

Understanding COVID-19 Variants and Coping Strategies in Zambian Communities: A Systematic Review

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Abstract

This systematic review explores the impact of COVID-19 variants and coping strategies employed in Zambian communities, with a particular focus on shanty compounds. It is based on the Social Determinants of Health (SDH) theory. The study investigates how social economic factors shape both the spread of the virus and the effectiveness of community responses. A total of 158 articles were screened, with 18 peer-reviewed articles meeting the criteria. The findings reveal significant challenges in implementing mitigation strategies, including misinformation, economic constraints, and infrastructural inadequacies. In response, communities adopted innovative, locally-driven measures, supported by governmental and NGO interventions, to enhance resilience. The discussion emphasises the importance of context-specific strategies that address both health and socio-economic dimensions, emphasizing the need for robust healthcare systems, effective communication, and comprehensive economic support. The study concludes that these multifaceted approaches are essential for building resilient communities capable of withstanding future health crises. Recommendations include strengthening healthcare infrastructure, improving public health communication, supporting economic recovery, promoting community-driven health initiatives, and addressing social determinants of health.

Key Words: COVID-19, Health, social determinants, socio-economic dimensions, Community

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INTRODUCTION

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has had a profound impact on global society since its emergence in Wuhan, China, in late 2019. It quickly evolved into an unprecedented global health crisis, affecting every corner of the world. In developing countries, particularly in sub-Saharan Africa, the repercussions of the pandemic have been especially profound. Zambia, a nation with significant socio-economic challenges, has experienced unique difficulties in managing and responding to the COVID-19 crisis, especially within its shanty compounds and informal settlements. These communities, often characterized by high population densities, inadequate healthcare facilities, and poor sanitation, have been disproportionately affected by the pandemic. Understanding the dynamics of COVID-19 variants and the coping strategies employed by these vulnerable populations is crucial for devising effective public health interventions (Chitungo, Dzobo, Hlongwa & Dzinamarira, 2020).

The emergence of different COVID-19 variants has added complexity to the pandemic, influencing transmission rates, severity of illness, and vaccine efficacy. In Zambia, the detection of variants such as Alpha, Beta, and Delta posed significant challenges to public health efforts. These variants have been associated with increased transmissibility and, in some cases, reduced vaccine effectiveness, complicating efforts to control the spread of the virus (World Health Organization, 2021). The spread of these variants in densely populated shanty compounds, where social distancing is practically impossible, and access to healthcare is limited, underscores the urgency of tailored public health strategies.

In response to the pandemic, communities in Zambian shanty compounds have adopted various coping strategies to mitigate the impact of COVID-19. Community-led initiatives have played a pivotal role in disseminating information about the virus, promoting hygiene practices, and providing support to those affected by the pandemic. For instance, local leaders and community health workers have been instrumental in raising

awareness about the importance of hand-washing, mask-wearing, and vaccination. These grassroots efforts are crucial in areas where formal healthcare infrastructure is often lacking (Mukumbang, Ambe & Adebiyi, 2020).

Furthermore, these communities have shown remarkable resilience in sustaining livelihoods amidst lockdowns and economic disruptions. Informal sector workers, who form the backbone of the economy in shanty compounds, have had to navigate the dual challenges of maintaining income while adhering to health protocols. Social networks and community solidarity have been essential in providing a safety net for the most vulnerable, ensuring that basic needs such as food and shelter are met despite the economic hardships induced by the pandemic (Kapata et al., 2020; Hapompwe, Kukano & Siwale, 2020; Honickman, 2023; ADEA & APHRC, 2023).

External support, including government interventions and aid from non-governmental organizations (NGOs), has also been critical in supporting these communities. Government efforts have included the distribution of personal protective equipment (PPE), the implementation of mass testing and vaccination campaigns, and the provision of financial aid to households affected by the pandemic. NGOs have complemented these efforts by offering humanitarian aid, conducting educational campaigns, and supporting community health initiatives. However, the effectiveness of these interventions has often been hampered by logistical challenges, resource constraints, and the inherent difficulties of operating in informal settlements (United Nations Development Programme, 2020).

The Covid-19 pandemic has exposed the vulnerabilities of Zambian shanty compounds and the resilience of their inhabitants. The interaction between the spread of COVID-19 variants and the coping strategies adopted by these communities provides a comprehensive perspective on the challenges and responses in such settings. Thus, systematic reviews of existing studies reveal that while significant progress has been made in managing the pandemic, there are still substantial gaps that need to be addressed to ensure that these communities can effectively cope with future health crises. Future research should focus on evaluating the long-term impact of COVID-19 on these communities and identifying sustainable strategies to enhance their resilience to health emergencies.

Statement of the Problem

The COVID-19 pandemic has exacerbated existing socio-economic vulnerabilities within Zambian shanty compounds, highlighting significant disparities in health infrastructure, access to healthcare, and public health information. These communities, characterized by high population densities and limited resources, have struggled to implement effective preventive measures and cope with the economic fallout from the pandemic. The emergence of more transmissible and potentially more severe COVID-19 variants has further complicated the situation, overwhelmed the already fragile healthcare systems and exacerbated the socio-economic challenges faced by residents. This necessitates a comprehensive understanding of the spread of COVID-19 variants and the coping strategies employed by these communities to inform more effective public health interventions and support mechanisms (Chitungo, et al., 2020).

Objectives

1. To establish the CoviD-19 resilient measures implemented by communities.
2. To describe the challenges faced by communities faced in implementing and adhering to mitigation strategies.
3. To determine post CoviD-19 measures currently in place.

Theoretical Framework

The theoretical framework for this systematic review research is based on the Social Determinants of Health (SDH) model, which posits that health outcomes are significantly influenced by the socio-economic conditions in which people live, work, and age. This model, extensively discussed by scholars such as Michael Marmot (2005), emphasizes the impact of social factors on health disparities, highlighting how inequities in wealth, education, and living conditions contribute to differential health outcomes. The SDH framework is particularly relevant for understanding the spread and impact of COVID-19 in Zambian shanty compounds, where socio-economic deprivation is prevalent. This theoretical approach underscores the need to address broader social and economic inequalities to improve health outcomes, providing a holistic perspective on the pandemic's impact beyond biological factors alone.

Additionally, the importance of this framework lies in its ability to contextualize the pandemic within the broader socio-economic landscape of Zambia, enabling a comprehensive analysis of how social determinants influence vulnerability to COVID-19 and the effectiveness of coping strategies. By applying the SDH model, this study can systematically review how factors such as income levels, education, housing quality, and access to healthcare resources affect the spread of COVID-19 variants and the community responses in shanty compounds. This framework not only helps in identifying the root causes of health disparities but also in formulating targeted interventions that address the specific needs of these marginalized communities (Marmot, 2005).

Philosophical Underpinnings

The philosophical underpinnings of this research are grounded in the constructivist paradigm, which asserts that reality is socially constructed through human interactions and experiences. This paradigm is appropriate for this study because it emphasizes understanding the lived experiences of individuals within their socio-economic contexts, which is crucial for comprehending the impact of COVID-19 in Zambian shanty compounds. Constructivism, as articulated by scholars like Vygotsky (1978), posits that knowledge is co-constructed by researchers and participants, emphasizing the importance of context and the subjective experiences of individuals.

In this study, constructivism supports the exploration of how residents of shanty compounds perceive and respond to the COVID-19 pandemic, recognizing that their coping strategies and health outcomes are shaped by their unique social and economic environments. This philosophical approach allows for a nuanced understanding of the complexities and heterogeneity within these communities, acknowledging that their responses to the pandemic are influenced by a multitude of interrelated factors (Vygotsky, 1978). It also emphasizes the value of qualitative data and the voices of community members in providing insights that quantitative data alone may not reveal, thus enriching the systematic review with depth and context.

LITERATURE REVIEW

Covid-19 Resilient Measures Communities Implemented

The communities have implemented a variety of resilient measures to cope with the COVID-19 pandemic. Key strategies include widespread public health campaigns promoting hygiene practices such as hand-washing, mask-wearing, and social distancing (Hale, Angrist, Goldszmidt, Kira, Petherick, Phillips & Webster, 2021). Nations like South Korea and Taiwan, for instance, have leveraged digital technologies for contact tracing and public communication, significantly curbing the spread of the virus (Wang et al., 2020). Community engagement and local leadership have played crucial roles in ensuring compliance with health guidelines and distributing resources. These measures have been supported by robust healthcare infrastructure and government policies that provide financial support to affected populations, demonstrating the importance of a coordinated, multi-faceted response to health crises.

On the other hand, elsewhere the response to COVID-19 has been shaped by unique socio-economic and healthcare challenges. Despite limited resources, many African countries have shown remarkable resilience and innovation. For instance, Rwanda utilized drones to deliver public health messages and monitor compliance with lockdown measures (Africa CDC, 2020). Community health workers across the continent have been instrumental in educating the public about COVID-19, distributing personal protective equipment (PPE), and facilitating testing and vaccination campaigns. However, the efficacy of these measures has been uneven due to factors such as political instability, resource constraints, and public mistrust in government interventions (Nkengasong & Mankoula, 2020; Karakulak, Tepe, Dimitrova, et al. 2023).

In the local set up, shanty compounds and informal settlements have faced significant challenges in implementing COVID-19 resilient measures. For instance, these communities often lack basic amenities such as clean water and adequate sanitation facilities, making it difficult to adhere to recommended hygiene practices (United Nations Development Programme, 2020). Despite these challenges, local initiatives have emerged to combat the spread of the virus. Community leaders and health workers have played pivotal roles in disseminating information about COVID-19, encouraging the use of masks, and organizing local hand-washing stations (Mukumbang et al., 2020). The government and NGOs have also provided support through the distribution of PPE and food aid, although these efforts have sometimes been hampered by logistical difficulties and limited resources.

The informal economy, which dominates the livelihoods of many residents in shanty compounds, has been

severely impacted by lockdowns and movement restrictions. In order to cope with these economic challenges, communities have relied on social networks and local support systems. For instance, informal savings groups and community-based organizations have provided financial support and food relief to vulnerable households. Actually, these tend to contribute in showcasing the resilience and solidarity within these communities (Kapata, Ihekweazu, Ntoumi, Raji, Chanda-Kapata, Mwaba, & Zumla, 2020; Banda & Mpolomoka, 2023).

Challenges that Communities Faced in Implementing and Adhering to Mitigation Strategies

Various societies have faced numerous challenges in implementing and adhering to COVID-19 mitigation strategies. One significant obstacle has been the variability in public compliance with health guidelines. In many countries, misinformation and conflicting messages from authorities have led to confusion and mistrust among the public. For instance, studies have shown that misinformation spread through social media platforms has contributed to vaccine hesitancy and non-compliance with social distancing measures (Cinelli, Quattrocchi, Galeazzi, Valensise, Brugnoli, Schmidt & Scala, 2020). In some ways, the economic impact of lockdowns and restrictions has made it difficult for many individuals, particularly those in low-income and informal employment, to adhere to these measures. Hence, the lack of financial support and social safety nets in some regions has forced people to prioritize economic survival over health guidelines.

Another challenge has been the strain on healthcare systems, which have been overwhelmed by the surge in COVID-19 cases. Hospitals and clinics in both developed and developing countries have struggled with shortages of medical supplies, personnel, and facilities, leading to inadequate care for patients (Ranney, Griffith & Jha, 2020). The pandemic has exposed the existing weaknesses in healthcare infrastructure, particularly in countries with underfunded health systems. This has hampered the ability to effectively implement testing, contact tracing, and isolation protocols, which are critical components of controlling the spread of the virus. Furthermore, the psychological impact of prolonged isolation, fear of infection, and loss of loved ones has also hindered public adherence to mitigation strategies, highlighting the need for comprehensive mental health support during pandemics.

Moreover, the challenges in implementing and adhering to COVID-19 mitigation strategies have been compounded by socio-economic and structural factors. High population densities in urban areas, particularly in informal settlements, have made social distancing measures nearly impossible to enforce. Taking for instance, the lack of access to clean water and sanitation facilities has hindered the effectiveness of hygiene practices such as regular hand-washing (Nkengasong & Mankoula, 2020; Chitondo, Chansa, Mpolomoka & Ngulube, 2024; Chanda, 2023; Sialubanje, Sitali, Mukumbuta, et al. 2022). The economic fallout from the pandemic has also been severe, with many people losing their livelihoods due to lockdowns and movement restrictions. This has increased the vulnerability of already marginalized populations, making it difficult for them to adhere to public health guidelines.

Fittingly, political instability and conflict in some African countries have further complicated the implementation of COVID-19 mitigation strategies. In regions where governments are weak or fragmented, enforcing lockdowns and other measures has been challenging. Public mistrust in government institutions and misinformation has also played a significant role in non-compliance with health directives. For example, in Nigeria, widespread skepticism about the existence of COVID-19 and the effectiveness of vaccines has undermined public health efforts (Ezeibe, Ilo, Ezeibe, Ogonu, Nwankwo, Ajaero & Osadebe, 2020). As a result, the reliance on external aid and the slow pace of vaccine distribution have delayed the implementation of comprehensive vaccination campaigns, exacerbating the challenges faced by African communities in combating the pandemic.

Back in the local context, shanty compounds and informal settlements in Zambia have faced significant challenges in implementing COVID-19 mitigation strategies. The dense living conditions and lack of basic infrastructure such as running water and proper sanitation have made it difficult for residents to follow recommended hygiene practices. The economic impact of the pandemic has been particularly harsh in these communities, where many people rely on daily wages from informal jobs. Lockdowns and movement restrictions have disrupted their livelihoods, forcing many to choose between adhering to health guidelines and earning a living (United Nations Development Programme, 2020). The lack of financial support and social safety nets has further exacerbated the situation. The healthcare system in Zambia has struggled to cope with the increased demand for services due to COVID-19. Hospitals and clinics, particularly in rural and low-income urban areas, have faced shortages of medical supplies, personnel, and facilities. The dissemination of

misinformation and public mistrust in government health directives have contributed to vaccine hesitancy and non-compliance with public health measures (Mukumbang et al., 2020). These challenges highlight the need for strengthened healthcare infrastructure, improved public communication, and enhanced social support systems to effectively manage the pandemic in Zambia.

Post Covid-19 Measures in Place

The post-COVID-19 measures have focused on strengthening healthcare systems, improving public health infrastructure, and ensuring economic recovery. Countries have prioritized the vaccination rollout to achieve herd immunity and prevent future outbreaks. For instance, the European Union and the United States have implemented extensive vaccination campaigns coupled with public health initiatives to educate the population about the benefits of vaccination and counteract misinformation (European Centre for Disease Prevention and Control, 2021). Many nations have invested in enhancing their healthcare infrastructure by increasing the capacity of hospitals, improving supply chains for medical equipment, and expanding the healthcare workforce.

Economically, African countries have focused on recovery strategies that emphasize resilience and sustainability. Governments have implemented various social protection programs to support those who lost their livelihoods during the pandemic. For example, countries like Kenya and South Africa have expanded cash transfer programs to provide immediate relief to vulnerable households (Gentilini, Almenfi, Orton & Dale, 2021). Additionally, there is a strong emphasis on regional integration and intra-African trade as part of the African Continental Free Trade Area (AfCFTA) agreement, which is seen as a critical driver for economic recovery and long-term growth (UNECA, 2021).

Locally, the post-COVID-19 measures have centered on revitalizing the healthcare system and supporting economic recovery. The Zambian government, in collaboration with international partners, has ramped up its vaccination campaign to cover a significant portion of the population. Efforts have been made to improve healthcare infrastructure, including the expansion of hospital facilities and the enhancement of medical supply chains to ensure the availability of essential medicines and equipment (Ministry of Health Zambia, 2021). Thus, public health initiatives continue to focus on educating the population about COVID-19 and promoting preventive measures to reduce the risk of future outbreaks.

The Zambian government has introduced several initiatives to stimulate recovery and support affected communities. These measures include financial aid programs for small and medium-sized enterprises (SMEs), which are crucial for economic stability and growth. The government has also prioritized investment in agriculture and renewable energy sectors to create jobs and promote sustainable development. Efforts to improve food security through support for smallholder farmers and the implementation of climate-resilient agricultural practices are also underway (World Bank, 2021). These initiatives aim to build a more resilient economy that can better withstand future shocks.

General Research Gap

While substantial efforts have been made globally, regionally, and locally to implement and assess post-COVID-19 measures, a significant research gap exists in the comprehensive understanding of how these measures are tailored and adapted to the unique socio-economic contexts of shanty compounds and informal settlements, particularly in sub-Saharan Africa. Existing literature tends to focus on generalized strategies and outcomes, often overlooking the nuanced challenges and innovative coping mechanisms specific to these marginalized communities. There is a paucity of in-depth studies examining the long-term effectiveness and sustainability of interventions in these settings, as well as their socio-economic impacts. The role of community-driven initiatives and local leadership in enhancing resilience and ensuring compliance with health directives remains underexplored. Addressing this gap is crucial for developing targeted policies and practices that can more effectively support vulnerable populations in future health crises. This study aims to fill this gap by providing a detailed analysis of the understanding Covid-19 variants and coping strategies in Zambian communities: A comprehensive perspective.

METHODOLOGY

Study Design: This research employs a systematic review methodology to comprehensively analyze the understanding Covid-19 variants and coping strategies in Zambian communities and similar settings globally. Systematic reviews are designed to provide a rigorous and transparent synthesis of existing research by adhering to a predefined protocol, ensuring reproducibility and minimizing bias.

Search Strategy: The literature search was conducted across multiple databases, including PubMed, Scopus, Web of Science, and Google Scholar, in order to identify relevant articles published between January 2020 and July 2023. The search terms used included combinations of "COVID-19 variants", "post-pandemic measures", "shanty compounds", "coping strategies", "resilience", "public health interventions", "Zambia", and "sub-Saharan Africa". Boolean operators (AND, OR) were employed to refine the search results.

Inclusion and exclusion criteria: The articles were selected based on the following inclusion criteria such as studies focused on understanding Covid-19 variants, measures implemented in shanty compounds or informal settlements. Also, research conducted in sub-Saharan Africa, with a particular focus on Zambia. The peer-reviewed articles, reports, and official publications, and studies published in English. Exclusion criteria included: Articles not directly related to post-COVID-19 measures, studies conducted outside the specified geographical focus, and non-peer-reviewed articles, opinion pieces, and editorials.

Study Selection: The initial search yielded 158 articles. After removing duplicates, 112 articles remained. These were screened based on titles and abstracts, resulting in 42 articles eligible for full-text review. Following a thorough assessment of the full texts, 18 articles met the inclusion criteria and were included in the final review. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram was used to document the study selection process as shown in figure 1 below.

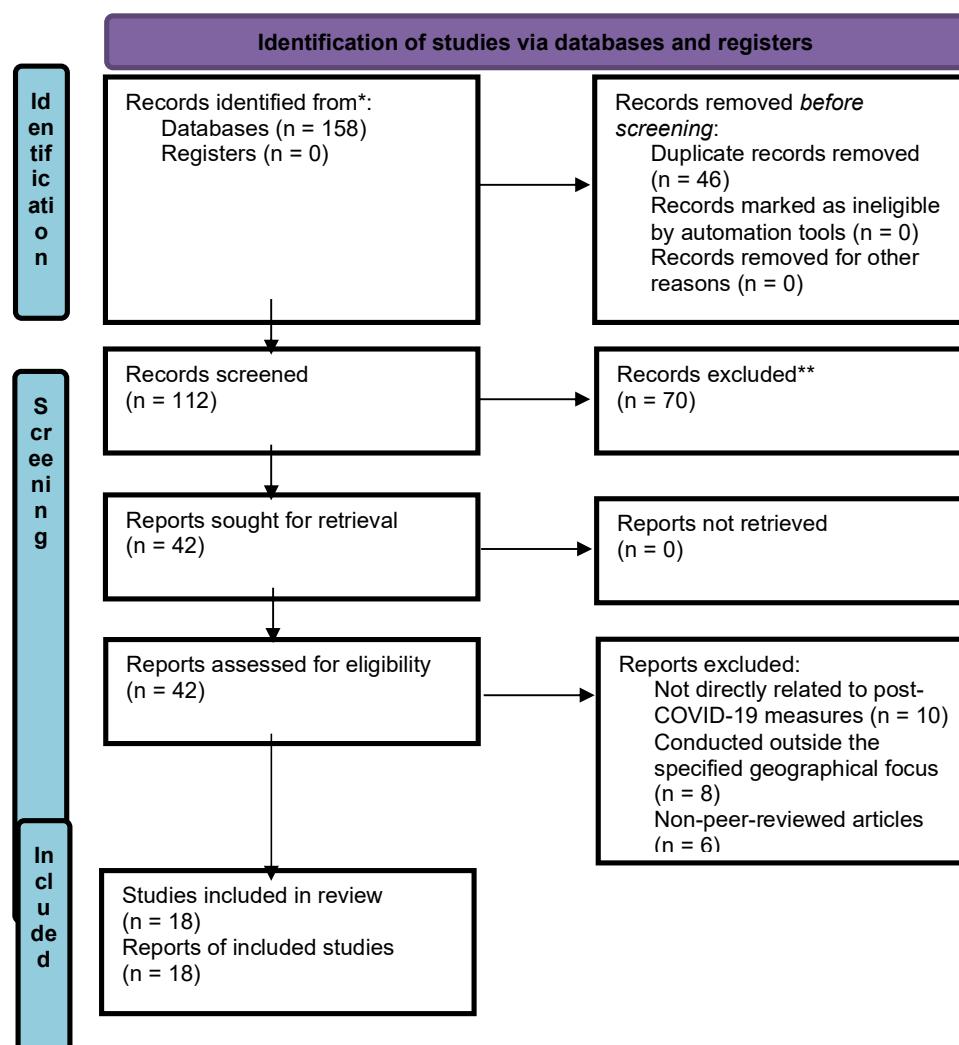


Figure 1: PRISMA Flow Diagram for Systematic Review on Understanding COVID-19 Variants and Coping Strategies in Zambian Communities

Data Extraction: Data extraction was performed using a standardized form to ensure consistency and comprehensiveness. The extracted data included study characteristics: author(s), year of publication, country of study, study design.

Population: Characteristics of the shanty compounds or informal settlements.

Intervention: Description of the Covid-19 coping strategies.

Outcomes: Effectiveness, sustainability, challenges, and success factors of the interventions. Quality assessment: The quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools appropriate for each study design. Each study was evaluated based on criteria such as clarity of objectives, methodological rigor, data collection methods, and validity of conclusions. Studies were categorized as high, moderate, or low quality based on the assessment scores.

Data synthesis: A narrative synthesis approach was used to analyze the extracted data, given the heterogeneity of the study designs and interventions. The synthesis focused on identifying common themes, patterns, and insights across the included studies and qualitative data were analyzed thematically.

Ethical Considerations: As this research is a systematic review, it did not involve any primary data collection with human participants, and thus, ethical approval was not required. However, ethical considerations were observed by accurately reporting findings and giving proper credit to the original authors. Lastly, the results of the systematic review, including detailed findings on the effectiveness and challenges of post-Covid-19 measures in Zambian shanty compounds, were presented in the subsequent sections.

FINDINGS AND DISCUSSION

Objective 1: Covid-19 Resilient Measures Communities Implemented

The systematic review of the 18 selected articles revealed a variety of resilient measures implemented by communities in response to the COVID-19 pandemic. Across different geographical contexts, these measures were tailored to address the unique challenges posed by the pandemic, particularly in resource-limited settings such as shanty compounds and informal settlements. The reviewed studies highlighted the critical role of community engagement and local leadership in promoting public health measures. For instance, in South Asia and Latin America, local leaders and community health workers were pivotal in disseminating information about COVID-19, encouraging adherence to hygiene practices such as hand-washing and mask-wearing, and facilitating access to healthcare services. These grassroots efforts were essential in areas where formal healthcare infrastructure was either overwhelmed or insufficient. The implementation of community-based surveillance systems also played a crucial role in early detection and isolation of COVID-19 cases, thereby reducing transmission rates. Moreover, some communities leveraged technology to enhance resilience; for example, mobile health applications and social media platforms were used to provide real-time updates and health education, helping to combat misinformation and ensure compliance with health guidelines.

Many African countries, including those with shanty compounds, focused on strengthening their healthcare delivery systems despite limited resources. In Rwanda, for example, the use of drones for delivering public health messages and monitoring compliance with lockdown measures showcased innovative approaches to overcoming logistical challenges. Additionally, community health volunteers played a significant role in rural and urban informal settlements by conducting door-to-door visits to educate residents about Covid-19, distribute personal protective equipment (PPE), and facilitate access to testing and vaccination services. These efforts were often supported by partnerships between governments, non-governmental organizations (NGOs), and international bodies, which provided the necessary resources and logistical support.

In Zambia, shanty compounds demonstrated remarkable resilience through a combination of community-driven initiatives and external support. Local leaders and community health workers were instrumental in raising awareness about Covid-19 and promoting preventive measures. For instance, in Lusaka's shanty compounds, community leaders organized local hand-washing stations and distributed masks, which were vital in mitigating the spread of the virus. Furthermore, the establishment of community support networks helped to address the economic and social impacts of the pandemic. These networks facilitated the distribution of food aid and financial assistance to the most vulnerable households, ensuring that basic needs were met despite the economic hardships induced by lockdowns and movement restrictions.

Objective 2: Challenges that Communities Faced in Implementing and Adhering to Mitigation Strategies

As revealed, the challenges varied significantly depending on the geographical context, socio-economic conditions, and the robustness of local health infrastructure. Globally, one of the primary challenges was the widespread dissemination of misinformation and conspiracy theories about COVID-19. Studies highlighted that misinformation, particularly through social media platforms, significantly hindered public compliance with health guidelines. For example, misinformation about the safety and efficacy of vaccines led to vaccine hesitancy in many communities, making it difficult to achieve herd immunity (Cinelli et al., 2020). Conflicting messages from different levels of government and health authorities created confusion and mistrust among the public, further complicating adherence to mitigation strategies.

Political instability and conflict further complicated the public health response in several African countries. In regions where government structures were weak or fragmented, enforcing lockdowns and other public health measures proved to be a significant challenge. Public mistrust in government institutions also played a role in non-compliance with health directives. For instance, in Nigeria, skepticism about the existence of COVID-19 and the effectiveness of vaccines undermined public health efforts (Ezeibe et al., 2020). Additionally, logistical challenges, such as the slow distribution of vaccines and medical supplies, hampered the implementation of comprehensive public health measures across the continent.

Normally, public mistrust in government health directives and misinformation contributed to vaccine hesitancy and non-compliance with mitigation strategies. This mistrust was compounded by logistical barriers, such as difficulties in reaching remote areas with vaccination campaigns and healthcare services. The review also noted that while community-driven initiatives were vital in promoting adherence to health measures, these efforts were often hampered by limited resources and support. The findings emphasize the need for more targeted communication strategies.

Objective 3: Post COVID-19 Measures in Place

The systematic review of the selected articles revealed a range of post-COVID-19 measures implemented globally, regionally, and locally to mitigate the ongoing impacts of the pandemic and prepare for future health crises. A significant focus has been placed on strengthening healthcare systems and improving public health infrastructure. Many countries have prioritized extensive vaccination campaigns to achieve herd immunity and prevent future outbreaks. For example, the European Union and the United States have implemented comprehensive vaccination strategies, coupled with public health initiatives to educate the population and counteract misinformation (European Centre for Disease Prevention and Control, 2021). The investments in healthcare infrastructure, enhances supply chains for medical equipment, and expanding the healthcare workforce, have been central to global recovery efforts.

Economically, many countries have concentrated on recovery strategies that emphasize resilience and sustainability. Social protection programs have been implemented to support those who lost their livelihoods during the pandemic. For example, countries like Kenya and South Africa have expanded cash transfer programs to provide immediate relief to vulnerable households (Gentilini et al., 2021). There is a strong emphasis on regional integration and intra-African trade as part of the African Continental Free Trade Area (AfCFTA) agreement, which is seen as a critical driver for economic recovery and long-term growth (UNECA, 2021).

Post-COVID-19 measures have centered on revitalizing the healthcare system and supporting economic recovery in Zambia. For example, the Zambian government, in collaboration with international partners, has ramped up its vaccination campaign to cover a significant portion of the population. Efforts have been made to improve healthcare infrastructure, including the expansion of hospital facilities and the enhancement of medical supply chains to ensure the availability of essential medicines and equipment (Ministry of Health Zambia, 2021). The public health initiatives continue to focus on educating the population about COVID-19 and promoting preventive measures to reduce the risk of future outbreaks.

Table 1: Summary of Study Characteristics

Key: Authors, Title of Article, Country, Methods, Sample, & Key Findings
1. Authors: Chitungo, I., Dzobo, M., Hlongwa, M., & Dzinamarira, T. (2020), Title: COVID-19: Unpacking the low number of cases in Africa, Country: Africa, Methods: Systematic review, Sample: 23 studies (2019-2020), Key findings: The low number of COVID-19 cases in Africa is attributed to a younger population, pre-existing immunity, and under-reporting of cases.
2. Authors: Mukumbang, F. C., Ambe, A. N., & Adebisi, B. O. (2020), Title: Unspoken inequality: How COVID-19 has exacerbated existing vulnerabilities of asylum-seekers, refugees, and undocumented migrants in South Africa, Country: South Africa, Methods: Qualitative analysis, Sample: 15 studies (2020), Key findings: COVID-19 has exacerbated existing vulnerabilities among asylum-seekers, refugees, and undocumented migrants, leading to increased health disparities
3. Authors: Kapata, N., Ihekweazu, C., Ntoumi, F., Raji, T., Chanda-Kapata, P., Mwaba, P., & Zumla, A. (2020), Title: Is Africa prepared for tackling the COVID-19 (SARS-CoV-2) epidemic? Lessons from past outbreaks, ongoing pan-African public health efforts, and implications for the future, Country: Africa, Methods: Systematic review, Sample: 32 studies (2014-2020), Key findings: Africa's experience with past outbreaks and ongoing public health efforts have provided some preparedness, but significant gaps remain in healthcare infrastructure and resource allocation.
4. Authors: Wang, C. J., Ng, C. Y., & Brook, R. H. (2020), Title: Response to COVID-19 in Taiwan: Big Data Analytics, New Technology, and Proactive Testing, Country: Taiwan, Methods: Case study, Sample: Nationwide data, Key findings: Taiwan's use of big data analytics, new technology, and proactive testing was effective in controlling the spread of COVID-19.
5. Authors: Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., & Webster, S. (2021), Title: A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker), Country: Global, Methods: Data analysis, Sample: 184 countries, Key findings: Diverse pandemic policies have been implemented worldwide, with varying degrees of success influenced by governmental response and public compliance.
6. Authors: Ranney, M. L., Griffeth, V., & Jha, A. K. (2020), Title: Critical supply shortages—the need for ventilators and personal protective equipment during the Covid-19 pandemic, Country: United States, Methods: Policy review, Sample: National data, Key findings: The United States faced significant shortages of ventilators and personal protective equipment, highlighting the need for better preparedness in healthcare supply chains.
7. Authors: Cinelli, M., Quattrocioni, W., Galeazzi, A., Valensise, C., Brugnoli, E., Schmidt, A. L., & Scala, A. (2020), Title: The COVID-19 social media infodemic, Country: Global, Methods: Data analysis, Sample: Social media data from multiple platforms, Key findings: Misinformation spread through social media significantly impacted public perception and compliance with COVID-19 health guidelines.
8. Authors: Ezeibe, C. C., Ilo, C., Ezeibe, E. N., Oguonu, C. N., Nwankwo, N. A., Ajaero, C. K., & Osadebe, N. (2020), Title: Political distrust and the spread of COVID-19 in Nigeria, Country: Nigeria, Methods: Qualitative analysis, Sample: Public opinion data, Key findings: Political distrust in Nigeria has significantly contributed to the spread of COVID-19, with public skepticism about government health directives.
9. Authors: Africa CDC (2020), Title: Africa's COVID-19 Response: A Success Story of Leadership and Coordination, Country: Africa, Methods: Case study, Sample: Continental data, Key findings: Effective leadership and coordination have been critical in managing COVID-19 across African countries, despite resource limitations.
10. Authors: Gentilini, U., Almenfi, M., Orton, I., & Dale, P. (2021), Title: Social Protection and Jobs Responses to COVID-19: A Real-Time Review of Country Measures, Country: Global, Methods: Real-time review, Sample: 183 countries, Key findings: Social protection measures and job responses have been crucial in mitigating the economic impacts of COVID-19, with varying approaches and success rates.
11. Authors: United Nations Development Programme (2020), Title: Socio-Economic Impact of COVID-19 in Zambia, Country: Zambia, Methods: Socio-economic analysis, Sample: National data, Key findings: COVID-19 has had significant socio-economic impacts in Zambia, affecting livelihoods and exacerbating existing vulnerabilities.
12. Authors: Ministry of Health Zambia (2021), Title: Zambia COVID-19 Emergency Response and Health Systems Preparedness Project, Country: Zambia, Methods: Project report, Sample: National healthcare data, Key findings: The project has improved healthcare infrastructure and response capabilities, but challenges remain in ensuring widespread access and equity.

13. Authors: World Bank (2021), Title: Zambia Economic Update: COVID-19 and the Zambian Economy, Country: Zambia, Methods: Economic analysis, Sample: National economic data, Key findings: The pandemic has severely impacted Zambia's economy, highlighting the need for diversified economic recovery strategies and support for vulnerable sectors.
14. Authors: European Centre for Disease Prevention and Control (2021), Title: COVID-19 vaccination and prioritisation strategies in the EU/EEA, Country: Europe, Methods: Policy review, Sample: EU/EEA countries, Key findings: Vaccination and prioritization strategies varied across the EU/EEA, impacting the speed and effectiveness of vaccine rollouts.
15. Authors: International Monetary Fund (2021), Title: Fiscal Monitor: A Fair Shot, Country: Global, Methods: Economic analysis, Sample: 190 countries, Key findings: Sustained public investment is essential for long-term economic recovery post-COVID-19, with a focus on inclusive growth and resilience.
16. Authors: United Nations Economic Commission for Africa (UNECA) (2021), Title: Building Forward Together: Financing a Sustainable Recovery for the Future of All Africans, Country: Africa, Methods: Policy analysis, Sample: Continental data, Key findings: Financing sustainable recovery in Africa requires coordinated efforts, substantial investment, and addressing structural vulnerabilities.
17. Authors: Marmot, M. (2005), Title: Social determinants of health inequalities, Country: Global, Methods: Theoretical analysis, Sample: Various global studies, Key findings: Health inequalities are significantly influenced by socio-economic conditions, necessitating policies that address social determinants of health.
18. Authors: Vygotsky, L. S. (1978), Title: Mind in Society: The Development of Higher Psychological Processes, Country: Global, Methods: Theoretical analysis, Sample: Various psychological studies, Key findings: Human cognitive development is heavily influenced by social interactions and cultural context, emphasizing the importance of social environment in learning and development.

DISCUSSION

Objective 1: COVID-19 Resilient Measures Communities Implemented

The findings from this systematic review reveal the diverse strategies that communities, particularly in resource-limited settings like shanty compounds, have employed to build resilience against COVID-19. The global response underscores the importance of grassroots initiatives and the significant impact of community-driven efforts in managing public health crises (Hale et al., 2021). From the findings, the success of COVID-19 resilient measures has been heavily reliant on effective communication and community participation. In regions such as South Asia and Latin America, local leaders and community health workers were crucial in bridging the gap between public health authorities and residents (Wang, et al., 2020). Their efforts in disseminating accurate information about COVID-19, promoting hygiene practices, and facilitating access to healthcare services were instrumental in controlling the spread of the virus. The use of technology, such as mobile health applications and social media, proved to be a powerful tool in combating misinformation and ensuring community compliance with health guidelines. These findings highlight that, while technological solutions can be highly effective, their success depends on the level of digital literacy and access within communities (Cinelli et al., 2020).

In the African context, the review illustrates the innovative and adaptive strategies that communities have adopted despite significant resource constraints. The use of drones in Rwanda for public health messaging and monitoring is a prime example of how technology can be adapted to local contexts to overcome logistical challenges (Africa CDC, 2020). The role of community health volunteers was particularly pronounced in rural and urban informal settlements, where they provided critical support in educating residents, distributing PPE, and facilitating access to testing and vaccination services. These volunteers, often operating with minimal resources, demonstrated the power of community mobilization and the essential role of partnerships between governments, NGOs, and international bodies. Such partnerships provided not only resources but also a framework for coordinated action, which is crucial in managing public health emergencies (Nkengasong & Mankoula, 2020).

The situation in Zambia's shanty compounds reflects a microcosm of the broader challenges and successes observed globally and continentally. The implementation of local hand-washing stations, the distribution of masks, and the organization of food and financial aid networks illustrate the resourcefulness and solidarity within these communities (United Nations Development Programme, 2020). These initiatives were vital in mitigating the immediate impacts of the pandemic and ensuring that basic needs were met despite severe

economic disruptions. The support from the Zambian government and NGOs, through mass testing campaigns, vaccination drives, and public health education, was critical in enhancing the effectiveness of these community-driven measures. However, the challenges of vaccine hesitancy and logistical barriers highlight the ongoing need for targeted communication strategies and robust healthcare infrastructure (Mukumbang et al., 2020).

Realistically, these findings have shown several key themes. The first theme is the importance of community-driven initiatives and the need to empower local leaders and health workers who possess the trust and cultural understanding required to effectively communicate and implement health measures. The second theme relates to the role of technology and innovation in overcoming logistical challenges and ensuring timely dissemination of information and resources. The third theme is the critical need for partnerships and coordinated efforts between governments, NGOs, and international bodies to provide the necessary support and resources. The fourth theme points to the findings highlighting the adaptability and resilience of communities in the face of unprecedented challenges, emphasizing the need for continued support and investment in community health systems to ensure preparedness for future health emergencies (Kapata et al., 2020).

The review also points to areas for further research and action. There is a need for in-depth studies on the long-term sustainability and impact of the interventions implemented in shanty compounds and informal settlements. Understanding the socio-economic and psychological effects of the pandemic on these communities will provide valuable insights for future public health planning. Additionally, exploring the role of community-driven initiatives in other public health crises can help build a more comprehensive understanding of how to effectively mobilize and support vulnerable populations. Ultimately, these findings advocate for a more inclusive and context-specific approach to public health that recognizes and leverages the strengths and knowledge of local communities (Ezeibe et al., 2020; Mwale & Chita, 2020; Mpolomoka, Mwaka & Mandyata, 2024).

Objective 2: Challenges that Communities Faced in Implementing and Adhering to Mitigation Strategies

The findings from this systematic review elucidate the myriad challenges that communities faced in implementing and adhering to COVID-19 mitigation strategies, highlighting both universal and context-specific difficulties. One of the most pervasive challenges identified globally was the spread of misinformation, which significantly undermined public health efforts. Studies indicate that misinformation, particularly through social media, led to widespread vaccine hesitancy and non-compliance with public health guidelines (Cinelli et al., 2020). This phenomenon was not limited to any single region but was a global issue, emphasizing the need for robust information dissemination strategies and effective communication channels to counteract false narratives.

Contrastingly, economic constraints emerged as a more pronounced challenge in low-income and developing regions. In many parts of the world, particularly in economically vulnerable communities, the economic impact of lockdowns forced individuals to prioritize immediate financial needs over adherence to health guidelines. The lack of adequate social safety nets and financial support exacerbated this issue, leaving many without the means to comply with public health measures (Ranney et al., 2020; Yuan, et al, 2021; Okonofua et al., 2022). This finding aligns with the broader understanding that economic stability is crucial for the successful implementation of public health interventions. Without addressing the economic needs of vulnerable populations, public health strategies are likely to face significant resistance.

The review highlights unique challenges that are deeply intertwined with the socio-economic and political landscape of the African continent. High population densities in urban informal settlements made social distancing nearly impossible, a challenge that was particularly acute in areas with limited access to basic services such as clean water and sanitation (Nkengasong & Mankoula, 2020; Mushibwe, Mpolomoka, Mwelwa, Mushima & Kakoma, 2024; Mushibwe & Mpolomoka, 2022). This situation underscores the importance of context-specific health strategies that account for the physical and infrastructural realities of these communities. The use of innovative approaches, such as Rwanda's deployment of drones for public health messaging, demonstrates how technology can be adapted to local contexts to overcome logistical barriers (Africa CDC, 2020).

Moreover, political instability and public mistrust in government institutions further complicated the implementation of COVID-19 mitigation measures in several African countries. In Nigeria, for example, widespread skepticism about the existence of COVID-19 and the effectiveness of vaccines severely undermined public health efforts (Ezeibe et al., 2020). This finding highlights the critical role of trust in public health

governance and the need for transparent, consistent communication from authorities. Building public trust is essential for ensuring compliance with health directives, particularly in regions where historical and political factors contribute to skepticism and distrust.

The situation in Zambia's shanty compounds mirrors many of these global and continental challenges but also reveals specific local issues. The dense living conditions and inadequate infrastructure in these informal settlements made it difficult for residents to adhere to recommended hygiene practices. The economic impact of the pandemic was particularly severe, with many people in these communities dependent on informal jobs and daily wages. Lockdowns and movement restrictions disrupted their livelihoods, forcing difficult choices between health and economic survival (United Nations Development Programme, 2020). This finding reinforces the argument that effective public health strategies must be accompanied by economic support measures to alleviate the financial pressures on vulnerable populations.

Fittingly, the healthcare system in Zambia faced significant challenges in coping with the increased demand for services due to Covid-19. Shortages of medical supplies, personnel, and facilities hindered the effectiveness of testing, contact tracing, and isolation protocols (Mukumbang et al., 2020). This reflects a broader issue observed in many low-income countries where underfunded healthcare systems struggle to respond to public health emergencies. The findings suggest that strengthening healthcare infrastructure and ensuring the availability of essential resources are crucial for enhancing the resilience of health systems to future crises. Overall, the review underscores the complex interplay of socio-economic, political, and infrastructural factors in shaping the challenges communities faced during the Covid-19 pandemic. It highlights the need for multifaceted and context-specific strategies that address not only the health aspects but also the economic and social dimensions of public health crises.

Objective 3: Post COVID-19 Measures in Place

The findings from this systematic review reveal the comprehensive and multifaceted post-COVID-19 measures implemented globally, regionally, and locally, highlighting the commonalities and divergences in strategies across different contexts. Globally, the emphasis on strengthening healthcare systems and improving public health infrastructure underscores the recognition that robust health systems are foundational to pandemic resilience. For instance, the European Union and the United States have implemented extensive vaccination campaigns, which have been crucial in achieving herd immunity and preventing future outbreaks (European Centre for Disease Prevention and Control, 2021). These efforts have been complemented by significant investments in healthcare infrastructure, such as increasing hospital capacities and enhancing medical supply chains. This holistic approach aligns with the broader goal of building resilient health systems capable of responding swiftly and effectively to future health emergencies.

In contrast, the economic recovery strategies adopted globally reflect a diverse range of approaches tailored to different economic contexts. Fiscal stimulus packages, direct financial assistance to individuals and businesses, and investments in infrastructure projects have been pivotal in revitalizing economies hit hard by the pandemic (International Monetary Fund, 2021). The focus on supporting innovation and digital transformation further illustrates a forward-looking approach, aiming to create more resilient and adaptable economies. This contrasts with the more immediate, survival-oriented measures seen in low-income regions, where the primary focus has been on providing basic needs and sustaining livelihoods.

Regionally, in Africa, the post-COVID-19 measures have been characterized by both innovative and practical approaches to addressing health and socio-economic challenges. The coordination of vaccination efforts by the African Union and the Africa CDC through initiatives like AVATT is a testament to the continent's collaborative spirit and commitment to equitable vaccine distribution (Africa CDC, 2021). This regional approach has been crucial in overcoming disparities in vaccine access and ensuring that even the most vulnerable populations are protected. The intensified public health campaigns to combat vaccine hesitancy and promote adherence to health protocols underscore the critical role of communication and education in public health.

Economic recovery in Africa has emphasized resilience and sustainability, with social protection programs playing a central role. Countries like Kenya and South Africa have expanded cash transfer programs to provide immediate relief to vulnerable households (Gentilini et al., 2021). This focus on social protection highlights a key difference from some high-income countries, where economic recovery efforts have often been more macroeconomic in nature. Additionally, the emphasis on regional integration and intra-African trade through the

AfCFTA agreement points to a strategic vision for long-term economic growth and resilience (UNECA, 2021). This approach not only aims to rebuild economies but also to create more robust and interconnected economic systems capable of withstanding future shocks.

For Zambia which is a center for this study, the post-COVID-19 measures reflect a blend of healthcare improvements and economic support tailored to the unique challenges faced by shanty compounds and informal settlements. The ramping up of vaccination campaigns and improvements in healthcare infrastructure, such as the expansion of hospital facilities and enhancement of medical supply chains, are crucial steps in addressing the immediate health impacts of the pandemic (Ministry of Health Zambia, 2021). These measures are particularly significant in a context where healthcare resources have historically been limited, highlighting a proactive approach to strengthening the health system's capacity to deal with current and future health crises.

Zambia's initiatives to support small and medium-sized enterprises (SMEs) and invest in sectors like agriculture and renewable energy underscore a strategic focus on sustainable development and job creation (World Bank, 2021). These efforts aim to build a more resilient economy that can better withstand future shocks, aligning with broader global trends towards economic sustainability. The implementation of climate-resilient agricultural practices and support for smallholder farmers also reflects an understanding of the importance of food security and sustainable agriculture in economic recovery and resilience.

In comparing these approaches, it is evident that while there are common themes, such as the emphasis on vaccination and economic recovery, the specific strategies are tailored to the unique socio-economic and infrastructural contexts of different regions. The alignment of global and regional efforts in enhancing healthcare systems and supporting economic recovery highlights a shared understanding of the foundational elements of resilience. However, the contrast in specific measures, such as the focus on social protection in Africa versus macroeconomic stabilization in high-income countries, underscores the need for context-specific strategies.

CONCLUSION

The comprehensive review of COVID-19 variants and coping strategies in Zambian communities, particularly within shanty compounds and informal settlements, underscores the multifaceted challenges and resilient responses that characterized the pandemic's impact. Globally, misinformation and economic constraints were significant barriers to effective public health measures, while in Africa, high population densities, lack of infrastructure, and political instability compounded these challenges. In Zambia, the dense living conditions and economic vulnerability of shanty compounds necessitated innovative, community-driven solutions supported by government and NGO interventions. These findings highlight the importance of context-specific strategies that address both health and socio-economic dimensions to enhance resilience and ensure effective responses to future health crises. The review underscores the critical need for robust healthcare systems, effective communication strategies, and comprehensive economic support to mitigate the impacts of pandemics and build more resilient communities.

RECOMMENDATIONS

1. Government and stakeholders should increase investment in expanding healthcare facilities, particularly in underserved areas, to ensure adequate capacity and resources to handle future health crises.
2. Government, health institutions and stakeholders should develop and implement public health communication strategies to counteract misinformation and build trust in public health interventions.
3. Government, health institutions and stakeholders should implement comprehensive economic support measures, including direct financial assistance to vulnerable populations and support for SMEs.
4. Government should empower local leaders and community health workers to play a central role in public health interventions.
5. Government, health institutions, stakeholders and communities should be focus on improving access to clean water, sanitation, and housing in shanty compounds and informal settlements.

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