Community engagement for COVID-19 prevention and control: A systematic review

Aanuoluwapo A. Afolabi[1], Olayinka S. Ilesanmi[1]

AFFILIATION
1 Department of Community Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

CORRESPONDENCE TO
Aanuoluwapo A. Afolabi. Department of Community Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria. E-mail: afoannade@gmail.com
ORCID ID: https://orcid.org/0000-0001-9928-2252

ABSTRACT

INTRODUCTION Given the contributions of community engagement (CE) in the prevention and control of diseases, this systematic review aimed to describe the mechanisms of CE in the prevention and control of COVID-19.

METHODS The review was conducted according to the Preferred Reporting for Systematic Reviews and Meta-Analyses (PRISMA) guidelines using three databases, in August 2021. The review specifically focused on the different ways through which CE had been adopted in different contexts for the prevention and control of COVID-19. Articles were required to describe at least one CE strategy.

RESULTS Overall, 2977 articles were retrieved from database searches, and 23 articles were included after the application of pre-defined inclusion and exclusion criteria. Self-imposed measures were more effective and sustainable in reducing COVID-19 cases compared to short-term interventions. Compliance with the use of face masks contributed to a decline in COVID-19 cases in Melbourne and Phoenix, while poor handwashing and masking practices contributed to a rise in COVID-19 cases in Sydney, London, and New York City. The establishment of district health committees helped community leaders and groups to design pandemic action plans and strategies and implement these using available local resources. Despite the vulnerability of slums to irresistible infections, community-wide implemented measures assisted with diminishing local area transmission of SARS-CoV-2. Support from religious leaders helped to reinforce the maintenance of handwashing, disinfection of hands and surfaces, and social distancing, while community-based opinion groups helped intensify COVID-19 risk communication efforts.

CONCLUSIONS CE ultimately has been proven as an effective method for sustained control of infectious diseases. To strengthen the community-based response to pandemics, CE should be immediately undertaken.

INTRODUCTION

The novel Coronavirus disease (COVID-19) is an infectious illness that emerged in Wuhan city, China, in late December 2019[1]. COVID-19 is characterized by rapid transmission primarily through direct inhalation of infected droplets introduced into the environment via coughing, sneezing, and possibly secondarily through contact with the eye, nasal, and mucus secretions[1,2]. Likewise, travel history from COVID-19 dense areas and regions could increase the spread of COVID-19 to other regions[3,4]. Similarly, several other studies have reported the suspension of SARS-CoV-2, the COVID-19 viral agent, in the air for some minutes, thus explaining the transmission dynamics of COVID-19 across different regions[5,6]. In highly polluted areas, high concentrations of toxic pollutants in $PM_{2.5}$ and PM_{10} or weather conditions may inhibit transmission[7,8]. Following SARS-CoV-2 infection, multiple symptoms can occur such as fever, cough, shortness of breath, loss of taste, loss of smell, sore throat, etc.[3,9]. Asymptomatic COVID-19 cases are laboratory-confirmed COVID-19 cases that do not develop symptoms[4]. Arrays of evidence from literature report that asymptomatic COVID-19 cases could account for nearly 15–

50% of total COVID-19 cases[10-12]. This, therefore, stresses that community transmission of SARS-CoV-2 could occur through symptomatic and asymptomatic cases enhanced via environmental and demographic factors.

There is a growing dynamism between personal, environmental, and community health, and non-pharmaceutical interventions (NPIs) are of particular importance. It has been argued that effective responses to public health emergencies should rely on timely evidence-informed policy and practice geared toward disseminating the scientific evidence on ways to mitigate the pandemic – one of which is community engagement (CE)[13-15]. NPI measures such as regular hand hygiene practices, use of face masks in public places, and social distancing have been recommended as effective COVID-19 preventive measures[16,17]. To adopt these NPI measures in breaking the chain of SARS-CoV-2 transmission, active community engagement (CE) is quintessential[18].

CE employs participatory communication, a community-development initiative that utilizes a bottom-up approach rather than the blueprint top-down approach in health interventions[19]. Previous studies have assessed the use of different CE strategies to improve populations' health and social outcomes[20-25]. Each of these studies have identified that CE interventions refer to 'meaningful citizen participation' in which community members themselves drive any health intervention. In the description of the community-led EVD control efforts implemented by Sierra Leone's Social Mobilization Action, Bedson et al.[26] found that the involvement of local radio stations built CE among community leaders, EVD survivors, as well as members of the EVD response team[26]. Specifically, role model behaviors have been adopted to support community surveillance through a structured participatory dialogue which helped to reinforce trust in risk communication messages[26,27]. While these studies have been insightful, they do not provide professionals with sufficient information of CE interventions to contextualize for the implementation of CE interventions during the COVID-19 pandemic. This is partly due to the novelty of the COVID-19 pandemic, and inadequate literature describing the relevance of CE to breaking the chain of COVID-19 transmission in community settings. A study of this regard is needed to identify how previous CE interventions led by community members themselves could be activated in breaking the chain of SARS-CoV-2 transmission in community settings. This study, therefore, aimed to describe the mechanisms of CE in the prevention and control of COVID-19.

METHODS
Study design, database search and article screening
A systematic review was conducted to support timely evidence on the control of the novel COVID-19 pandemic. A systematic review is a type of research that incorporates a rich body of evidence synthesis to produce relevant evidence on a subject matter of investigation[28,29].

The research team documented a protocol prior to conducting the study. A systematic review of published academic literature was conducted in August 2021. The review specifically focused on the different ways through which CE had been adopted in different contexts for the prevention and control of COVID-19. Articles were required to describe at least one CE strategy. Criteria for including and excluding articles are as shown in Table 1.

The definition of CE adopted in this study considered the process by which community members actively coordinated themselves in the COVID-19 outbreak response efforts. These relate to the design, planning, implementation, and evaluation of specific disease-control activities.

The literature search was limited to three databases: Directory of Open Access Journals, PubMed, and Google Scholar. These databases were selected because they have higher indexation on many journals compared to other databases. Searches were conducted in English. In addition

Table 1. Inclusion and exclusion criteria for retrieved articles

Themes	Inclusion criteria	Exclusion criteria
Focus	Prevention and/or control of COVID-19 or SARS-CoV-2 either in the topic, abstract, or full-text.	Prevention and/or control of other infectious diseases only. Interventions describing the role of community or village health workers only. Description of only other contexts apart from community engagement in COVID-19 prevention and/or control.
Article type	Primary research (using any study design), commentaries, and abstracts of studies that present detailed community engagement approach.	Lack of detailed community engagement approach.
Language	English (to aid adequate understanding of the authors, only articles published in English or with English translations).	Other languages (especially those with no English translation available on the manuscript).

to retrieved articles, a search of the reference lists of the included studies was conducted. To expedite the literature search process, both authors participated in the database search reference list checking. All retrieved results were manually screened, and duplicates were removed. Thereafter, screening of article title, abstracts, and full texts were assessed by both authors, while a third party was invited to resolve discrepancies between both authors regarding the inclusion/exclusion of an article.

Predefined keywords were used for the search strategy. The Boolean operator "AND" was used to enhance the retrieval of relevant literature. Terms such as community participation, community involvement, community action, community initiatives, public participation, public engagement, public involvement, public action, public initiatives, and community efforts, have similar definitions to community engagement, therefore, they were also included in the search key words.

Keywords used in the literature search process

The search string was: [community participation OR community engagement or community involvement OR community collaboration OR grassroots engagement OR local participation OR citizen participation OR local group collaboration OR community contribution OR bottom-up contribution OR community network OR community groups OR community coalition] AND [COVID-19 OR SARS-CoV-2 OR coronavirus disease OR novel coronavirus disease OR coronavirus disease 2019] AND [prevention OR control OR hand washing OR social distancing OR masking OR testing OR isolation OR contact tracing OR case investigation OR sensitization campaigns OR screening OR quarantine OR safety measures].

RESULTS

Overall, 2977 articles were retrieved from database searches, and 651 duplicates were removed. Thus, 2326 articles were screened for eligibility, out of whom 2079 were excluded due to unmatched content. Among them, 464 articles were excluded for containing information on the pattern of COVID-19 transmission only, and 1615 articles were excluded for describing the effects of COVID-19 only. As a result, 247 articles were eligible for the review. Among these, 224 full-text articles were excluded for detailing only recommendations on CE in COVID-19 prevention and control. Overall, 23 articles (7 cross-sectional studies, 2 commentaries, 3 reviews, 1 letter to the editor, 1 editorial, 1 perspective, 1 implementation piece, 5 newspaper articles, 1 magazine article, and 1 bulletin article) were included (Figure 1).

Table 2 shows the synopsis of literature retrieved from the literature search. MacIntyre et al.[30] conducted a cross-sectional study that aimed to determine the trends in masking and other infection prevention behaviors during two periods of the COVID-19 pandemic, in cities in the United Kingdom and the United States, where a face mask was not a cultural norm. Another study found that compliance with the use of face masks contributed to a decline in COVID-19 cases in Melbourne and Phoenix. Poor handwashing and masking practices, however, contributed to a rise in COVID-19 cases in

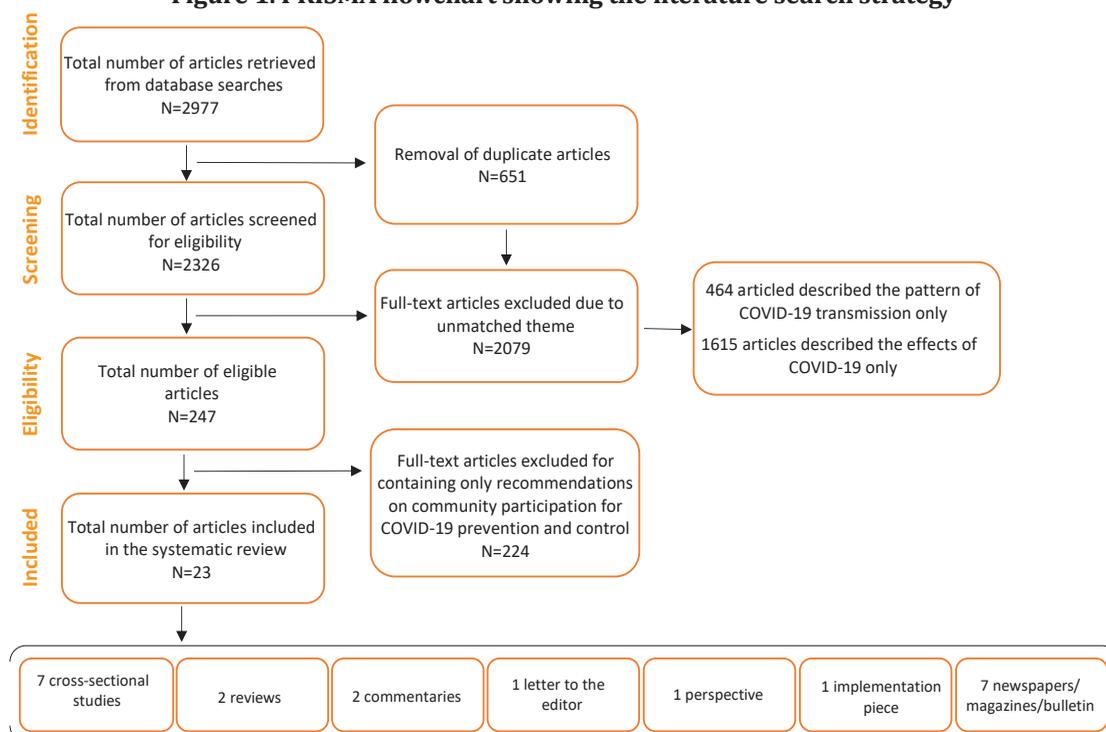**Figure 1. PRISMA flowchart showing the literature search strategy**

Table 2. Summary of literature retrieved from database search

Topic	Objective	Study type	Study area	Population	Results	Implications
Mask use, risk-mitigation behaviors, and pandemic fatigue during the COVID-19 pandemic in five cities in Australia, the UK and USA: A cross-sectional survey [30].	To determine trends in masking and other infection prevention behaviors during two periods of the COVID-19 pandemic, in cities where wearing a facemask was not a cultural norm.	Full research article (cross-sectional).	United Kingdom (London), Australia (Sydney and Melbourne), United States (Phoenix, New York).	Adults aged ≥18 years.	Pandemic fatigue was more common in younger people. The prevalence of masking was significantly lower in Sydney (45.5%) and Melbourne (51.4%), and higher in London (70.8%), Phoenix (75.6%), and New York (77.4%) ($p<0.001$).	Community engagement is beneficial towards addressing pandemic fatigue.
Impact of self-imposed prevention measures and short-term government-imposed social distancing on mitigating and delaying a COVID-19 epidemic: A modelling study [31].	To compare the individual and combined effectiveness of self-imposed prevention actions and government imposed social distancing in the near term to mitigate, delay or prevent a COVID-19 outbreak.	Full research article (cross-sectional).	Not specified.	Not specified.	Self-imposed preventive measures also helped to prevent a large epidemic altogether. The second wave of the outbreak could be completely avoided if the effectiveness of hand washing exceeds 50% when the efficacy is high enough.	All self-imposed measures are more effective than short-term government intervention.
Semiformal organizations and control during the COVID-19 crisis in China [32].	To investigate the prevalence and importance of semiformal organizations, formal organizations, and informal groups participating in social control and social service and the predictors of the perceived importance of these three forms of social control mechanisms.	Letter to the Editor.			Community committees (residents and villagers) had the highest participation in all COVID-19 monitoring activities, such as drug supply, screening checkpoints, cleaning communities, distributing COVID-19 information and social distancing (for confirmed COVID-19 cases). Community police officers assisted in making screening and medical screening mandatory, as well as inexpensive in-service items, such as assistance with the purchase of basic necessities and medicine.	Semiformal organizations and groups in communities are effective in coordinating the COVID-19 response at the grassroots level.

Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
Coronavirus (COVID-19) infodemic and emerging issues through a data lens: The case of China [33].	To use firsthand Chinese social media and Internet data and information to describe the chronological narrative of Wuhan and China with a focus on key policy decision To identify the use of different types of online services at different stages of lockdown.	Full research article (cross-sectional).	China.	General population.	Forty-four percent of persons proactively sought information. In total, 33% proactively viewed information on COVID-19. Greatest access was to get information on prescriptions, food/drink, education, in-house sports, business data and diversion and recreation products.	This shows the way of life prerequisites when individuals were disengaged in their home for a significant stretch of time. The achievement of China's endeavors in controlling the pandemic was a blend of solid administration, severe guidelines, and unconstrained local area/resident interest. Although it was a late reaction as far as the nearby and common government at the underlying stage, when the sickness was affirmed as another one, aggregate reactions at the local area, ward, city, territory, and public levels were critical.
Community participation in the fight against COVID-19: Between utilitarianism and social justice [34].	To discuss the foundations and possibilities for community participation in the fight against COVID-19.	Commentary.	Brazil.	Not stated.	The utilitarian viewpoint includes activities designated to the medical issue's alleviation and concealment and to crisis support during the pandemic. The populace's investment is hence fundamental for executing measures, for example, social isolation, contact tracing, and wearing covers. The social justice perspective creates a sense of community appropriation of local problems.	The break in the chain of COVID-19 transmission in Brazil shows that community participation leads to collaboration and empowerment.

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Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
Community participation approaches for effective national COVID-19 pandemic preparedness and response: An experience from Oman [35].	To describe the three community approaches that exist in Oman and review their role in preparedness and response strategies to COVID-19 pandemic and discuss the lessons learned.	Review.	Oman.		Community organizations within the 'healthy cities and villages' initiative facilitated networking and acted as a platform for community engagement, reviewing the health information and updating them accordingly to meet evolving demands. The second approach was the establishment of Willayat (District) health committees. This helped to enhance collaboration at the state level with different community leaders and groups to develop pandemic action plans, which were implemented using available local resources. The third methodology is local area volunteerism. This assisted with keeping local area individuals updated with key data on COVID-19 wellbeing measures especially when physical access becomes restricted due to lockdown measures.	The three methodologies of local area cooperation in Oman give diverse methods of drawing in local area individuals in ensuring their wellbeing during the pandemic and accompany qualities.
Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria, and Pakistan: Results of pre-COVID and COVID-19 lockdown stakeholder engagements [36].	To describe access to healthcare before and during COVID-19 among those working and living in slum communities of Bangladesh, Kenya, Nigeria, and Pakistan.	Full research article (cross-sectional).	Bangladesh, Kenya, Nigeria, and Pakistan.	860 community leaders, residents, health workers and local authority representatives.	During lockdowns, community stakeholders donated their phones for teleconsultation between patients and their physicians.	

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Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
The Brazilian slums hiring their own doctors to fight COVID-19 [37].	To describe COVID-19 control measures implemented by slum communities in Brazil.	Full research article (cross-sectional).	São Paulo, Paraisópolis, Brazil.	General population.	Local area commitment assisted with guaranteeing adherence to COVID-19 security conventions in ghetto networks in Brazil.	Despite their vulnerability to infectious diseases, the carried-out measures assisted with diminishing local area transmission of SARS-CoV-2.
Community engagement for COVID-19 prevention and control: A rapid evidence synthesis [38].	To describe community engagement for infectious disease prevention and control to learn lessons for COVID-19 and future pandemic response.	Review.	Not applicable.	Not applicable.	Commitment of community leaders and stakeholders was basic to helping to debunk COVID-19 myths in community settings. Barriers to community engagement: 1) Absence of logical arrangement, 2) Conflicting information that lacks evidence base. Enhancers of community participation: A two-way exchange with networks and different partners, fundamental for trust building, ought to be set up through various channels with straightforward, precise and reliable data to assist with tending to reports and misguided judgments.	These findings feature that much executed local area commitment methodologies can be utilized to help planning of mediations, building trust and local area passage, behavioral change communication, case notification, and screening during the COVID-19 pandemic.
Cards from the community: Engagement of the local community to enhance patient and staff experience during the COVID-19 pandemic [41].	To engage with local groups to share hopeful messages and pictures created by school-age children from communities and display them in locations of high visibility.	Perspective.	YNHHS catchment area.	Beneficiaries: Patients and staff within the hospital Actors: School-age children.	The cards helped to reduce the sense of social isolation between patients, staff, and community members.	The technological platforms utilized in the design of the cards allow for easy increases in scale and customization of messages.

Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
COVID-19 case investigation and contact tracing: Early lessons learned and future opportunities [42].	To determine the implementation of case investigation and contact tracing in controlling COVID-19 transmission during the early stages of the US pandemic response (20 January through 31 August 2020).	Implementation piece.	United States.	Community leaders.	Community engagement helps to improve adherence to non-pharmacological interventions, and reduce the risk of onward transmission of COVID-19.	The extent to which the COVID-19 case investigation and contact tracing exercise could be successful depends on the ability to encourage full adherence to isolation and quarantine recommendations, and they are only achievable through community participation. In the containment of an outbreak, contact tracing and social distancing complement each other especially when implemented together.
Why health promotion matters to the COVID-19 pandemic, and vice versa [43].	To determine the role of health promotion in tackling the COVID-19 pandemic	Editorial	Not applicable	Community stakeholders	Local knowledge is required in the design of health promotion to facilitate early adoption of recommended COVID-19 preventive measures.	Behavioral change communication across society through community engagement is very important to flatten the peak of the epidemic curve.
COVID-19 pandemic: Lessons learned and future directions [44].	To describe the COVID-19 pandemic response in selected countries.	Review.	Global/India.	District heads.	Dissemination of information on COVID-19 risks and the adoption of telemedicine to reduce social contacts.	Context-based containment measures with adequate engagement of the local people are important to control the spread of COVID-19.
Variations in COVID-19 spread and control measures in Palestinian Territories [45].	To describe the differences in COVID-19 spread, risk factors, and intervention activities in Palestinian Territories.	Original research (cross-sectional).	West Bank, East-Jerusalem, and Gaza Strip.	Community-based organizations, and volunteer individuals.	Collaboration between community stakeholders and WHO personnel helped to reinforce COVID-19 risk communication through modern and traditional media, thus reducing COVID-19 morbidity and mortality.	The control of pandemics is the responsibility of both national organizations and citizens.
Community engagement in COVID-19 prevention: Experiences from Kilimanjaro region, Northern Tanzania [46].	To describe the experiences and challenges of community engagement in COVID-19 prevention.	Commentary.	Kilimanjaro region, Northern Tanzania.	Religious leaders.	Maintenance of handwashing, disinfection of hands and surfaces, and social distancing.	Support from respective local stakeholders is necessary to strengthen the implementation of preventive interventions.

Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
Community engagement in the prevention and control of COVID-19: Insights from Vietnam [47].	To describe the experience of community engagement on COVID-19 prevention in Vietnam, regarding the role of migrant workers in Vietnam.	Cross-sectional (Qualitative).	Vietnam.	Members of community-based opinion groups.	Community engagement helps to improve risk communication on COVID-19.	Community supervision groups are effective in reducing the rate of COVID-19 transmission.
Bengal's COVID-19 patients battle anxiety over tests, ostracism in neighborhoods [48].	Not Applicable.	Newspaper article.	West Bengal.	Community members with a history of positive COVID-19 test.	Through their organized group, community members set up the COVID Care Network (a caregiving and consultation service), and conducted COVID-19 sensitization campaigns.	Community management is the third pillar of pandemic management, and is highly effective in addressing psychological lynching during health emergencies.
Making a Community Action Net (work): Organizing in the times of COVID-19 [49].	Not Applicable.	Newspaper article.	Cape Town, South Africa.	Residents with different backgrounds.	Community members formed the Sew4Safety group (a mask-making and distribution initiative).	Through adequate community engagement strategies, the availability and use of masks is encouraged.
How Brazil's COVID-19 response has fallen to community leaders [50].	Not Applicable.	Newspaper article.	Brazil.	Brazilian favelas.	Initiation of community-specific techniques for isolating suspected cases and reducing physical contact, and broadcast of jingles on COVID-19 prevention via audio and video modalities.	Adequate coordination of an outbreak response is both cheap and effective.
Mozambican workers returning from South Africa engaged to check COVID-19's spread [51].	Not Applicable.	Bulletin.	Mozambique.	Mozambican returnees from South Africa.	Volunteer Mozambican returnees contacted other returnees by phone, delivering key information on mandatory quarantine, COVID-19 prevention and management measures, and referral pathways, and obtained information on the manifestation of symptoms from each returnee.	Phone screening of migrants was effective in the identification of those with COVID-19 symptoms.

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Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
'We are subjects, not objects in health': Communities taking action on COVID-19 [52].	Not Applicable.	Newspaper article.	Brazil, Burkina Faso, Cameroon, China-Taiwan province, Côte d'Ivoire, Haiti, India, Kenya, Lebanon, Mauritania, Malawi, Mali, Mozambique, Nigeria, Philippines, Senegal, South Africa, Syrian Arab Republic, United States of America, Yemen, and. Zimbabwe	42 case studies from around the World.	Through their organized groups, community volunteers have produced and distributed PPE; have provided medical care and counselling support using ICT in ways that address psychosocial challenges and cultural and religious beliefs to overcome stigma and social isolation among COVID-19 positive cases.	A responsive society promotes public health. ICT plays a key role in problem solving during health crisis.
Meet 10 young people leading the COVID-19 response in their communities [53].	Not Applicable.	Newspaper article.	South Sudan, Peru, Kenya, Cameroon, Syria, Switzerland, Haiti, and Italy.	Youths.	South Sudan: Initiation of the #211CHECK collective to fight misinformation and raise awareness on coronavirus prevention and protection. Switzerland: Mobilization of Perceval Scouts to deliver supplies in communities to reduce social gathering and risk of exposure to COVID-19. Cameroon: Production of bottles of disinfectants. Kenya: Digital advocacy for COVID-19 preventive measures. Italy, Syria, and Peru: Coordination of COVID-19 awareness campaigns with civil organizations. South Africa: Use of entertainment to raise awareness. Haiti: Awareness and hand washing campaigns.	There is no better resource to invest in during health emergencies than human resource through community engagement.

Table 2. Continued

Topic	Objective	Study type	Study area	Population	Results	Implications
Corona warriors in communities: Adolescent girls' response to local problems in COVID times [54].	Not Applicable.	Magazine article.	Vadodara City in Gujarat.	Adolescent girls.	Production of 5328 masks for frontline workers and peer leaders working with Society for Health Alternatives.	Enabling factors for community engagement during the COVID response included the history of proven and credible leadership at the local level.

Sydney, London, and New York city[30]. A modelling study was conducted by Teslya et al.[31] to compare the effectiveness of self-imposed prevention actions and government-imposed social distancing to mitigate, delay, or prevent COVID-19. It found that self-imposed measures were more effective and sustainable in reducing COVID-19 cases compared to short-term interventions[31].

A Letter to the Editor detailing the prevalence of formal, semi-formal, and informal organizations in the social control of COVID-19 reported the involvement of community committees in drug supply, screening, and distribution of COVID-19 information[32]. These measures have been helpful in breaking the chain of COVID-19 transmission. A study conducted by Hua et al.[33] aimed at using firsthand Chinese social media and internet data and information to describe the chronological narrative of Wuhan and China. The study found that the achievement of China's endeavor in the COVID-19 control effort was a blend of solid administration, and unconstrained local area involvement[33]. In a commentary, Bispo et al.[34] described the community fight against COVID-19 in Brazil. The study reported that the populace's investment is critical to enforcing social isolation and wearing of face masks, as well as in conducting effective contact tracing.

In their review, Al Siyyabi et al.[35] described the three community approaches that exist in Oman and reviewed their role in preparedness and response strategies to COVID-19 pandemic. There, it was found that community organizations within cities and village initiatives created a platform for CE in ensuring community well-being during the COVID-19 pandemic. Likewise, the establishment of district health committees helped community leaders and groups to design pandemic action plans and strategies and implemented these using available local resources. Through volunteerism from local residents, community members were updated with COVID-19 data especially when lockdown measures were implemented[35]. In a primary research conducted on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria, and Pakistan, community leaders and residents applied telemedicine (using their phones) to contact healthcare providers[36].

The engagement of slum communities in urban slums of São Paulo, Brazil, promoted adherence to COVID-19 safety measures in these communities. Despite their vulnerability to irresistible infections, community-wide implemented measures assisted with diminishing local area transmission of SARS-CoV-2[37]. In a rapid evidence synthesis describing CE for COVID-19 prevention and control, the commitment of community leaders and stakeholders was basic to helping to debunk COVID-19 myths in community settings[38]. CE was enhanced through the creation of a two-way network of communication which aimed at building trust in the health system and avoiding misguided COVID-19 information in community settings. CE was, however, deterred through the

absence of logical arrangement, and conflicting information that lacks evidence base[39]. To combat the spread of COVID-19 through community participation, Khongsai[40] reported that community members were empowered as surveillance officers and health educators for the masses.

From a perspective that described the engagement of the local community in enhancing patient and staff experience during the COVID-19 pandemic in the YNHHS catchment area, school-age children designed cards that helped to reduce the sense of social isolation between patients, staff, and community members[41]. In an article that aimed to determine the implementation of case investigation and contact tracing in controlling COVID-19 transmission during the early stages of the US pandemic response, the engagement of community leaders helped to improve medication adherence and reduce the risk of onward transmission of COVID-19[42]. In an editorial that aimed to determine the role of health promotion in tackling the COVID-19 pandemic, it was reported that local knowledge (through the engagement of community stakeholders) is required in the design of health promotion to facilitate early adoption of recommended COVID-19 preventive measures[43].

To describe the COVID-19 pandemic response in selected countries across the globe, district heads coordinated the dissemination of information on COVID-19 risks and the adoption of telemedicine to reduce social contacts[44]. To describe the differences in COVID-19 spread, risk factors, and intervention activities in the Palestinian Territories, the collaboration between community stakeholders and World Health Organization personnel helped to reinforce COVID-19 risk communication through modern and traditional media, thus reducing COVID-19 morbidity and mortality[45]. To describe CE in COVID-19 prevention using experiences from the Kilimanjaro region of Northern Tanzania, it was found that support from religious leaders helped to reinforce maintenance of handwashing, disinfection of hands and surfaces, and social distancing[46]. To describe the role of CE in the prevention and control of COVID-19 drawing on insights from Vietnam, a cross-sectional qualitative study reported that members of community-based opinion groups helped to intensify COVID-19 risk communication efforts[47].

Regarding the mechanism with which COVID-19 patients battled anxiety over tests and ostracism in their neighborhoods, community members set up the COVID Care Network (a caregiving and consultation service) and conducted COVID-19 sensitization campaigns[48]. In another piece on community-wide control of COVID-19 in Cape Town, South Africa, community members organized a Community Action Network where masks were distributed[49]. On Brazil's COVID-19 outbreak response, Brazilian favelas initiated community-specific techniques for isolating suspected cases and reducing physical contact, and broadcast of jingles on COVID-19 prevention via audio and video modalities[50]. In a bulletin on the engagement of Mozambican workers returning from South Africa to check COVID-19 spread,

volunteer Mozambican returnees contacted other returnees by phone, delivering key information on mandatory quarantine, COVID-19 prevention and management measures, and referral pathways, and obtained information on the manifestation of symptoms from each returnee[51].

Through their organized groups, community volunteers in 42 case studies across the World produced and distributed PPE; and provided medical care and counselling support using ICT in ways that address psychosocial challenges and cultural and religious beliefs to overcome stigma and social isolation among COVID-19 positive cases[52]. In an article reporting the role of 10 young people leading the COVID-19 response in their communities in South Sudan, Peru, Kenya, Cameroon, Syria, Switzerland, Haiti, and Italy, youths fought COVID-19 misinformation and provided supplies to communities to reduce the risk of transmission of COVID-19[53]. To describe adolescent girls' response to local problems in COVID times in Vadodara City in Gujarat, the adolescents led the production of 5328 masks for frontline COVID-19 workers[54].

DISCUSSION

This article aimed to describe the role of CE in the prevention and control of COVID-19 using a systematic review. This study exemplified CE in the context-based design of COVID-19 control measures such as screening, medication supply, handwashing, and dissemination of evidence-based COVID-19 information through community health committees. As described in one of the studies included in this review, CE is a continuum that begins with identifying the need for collaboration and resulting in community empowerment, especially in disease control[39]. The absence of sustained engagement of community members, traditional/opinion leaders, and community-based healthcare professionals, has been described as a major missing link in the control of EVD[39]. Since community members and their stakeholders are repositories of rich knowledge and experience regarding infectious disease outbreaks in their settings, they are therefore sustainable assets that should not be overlooked in any disease control intervention[40,55]. While promoting rigorous NPI measures in health facilities is of crucial need, the local community represents a potential source of spikes in national and global COVID-19 cases, if COVID-19 preventive measures are not implemented at the grassroots. Therefore, adequate integration of local communities is critical towards ensuring a more successful outbreak response.

From this review, we identified the role of CE in addressing COVID-19 infodemic and misinformation. Findings from China revealed that nearly one-third of community members proactively sought information on COVID-19[33]. If community stakeholders are not equipped with evidence-based knowledge of COVID-19, how then would they be able to disseminate this critical information to residents of their communities? Establishing partnerships

with communities can help dispel COVID-19-related rumors and fallacies and alleviate unnecessary fear in community settings[45,51,56]. Likewise, it could help to improve trust levels of community members in government-led outbreak response efforts[57]. As a result, persons who manifest one or more COVID-19 symptoms would be linked to care, and many deaths would be prevented[58]. Thus, CE not only benefits the government and heath institutions, but also community members themselves. Therefore, collaboration with local authorities should be promoted by the government and other agencies in the COVID-19 outbreak response activities. Young persons in the community should be encouraged to volunteer, while community health workers should be empowered to conduct NPI trainings and COVID-19 sensitization campaigns for intending volunteers.

One of the studies included in the review reported that government-imposed COVID-19 preventive measures were short-term, and do not influence the attack rate of SARS-CoV-2[31]. For instance, total nationwide lockdown could cause a reduction in social contact in communities, thereby postponing COVID-19 peak periods by about 5–8 months. However, government-imposed measures are only temporary and necessitate the implementation of more sustainable measures. Sustainable self-imposed measures are especially required following the distribution of the COVID-19 vaccines. Self-imposed and/or community-imposed COVID-19 safety measures outlive the lockdown period and could delay peak periods in COVID-19 infection up to 12 months or beyond[31]. Due to pandemic fatigue, many individuals across the globe have thrown caution to the wind and COVID-19 enforcement efforts are no longer effective in the public[58,59]. Unfortunately, this disregard for the recommended measures contributed to the third wave of the COVID-19 pandemic. To promote global health, public health institutions and the government at large should intensify the promotion of self-imposed measures to delay the impending fourth wave. All that is required is sufficiently high coverage of self-imposed measures among community members, such as the use of face masks, regular handwashing, and/or social distancing, each having at least 50% efficacy in delaying viral replication.

From this review, we identified certain barriers to CE. These included the absence of logical arrangement and conflicting information that lacks concrete evidence[38]. These barriers could prompt distrust in implemented COVID-19 measures among community members. Reports from the EVD outbreak in Sierra Leone in 2015 revealed that distrust in the government and supporting institutions on NPI measures was a major barrier to the success of the EVD outbreak efforts[60]. To enhance CE, participatory communication between different partners and community members is crucial. Participatory communication entails an objective dialogue with a combination of actions to motivate local participation in its own development. To achieve participatory communication, channels of communication within each community should be open between community

members, stakeholders, and partners[55]. Meetings could be scheduled on a regular basis to evaluate and modify COVID-19 preventive measures that are currently practiced. Community members could act as watchdog or surveillance officers in reporting individuals with COVID-19 symptoms or those with a travel history to a COVID-19 high-risk country, e.g. South Africa, Italy, or the United States[61,62]. Likewise, persons with no formal education in rural communities could be educated by volunteer community members through information, and education[62].

Limitations
This study did not focus on the actors and mechanism of CE in the prevention and control of COVID-19, while the results of the identified studies are presented in narrative format. The absence of these details could have therefore masked certain important information. Despite these limitations, this study provides important evidence on the critical role played by community members themselves in breaking the chain of COVID-19 transmission.

CONCLUSIONS
CE ultimately has been proven as an effective method for sustained control of infectious diseases. To strengthen community-based response to pandemics, CE should be implemented through the following measures. Firstly, community members should be involved in the design of COVID-19 control measures in each setting. Secondly, volunteer young persons, with or without medical or allied qualification, should be mobilized to disseminate COVID-19 risk communication messages and promote acceptance of the COVID-19 vaccine in their resident communities. Thirdly, pre-existing community health committees should be actively engaged in coordinating the COVID-19 outbreak response at the ward or district level. Social policies such as social distancing and use of face masks should be made with high stringency levels to ensure that community members contribute their quota towards reducing the transmission of COVID-19. Future longitudinal studies are required to determine the effects of community designed COVID-19 control measures in reducing the transmission rate of COVID-19 in community settings.

REFERENCES
1. World Health Organization. Coronavirus disease (COVID-19) pandemic. Accessed September 10, 2021. https://www.who.int/emergencies/diseases/novel-coronavirus-2019
2. Wen-juan Fan, Xiao-ling Liu. Effect of advanced nursing care on psychological disorder in patients with COVID-19. Medicine. 2020;99(27):e21026. doi:10.1097/MD.0000000000021026
3. Centers for Disease Control and Prevention. COVID-19. Accessed September 10, 2021. https://www.cdc.gov/coronavirus/2019-ncov/index.html
4. World Health Organization. Coronavirus disease 2019

(COVID-19) Situation Report – 73. April 2, 2020. Accessed September 9, 2021. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf
5. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med. 2020;382(16):1564-1567. doi:10.1056/NEJMc2004973
6. Zhu Y, Xin J. Association between ambient temperature and COVID-19 infection in 122 cities from China. Sci Total Environ. 2020;724:138201. doi:10.1016/j.scitotenv.2020.138201
7. Coccia M. How do low wind speeds and high levels of air pollution support the spread of COVID-19? Atmos Pollut Res. 2021;12(1):437-445. doi:10.1016/j.apr.2020.10.002
8. Coccia M. Effects of the spread of COVID-19 on public health of polluted cities: results of the first wave for explaining the dejà vu in the second wave of COVID-19 pandemic and epidemics of future vital agents. Environ Sci Pollut Res Int. 2021;28(15):19147-19154. doi:10.1007/s11356-020-11662-7
9. Tang X, Wu C, Li X, et al. On the origin and continuing evolution of SARS-CoV-2. Natl Sci Rev. 2020;7(6):1012–1023. doi:10.1093/nsr/nwaa036
10. Alene M, Yismaw L, Assemia MA, et al. Magnitude of asymptomatic COVID-19 cases throughout the course of infection: A systematic review and meta-analysis. PLoS One. 2021;16(3):e0249090. doi:10.1371/journal.pone.0249090
11. Yanes-Lane M, Winters N, Fregonese F, et al. Proportion of asymptomatic infection among COVID-19 positive persons and their transmission potential: A systematic review and meta-analysis. PLoS One. 2020;15:e0241536. doi:10.1371/journal.pone.0241536
12. Pollock AM, Lancaster J. Asymptomatic transmission of COVID-19. BMJ. 2020;371:m4851. doi:10.1136/bmj.m4851
13. Coccia M. Disruptive firms and industrial change. JEST. 2017;4(4):437-450. doi:10.1453/jest.v4i4.1511
14. Coccia M. The theory of technological parasitism for the measurement of the evolution of technology and technological forecasting. Technol Forecast Soc Change. 2019;141:289-304. doi:10.1016/j.techfore.2018.12.012
15. Sagan A, Thomas S, McKee M, et al. COVID-19 and health systems resilience: lessons going forwards. Eurohealth. 2020;26(2). Accessed September 9, 2021. https://apps.who.int/iris/bitstream/handle/10665/336290/Eurohealth-26-2-20-24-eng.pdf
16. Centers for Disease Control and Prevention. COVID-19 Overview and Infection Prevention and Control Priorities in non-US Healthcare Settings. Accessed September 9, 2021. https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/overview/index.html
17. Nigeria Centre for Disease Control. Infection prevention and control recommendations during health care provision for suspected and confirmed cases of COVID-19. Accessed September 10, 2021. https://covid19.ncdc.gov.ng/media/files/IPC_GUIDELINE_version_2.pdf
18. World Health Organization. Transmission of SARS-CoV-2:

implications for infection prevention precautions. July 9, 2020. Accessed September 10, 2021. https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions

19. Community Engagement: Definitions and Organizing Concepts from the Literature. Accessed September 10, 2021. https://www.atsdr.cdc.gov/communityengagement/pdf/PCE_Report_Chapter_1_SHEF.pdf

20. Carlisle S. Tackling health inequalities and social exclusion through partnership and community engagement? A reality check for policy and practice aspirations from a social inclusion Partnership in Scotland. Crit Public Health. 2008;20(1):117-127. doi:10.1080/09581590802277341

21. De Freitas C, Martin G. Inclusive public participation in health: policy, practice, and theoretical contributions to promote the involvement of marginalised groups in healthcare. Soc Sci Med. 2015;135:31-39. doi:10.1016/j.socscimed.2015.04.019

22. O'Mara-Eves A, Brunton G, McDaid D. Community engagement to reduce inequalities in health: a systematic review, meta-analysis and economic analysis. Public Health Res. 2013;1:4. doi:10.3310/phr01040

23. Chan YE, Benecki LA. Evaluating the success of a Hospital's community engagement process. Healthc Manage Forum. 2013;26(1):20-25. doi:10.1016/j.hcmf.2012.12.002

24. Rahimi NR, Fouladi-Fard R, Aali R, et al. Bidirectional association between COVID-19 and the environment: A systematic review. Environmental Res. 2021;194:110692. doi:10.1016/j.envres.2020.110692

25. Bashir MF, Bilal BM, Komal B. Correlation between environmental pollution indicators and COVID-19 pandemic: A brief study in Californian context. Environ Res. 2020;187:109652. doi:10.1016/j.envres.2020.109652

26. Bedson J, Jalloh MF, Pedi D, et al. Community engagement in outbreak response: Lessons from the 2014-2016 Ebola outbreak in Sierra Leone. BMJ Global Health. 2020;5:e002145. doi:10.1136/bmjgh-2019-002145

27. Ratnayake R, Ho LS, Ansumana R, et al. Improving Ebola infection prevention and control in primary healthcare facilities in Sierra Leone: a single-group pretest post-test, mixed-methods study. BMJ Global Health. 2016;1(4):e000103. doi:10.1136/bmjgh-2016-000103

28. Dowd AC, Johnson RM. Why Publish a Systematic Review: An Editor's and Reader's Perspective. In: Zawacki-Richter O, Kerres M, Bedenlier S, Bond M, Buntins K, eds. Systematic Reviews in Educational Research. Springer. doi:10.1007/978-3-658-27602-7_5

29. PRISMA. Transparent reporting of systematic reviews and meta-analyses. Accessed August 8, 2021. http://prisma-statement.org/

30. MacIntyre CR, Nguyen P-Y, Chughtai AA, et al. Mask use, risk-mitigation behaviours and pandemic fatigue during the COVID-19 pandemic in five cities in Australia, the UK and USA: A cross-sectional survey. Int J Infect Dis. 2021;106:199-207. doi:10.1016/j.ijid.2021.03.056

31. Teslya A, Pham TM, Godijk NG, Kretzschmar ME, Boostma MCJ, Rozhnova G. Impact of self-imposed prevention measures and short-term government-imposed social distancing on mitigating and delaying a COVID-19 epidemic: A modelling study. PLoS Med. 2020;17(7): e1003166. doi:10.1371/journal.pmed.1003166

32. Jiang S, Zhang D, Irwin DD. Semiformal organizations and control during the COVID-19 crisis in China. Asian J Criminol. 2021;16(1):75–90. doi:10.1007/s11417-020-09334-z

33. Hua J, Shaw R. Corona Virus (COVID-19) "Infodemic" and Emerging issues through a data lens: The case of China. Int J Environ Res Public Health. 2020;17(7):2309. doi:10.3390/ijerph17072309

34. Bispo JP Jr, Morais MB. Community participation in the fight against COVID-19: between utilitarianism and social justice. Cad. Saúde Pública. 2020;36(8):e00151620. doi:10.1590/0102-311x00151620

35. Al Siyyabi H, Al Mukhaini S, Kanaan M, et al. Community participation approaches for effective national COVID-19 pandemic preparedness and response: An experience from Oman. Front Public Health. 2021;8:616763. doi:10.3389/fpubh.2020.616763

36. Ahmed SAKS, Ajisola M, Azeem K, et al. Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria and Pakistan: results of pre-COVID and COVID-19 lockdown stakeholder engagements. BMJ Global Health. 2020;5(8):e003042. doi:10.1136/bmjgh-2020-003042

37. de Oliveira Andrade R. The Brazilian slums hiring their own doctors to fight COVID-19. BMJ. 2020;369:m1597. doi:10.1136/bmj.m1597

38. Gilmore B, Ndejjo R, Tchetchia A, et al. Community engagement for COVID-19 prevention and control: a rapid evidence synthesis. BMJ Global Health. 2020;5(1):e003188. doi:10.1136/bmjgh-2020-003188

39. Ntumba HCK, Bompangue D, Situakibanza H, Tamfum J-JM, Ozer P. Ebola response and community engagement: how to build a bridge? Lancet. 2019;394(10216):2242. doi:10.1016/S0140-6736(19)32532-2

40. Khongsai L, Anal TSSC, Rapheileng AS, Singh T Kh, Shah MK, Pandey D. Combating the spread of COVID-19 through community participation. Glob Soc Welf. 2020;8(2):127-132. doi:10.1007/s40609-020-00174-4

41. Branson B. Cards from the community: Engagement of the local community to enhance patient and staff experience during the COVID-19 pandemic. J Patient Exp. 2020;7(2):30. doi:10.35680/2372-0247.1467

42. Ruebush E, Fraser MR, Poulin A, Allen M, Lane JT, Blumenstock JS. COVID-19 Case Investigation and Contact Tracing: Early Lessons Learned and Future Opportunities. J Public Health Manag Pract. 2021;27(Suppl 1):S87-S97. doi:10.1097/PHH.0000000000001290

43. Van den Broucke S. Why health promotion matters to the COVID-19 pandemic, and vice versa. Health Promot Int. 2020;35(2):181-186. doi:10.1093/heapro/daaa042

44. Khanna RC, Cicinelli MV, Gilbert SS, Honavar SG, Murthy GVS. COVID-19 pandemic: Lessons learned and future directions. Indian J Ophthalmol. 2020;68(5):703-710. doi:10.4103/ijo.IJO_843_20

45. Abed Y, Shaheen A, Abedrabbo A. Variations in COVID-19 Spread and Control Measures in the Palestinian Territories. Front Public Health. 2021;9:736005. doi:10.3389/fpubh.2021.736005

46. Mboya IB, Ngocho JS, Samu LP, et al. Community engagement in COVID-19 prevention: experiences from Kilimanjaro region, Northern Tanzania. Pan Afr Med J. 2020;35(2):146. doi:10.11604/pamj.supp.2020.35.146.24473

47. Ha BTT, Quang LN, Thanh PQ, Duc DM, Mirzoev T, Bui TMA. Community engagement in the prevention and control of COVID-19: Insights from Vietnam. PLoS One. 2021;16(9):e0254432. doi:10.1371/journal.pone.0254432

48. Banka N. Bengal's Covid-19 patients battle anxiety over tests, ostracism in neighbourhoods. The Indian Express. August 28, 2020. Accessed February 11, 2022. https://indianexpress.com/article/cities/kolkata/west-bengal-coronavirus-covid-19-testing-tests-6566724/

49. Open Global Rights. Making a Community Action Net (work): organising in the times of COVID-19. May 15, 2020. Accessed February 9, 2022. https://www.openglobalrights.org/organising-in-the-times-of-COVID-19/

50. The New Humanitarian. How Brazil's COVID-19 response has fallen to community leaders. May 27, 2020. Accessed February 4, 2022. https://www.thenewhumanitarian.org/news/2020/05/27/Brazil-coronavirus-response-community-leaders

51. IoM UN Migration. Mozambican Workers Returning from South Africa Engaged to Check COVID-19's Spread. April 21, 2020. Accessed February 1, 2022. https://www.iom.int/news/mozambican-workers-returning-south-africa-engaged-check-covid-19s-spread

52. Loewenson R, Colvin C, Rome N, et al. `We are subjects, not objects in health': Communities taking action on COVID-19. EQUINET. October 4, 2020. Updated September 30, 2020. Accessed September 10, 2021. https://reliefweb.int/report/world/we-are-subjects-not-objects-health-communities-taking-action-covid-19

53. Wickramanayake J. Meet 10 young people leading the COVID-19 response in their communities. April 3, 2020. Accessed February 4, 2022. https://www.un.org/africarenewal/web-features/coronavirus/meet-10-young-people-leading-covid-19-response-their-communities

54. Khanna R. Corona Warriors in Communities: Adolescent girls' response to local problems in COVID times. Accessed February 4, 2022. https://www.equinetafrica.org/sites/default/files/uploads/documents/Corona%20Warriors%20in%20Communities%202020.pdf

55. Charania NA, Tsuji LJS. A community-based participatory approach and engagement process creates culturally appropriate and community informed pandemic plans after the 2009 H1N1 influenza pandemic: remote and isolated First Nations communities of sub-arctic Ontario, Canada. BMC Public Health. 2012;12(1):268. doi:10.1186/1471-2458-12-268

56. De Weger E, Van Vooren N, Luijkx KG, Baan CA, Drewes HW. Achieving successful community engagement: a rapid realist review. BMC Health Serv Res. 2018;18(1):285. doi:10.1186/s12913-018-3090-1

57. Cyril S, Smith BJ, Possamai-Inesedy A. Exploring the role of community engagement in improving the health of disadvantaged populations: a systematic review. Glob Health Action. 2015;8(1):29842. doi:10.3402/gha.v8.29842

58. Ilesanmi OS, Akosile OP, Afolabi AA, Ukwenya OV. Handling distrust on risk communication in Nigeria: A strategy to strengthening the COVID-19 outbreak response. Disaster Med Public Health Prep. 2021;1-6. doi:10.1017/dmp.2021.245

59. World Health Organization. Pandemic fatigue - reinvigorating the public to prevent COVID-19: policy framework for supporting pandemic prevention and management: revised version November 2020. Accessed September 11, 2021. https://apps.who.int/iris/handle/10665/337574

60. Ilesanmi OS, Bello AE, Afolabi AA. COVID-19 pandemic response fatigue in Africa: causes, consequences, and countermeasures. PAMJ. 2020;37(Suppl 1):37. doi:10.11604/pamj.supp.2020.37.37.26742

61. Richards P, Mokuwa E, Welmers P, Maat H, Beisel U. Trust, and distrust, of Ebola Treatment Centers: A case-study from Sierra Leone. PLoS One. 2019;14(12):e0224511. doi:10.1371/journal.pone.0224511

62. Ukwenya VO, Fuwape TA, Ilesanmi OS, Afolabi AA. Willingness to Participate in Testing, Contact Tracing, and Taking the COVID-19 Vaccine among Community Members in a Southwestern State in Nigeria. Global Biosecurity. 2021;3(1). doi:10.31646/gbio.106