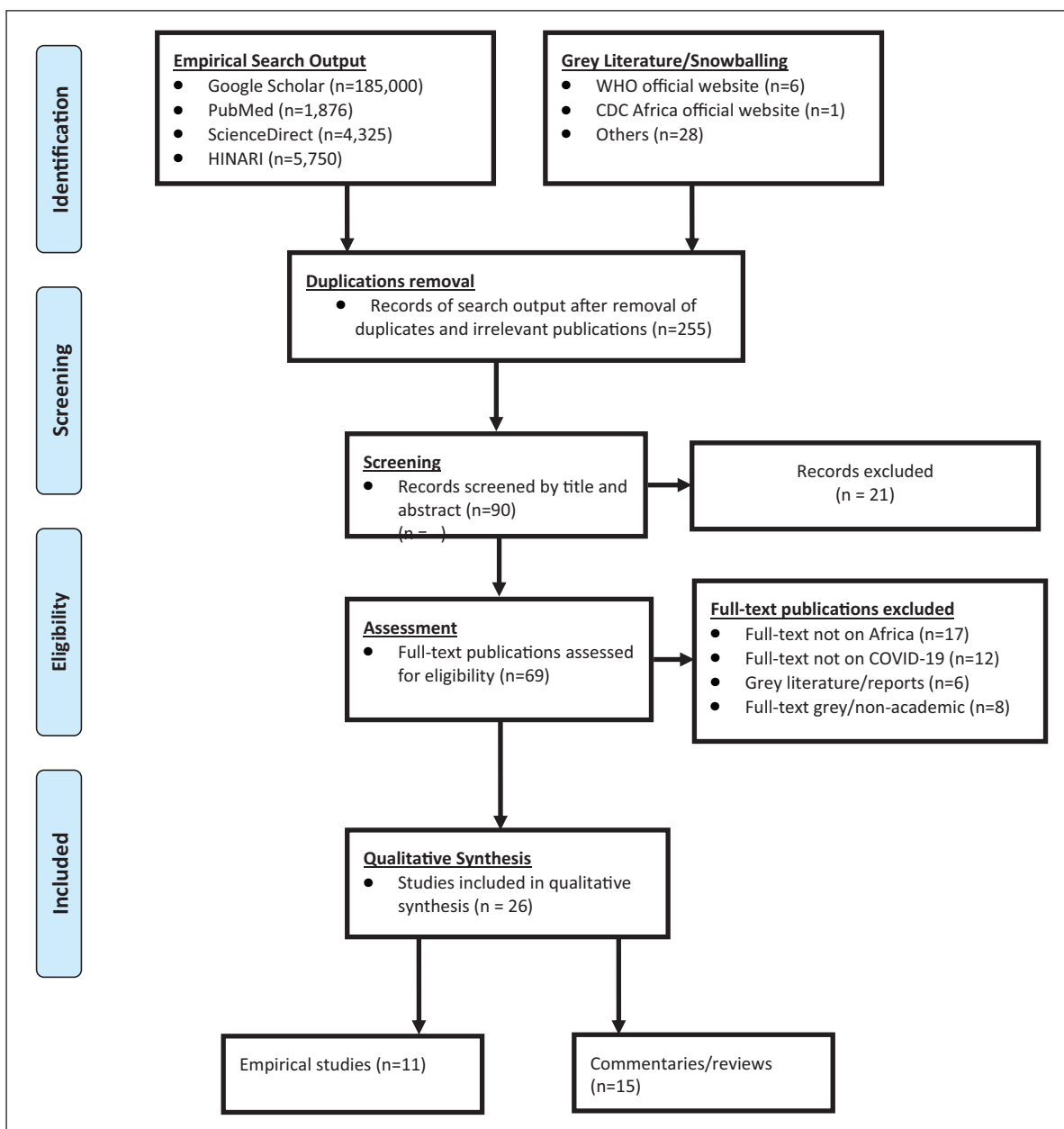
Source: Aggregated by authors based on reviewed literature (August 2020). COVID-19: coronavirus disease 2019.

it is a systematic scoping review of the available evidence. The population in the milieu of this review is the various countries in Africa and their health systems while the concept is the COVID-19 preparedness and response strategies; the context milieu is Africa. Population, Intervention, Comparator and Outcome (PICO) was not applied in this article since the review does not seek to answer questions on effectiveness. Moreover, the review is not an umbrella review, which makes PICO inappropriate under the circumstance.

### Eligibility and exclusion criteria

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart (2009) was used to determine the eligibility criteria for literature inclusion and

exclusion (see Figure 4). Reviewed literature comprised of peer-reviewed publications and grey literature on COVID-19 preparedness and response strategies in Africa and the relationship with urbanisation. Search for relevant literature was done in the English language using keywords/terms together with the Boolean search terms ‘and’, ‘or’ and ‘not’. The search terms and keywords were as follows: ‘Coronavirus’, ‘Coronavirus disease’, ‘COVID-19’, ‘preparedness’, ‘response’, ‘urban health’, ‘urbanisation’ and ‘Africa’. The inclusion criteria for the review were as follows: publications written in the English language, and articles focusing on COVID-19 in the context of urbanisation and articles published in the African context not earlier than December 2019 when the first confirmed case of COVID-19 was recorded in China. Conversely, exclusion criteria for the reviewed publications were as follows: publications not written in English



**Figure 4.** PRISMA 2009 flow diagram.

Source: Moher D, Liberati A, Tetzlaff J, et al. The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. DOI: 10.1371/journal.pmed1000097. For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

language, not published on COVID-19 and not focused on Africa or urbanisation nexus with COVID-19.

### Information sources and literature selection

An electronic search was conducted using relevant databases such as PubMed, ScienceDirect, GoogleScholar and HINARI. The Medical Subjects Heading (MeSH) search terms were ‘coronavirus’, ‘coronavirus disease’ and ‘COVID-19’, while the non-MeSH search terms were ‘preparedness’, ‘response’, ‘Africa’, ‘urbanisation’ and ‘urban health’. In addition, grey

literature from official websites of international institutions such as the World Health Organization (WHO) and Africa Centres for Disease Control and Prevention (CDC) were used to access relevant publications. Time frame for the literature was since the outbreak of COVID-19 in December 2019 till 31 December 2020. Furthermore, snowballing technique was used as a manual search strategy. The snowballing involved manually tracing relevant literature from the list of references cited in a primary reviewed publication up to the point of saturation (i.e. no new information emerged from subsequent articles manually searched).

## Screening and literature quality

JBICritical Appraisal Checklist for Systematic Reviews and Research Syntheses was used to promote quality in the review process. Publications that did not meet at least 70% of the criteria were dropped from the final synthesis and analysis. In the case of empirical peer-reviewed publications, the critical appraisal quality checks per the JBI Critical Appraisal Checklist for non-experimental studies included publications having explicitly stated research questions/objectives/aims, inclusion/exclusion criteria, literature search sources, study setting and study subjects. Other quality checks were methodology employed, outcome measures and confounders, and appropriateness of statistical analysis. The remaining quality checks were as follows: recognised limitations and mitigating measures, ethical considerations and interpretation of findings. In addition, published literature should have been peer-reviewed (or undergoing review in preprint). Commentaries, perspectives and reviews were included because of the paucity of publications on COVID-19 at the time of writing this scoping review.

## Data extraction and analysis

Data extraction from the accessed literature was done using an extraction form developed by the authors based on JBI guidelines for scoping reviews. For objectivity and reduction of chance effect bias, literature search, screening and data extraction were concurrently done by two independent reviewers who later reconciled the extracted information for convergence. Synthesis and analysis were guided by the recurrent themes from the reviewed literature. Where applicable, data extraction categories included authors, year of publication, study location/context, outcome measures, study type and participants/subjects. Main thematic areas that emerged from the review on COVID-19 were preparedness, response strategies and the COVID-19 nexus with urban health. Key findings/conclusions and thrusts of each publication were also captured in the extraction form as shown in Table 3.

## Findings

### Synthesis and analysis of results

Out of nearly 200,000 initial search output from the various databases, 26 full-text publications (see Table 3) were retained, synthesised and analysed. Retained articles were arrived at after removing repetitive and irrelevant publications based on the predefined inclusion and exclusion criteria explained earlier. These articles included empirical studies, systematic reviews and commentary publications. The 26 publications were synthesised and analysed based on relevance to the African context and quality; all publications were published in 2020. Eleven out of 26 publications were empirical studies, which were mostly cross-sectional descriptive studies, with one being a case study and three publications based on

secondary data. The largest sample size for the publications based on primary data was 2711 and lowest was 10.

In terms of context distributions of reviewed articles, most of the publications focused on Africa as a continent ( $n=5$ ) followed by Sub-Saharan Africa (SSA;  $n=4$ ). Eight publications focused on global context with interest on Africa and other low- and middle-income countries (LMICs). A few others specifically focused on Ghana ( $n=2$ ), South Africa ( $n=2$ ), Ethiopia ( $n=1$ ), Nigeria ( $n=1$ ), Kenya ( $n=1$ ), Democratic Republic of Congo (DRC;  $n=1$ ) and Liberia ( $n=1$ ).

Concerning the type of study participants investigated, majority of the publications focused broadly on health systems ( $n=7$ ) and community participants such as slum/urban dwellers, women, children and people living with HIV (PLWHIV;  $n=7$ ). Other articles focused on healthcare workers (HCWs) such as community health workers ( $n=5$ ), while dentists ( $n=1$ ) and critically ill COVID-19 patients had one article each. Two publications concentrated on public transport vehicles and motorcycle riders, while two others broadly investigated COVID-19 impact on economies of countries in Africa as shown in Table 2.

Synthesis by themes revealed that majority of the publications (77%) predominantly examined COVID-19 response strategies in Africa with a few others looking at the combine spectra of preparedness, response and urbanisation. Ten out of 26 synthesised publications primarily focused on COVID-19 nexus with urbanisation, while 27% primarily focused on health system preparedness for COVID-19 in Africa.

Furthermore, the review revealed that most recurrent themes were on impact of COVID-19 on health service provision (mental health, maternal and child health services, mortality outcomes among the critically ill), health logistics and supplies, including HIV/AIDS medications. Another most recurrent theme was health systems resilience in Africa towards COVID-19 and future pandemics. Other recurrent theme was spillover effects of COVID-19 response strategies on economies and livelihoods. Literature on Africa's approach to COVID-19 was also apt in many of the publications.

Additional recurrent themes were health sector human resources to fight the pandemic and lack of compliance with COVID-19 prevention and safety protocols. One publication emphasised leveraging Africa's past experiences with Ebola and HIV/AIDS in the prevention and control of COVID-19. Finally, another publication examined the nexus between urbanisation and COVID-19 in Africa's urban slums and informal settlements, while one other prospective cohort study examined the association between limited critical care resources and COVID-19-related mortalities (see Table 3 and Figure 5).

## Discussion

### Summary of evidence

Globally, it has been established that sufficient preparedness for pandemics by countries is a crucial investment since the cost is comparatively smaller than an unmitigated impact of health

**Table 2.** Challenges and opportunities for global pandemics response in urban settings in Africa.

Dimensions	Challenges	Opportunities
Urban population density	<ul style="list-style-type: none"> <li>• Ease of disease spread between humans due to congestions</li> <li>• Difficulties in contact tracing</li> <li>• Urban inequalities resulting in poor housing/ environments</li> </ul>	<ul style="list-style-type: none"> <li>• Urban planning/design should factor in health emergency preparedness</li> <li>• Leveraging technological advances for more effective contact tracing and health supplies distribution (i.e. medical drones)</li> </ul>
Urban transportation/ mobility	<ul style="list-style-type: none"> <li>• Congestions in public transport systems</li> <li>• Inefficiency in public transport system</li> </ul>	<ul style="list-style-type: none"> <li>• Cities with efficient transport networks can be used to rapidly move supplies to outbreak in epicentres</li> </ul>
Interface between animals and humans	<ul style="list-style-type: none"> <li>• Poor sanitation in urban slums with high exposure of humans to rodents, unvaccinated animals and other animal vectors</li> <li>• Expansion into previously untouched ecosystems and encounters with wildlife via food markets</li> </ul>	<ul style="list-style-type: none"> <li>• Improved sanitation and rodent control including vaccination of domestic animals for common zoonotic infections</li> <li>• Enhanced regulation of fresh markets and slaughterhouses</li> </ul>
Governance by local authorities	<ul style="list-style-type: none"> <li>• Insufficient epidemic preparedness capacities at local government levels</li> <li>• Reliance on national level for response measures</li> </ul>	<ul style="list-style-type: none"> <li>• Increased investment in local governance for self-reliance in health emergency response</li> <li>• Effective decentralisation of local governance and health systems</li> </ul>
High mobility of urban populations	<ul style="list-style-type: none"> <li>• Unrelenting rural–urban migration</li> <li>• Increased risk of rapid export of disease to other parts of the country and neighbouring countries</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence-based points of entry measures and exit screening measures (e.g. mass testing, mandatory quarantines)</li> <li>• Inter-sectoral collaborations</li> </ul>
Health communication/ education	<ul style="list-style-type: none"> <li>• Multiple information sources leading to misinformation and false information might spread quickly</li> <li>• Fear and stigma can discourage voluntary positive health-seeking behaviour</li> </ul>	<ul style="list-style-type: none"> <li>• Unconventional but reliable information channels and social media can be used for risk communication</li> <li>• Trust can be built through anti-stigma messages</li> </ul>

Source: Modified based on Jamison DT, Gelband H, Horton S, et al. (eds). *Disease control priorities: improving health and reducing poverty. Disease control priorities* (3rd ed.), Vol. 9. Washington, DC: World Bank, 2018. DOI: 10.1596/978-1-4648-0527-1.

emergencies like COVID-19. For instance, the global financing gap for health emergency preparedness, estimated at US\$4.5 billion per year, is minuscule compared with the estimated pandemic costs of US\$570 billion per year.<sup>27</sup> Health emergency preparedness activities in Africa with more fragile health systems are particularly crucial<sup>48,49</sup> because of increasing urban populations and the attendant negative public health implications.<sup>50</sup> Thus, opportunities in urban environments thus need to be leveraged to enhance the preparedness of urban settings for health emergencies like COVID-19. Table 2 presents the challenges and opportunities for urban settings in raising preparedness for public health emergencies in Africa.

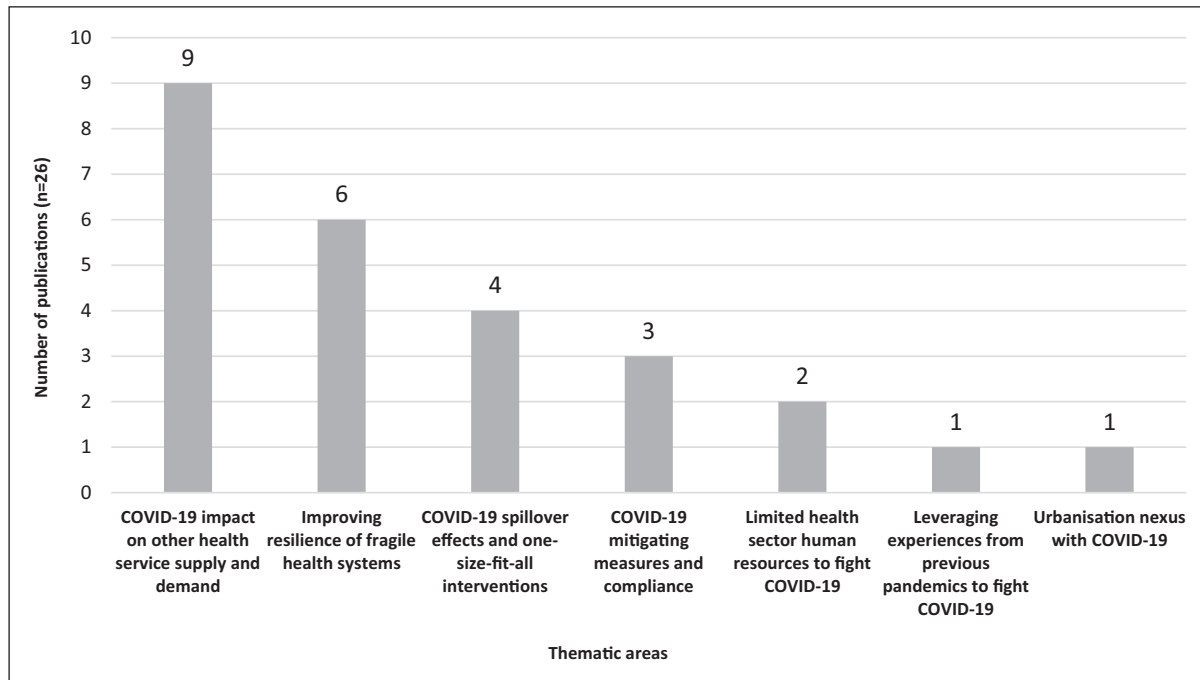
In many parts of Europe and the Americas, strict COVID-19 prevention and control measures have been enforced, including total lockdowns. Unfortunately, many African countries spontaneously adopted same lockdown measures without requisite knowledge of the COVID-19 infection rate and the context-specific relevance of these measures.<sup>30,33,34,41,43,45,46</sup> Ghana, for instance, observed three weeks partial lockdown in the two most urbanised regions as part of the early control measures without sufficient evidence. Unlike other continents, Africa was fortunate to record COVID-19 cases months after other continents recorded cases. The continent thus had the benefit of time and hindsight to prepare and respond differently to the pandemic

based on lessons learnt. However, reviewed literature predominantly suggests that Africa's response strategies were largely not context-specific but can best be described as a carbon copy of interventions adopted in China, other Asian countries, Europe and the Americas, albeit the circumstances and epidemiology of the virus are different.<sup>5-8</sup> Consequently, a 'one-size-fits-all' approach was spontaneously adopted by many countries in Africa. Indeed, some of the COVID-19 response measures were needless and turned out to be ineffective.<sup>51</sup>

Restrictions in social gatherings have also been imposed to control the spread of the virus particularly church activities, funerals, weddings and closure of schools.<sup>52</sup> Compulsory wearing of face masks and use of hand sanitisers are other pervasive COVID-19 preventive measures in Africa even though strict compliance remains problematic due to ignorance, poverty, resource constraints and unfavourable belief systems.<sup>28,36,53-55</sup> Although some successes have been achieved in respect of these response strategies, critics have described them as 'one-size-fit-all' and 'Western elitist' approach because of their relevance to Africa's local settings vis-à-vis trends in other parts of the world.

For example, in many African countries, hand sanitisers have been misconceived as a replacement for regular hand hygiene mainly due to ignorance and lack of education.





**Figure 5.** Recurrence of main themes from reviewed literature.  
Source: Aggregated by authors based on reviewed literature (2020).

Likewise, enforcement of social distancing in crowded urban communities is proving to be impracticable just like self-isolation in congested households. These measures have largely been ineffective partly due to poor living standard particularly in urban slums. Also, the ‘work from home’ mantra immediately embraced by already fragile economies in Africa is equally, arguably, an ineffective response strategy relative to more resilient economies outside Africa. For instance, over 70% of Africa’s workforce is in the informal sector and predominantly engaged in manual labour. In view of the huge informal sector in Africa, the ‘work from home’ policy at the initial phase of the pandemic rather worsened the plight of many citizens already in the lower wealth quintiles.<sup>44,56–58</sup>

Other COVID-19 mitigating measures questioned and heavily criticised in Africa are mass closure of schools without established e-learning systems and infrastructure, enforcement of handwashing protocols when over 50% of households in Africa do not have access to portable water,<sup>51</sup> temperature checks of travellers at borders and airports without accounting for asymptomatic carriers of the virus and mass testing capacities coupled with ability to pay for COVID-19 testing upon arrival at airports.

Moreover, many countries in Africa are still battling fear-based messaging and misinformation on COVID-19<sup>59</sup> similar to Ebola and HIV/AIDS.<sup>13</sup> Available literature maintains that misinformation and fear-based communication cause anxiety and possibly deaths<sup>39</sup> of which COVID-19 is not an exception. Over the years, in pandemics response, fear has rarely been a good motivator for people’s adherence to safety

precautions. Indeed, people generally respond better to calm and fact-based messages/information.<sup>39</sup> Unfortunately, many countries in Africa have not performed optimally well in respect of COVID-19, Ebola and HIV/AIDS, and stigma management. In effect, misinformation and fear-based messaging associated with COVID-19 continue to break stigma, discouraging infected persons to declare their status and seek early treatment. Similarly, fear of disclosure potentially promotes community spread of the virus.

Notwithstanding these challenges, Africa is praised for some positives in the COVID-19 fight. For instance, countries with more recent experience with Ebola appear to be leveraging this expertise in response to COVID-19. Liberia, Sierra Leone, DRC and Guinea are currently re-purposing existing structures used during Ebola as COVID-19 isolation and treatment centres.<sup>30,34</sup> In DRC, single-patient-transparent cubicles originally designed for isolation of Ebola cases are re-purposed for COVID-19 isolation and treatment centres.<sup>41</sup> Likewise, inter-sectoral collaboration with government institutions, non-governmental organisations (NGOs), religious bodies, industry players and national security agencies have been effectively leveraged in many countries in Africa towards COVID-19 fight.<sup>12,33,43,45,46,51,52</sup> The role of the media and civil society in propagating health education and communication on COVID-19 prevention and control has equally been phenomenal in Africa.<sup>51</sup> In addition, the ingenuity of many African countries in developing locally manufactured handwashing devices and PPE is especially commended in the bit to promote self-reliance and sustainability in the wake of COVID-19.<sup>53</sup>

**Table 3.** Data extraction and review summary..

Authorship and publications information				Key perspectives on COVID-19			Findings/conclusions on COVID-19		
Author	Year	Location/context	Study design/type	Participants/focused group	Outcome measures	Preparedness	Response	Urbanisation	Key findings
Afulani et al. <sup>27</sup>	2020	Ghana	Empirical article (cross-sectional)	HCWs (n=472)	Perceived preparedness to respond to COVID-19	X			Increase HCWs' preparedness to respond to COVID-19/pandemics
Ahmed et al. <sup>28</sup>	2020	Global	Empirical article (cross-sectional)	Dentist (n=669)	Anxiety and fear of getting infected while working on COVID-19 outbreak		X		Truncated dental care services
Akseer et al. <sup>29</sup>	2020	LMICs	Review article	Women and children	Knowledge about various practice modifications to combat COVID-19			X	COVID-19 direct effect on maternal/child health nutrition
Alegbeleye <sup>9</sup>	2020	SSA	Systematic review	HCWs	Maternal and child nutrition during and in the aftermath of COVID-19		X		Non-compliance with protocols <sup>a</sup>
Ayebare et al. <sup>30</sup>	2020	SSA	Review	Health system	Factors impacting hand hygiene practice	X			Leveraging Ebola experiences to combat COVID-19
Biccard et al. <sup>31</sup>	2020	Africa	Prospective observational cohort study	Patients (n= 1243) Hospitals (n= 38) Countries (n=6)	Ebola preparedness for COVID-19		X		Mortality in critically ill COVID-19 African patients is higher than any other region and is associated with limited resources and severity of organ dysfunction at admission
Boniful et al. <sup>32</sup>	2020	Ghana	Empirical article Exploratory, observational	Public transport stations (n=45)	Mortality in critically ill COVID-19 African patients		X	X	Low compliance with protocols
Bong et al. <sup>10</sup>	2020	LMICs	Review	Health system	Adherence to COVID-19 safety protocols	X			Fragile health systems
Cash and Patel <sup>33</sup>	2020	LMICs	Perspective	Health system	Effect of COVID-19 on LMICs		X	X	Fragile economies
Chersich et al. <sup>34</sup>	2020	Africa	Review	HCWs	Socio-economic impact of COVID-19 response strategies		X	X	Fragile health economies/health systems
Seifu Estifanos et al. <sup>35</sup>	2020	Ethiopia	Commentary	Community	Staff motivation and retention through carefully managed risk 'allowances' or compensation		X		Political and socio-economic crisis from lockdown
Gilbert et al. <sup>13</sup>	2020	Africa	Empirical article (air travel data)	Countries (n= 10)	Public health limitations to adhering to lockdown as a significant public health strategy for containing the spread of COVID-19	X			Low capacity, high vulnerability
Iwuoha and Aniche <sup>36</sup>	2020	Nigeria	Empirical article (descriptive)	Urban slum dwellers	Preparedness and vulnerability of African countries against their risk of importation of COVID-19		X	X	Elitist/western contexts of COVID-19 lockdown and physical distancing
Jewell et al. <sup>37</sup>	2020	SSA	Empirical article (modelling) <sup>b</sup>	HIV/AIDS populations	Experience of suburban slum residents on COVID-19 in selected states in Nigeria				Interruption in supply of ARTs/ services due to COVID-19
Joska et al. <sup>38</sup>	2020	South Africa	Field notes	PLWHIV (women)	Effects of COVID-19 disruptions on HIV-related deaths and new infections in SSA		X		COVID-19 negative impact on mental health of populations
Kigatira <sup>39</sup>	2020	Kenya	Empirical article (case study)	Public motorcycle riders (n= 17)	Effect of lockdown on 'fattening the curve' on population health and well-being of the South African population			X	Fear-based messaging/ communication

(Continued)

Table 3. (Continued)

Authorship and publications information				Key perspectives on COVID-19			Findings/conclusions on COVID-19		
Author	Year	Location/ context	Study design/type	Participants/focused group	Outcome measures	Preparedness	Response	Urbanisation	Key findings
Kim et al. <sup>40,c</sup>	2020	South Africa	Empirical article (modelling) <sup>b</sup>	Adults (n = 957)	Perceived COVID-19 risk and depression		X	X	Mental health impact of COVID-19 on urban adults
Lee et al. <sup>6</sup>	2020	Global	Commentary	Urban populations	Preparedness and challenges to pandemics in urban settings	X		X	Urbanisation and population effects on health systems
Martinez-Alvarez et al. <sup>41</sup>	2020	SSA	Commentary	Health system	Resource capacity of countries to fight COVID-19 pandemic		X	X	Response capacity of resource-poor countries
Nachega et al. <sup>42</sup>	2020	DRC	Perspective	Health system	Response to COVID-19 and associated challenges, priorities and innovations for infectious disease control		X		Infectious and non-infectious diseases negative impact on countries' economies
Nepomnyashchiy et al. <sup>43</sup>	2020	Liberia	Commentary	CHWs	Support for CHWs to interrupt virus transmission while maintaining essential services and shielding vulnerable populations		X		Urgent need for investment in CHWs and PHC
Nyarko et al. <sup>44</sup>	2020	Global	Review	Country economies	Effect of lockdown on the public health policies that can bring massive and tremendous change to health systems and general economy of African countries		X	X	Negative impact of lockdowns on economies of countries
Paintsil <sup>45</sup>	2020	Africa	Viewpoint	Health system	Potential impact of the COVID-19 epidemic on already fragile health systems in SSA	X			Low capacity of Africa towards COVID-19 fight
Rosenthal et al. <sup>46</sup>	2020	Africa	Editorial	Health system	Challenges in implementing COVID-19 measures		X		Need for context-specific COVID-19 mitigating measures
Robertson et al. <sup>47</sup>	2020	LMICs	Empirical article (modelling) <sup>b</sup>	Women and children	Additional maternal and under-5 child deaths resulting from the potential disruption of health systems and decreased access to food due to COVID-19		X		Indirect effects of COVID-19 on maternal and child mortality
Tabah et al. <sup>26</sup>	2020	LMICs	Empirical article (PPE availability for ICU staff caring for COVID-19 patients)	Healthcare staff (n = 2711)	Availability of PPE for ICU staff caring for COVID-19 patients		X		HCWs reported widespread shortages, frequent reuse of and adverse effects related to PPE
Total						7/26 (27%)	20/26 (77%)	10/26 (38%)	

Source: Aggregated by authors based on reviewed literature (2020).

COVID-19; coronavirus disease 2019; HCWs: healthcare workers; LMICs: low- and middle-income countries; SSA: Sub-Saharan Africa; PLWHIV: people living with HIV; DRC: Democratic Republic of Congo; CHWs: community health workers; PPE: personal protective equipment; ICU: intensive care unit; ART: anti-retroviral therapy; PHC: primary health care.

<sup>a</sup>COVID-19 safety and preventive protocols include wearing of nose masks, use of alcohol-based sanitiser, social distancing, hand hygiene/washing.

<sup>b</sup>Mathematical modelling.

<sup>c</sup>Pre-print article.

The "X" is used to denote applicable key perspectives in columns 7, 8 and 9.

Finally, lessons learnt from Ebola in West Africa show that balancing urgent clinical care with the general well-being of the community is the best prescription for containing pandemic outbreaks, particularly in urban settings which have so far suffered most from the pandemic. In light of this, some African countries have incorporated community engagement approach in the prevention and control of COVID-19.<sup>30,42,60,61</sup> Some reports suggest that lockdown impositions in Africa were executed with human considerations and social support for the less privileged through community mobilisation. These community-centred response strategies have contributed to high compliance with the COVID-19 preventive measures in some countries<sup>62</sup> and must be encouraged and sustained.

Irrespective of these important achievements chalked in Africa, the reviewed literature also reports instances of spillover effects from the COVID-19 mitigation measures especially in urban settings. First, urban dwellers working in the informal sector (and are predominantly labour migrants) are so far the worst affected by COVID-19 in Africa since approximately 85% of workers in Africa are not on regular wages and do not have the option to work from home.<sup>63</sup> For instance, during the lockdowns, these underprivileged majority did not earn a wage throughout the period. The story of the Kenyan widow of many children boiling stones for her children during the lockdown elucidates this point.<sup>64</sup>

Furthermore, many countries in Africa recorded an interruption in food supply chain especially in urban cities, which often relied on rural communities for food supplies. Countries like Ghana witnessed an escalation in food prices by nearly 30% during the partial lockdowns<sup>65,66</sup> due to panic buying and disruptions in food supply chain. Even though lockdowns might have helped curb the virus transmission, these measures also pushed millions of people into extreme poverty to the extent that hunger, rather than COVID-19, had a greater chance of killing already impoverished individuals during the lockdowns.<sup>63-67</sup> The review also found that human rights abuse during lockdowns<sup>54,67</sup> were excesses that emanated from the COVID-19 response measures in many parts of Africa.

Other spillover effect of the COVID-19 response measures in Africa was the effect on already fragile health systems. Neglect of the public health needs of populations in the wake of COVID-19 has already been reported with unprecedented reduction in health service utilisation, including HIV/AIDS services.<sup>68</sup> Utilisation of mental health,<sup>37,38,40,69</sup> maternal/child health and related outpatient department (OPD) services<sup>29,40,47,70-72</sup> have equally been adversely affected in Africa. There are equally fears of imminent post-COVID 19 negative impact on African economies with a possible gross domestic product (GDP) growth rate dropping to record low of single digits.<sup>23,36,44,46</sup>

Finally, evidence adduced by Biccard et al.<sup>31</sup> on a relatively higher case mortality in critically ill COVID-19 African patients than any other regions in the world suggests

the urgent need to resource healthcare facilities in Africa to improve on the quality of healthcare for COVID-19 victims. Biccard et al.,<sup>31</sup> for instance, found that there is an excess mortality of 18 and 29 deaths per 100 COVID-19 African patients compared to other parts of the world with an even worrying evidence of a positive correlation between COVID-19-related mortalities and limited critical care resources. Since the impact of COVID-19 has so far been most severe in urban settings which do not also have the requisite healthcare facilities to promote strict adherence to the COVID-19 safety protocols in many parts of Africa including Ghana,<sup>32</sup> there is the need for greater commitment to health systems strengthening to avert possible humanitarian catastrophe as the pandemic continues to strike harder on Africa.

## Limitations

This review included commentaries, editorials, perspectives and some grey literature because of the novel nature of COVID-19 and the fact that not many empirical publications are yet available, especially on Africa. Africa therefore needs a rigorous research agenda on COVID-19 to inform evidence-based policies during and after the pandemic to help address this existing limitation.

## Conclusion

Evidence from the reviewed literature suggests that countries, particularly in Africa, need to improve health infrastructure, human resources and medical technology using local resources to enable the continent respond adequately to public health emergencies. COVID-19 has taught the world, including Africa, that pandemic preparedness should be prioritised over response. A relatively less expensive yet effective investment should be community-level preparedness and response strategies long before pandemics strike.

Improving health sector human resource capacity at the primary healthcare level such as community health workers has particularly proven to be an effective approach to early containment of global pandemics and must be prioritised as Africa's trump-card in pandemics response. Trillions of dollars have already been committed in just a little over a year for the COVID-19 response globally. Meanwhile, a COVID-19 vaccine or treatment might take months if not years to become commercially available and accessible to resource-poor settings mostly in Africa.

Moreover, a readily available and accessible COVID-19 vaccine today does not guarantee acceptance and adoption in many African countries where there are shortages of health sector human resources to effectively deliver COVID-19 vaccines. A comparative US\$2 billion annual investment in African health systems to bolster CHWs for primary care is minuscule compared to the current global cost of health systems response to the current pandemic. These practical nuances elucidate the need for prioritisation of efficient and

effective community-level interventions particularly for the urban poor in resource-constrained countries in Africa which are often the worst affected victims of global pandemics.

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### Author contributions

R.K.A. provided conceptualisation direction, literature search, synthesis and analysis, and manuscript write-up. J.J.N., A.A.A., A.A., S.S.M., M.A.D., M.I., A.K.M., D.K., M.A.-A., P.T.D., E.A., E.N.-A., J.T., S.K.A., P.A., E.K.A., M.G., S.O.-A. and J.G. read and peer-reviewed the manuscript based on their respective technical knowledge and expertise.

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### Supplemental material

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