Research Article

Assessing Urban Slums in Post-COVID-19 to Achieving Sustainable Development Goal 1: Nigeria's Stakeholders Perspective Using Qualitative Approach

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ABSTRACT

Studies showed that upgrading urban slums could bridge income inequality, create better opportunities, and mitigate/prevent virus spread in slums environment. There is a paucity of research concerning regenerating urban slums to achieve Goal 1 in Nigeria with reference to the post-COVID-19. Therefore, this research explored the impact of COVID-19 on slums in Nigerian cities and recommend measures to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1. The research used an interview type of qualitative research design and covered five major cities across Nigeria. The researchers engaged thirty interviewees (selected construction practitioners, NGOs, medical experts, and government agencies). The study adopted a thematic method to analyse the collated data. Findings show an increased poverty level across the five slum cities covered during and immediately after the pandemic. The significant impacts are high exposure to contagious and non-contagious infections, increased food insecurity, homelessness, unemployment, increased crime rates, and worse overcrowding during the lockdown. The study recommended measures to regenerate urban slums. The findings would stir policymakers to promote urban slum upgrading. Findings will support and provide insight into the active transformations of slums for the benefit of humanity and mitigate climate disruptions in future pandemics.

Keywords: COVID-19; informal settlement upgrading; Nigeria; suburban housing; sustainable cities

1. Introduction

The Corona Virus Disease 2019 (COVID-19) hit the world in late 2019[1]. On 30th January 2020, the World Health Organisation declared the virus a pandemic and public health crisis of global concern[2]. Several countries embraced restrictions on movement to reduce/prevent the spread of the virus. This action affected economic activities in several sectors. The pandemic may be highly damaging to inhabitants, especially urban slum inhabitants in developing countries that are grouped as low-income countries. The term "urban slum inhabitants," as used in this study, describes people living within a defined urban area without basic public utilities (sanitation facilities, electricity supply, pipe-borne water, etc.). Thus, it exposes the slum settlers to communicable and non-communicable diseases because of its unplanned layout[3]. Migration from rural to urban settlements for better employment prospects has been identified as one of the factors enhancing urban slums, especially in developing countries. Studies[4-5] asserted that vulnerabilities discovered in urban slums vary. One common feature is that a slum's physical environment can spread contagious infections because of unplanned settings[6]. The issue is compounded because of the absence of social and welfare aspects. Thus, the slum settings hinder efforts (self-isolation, physical distancing, and hand washing) to prevent or reduce the disease spread[7-8]. Tampe[5] affirmed that slum homes are exemplified by their inadequate access to clean drinking water and inhabitable environment, as acknowledged by United Nations-Habitat. Tampe[5] and Ebekozien et al. [1] affirmed that many households live in small slum spaces and use shared facilities. It may aggravate disease outbreaks in such neighbourhoods.

In the past, studies[4,9-11] were conducted regarding ways urban slums can be upgraded, especially in low-income countries. Lilford et al. [4] and Ilesanmi et al. [9] found that apart from the poverty level and implications of the inhabitants' health in slum environments, living in slums is a function of deeply shared physical and social environments. Opoku and Akotia[10] worked on urban regeneration for sustainable development by proffering ways to achieve the goals. Ebekozien et al. [11] worked on developing policies to address urban slum challenges in Nigerian cities. The danger from COVID-19 in the past three years cannot be over-looked. It is a threat to achieving Goal 1 (Mitigate extreme poverty). Ebekozien et al.[11] found a shortage of housing in most cities covered. It indicates modernised slum areas are inevitable in these cities. For example, Lagos State has a housing shortage of about 2.5 million with a population of over 21 million. Report shows that the poverty rate increased from 8.3% in 2019 to 9.2% in 2020, and international households' poverty line increased from 6.7% in 2019 to 7.2% in 2020[12]. The worst hit is urban slum inhabitants. The outbreak of COVID-19 has compounded issues for the inhabitant living in urban slums and may have widened the income inequality because of economic activities shut down. This may threaten the SDGs, especially Goal 1 (no poverty). This is one issue that is yet to receive an in-depth evaluation.

The United Nations (UN) [13] reported that one billion live in dilapidated houses. The peak of the pandemic would have increased the figure. Studies[10-11,13-14] underscored the significance of regenerating urban slums to humans, not regarding the pandemic. The UN[15] reported that by 2050, at least 68% of the world will be habitat by cities. About 90% of this increase will come from Africa and Asia[15]. Attempting to proffer measures to urban slums in low-income countries, such as Nigeria, might mitigate severe poverty (SDG 1) due to the pandemic. Records show that the pandemic compounded the situation with grave SDGs impacts[16], and Sustainable Development Goal 1 was not exempted. An extra 75 to 95 million people will live in extreme poverty in 2022, likened to pre-COVID-19[12]. Goal 1 deserves special attention.

The study focuses on exploring the perceived impact of COVID-19 on slums in Nigerian cities and recommends measures to transform slums into sustainable cities and bridge income inequality to improve

achieving Goal 1. The study would reawaken the concept of proffering measures to transform slums into sustainable cities to improve achieving Goal 1. Thus, one way Goal 1 can be achieved is by upgrading urban slums, which deserve special attention. Studies[1,11,13-14] showed that upgrading urban slums can bridge income inequality and create better opportunities. There is a paucity of studies regarding regenerating urban slums in Nigeria. Thus, the study investigated the perceived impact of COVID-19 on slums in Nigerian cities and recommended measures to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1. The following objectives achieved the study's aim:

To investigate the perceived impact of COVID-19 on slums in Nigerian cities.

To proffer measures to transform slums into sustainable cities and bridge   income   inequality   to improve achieving Goal 1.

This research focused on the main aim – The study investigated the perceived impact of COVID-19 on slums in Nigerian cities. It recommended measures to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1. The study's presentation is clustered into seven sections. The current section focuses on the study's introduction. This includes the main objectives and motivation for the research. The second section summarises the relevant literature to the study. This includes regenerating urban slums and the impact of COVID-19 on urban slums. The research method section followed, which engaged participants across five urban cities via in-depth virtual interviews. The fourth section is the qualitative findings and discusses related findings to previous papers. The fifth section presents the study's implications. The sixth section presents the study's limitations and areas for future studies. The last part consists of the study's conclusion and recommendations.

2. Literature review

2.1. Regenerating urban slums

This sub-section addresses the term "slums," as used in this study. Slums describe a diversity of social, environmental, and economic social issues. Slum-settlers, especially urban occupants, face non-communicable and communicable diseases and exposure to various vulnerabilities. This study adopted the United Nations-Habitat[17] definition. It describes a slum household as a group of people living within a defined city area with a shortage of one or more of the identified conditions:

Appropriate living space and up to three persons sharing the same room.

Right to affordable clean drinking water.

Right to use adequate sanitation.

Security of tenure that avoids forced evictions.

Adequate housing of a permanent structure that protects against severe climate   conditions.

Slums are informal settlements that accommodate residents in an unplanned layout. Urban slums do not have the same attributes, nor do all residents undergo the same degree of poverty[3,18]. Most slums are faced with crowded and poorly built shelters and inadequate services such as pipe-borne water, electricity supply, and sanitation facilities[11].

Globally, up to one billion live in dilapidated shelters[19-20]. Regenerating these slums may promote sustainable housing for the disadvantaged. Studies[10-11,13] underscored the relevance of regenerating urban slums to proffering solutions to urban slums. It has become pertinent because, by 2030, 5 billion of the earth's population will live in cities[21]. Also, by 2050, about 68% of the world will live in urban areas[15].

Attempting to provide measures to urban slums, especially in developing countries, will mitigate severe poverty (SDG 1). Akotia and Opoku[14] affirmed that the urban regeneration concept has become more central and one of the critical drivers tailored toward sustainable development. Thus, this study adopted Roberts's[22] definition, which defines urban regeneration as the "*comprehensive and integrated visions and actions, which lead to the resolution of urban problems, and which seek to bring about a lasting improvement in the economic, physical, social and environmental conditions of an area that has been subject to change*" (p. 17). The concept presents programmes and policies that tackle society's socio-economic problems to reduce environmental impacts. It is a mechanism to regenerate declined cities towards attaining the SDGs[10]. Teferi and Newman[23] asserted that regenerating the informal urban settlements could contribute to understanding many SDGs, including Sustainable Development Goal 1. This is the focus of this study.

2.2. Impact of COVID-19 on urban slums

In the pre-COVID-19 era, health, social, economic, and environmental issues were linked with urban slums[1]. The era of COVID-19 may have intensified the impacts on the urban low-income people to access health services within those settings and losses of jobs. Ilesanmi *et al.*[9], Tampe[5], and Patel and Shah[6] avowed that many slum locations are faced with inadequate health coverage and access to primary health, especially for women and children. Apart from the COVID-19 era weakening access to quality health care, there needed to be more resources to seek private treatment as an alternative. Flint and Tahrani[24] found that preliminary studies link infection with elevated body mass index and diabetes with COVID-19. Tampe[5] found that the economic and social consequences of the COVID-19 crisis are destructive among disadvantaged urban settlers. The outcome can enhance economic and gender inequality. The UNDP[25] documented early evidence to show increasing gender-based violence, public health crises, and issues during the peak of the COVID-19 pandemic.

The economic, social, and environmental encumbrances and inequities in urban environments entail critical thinking in a multidisciplinary approach to provide innovative and integrated results to mitigate COVID-19 impacts on slum dwellers, bridge income inequality, and transform slums into sustainable cities in low-income countries. Tampe[5] identified increased food insecurity and malnutrition, loss of income and livelihood, increased exposure due to social and welfare issues, poor access to water, and poor access to quality health care as the major impacts of COVID-19 on the slum dwellers. Community-based strategies are essential to tackle COVID-19 issues and promote resilience. Leveraging active partnerships and alliances to include policymakers, community development representatives, and urban planners cannot be over-emphasised[5]. In the 21st century, urban regeneration has become a critical discussion and one of the drivers tailored toward sustainable development[14]. It can transform the weakening neighbourhoods and create a sustainable environment. Urban regeneration is a mechanism to regenerate and elevate prevailing declined cities towards attaining the SDGs[10]. Regenerating the informal urban settlements could contribute to understanding many SDGs, including Sustainable Development Goal 1 [No poverty][23]. Urban regeneration is one pertinent task impacting a more sustainable society, especially in developing countries with several urban slums. Also, it bridges income inequality and transforms slums into sustainable cities. In Nigeria, Ebekozien and Aigbavboa[8] found the lockdown during the movement restriction to curb the spread of the pandemic makes managing construction projects difficult. This applies to other sectors, including slums residential areas with evidence of lax enforcement of COVID-19 guidelines. Also identified were increase in unemployment, contracting firms struggling to survive, laying-off of workers, and closing of businesses. The slums are not exempted from these impacts with increased hunger.

3. Research method

The study adopted phenomenology. It is a qualitative research design that focuses on the interviewees' proficiency and experience during the interview[26]. This is in line with Ebekozien[27], who employed the same method in exploring construction companies' compliance for staffers in Nigeria. The study data were collected from five cities (Lagos, Kano, Abuja, Port Harcourt, and Onitsha) across Nigeria via virtual interviews, as presented in **Figure 1** and **Table 1**. The researchers employed snowball and purposive sampling techniques. Snowball sampling was used to obtain data which were difficult to access directly by the researchers, thus, the interviewees recruit other interviewees for the study. Also, the researchers employed purposeful sampling to obtain data from specific target groups that were advantageously positioned to offer the information required and ensures each group was adequately represented[8]. The five cities are known for urban slums in Nigeria and align with Ebekozien *et al.*[1], who worked on low-income earners' housing policy and settlers in Nigeria. Besides the interviewees (health/social welfare workers, senior staffers in government housing agencies, and residents in informal urban slums) being knowledgeable and experienced regarding urban slums, the study ensures that at least one participant represented each group. The study concealed the participants' identities for privacy. This aligns with Jaafar *et al.*[28] and Ibrahim *et al.*[29]. Thirty participants were interviewed, and the study saturation was achieved at the 27th participant. The researchers analysed the collected data via a thematic approach, as presented in **Figure 1**.
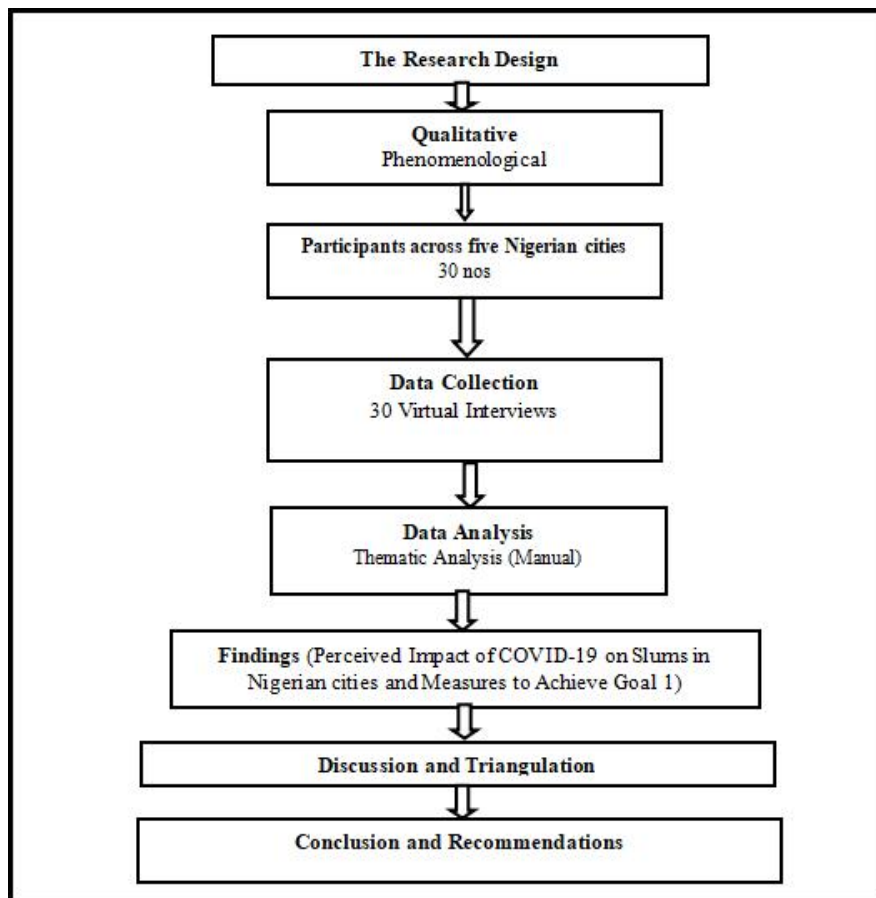

Figure 1. The research design.

Table 1. Description of the interviewees' background.

Participant/Rank	City/Participant Code					
	Lagos	Kano	Abuja	Port Harcourt	Onitsha	
	A	B	C	D	E	Total
Social welfare and health workers	H1 & H2	H3 & H4	H5 & H6	H7 & H8	H9 & H10	10
Senior staffers in govt. housing agencies	G1	G2	G3	G4	G5	5
Residents in informal urban settlements	R1-R3	R4–R6	R7-R9	R10-R12	R13-R15	15
Total Number of Interviewees						**30**

Source: Authors work

In line with Teddlie and Tashakkori[30], who employed the snowball sampling method to achieve good representation. The interviews conducted virtually lasted 45 minutes on average. This took place between July 2022 to September 2022. As highlighted in Appendix A, the researchers engaged the interviewees with questions within the two objectives. The investigators coded the collated data[31]. Sixty-two codes emerged from the coding and clustered into eight sub-themes. From the eight sub-themes, two themes emerged.

4. Findings and discussion

The section presents the findings and discussion from the interviewees.

4.1. Theme 1: perceived impact of COVID-19 on the slums

An urban slum is associated with economic, social, and environmental issues, but the unplanned COVID-19 crisis complicated or increased the problem of most urban slums, especially in developing countries, including Nigeria. Findings agree with the United Nations[12]. They reported that the poverty rate increased from 8.3% in 2019 to 9.2% in 2020. Also, in 2020, about 4.1 billion (53%) people were insecure from the short-term social protection measures announced by 209 countries and territories. Therefore, the sub-section allows the participants opportunity to identify COVID-19 impact on urban slums. Findings identified nine major impacts of COVID-19 on urban slum dwellers. This includes lack of social protection and support from the government, increased food insecurity and malnutrition, increased poverty line due to loss of income and livelihood, high exposure to contagious and non-contagious infections, and poor access to quality drinking water and health care as the significant impacts of COVID-19 on the slum dwellers. Others are increased exposure due to social and welfare issues, increased homelessness, increased social and criminal vices, and worse overcrowding during the lockdown. From the nine emerged impacts, increased food insecurity and malnutrition, increased poverty line due to loss of income and livelihood, increased homelessness, high exposure to contagious and non-contagious infections, and increased social and criminal vices were common among the participants as perceived impact of COVID-19 on slum dwellers in Nigeria, as summarised in **Figure 2**. Regarding increased homelessness, most participants (R1-R15) agree that the population has increased because some families that could not sustain higher rental charges due to job losses have relocated to join them in the slums. Findings agree with Honey-Roses *et al.* [32]. They found that people without homes and people experiencing poverty have been harder hit by COVID-19. They are economically vulnerable and lack basic needs such as livelihoods and adequate shelter.
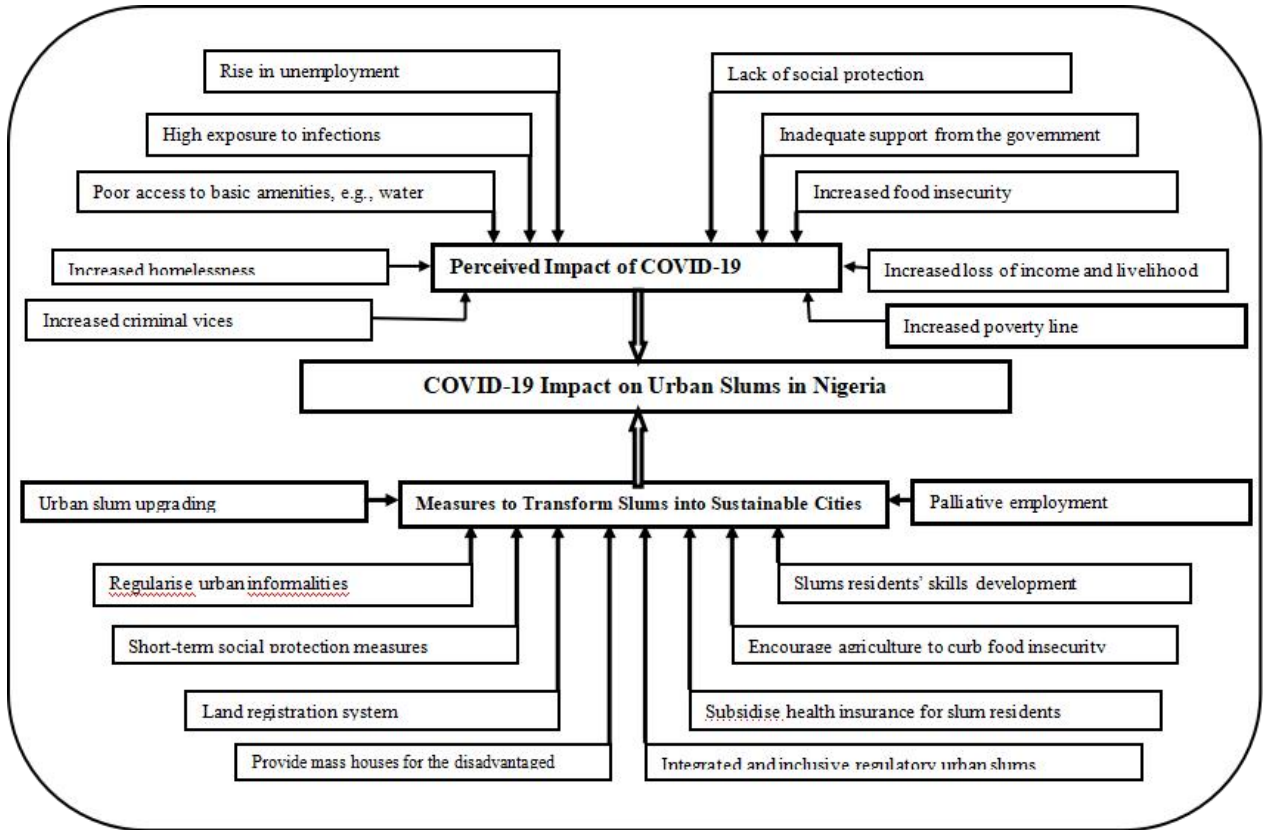
Figure 2. Thematic network of COVID-19 on urban slums in Nigeria.

Source: Authors Work.

One pertinent impact across the board is that more Nigerians have migrated below the poverty level than in the pre-COVID-19 era. This implies that more Nigerians live below US$1.25 a day (G3, G4, H5, H8, & H9). "…. *the truth be told, many Nigerians are not finding this pandemic era funny, but the strong spirit of keeping hope alive keeps them going*…." Participant H9. Findings agree with Olurounbi[33], Omeihe[34], and UN[12]. Olurounbi[33] found that Nigeria's unemployment is forecast to rise to 33.5% by 2020, and not less than five million pushed into poverty, according to multiple data and reports from World Bank and the United Nations World Food Programme. This figure paled insignificance when Nigeria's Vice President Osinbajo-led Economic Sustainability Plan Committee told the nation that the COVID-19 pandemic had caused 33.6% rise in unemployment. This implies that about 39.4 million people will be unemployed[34]. It shows that job losses in all sectors of the national economy are profound (H3, H6, H10, G3, & G5). The UN[12] projected that 75 to 95 million people would live in extreme poverty in 2022 compared to the pre-COVID-19 era. Nigerians are not exempted from this figure. Participant R14 says, "…*feeding has been a challenge since the factory that engaged me shut down but not as worse during the COVID-19 crisis. A nearby construction site that employed most of us was shut down during the crisis, leaving us to our fate without government palliative measures to remain indoors…. It was not a good experience for my household*…." The findings agree with Tampe[5]. It was found that apart from increased food insecurity in urban slum locations, there was a lack of social protection and support from the government to the people affected due to the down-sized or shut-down of organisations during the COVID-19 peak and the government movement control order.

4.2. Theme 2: proposed measures to transform slums into sustainable cities

The sub-section presents measures to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1. Findings agree that these measures would mitigate COVID-19 negative impact on urban slums if well implemented. It implies that income inequality would bridge the process and improve achieving Goal 1 (no poverty). One germane point that emerged is that integrated and inclusive regenerating urban slums can assist in transforming slums into sustainable cities and bridging income inequality, especially in low-income countries such as Nigeria. Others are short-term social protection measures (H5, H7, & G3), palliative employment such as direct labour construction for specific contracts (H8, G3, R3, R7, & R12), slums residents' skills development for better job opportunities (H1, H4, G4, R3, & R8), policies and programmes to encourage agriculture to curb food insecurity looming the land (G2, G5, R11, & R14), and subsidised and affordable health care insurance for slum residents (H1, H4, H5, H8, & H10), as summarised in **Figure 2**. Findings show that the COVID-19 experience, almost three years, calls for immediate short-term social protection measures to mitigate the pandemic. Findings agree with Omeihe[34] and Sachs *et al.*[35]. Omeihe[34] suggested direct bailouts, injection of huge funds, and investments in the productive sectors to stem the looming gale of unemployment as part of the short-term measures. Sachs *et al.*[35] found that the global poverty rate increased from 8.3% in 2019 to 9.2% in 2020. One major contributing factor is COVID-19, which may be higher by the end of 2022.

Participant H4 says, *"…. Africa is one of the continents with a high rate of urban slum inhabitants before the pandemic peaks. Note that Nigeria's cities are among Africa's leading slum cities…. The government needs to get it right regarding a good land registration system. Many slum families are in limbo because of passive government decisions. The government refused to provide social housing and formalise land ownership in some of these locations or the residents to build good quality housing…."* Findings agree with BBC[36] and Ebekozien et al.[37]. BBC's Mayeni Jones visited Lagos city, Nigeria, based on a United Nations release criticising the bad shelter provision in Nigeria's cities, including Lagos[36]. Ebekozien et al.[37] recommended regularising urban informalities in sub-Saharan Africa. It is a tool for promoting informalities' promising roles in sustainable city development via integrated and civic engagement of key actors.

On the 30 January 2020, the WHO declared COVID-19 a Public Health Emergency of International Concern. This compounded issue affects slum dwellers experiencing social and economic inequities (H6, H10, & G1). In bridging inequality, the issue of subsidised and affordable health insurance for disadvantaged residents in slums cannot be over-emphasised. Regarding transforming slums into sustainable cities, findings agree with the United Nations[38], Teferi and Newman[23], and Opoku and Akotia[10]. The United Nations[38] developed and adopted the agenda (New Urban Agenda) frames global policy for cities and urban regeneration. The agenda will focus on regenerating urban slums into sustainable cities in the next two decades and after that. Teferi and Newman[23] avowed that regenerating urban slums and informal settlements could contribute to understanding many SDGs, including Sustainable Development Goal 1 (no poverty). Urban regeneration is one pertinent task impacting the agenda toward a more sustainable society, especially in developing countries with several urban slums[39]. Opoku and Akotia[10] asserted that urban regeneration is a mechanism to regenerate and elevate prevailing declined cities towards attaining the SDGs.

The concept of urban slum upgrading can deliver policies and programmes that tackle society's socio-economic issues to mitigate the environmental impacts. Findings reveal that poverty reduction can enhance sustainable development. This is critical to a sustainable and healthy environment for the well-being of humanity (H5 & H9). This is possible if the governments (federal, state, and local government councils) are

sincere and willing to lead via partnerships and collaborations with the community development actors and non-governmental organisations (G4, H1, H6, H10, R3, R10, & R14). This is missing; a few attempts, appalled with political promises here and there (R14). Participant R10 says, "…. *quote me anywhere and anytime; we are only relevant when the election is approaching. They (politicians) come with fabulous promises, and after the election accessing them to implement their promises becomes a mirage…. I have lived here with my family for over 15 years but hoping to relocate one day….*" Critical issues such as food insecurity, social and criminal vices, and hindrances to accessing quality and reasonably priced health care demand attention. These issues can destabilise the wellbeing of the most vulnerable inhabitants.

5. The study's implications

5.1. Theoretical implication

The research investigated the impact of COVID-19 on slums in Nigerian cities and recommended measures to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1. The recommended measures will promote achieving other goals linked with urban slum upgrading and transformation in Nigeria. Findings show a threat from the impact of COVID-19 on urban slums and, by extension, negatively influencing achieving Goal 1. Records show that the poverty rate increased from 8.3% in 2019 to 9.2% in 2020. In 2020, about 4.1 billion (53%) people were insecure from the short-term social protection measures announced by 209 countries and territories[12]. This is because of the pandemic consequences across all sectors, especially in developing countries. Thus, suggesting measures to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1 and other SDGs are germane and cannot be over-emphasised. This signifies that recommending measures to promote urban slum upgrading and transformation will enhance sustainable cities and bridge income inequality. This, in principle, would improve achieving Goal 1 via created job opportunities and upgrading of residents' status. From the nine impacts, increased food insecurity and malnutrition, increased poverty line due to loss of income and livelihood, increased homelessness, high exposure to contagious and non-contagious infections, and increased social and criminal vices are common among the participants as perceived impacts of COVID-19 on slum dwellers in Nigeria. These constructs formed part of the theoretical implications. The study's results show that some impacts cut across the groups, such as increased food insecurity and malnutrition, increased poverty line, and increased homelessness.

5.2. Practice implication

Concerning the practical implication, the research offers stakeholders, including urban housing policymakers, the privilege to engross in measures that will help transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1. Besides solutions tailored toward achieving Goal 1, other SDGs connected with urban slums upgrading will be achieved for Nigeria's habitable, sustainable communities and cities. It is germane and can be achieved if the relevant authorities do the needful. Urban housing policymakers, developers, settlers, and researchers might benefit from the in-depth results that will promote upgrading urban slums into sustainable cities and bridge income inequality to improve achieving Goal 1 and other SDGs connected with urban slum upgrading. This will form part of the study's implications.

6. Conclusion and recommendations

This research investigated the impact of COVID-19 on slums and proffer measures to bridge income inequality and transforms slums into sustainable cities in Nigeria. Data were collected via virtual interviews with experts and analysed. The study concludes that mechanisms (such as slum upgrading) tailored toward poverty reduction can enhance sustainable development. A sustainable city is a component of sustainable

development, the removal of fuel subsidy and hyperinflation are threats. In the process of slum upgrading, jobs are created, leading to improve household incomes. The action enhances poverty and hunger eradication in all forms and dimensions. It is germane to sustainable development. Also, habitable homes and environments are created, leading to less exposure to contagious diseases. This research has limitations. First, the research adopted a qualitative research method. Also, it covered five cities and engaged 30 interviewees in Nigeria. The negative impacts of these limitations were mitigated via a robust reviewed academic literature and collected data saturation accomplished. Regarding future research, the research design method could be employed in other countries with similar urban slums issues during the COVID-19 era. Similarly, mixed methods could be used to validate the study's findings in the future.

Therefore, the study suggested the following measures to bridge income inequality and transform slums into sustainable cities.

The study recommends that the government should develop policies and programmes to promote the regularisation of informalities to address the ills linked to urban slums. This should be supported with empowerment via employment creation that can improve quality of life. Regularisation will advance sustainable cities and bridge the gap connected to gender and social inequality, insecurity, environmental pollution, and overcrowding.

The study suggests that the government should integrate ecosystem and leadership frameworks into national and local planning development processes. The approach should be supported by consistent commitments from the political elites, in line with the best global economic and social governance. The framework will enhance the distribution of short-term palliative measures to the disadvantaged during future pandemics.

Stakeholders, including the government, should commit more to implementing Agenda 2030 SDGs and focusing on mitigating poverty (Goal 1). Poverty correlates with slums. A fight against extreme urban poverty is a fight against urban slums. Also, policies and programmes that can trigger equal rights to economic resources and accelerate investment in poverty eradication actions and gender-sensitive development strategies should be encouraged.

Author contributions

Conceptualisation, A.E., M.A.H., and C.A.; methodology, A.E., M.A.H., C.A., M.S.S., J.A., A.N.C.N., and A.I.A.O.; software, A.E., E.O.E., and J.A.; validation, A.E., M.A.H., C.A., M.S.S., J.A., A.N.C.N., and A.I.A.O.; formal analysis, A.E., M.A.H., C.A., J.A., A.N.C.N., and A.I.A.O.; investigation, A.E., M.A.H., C.A., E.A.O., J.A., A.N.C.N., and A.I.A.O.; resources, A.E., M.A.H., C.A., M.S.S., E.A.O., J.A., A.N.C.N., and A.I.A.O.; data curation, A.E., C.A., M.S.S., E.A.O., J.A., A.N.C.N., and A.I.A.O.; writing—original draft preparation, A.E., M.A.H., C.A., M.S.S., E.A.O., J.A., A.N.C.N., and A.I.A.O.; writing—review and editing, A.E., M.A.H., C.A., M.S.S., E.A.O., E.O.E., and N.I.M.; visualization, A.E., M.A.H., and J.A.; supervision, A.E., M.A.H., C.A., and M.S.S.; project administration, A.E., M.A.H., C.A., M.S.S., E.A.O., J.A., A.N.C.N., and A.I.A.O.; funding acquisition, A.E., M.A.H., C.A., and M.S.S.. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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Appendix A: Semi-structured questions

Dear Participant,

Request for Short Virtual Interview

The COVID-19 crisis threatens the 2030 United Nations Sustainable Development Goals (SDGs), including SDG 1. Goal 1 (no poverty) may be the most hit, especially in developing countries. Studies showed that upgrading urban slums could bridge income inequality, create better opportunities, and

mitigate/prevent virus spread in slums environment. Research concerning regenerating Nigerian urban slums to achieve Goal 1 is yet to receive in-depth work. Therefore, the paper is titled: "**Assessing Urban Slums in Post-COVID-19 to Achieving Sustainable Development Goal 1: Nigeria's Stakeholders Perspective Using Qualitative Approach**" Specifically, the researchers will achieve the stated aim through the following:

    i.   To investigate the perceived impact of COVID-19 on slums in Nigerian cities.

    ii.   To proffer measures to bridge income inequality and transforms slums into sustainable cities.

Note that the virtual interview questions will be within the stated objectives. Responses provided by you will be collated and analysed with those of other interviewees. It will make up the value and contribution to achieving the success of this work. Information provided will be treated with the greatest secrecy.

Hence, your valuable time and other answers to the questions will be highly cherished.

With regards.

Yours faithfully,

(Research Coordinator)

BASIC QUESTIONS FOR THE PARTICIPANTS

1. Please, for record purposes, what is your organisation's name and state location?

2. Please, what is your position in the organisation?

3. Please, tell us your years of work experience.

4. Please, are you knowledgeable regarding COVID-19 and urban slums?

5. If yes to question 4, how can you describe the perceived impact of COVID-19 on slums in Nigerian cities?

6. Do you see the impact of COVID-19 as a threat to Goal 1?

7. If yes to question 6, how?

8. If no to Question 6, why do you think so?

9. What measures can stakeholders put in place to transform slums into sustainable cities and bridge income inequality to improve achieving Goal 1?

10. Are these measures feasible before 2030?

11. If yes to Question 10, how?

12. If no to Question 10, why do you think so?