



COVID-19 risks and systemic gaps in Nigeria: resilience building lessons for pandemic and climate change management

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Abstract

Pandemics alter a lot of human activities and the COVID-19 outbreak of 2020 was no exception. The COVID-19 pandemic, like climate change, has far-reaching consequences that transcend geographical boundaries. The COVID-19-induced disruptions were global and rapid and so are emerging climate change impacts which are slow on set. The consequent closure of businesses and public facilities translated to economic grounding which invariably took a toll on people. The extensive impact across various facets of society highlights the complex interrelationship often overlooked by most people. Although most African countries escaped the wrath of the disease, the lessons from the pandemic must be learnt and mainstreamed into managing the impacts of climate change. This paper attempts to draw lessons from recent developments and gaps experienced in the handling of the COVID-19 pandemic in Nigeria and how improvements can be made in managing climate change. The analysis identified gaps in the management of COVID-19 in Nigeria. These gaps are evident in the current management of climate change impact and mitigation. The paper highlighted lessons from the pandemic in Nigeria that are vital in the management of climate change. The paper identified supply chain resilience and circularity, overhauling of health insurance programmes, diversification for growth, reorientation of priorities, and the building of agile and responsive institutions as practical approaches to mainstream lessons from the pandemic for climate change impact management. Furthermore, adequate investment in preparedness, risk education, research and development, and integrated data infrastructure is vital to ensure the lessons become part of the consciousness of the people.

Keywords COVID-19 · Pandemic · Resilience · Vulnerability · Climate change · Complexity

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Background

Pandemics characteristically alter a lot of human activities and the COVID-19 outbreak of 2020 was no exception. The same can be said for climate change. Globally, lockdowns were instituted at the outset to curtail the spread of the disease. Consequently, the closure of businesses and public facilities translates to economic grounding which invariably takes a toll on people—strangling livelihoods. This action put the entire society at risk—socially and economically. But the risk to people and communities varies. Thus, lockdown or quarantine for some is a luxury (they can afford it), whilst for others it is a hardship or solitary confinement. In essence, this laid bare the challenges of sustainable and inclusive development across Nigeria's public infrastructure, economy, and society.

With over 5 million deaths and more than 240 million cases and three waves of the disease as well as new variants (Worldometer 2021), there is a need to do better. Many low- and middle-income countries faced significant challenges in curtailing the spread of the disease, some of which included porous borders, the burden of communicable and non-communicable diseases, poverty, poor health literacy, infodemic, overcrowding, and weak health systems (Lucero-Prisno et al. 2020). Despite these challenges, African countries escaped most of the wrath of the disease; this could be attributed to African nations' long history of dealing with infectious diseases, younger populace implying fewer comorbidities, early shutdowns, and limited transportation networks. But the lessons from the pandemic must be learnt, as we might not be that lucky the next time. Furthermore, across the globe, the various effects were noticeable some of which include, an increase in cybercrime, the rampant spread of disinformation/misinformation, protests/civil unrest, overwhelmed public/private infrastructure, shortages of essential items, exposure to the frailty of lean manufacturing system (just-in-time), pressures on government revenue, increase in domestic violence, depression as well as negative impact on education, tourism, and other sectors of the economy. This level of impact and complexity serves as a reminder of how inter-related and vulnerable we are as a people to the effect of disasters and now, climate change.

Climate change just like COVID-19 has wrought disruption to the biological, environmental, and social systems of humans, plants, and animals. The resultant scarcity of resources has had overreaching impacts on the food chains all over the world, especially in Africa (Botzen et al. 2021), such as low productivity, the disappearance of species of plants and animals, and drought due to extreme weather conditions (global warming). Meanwhile, there is a growing worry regarding the increased rate of greenhouse gases on a global scale owing to human activities such as the burning of fossil fuels and deforestation which has led to an increase in carbon dioxide and methane levels (Centi and Perathoner 2009). With the melting of polar ice caps engendered by global warming, there is a likelihood that about 1.7 million people will be forced to relocate or migrate from their native Pacific regions (Henderson et al. 2015) thereby constituting overpopulation in the recipient regions and making these regions vulnerable to several socio-economic

and health problems such as food scarcity, high rate of unemployment, and disease outbreak. The increased occurrence of typhoons and hurricanes due to extreme weather conditions has also brought about the loss of lives, properties, and loss of livelihoods in several regions of the world. Furthermore, due to the increase in temperature, novel viruses, insects, and vector-borne diseases are emergently putting the global community at risk, especially in Africa. This extensive impact across the various facets of society highlights the complex interrelationship often overlooked by all and sundry.

Instructively, there is a tendency for climate change to bring wide-scale disruptions to the global community just like during COVID-19. This has revealed the world's ill-preparedness in managing rapid, environmental risks induced by climate change in an interconnected world (Manzanedo and Manning 2020; Ringsmuth et al. 2022). Africa's survival from COVID-19 and its performance better than earlier projections by experts has not been fully discussed in a way that could enable the world to learn lessons. Even considering its reliance on the global community which often inspires a lack of confidence in its systems within and outside the continent (Happi and Nkengasong 2022; Maeda and Nkengasong 2021; Walker et al. 2020).

Therefore, planning for resilience should consider intervention initiatives that can reduce negative impacts, especially for futuristic events with the potential for large-scale global disruptions, by adopting lessons learned from COVID-19, especially for highly vulnerable nations, like Nigeria. This paper seeks to provide a review of experiences and lessons learned from COVID-19 in the light of risks and systemic gaps in Nigeria and the opportunity it offers for resilience building for pandemics and climate change management. Aligned with this aim, this paper set out to achieve the following objectives:

- (a) Assessment and outlining of systemic gaps and risks exposed by the COVID-19 pandemic in Nigeria.
- (b) Outlining the relevant features of complexity and resilience for COVID-19 in Nigeria.
- (c) Incorporating these features into a framework for addressing the effects of climate change in Nigeria.

Researchers such as Newell and Dale (2021) have surmised that the COVID-19 outbreak is a caveat for future socio-economic and public health crises that climate could bring to the world. It is thus pertinent to utilise the lessons gleaned from COVID-19 to build a sustainable framework for addressing systemic gaps in community resilience through the incorporation of health and socio-economic protocols into a long-term integrated plan.

Therefore, for Nigeria to build back better after COVID-19 considering ongoing recovery efforts and getting a handle on the harmful effects of climate change, there is a need to learn from the shock and address the systemic gaps and risks revealed by the pandemic. The same applies to the impact of climate change. Significantly, this will provide the insights required to enhance preparedness actions

on the part of the government and other stakeholders. This will also provide a buffer for better response and recovery planning based on historical evidence and ensure more resilient fiscal policies to reduce economic shocks and losses.

This paper hopes to contribute to knowledge by providing insights for policy/decision-making in Nigeria, for effective management of the impacts of climate change and future events, by identifying systemic gaps and managing associated risks that were apparent during the COVID-19 pandemic. The added literature will be useful for future research, especially for African researchers.

Systemic gaps and risks

Health care, surveillance and monitoring gaps

Humans today live in a global village; therefore, their health and socio-economic reality are becoming more and more interwoven. Most significantly their health is linked irrespective of distance. According to the risk society theory (Giddens 2003), modern life creates comfort which results in unintended and unforeseen consequences. COVID-19 bring this closer home, the global reach of air travel and trade created an unintended consequence of ease of spread of communicable disease. The problem of climate change similarly highlights this problem. The pursuit of comfort and sustenance has resulted in a planet-wide modification that is now endangering human existence on the planet. Please confirm the section headings are correctly identified. They are in order

Globally, the COVID-19 pandemic uncloaked the fragility of various sectors of the economy and interrelationships aspects of human lives bringing to light their corresponding deficiencies. Whilst the impact of climate change is felt in different ways across different regions, COVID-19 impacts bring to the fore, the potential complexity humans could face if they fail to find an agreement and solution to reversing climate change. In Nigeria, surveillance was heightened since January 2020. Despite that, the index case was imported into the country and was identified on the 27th of February. Here begins the story of the nation's one systemic gap or vulnerability (effectiveness of the airport surveillance) that led to a series of challenges for the country. This can be likened to the slow pace of action across the country and globally towards reducing carbon footprint. The inability of Nigeria to take decisive preventive actions before the arrival of the index case typifies the lack of concerted actions being witnessed around the world in the seemingly lacklustre handling of climate change escalating conditions.

The nation was also slow to ban travel from high-risk countries and between the 27th of February and the 17th of March 2020 (the first 30 days), all recorded cases were imported via the nation's ports of entry. One month from the index case, there were 81 cases, 1 death and 3 recoveries spread across 10 States (Table 1). 41% of the cases within the first 30 days have an unknown source of infection. Lagos and Abuja with major international air travel hubs in Nigeria accounted for most of the cases. Ejigbo, the epicentre in Osun State, accounted for about 9% of the cases, this could be attributed to indigenes who had to return to Nigeria from Cote d'Ivoire and other neighbouring countries due to the pandemic (Amzat et al. 2020). The gaps in

Table 1 Timeline of coronavirus outbreak in Nigeria (February 27–June 7, 2020) *Source* Amzat et al. (2020)

Incidence of coronavirus February 27–March 27 (first 30 days)		
	Number	Percentage
Total positive cases	81	3.7% (of positive cases)
Total discharged	3	1.2% (of positive cases)
Total deaths	1	
Incidence of coronavirus February 27–April 27, 2020 (first 60 days)		
Total positive cases	1337	12.2% (of the total tests)
Total discharged	255	19.2% (of the positive cases)
Total deaths	40	3.0% (of positive cases)
Total tests	10,918	
Incidence of coronavirus February 27–June 7, 2020 (first 100 days)		
Total positive cases	12,486	16.3% (of total tests)
Total discharged	3957	31.7% (of positive cases)
Total deaths	354	2.8% (of positive cases)
Total tests	76,802	

Nigeria's surveillance and slow response led to the situation she has had to grapple with today. Similarly, if climate change is still taken with levity, this will be like walking literally towards the abyss.

The systemic gap in the health sector was made manifest by the glaring shortage of manpower, hospital equipment (most especially ICU, ventilators, oxygen tanks and hospital beds), drugs, and so forth, experienced at the peak periods of the contagion. Isolation centres and testing capacity for the disease were stretched beyond their capacity as preparedness for an event of such magnitude was non-existent across most states. Key workers across federal, state, and local government agencies were vulnerable socially, physically, and economically, due to the lack of adequate measures to protect them whilst serving the populace. This gap was more pronounced with COVID-19; however, it brings to the fore the need to build capacities and resilience across the health sector for emergency and disaster situations.

The COVID-19 pandemic and the attendant lockdown measures led to improvements in air quality, due to less use of fossil fuel for production activities and transportation. This is important for the reduction of respiratory illnesses and conversely for the reduction of climate change (Arora et al. 2020; Ringsmuth et al. 2022; Srivastava et al. 2020).

Climate-induced disasters threaten part of Africa with drought and a large-scale possibility of widespread hunger, malnutrition, and attendant diseases that can overwhelm healthcare infrastructure. Although there has been no empirical evidence to suggest that COVID-19 spread is influenced by climate change, the underlying conditions that contribute to climate change have some impacts on disease spread. For instance, deforestation affects animal emigration which can lead to cross-contact of pathogens when animals are driven together, for animal species that would never have met but for actions, like deforestation and loss of habitat.

Furthermore, climate change is said to be extending the geographical range of insects, shifting phenology, changing generation/year and season, as well as changing the duration of disease vectors (Hodgson et al. 2011; Ryan et al. 2020). This will lead to an exponential increase in diseases and illnesses globally, especially in Africa. For instance, malaria is the second leading cause of death in Nigeria only surpassed by neonatal disorders (Vos et al. 2020). WHO report shows that in Africa, malaria cases and mortality rates spiked from 56 in 2019 to 60 deaths per 100,000 persons in 2020 (World Health 2021). Recent studies have indicated that the extension of the geographical range of malaria vectors is dependent on the level of local warming and the ecology of the vectors. In addition, Pu et al. (2020) claimed that temperature and changes in humidity owing to climate change are engendering severe evolutionary changes in various animal species, such as agricultural pests and disease vectors. These evolutionary changes are apparent as the alterations in allele frequencies of genes that are implied in thermotolerance and desiccation resistance.

With the increase in emerging diseases around the world; if scenarios arise where States in Africa, like Nigeria, are confronted with such health emergencies combined with complex emergencies (insurgency) or large-scale disaster situations, like drought, the existing healthcare infrastructure may not be able to cope with the consequent humanitarian crisis.

Societal and socio-economic gaps

Many Nigerians depend on daily income, thus the sudden restriction of movement and grinding halt to economic activities created a shock to many. With a poorly coordinated social support system, it was difficult for many families during this period. This gap also extends to the educational system with many from the low-income bracket not able to send their children to private schools witnessing little or no learning for their wards. Many higher education institutions were ill-prepared and still trying to cope with the fallout of the pandemic—creating a knock-on effect on the welfare of the staff and students. This has a negative implication for achievement gaps and most importantly for social mobility. The lack of access or poor access to learning and education for some children and young people during this period will surely have implications beyond this COVID-19 pandemic. Whilst some states instituted radio and TV programmes to bridge the gap, the pandemic showcased the glaring disparities in education access. Some of those earning monthly incomes witnessed a reduction in salary, whilst some lost their jobs, due to employers' inability to pay as there were no economic activities to generate the necessary revenues to pay them. With the loss of jobs for many, the lack of employment insurance is worth considering as a measure to address the future downturn in labour market participation. Similar challenges are slowly emanating from climate change and global warming, which are inducing disasters, thus bringing up questions on.

1. How are we planning to ensure people losing their livelihoods to climate change and global warming are not left behind?

2. How do we mitigate the impact of climate change on education and prevent it from undermining education access?

The lack of a proper social safety net system was instrumental in the problem surrounding the distribution of palliatives and the ensuing crisis that surrounded it. And it is evident that when there is a systemic gap, the resulting risk can be devastating. The country witnessed the destruction of many warehouses, business infrastructures, and facilities related and unrelated to the palliative distribution of palliative care. The lack of proper structure and framework to alleviate the sufferings of many during the lockdown led to pent up anger, which created a chain reaction leading to nationwide destruction and civil disobedience as well as fatalities. Thus, it is imaginable that failure to curb climate change and its impact could result in similar chaos on a much larger scale. The incidence of chaos experienced during the lockdown represents a very clear example of how systemic gaps can create major catastrophes. The level of inequalities in Nigeria’s socio-economic landscape is glaring and is a systemic gap that needs to be addressed. From the pandemic, there is a reiteration that health outcomes are socially determined by the interrelationship of health-related practices, social, and community

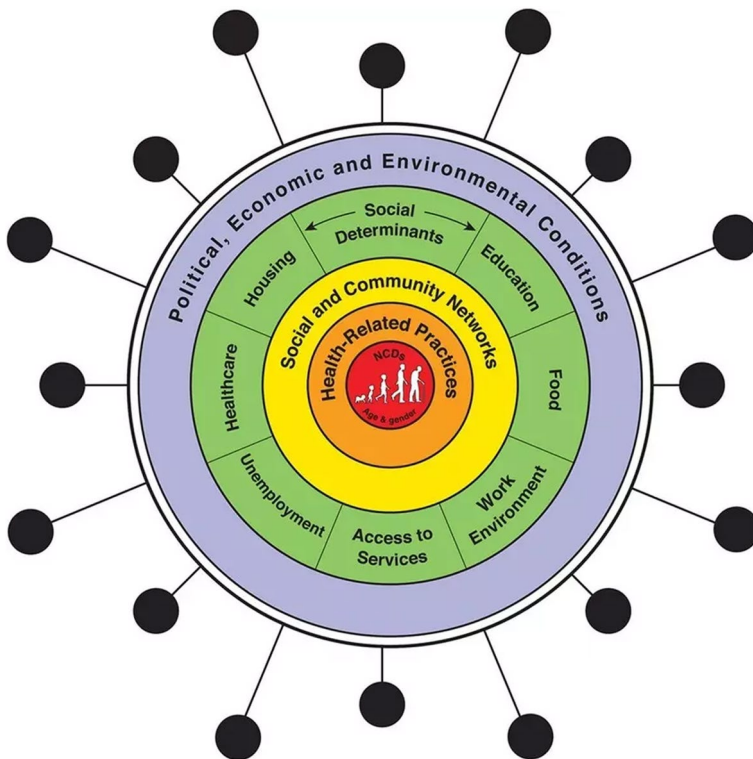


Fig. 1 The social determinants of health. Source Bambra et al. (2020)

networks, as well as the social, economic, and environmental conditions within which households find themselves (Fig. 1).

Generally, the climate has an impact on the life history, development cycle, and metabolic rates of insects (Bale and Hayward 2010). Insects are generally ectotherms, which implies that their body temperature is linked to their external environment, making them highly sensitive to climatic conditions (Moiroux et al. 2014). Changing climate conditions can therefore further the population distribution, growth rates, and number of generations of pests which will have severe implications on agricultural productivity and livelihoods. The associations between climate and energy are unparalleled; energy systems are susceptible to high temperatures which elicit surges in demand whilst putting strains on supply and transmission. These systems have a vital role to play in supporting adaptation by enhancing cooling and heating irrigations and trade. Households and industries use a high amount of energy in maintaining indoor climates based on external weather conditions (Auffhammer and Mansur 2014; Cian and Wing 2014). This demand rises as global temperature increases and falls and the global temperature cools. It is also noteworthy to mention that energy utilisation is the greatest contributor to anthropogenic climate change.

Interpersonal violence is consistently seen to rise with temperature and, occasionally, low rainfall in a variety of circumstances (Hsiang et al. 2013; Miguel et al. 2015). This response manifests in overt violence, such as retaliation in sports (Larrick et al. 2011), violent crimes like rape, murder, robbery, and assault (Jacob et al. 2007; Ranson 2014), as well as low-level aggression like horn honking (Kenrick and MacFarlane 1986), antisocial behaviour towards service employees (Kolb et al. 2012), and the use of profanity on social media (Baylis 2015). The effect of temperature is remarkably linear with almost no delay, indicating that a physiological mechanism may be responsible for it (Morrison et al. 2008; Ray et al. 2011; Seo et al. 2008). Rainfall's effects on interpersonal violence are predominantly observed in some underdeveloped agricultural environments, such as rural Tanzania (Miguel et al. 2015) and India (Iyer and Topalova 2014; Morrison et al. 2008; Sekhri and Storeygard 2012) and Fulani-herdsman crisis in Nigeria 2020 (Folami and Folami 2013) raising the possibility that harm to agricultural production may operate as a mediating factor. Furthermore, air pollution and cardiovascular illness and death, food and waterborne disease, food security, mental health, and stress-related impacts are some of the other challenges likely to be aggravated by climate change. Thus, we need to learn from the current pandemic and build back better in Nigeria. As climate change could lead to an increased in the level of socio-economic stress for everyone, we need to build resilience across the various facet of society.

Digital divide and the information gap

Lack of internet access and limited access to education for many were highlighted earlier and this represents inequality with a significant impact on poverty and human capacity development. Another perspective to access to education is that it is a problem we have failed to properly address in the past. It manifested in the ease at which

the populace accepted and spread misinformation. This militated efforts in curtailing the disease across the country. Therefore, the shortcoming in science, technology, engineering, and mathematics (STEM) education and awareness became obvious. Many Nigerians were quick to accept falsehoods. This could be partially attributed to the lack of access to information (poor access to the internet), poor critical thinking skills (that could be gained through knowledge of the scientific method), poor public education campaigns by the appropriate authorities and potential lack of trust in the authorities (Adebisi et al. 2021). Addressing the climate change issue requires the participation of an educated and knowledgeable citizenry. Failure in educating the populace adequately will likely result in a lack of understanding of the challenges, a lack of acceptance of innovations and policies to mitigate impacts, an increase in support for quick fixes and little or no buy-ins for long-term policies.

The challenge of social media networks became apparent (echo chamber), whereby people can remain in their social network and get the same falsehood echoed repeatedly, giving no room to the truth. Whilst the medium provides a viable means of disseminating information to the citizenry, many people hide behind the anonymity it offered to perpetuate the evil of misinformation (Obi-Ani et al. 2020). The poor coverage and most probably the paucity of public education campaigns gave room for the spread of disinformation making the disease more difficult to curtail. Olatunji et al. (2020) showed that COVID-19 conspiracy theories were driven majorly by social media, a dearth of trust in political leadership and the sensationalisation of inaccurate COVID-19 news by traditional media. Other studies showed that news media reporting lacked in-depth coverage, they are often alarming and panic-inducing reporting and public sensitisation and education were sparingly captured (Apuke and Omar 2020).

It is a herculean task to keep up with the speed and spread of misinformation on social media. Thus, lessons must be learnt by the various authorities on the need to build trust and understand the dynamics of misinformation on social media and other media. The information gap and digital divide must be taken care of. Addressing such would also include addressing access to electricity which is a major bane for industrial, economic, and human development in Nigeria. The results of the mobility by Lawal and Nwegbu (2020) showed that people responded initially to the lockdown; however, because of the difference in risk communication across the States of the federation risk perception varied significantly across the State making the control of the disease more challenging.

Gaps in capacity and resilience across industries and organisations

From the fragility of the healthcare system to vaccine production and from manufacturing to agricultural production, there were glaring gaps in the capacity of the country to locally produce and manufacture essential items required. Some farmers lost their harvest as enforcement agents lack the coordination on how to address such peculiar cases. This is a situation often experienced by many farmers as climate change impacts such as floods and drought wreak havoc on farmlands. During the lockdown, there were reports of exploitation by various enforcement agents.

Urban food systems and value chains showed clear indications of a lack of resilience—driving consumer prices up and exacerbating urban poverty. The implication was food insecurity, most especially amongst the urban poor. A recent report showed that state-level mobility restrictions reduced the probability of non-farm business activity participation by 11% and increase the household experience of food insecurity by 13% (Amare et al. 2021). And the restriction led to income losses and a reduction in purchasing power amongst the poorest households (Béné 2020).

Across many industries, there were no business continuity plans which left them vulnerable because of a significant reduction in labour market participation. This shows that a lot is still required to mainstream DRM in the daily operations of many businesses, especially amongst SMEs. With each State enforcing the lockdown as they deem fit, there is the likelihood of differential impact across industries and sectors of the economy. However, huge capacity and resilience gaps were obvious across Nigeria's organisation of resources and manpower across the economy. The lack of organisation and coordination at various levels can be implicated in the lack of widespread testing and the potential for underreporting of cases.

The pandemic places an extra burden on the environment in that the personal protective gears worn by medical personnel and attendants in caring for the sick are non-biodegradable hence assuming a menace when improperly disposed of. Thus, the lack of a proper waste management system will manifest sooner or later as pollution and contamination of the environment.

In terms of vaccinations, Ritchie et al. (2021) reported that 53.1% of the world population has received at least one dose of the COVID-19 vaccine with just about 5% in low-income countries having received one dose. The COVID-19 vaccines global access (COVAX) programme was established for the primary purpose of vaccine accessibility for disadvantaged countries. Despite this, there is still a stark contrast in the statistics which points to a tremendous gap in vaccine equity. This is coming off the time when some of these developed countries have already proceeded to the booster jab phase, whilst the rest of the world is being left behind. It is an unclouded indication that the exercise is still largely prioritised rather than it being distributive. In the context of risk society theory, unequal access to the vaccine put everyone at risk and ensures that the disease persists for longer wrecking social, political, and economic havoc. The lack of capacity to produce vaccines locally will always leave the country vulnerable. This is like the impact of climate change, failure to curb it might aggravate local impacts, but the ripple effect will go beyond that locality.

Additionally, the challenges encountered with global vaccine distribution suggest the hoarding of critical health-dependent commodities—leaving Africa behind despite the United Nations and World Bank mantra of “leaving no one behind.” This highlights the need for home-grown solutions and investments into research and development for infectious diseases and climate change adaptation and any other existential threat with the potential for large-scale global impacts and disruptions.

The lesson learnt from the pandemic shows that notwithstanding the international collaboration and commitments for actions in normal times, this may not be guaranteed as national considerations and geopolitical interests may become a top priority

for big nations during the global crisis, therefore efforts towards home-grown solutions should be intensified.

Themes and dimensions for building back better

Themes for resilience building

The central theme for building back better should be to enhance well-being and promote inclusiveness. With many of the nation's challenges being interconnected, the most viable approach to building resilience for the future pandemic or emergencies is to view development from the point of view of a complex system. Thus, this requires that we work on enhancing capacities at the elemental level of the system. In essence, policies that improve income, job quality, housing, health, and equality will surely gain acceptance amongst the populace and create an environment whereby the populace has enhanced resilience and adaptive capacities.

Such well-being and inclusiveness promotion must be at all levels, proper understanding must be sought at all levels to understand which lever could be moved to achieve greater benefits for the largest number of people. Would unemployment insurance help promote resilience? How do we improve educational systems to enhance social mobility? What will ensure that the disabled, minorities, females and others are included in the economic and social development of the country? What sort of data do we need to collect to ensure adequate preparedness and robust response? Various approaches would have to be explored as there is no one-size-fits-all.

Dimensions for resilience building

It was observed that systems put in place during the Ebola outbreak were instrumental in COVID-19 response and management in Nigeria, accounting for some level of institutional readiness and general alertness. Even though the disruptions wrought by COVID-19 were far greater than Ebola, these systems provided the basis for initial support. Therefore, whatever structures are in place now or are being rebuilt should be resilient enough for future emergencies, including climate change adaptation measures.

Relevant dimensions worth considering for resilience building in Nigeria include

1. Build integrated data infrastructure:

Currently, most of the ministries, departments, and agencies (MDAs) of government operate in silos, with each fighting one another for budgetary allocation. Synergy and cooperation would have to be developed to ensure data collection and sharing and open data policies are adopted to support research and development. Two types of data gaps were identified during the pandemic (1) "data poverty"—lack of data jeopardising response and (2) "poor data"—lack of adequate data about vulnerable people, perpetuating various forms of inequality (Milan and

Treré 2020). Filling this gap also enhances the nation's ability to address climate change and its impact.

2. Improving supply chain resilience and circularity:

The pandemic raised the question about the resilience of global and local value and supply chains as well as production systems. Thus, triggering the need for a more diversified and localised production and most importantly short supply chains. Therefore, policy and stimulus could be targeted at ensuring that local supply chains improve their resilience, resource use efficiency and circularity (designs out waste and keeps products in use). Addressing this not all reduces wastage it also reduces the national carbon footprint which is a critical factor in ongoing discussions of reducing risks associated with climate change.

3. Focus on the furthest behind first:

As the pandemic exacerbates inequalities within the countries and pushes some further into poverty, resources must be allocated and used in ways that effectively reach and support the furthest behind. Such might include strengthening and overhauling social protection and health systems. There is a need for an efficient and effective method of identifying and supporting the furthest behind and their care needs to be prioritised (we are as strong as the weakest amongst us). The slums and informal settlements created contagion hotspots across the country thus there is a need to change the narratives. Climate change impact may affect the poorer amongst us more, but it will also put the well-off at risk, thus inclusive development is a must for us to ensure climate justice.

4. Sponsored growth and innovation:

There is currently a dichotomous growth across the country, with some places growing economically, whilst others just get drained of human and natural capital to support the growth of the major urban centres. Thus, to ensure an inclusive economy there is a need for growth to be sponsored across other places which are not currently major hubs of economic activities across the country. Such will provide redundancies for the economy and ensure that innovations can be derived from the peculiarities of such places outside the traditional economic hubs. Urban areas currently house most of the population of Nigeria, thus there is a heightened risk from climate change. Efforts at improving land-use efficiency of urban areas ensure that we achieve sustainable development and minimise the carbon footprint of urban existence. Rural–urban migration is putting pressure on infrastructure in city centres, driving people further into slums and making them more vulnerable to climate-induced disasters, like flooding. New agricultural methods are required to resolve issues of the farmers–herders crisis stemming from outdated pastoral practices of migrating with herds in search of pasture and water, which lack thereof, is exacerbated by climate change.

5. Reorientate priorities:

The national discourse needs a clear purpose to reorientate priorities. The current purpose is economic development with GDP growth being the target. With the challenges of climate change, we need to reorientate national priorities towards inclusive and sustainable development. The welfare of organised labour, protection of the environment, elimination of discrimination, and emphasis on social goals are central to ensuring well-being and inclusivity. The lack of such priorities

has resulted in greater inequality leading to political instability and the risk of disruptions due to climate change. If the nation's priorities do not change, then we have not learnt anything from the current pandemic. Consequently, we are not going to be better prepared for the uncertain future we face.

6. **Build agile and responsive institution:**

The development of agile and responsive institutions is necessary to address risk and reduce vulnerabilities. Institutional capacities would need to be enhanced at all levels of government to both prevent and manage crises. The value of institutional capacities in achieving national sustainable development priorities cannot be overemphasised. Good plans cannot be implemented without adequate and capable institutions. By integrating national, state, and local plans via (agile and responsive) institutions, strategies and resources could be collectively aligned in achieving set out priorities.

7. **Invest in preparedness:**

COVID-19 underscores the importance of preparedness, especially investing in crisis prevention, risk reduction and planning. Therefore, financing industries and institutions that are efficient and effective in enhancing risk reduction should be promoted as part of climate change adaptation planning.

Conclusions and practical steps

For all-inclusive resilience to be achieved, it is pertinent to develop and implement long-term people-oriented plans. The following needs to be established to insulate economies and communities from future outbreaks:

1. **Supply chain resilience and circularity:** Supporting local production closer to point of consumption can create new job opportunities, but efforts should be made to support industries and enterprises that would not increase environmental impacts, e.g. climate-smart agriculture, peri-urban vegetable production and animal rearing. Production systems that showed clear opportunity and innovation towards circularity could be supported. This could limit disruption and enhance resilience.
2. **Furthest behind first:** National health insurance programmes should be restructured and reinforced to capture and cater to the health needs of different classes of society. State insurance schemes should be made to complement the national scheme. The social safety net needs to be overhauled considering challenges encountered during the pandemic to make it effective and efficient—data driven. A move away from just empowerment slogans to a robust innovation-driven entrepreneurial support framework is a must. The problem of housing needs to be addressed as the overcrowding, slums and informal settlements create viable contagion hotspots.
3. **Diversified growth and innovation hubs:** The identification of potential opportunity zones across States and LGAs away from the traditional urban centres is necessary. Thus, creating new centres for innovations and economic development. As government revenue is under significant pressure such opportunity zones can

improve IGR and support job creation. However, these would have to be supported by adequate infrastructures to connect them to established centres and create redundancies.

4. **Reorientate priorities:** People-centred and socially responsible policies should drive the next stage of national development. The drive towards collective responsibility be reiterated, as we face climate change impacts, and the risk of another pandemic is imminent in the future. The need for movement away from business as usual is pertinent to building resilience, as various inadequacies of the current system were laid bare.
5. **Agile and responsive institution:** Poor response and agility of many of Nigeria's institutions imply that there are poorly prepared to handle unexpected situations. This was exemplified by the failure to prevent imported cases from entering the country. Responsive institutions would have anticipated points of failure and set up redundancies to mitigate such failures or address the point of failure as they were identified.
6. **Preparedness investment:** The fatalistic attitude of Nigerian society often dissuades the prioritisation of prevention and preparedness. Thus, exacerbating losses and damages. This needs to change and to do that we need to invest more in preparedness and public education. Emergency management agencies should not be looked at as relief agencies, they must be actively working on risk reduction and preparedness planning. Most States and LGAs across the country do not have existing infrastructure to support preparedness planning. Whilst the national agency has provided various capacity-building exercises across these levels of government, the poor attitude is a major challenge to disaster risk reduction in Nigeria. There are inadequacies in ambulance and fire services across the nation. This can be attributed to the attitude towards prevention and preparedness. This attitude also dovetails into other areas where prevention and preparedness could save lives and properties.

Other aspects which could enhance national resilience include

- Disaster risk management education at all levels of education
- More investments should be made by governments/enterprises in research and development to boost knowledge and technology development capacity.
- Addressing GHGs emissions (which exacerbates global warming and climate change hence making us more vulnerable to emergent infectious diseases).
- Building on and increased commitment to existing international agreements such as the Sendai framework for disaster risk reduction and recently the COP26.

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Data availability Data used in this study are freely available and those not available can be made available on reasonable request.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval This article does not contain any studies with human participants performed by any of the authors.

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