Determinants of Coronavirus Infections and Public Health Challenges in Georgia

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Abstract

Background: Coronavirus infections have emerged as one of the most significant global health threats of the 21st century. Since the identification of SARS-CoV-2 in late 2019, the pandemic has compelled governments worldwide to adjust their public health strategies according to their socio-political and economic contexts. While European countries largely adhered to WHO recommendations, Nordic countries adopted more flexible approaches, leading to notable differences in mortality and morbidity rates across regions.

Aim: This study aims to evaluate the specific determinants that influenced the COVID-19 response in Georgia, focusing on both systemic public health challenges and the socio-economic factors that affected pandemic outcomes. It examines the resilience of Georgia's healthcare system and its capacity to mitigate the immediate and long-term impacts of the pandemic.

Methods: This study employs a desk-based, systematic review methodology that integrates both quantitative and qualitative analyses. The review primarily considers primary documents, including government recommendations, public health laws, and crisis management strategies aimed at controlling virus transmission. Key databases such as PubMed, ScienceDirect, and Medline were systematically searched for peer-reviewed publications from 2018 onward, in English, Georgian, and Russian. Only empirical studies with original analyses were included.

Results:The findings are expected to provide valuable insights into strengthening public health crisis response frameworks in Georgia. By analyzing the systemic challenges and successes during the pandemic, the results will help inform the development of more resilient healthcare strategies for future global health crises.

Conclusions: This research is crucial as it addresses the gap in in-depth studies on the impact of COVID-19 on Georgia's healthcare system. It offers an evidence-based foundation for evaluating pandemic management strategies and provides recommendations for improving preparedness for future public health emergencies.

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Keywords: COVID-19, MERS-CoV, SARS-CoV, Georgia, COVAX, zero-Covid policy, long COVID

Introduction

The World Health Organization places significant importance on the preparedness of global public health systems to mitigate the threat and impact of pandemics. Equally crucial is the implementation and enforcement of the International Health Regulations by Member States to prevent pandemics. This requires a professional analysis of public health challenges based on scientific evidence (50).

Coronavirus infections are classified as diseases of social importance, which refers to diseases or groups of diseases that cause substantial and sometimes irreversible economic, social, medical, and political damage to society. Coronavirus infections are caused by viruses in the Coronaviridae family. These viral diseases primarily affect the human respiratory system and often lead to cold-like symptoms. Some strains, such as SARS-CoV, MERS-CoV, and SARS -CoV-2, can cause more severe conditions, including pneumonia, respiratory failure, and kidney damage.

The study of the discovery, morphology, biology, and classification of coronaviruses is crucial for virology, epidemiology, and understanding the mechanisms driving modern pandemics. Coronaviruses were first identified in humans by Tyrrell and Bynoe in 1966 (1).

The first significant coronavirus epidemic occurred between 2002–2003, when a novel coronavirus was discovered in China, later named SARS-CoV (Severe Acute Respiratory Syndrome Coronavirus). SARS-CoV caused a severe respiratory illness that spread widely in China and other countries, resulting in 774 deaths and tens of thousands of infections. Although the spread of the virus was halted in mid-2003, this epidemic demonstrated the potential of coronaviruses to cause large-scale pandemics (2) (3). For this reason, diseases caused by coronaviruses are classified as socially significant diseases.

Middle East Respiratory Syndrome (MERS) is a respiratory illness caused by the MERS coronavirus (MERS-CoV). It was first identified in Saudi Arabia in 2012 and spread to the Arabian Peninsula and neighboring regions.

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Several cases have been reported outside the Middle East. Most of these cases are believed to have been acquired in the East and subsequently spread elsewhere. MERS-CoV has not been reported in Georgia. The largest outbreak outside the Arabian Peninsula occurred in the Republic of Korea, where delayed epidemiological investigations and preventive measures exacerbated the spread of the disease (4).

Both SARS-CoV and MERS-CoV have animal reservoirs (bats and camels) and are characterized by limited human-to-human transmission, which complicates the control and management of epidemics.

During the SARS, MERS, and COVID-19 pandemics, the World Health Organization (WHO) issued similar recommendations to affected countries to control the spread of the virus. Key measures included timely identification and reporting of cases, strengthening global surveillance systems, and developing and implementing response and isolation mechanisms. WHO urged countries to adopt preventive measures, such as closing borders, limiting social activities, and promoting physical distancing. Additionally, WHO emphasized the importance of strengthening health systems, including the use of personal protective equipment (PPE) by health workers, ensuring hospital readiness, and raising public awareness through information campaigns and updated communication strategies to limit the spread of infection. During the COVID-19 pandemic, the WHO also developed the COVAX initiative to increase access to vaccines, particularly for low- and middle-income countries (5-9).

During the COVID-19 pandemic, global public health systems responded with different approaches to pandemic management based on geographical and political contexts. China implemented a strict "zero-Covid policy" to manage the pandemic, but after easing restrictions, cases surged. "Scandinavian countries initially considered the pandemic a local issue, with Sweden adopting a citizen-responsibility approach as the situation worsened, while the other Nordic countries imposed stricter restrictions to manage the pandemic. European countries, such as Italy, were quick to adopt and share the WHO recommendations."

COVID-19 has had a significant impact on global public health, highlighting the role of social and economic determinants in the spread of the infection. Countries that did not follow WHO recommendations suffered severe losses, with the global death toll reaching 7 million. Medical losses were particularly high in developing countries. In regions with limited healthcare resources and poor implementation of international health regulations, the spread of the virus was significantly more pronounced.

The World Health Organization (WHO) launched initiatives such as the Preparedness and Resilience for Emerging Threats (PRET) and the Health Emergency Preparedness and Response (HEPR) programs to strengthen pandemic preparedness and resilience in countries. The Georgian healthcare system sought to integrate these models to effectively manage and adapt to the pandemic.

During the COVID-19 period, the spread and severity of the infection were strongly influenced by social determinants such as poverty, education level, and employment conditions. These factors particularly affected the most vulnerable groups, amplifying the negative impact of the pandemic on their health.

Georgia's healthcare system faced numerous challenges during the pandemic, especially with vaccine distribution and the development of infection control strategies. Additionally, the COVID-19 pandemic revealed new issues, such as "long COVID," which further complicated post-pandemic rehabilitation processes.

By 2024, although COVID-19 cases continue to rise, mortality and hospitalization rates are declining, largely due to the widespread vaccination efforts and effective immune responses to novel antibodies against the virus (10-21).

The COVID-19 pandemic has shown that both rapid response and long-term resilience are critical for global health systems. In 2023, the World Health Organization (WHO) launched the PRET and HEPR programs to enhance pandemic preparedness and build the resilience of health systems. Georgia actively participates in WHO training programs and is working on developing a national emergency management plan. This plan includes strengthening infrastructure, mobilizing resources, and training personnel, particularly for managing COVID-19 and influenza-like illnesses (22-24).

Moreover, the COVID-19 pandemic exposed weaknesses in the International Health Regulations (IHR, 2005), including inconsistent preparedness levels, gaps in legal frameworks, and insufficient global coordination, all of which limited the effectiveness of the pandemic response (WHO, 2020; WHO, 2021; WHO, 2022). Forecasting models, such as those developed by IHME, and strategic plans by WHO have played a crucial role in better understanding pandemic scenarios (25 -27).

In Georgia, the pandemic exacerbated poverty, limited access to healthcare services, and worsened social inequality, particularly among vulnerable groups. The lack of education and information contributed to the population's negative attitudes toward preventive measures. A national vaccination program in Georgia was implemented with support from COVAX, but skepticism and lack of awareness hindered the vaccination process. Despite this, awareness campaigns and healthcare worker training contributed to a reduction in infection rates and severe cases. In the post-pandemic period, cases of "long-term COVID-19" in Georgia remain a concern, especially in terms of strengthening rehabilitation services (28-30).

Methods

A desk study was conducted to examine the determinants of coronavirus infections and the public health challenges in Georgia. A literature review was carried out based on a systematic analysis of existing studies, employing both quantitative and qualitative methods. Particular emphasis was placed on key documents related to the pandemic, including government recommendations, public health regulations, practices, and strategies aimed at reducing the spread of the virus.

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The following keywords and terms were used in the search process: coronavirus infections, public health challenges, pandemic management, COVID-19, Georgia, public health system response, social determinants of disease severity (such as poverty, education level, employment conditions, and access to healthcare systems). Synonyms and spelling variations were also considered. Relevant publications were identified through searches in the following databases: PubMed, ScienceDirect, Medline, Cochrane Database of Systematic Reviews, and Google Scholar. The literature search was conducted for studies published since 2018, and publications in English, Georgian, and Russian were considered. Publications that provided general analyses of COVID-19 without focusing on the specific context of Georgia were excluded from the research process.

Publications were deemed relevant if they presented empirical evidence and original analysis regarding the spread of coronavirus infection in Georgia, the public health system response, and challenges that emerged in the post-pandemic period.

Results and discussion

There is a lot of literature on the determinants of coronavirus infections and public health challenges in Georgia; however, it is difficult to find relevant and high-quality literature. The search and systematization of literary sources took place over 3 months. At the initial stage, 46 articles and about 8 strategies were found, as well as about 50 recommendations issued by the World Health Organization in English, along with important reports and decrees from the Ministry of Internally Displaced Persons from the Occupied Territories of Georgia, the Ministry of Labor, Health and Social Protection of Georgia, and the National Center for Disease Control and Public Health in Georgian. A study of evidence-based publications was conducted. The majority of the articles and reports found mainly described general discussions about the global trends of the COVID-19 pandemic. A significant portion was based on the authors' subjective opinions on the achievements and challenges of pandemic management, but without reasoned, evidence-based analysis.

The main findings presented in the publications were divided into three main subgroups, reflecting the determinants of coronavirus infections and public health challenges in Georgia and around the world:

i) **Key indicators reflecting the health status of the population before the pandemic (2018-2019):** This period represents the initial stage during which the main social, economic, and environmental determinants affecting the health of the population in Georgia and around the world were analyzed.

ii) **Pandemic period (2020-2022):** During the pandemic, attention was focused on the global and regional features of the spread of COVID-19. Formal and informal disease management mechanisms were examined, including quarantine measures, vaccination programs, health system response capacities, and social protection strategies.

iii) **Post-pandemic period (2023-2024):** This section discusses the long-term consequences of the pandemic's impact, both for Georgia and globally, assessing the consequences of the public health crisis caused by the pandemic, measures taken for economic and social recovery, and developing sustainable public health strategies for the future.

Each sub-group is analyzed in detail to highlight the characteristics of the determinants of coronavirus infections and their impact on healthcare systems and populations in Georgia and globally.

While the COVID-19 pandemic poses a significant challenge to healthcare systems around the world, it also highlights the legislative and policy frameworks in place in countries that shape crisis management strategies. The Constitution of Georgia, as the country's supreme law, plays a special role in the legal framework of the public health system, as it defines the state's obligations and principles related to health protection and the well-being of citizens. Article 38 of the Constitution specifically defines the state's duty to ensure the right to health and create conditions for the prevention of potential risks, which became particularly important during the pandemic (31).

In 2020, in response to the COVID-19 pandemic, the Ministry of Labor, Health, and Social Protection of Georgia implemented a number of regulations and strategies to control the spread of the disease. These strategies were based on both domestic policy documents and recommendations from international organizations, such as the World Health Organization (WHO). During the pandemic, the Georgian Constitution and relevant legislation effectively embodied the legal framework for managing this type of crisis, which ultimately facilitated the management, prevention, and control of healthcare structures (32; 33).

In accordance with the aforementioned legislation and policy documents, the Georgian Healthcare System Standards from 2018-2019 also provided direction for prevention and disease management, with a strong focus on the management of not only infectious but also chronic diseases. The COVID-19 pandemic became a test for the system that preceded this crisis, revealing how ready the country was, both legally and practically, to manage its healthcare system (34) (35) (36).

The COVID-19 pandemic led to significant changes in the public health system, which were preceded by certain political and legislative regulations. In 2018-2019, the Georgian public health system was governed by standards and policy documents that regulated the prevention, control, and general management of diseases. At that time, the Ministry of Labor, Health, and Social Protection of Georgia led the health service structures, which were based on strategic documents and regulations from the World Health Organization (WHO). During the COVID-19 pandemic, these strategies underwent significant development, which included the introduction of new medical and legislative regulations, as well as the improvement of the existing system (37) (38).

The challenges and consequences of the COVID-19 pandemic were particularly evident in 2020, although the foundation for pandemic preparedness and prevention

was laid back in 2018-2019. During this period, the basic system for infectious disease control was established, along with political and socio-economic changes in public health that were associated with global and local challenges.

According to data from 2018, the main reasons for the spread of infectious diseases in Georgia were improper regulation of hygiene norms, insufficient sanitary standards, and inadequate healthcare infrastructure. During this period, the country's healthcare system was not sufficiently prepared to manage pandemic risks or mitigate the impact of the damage caused by the pandemic. Although certain preventive measures were implemented in the country, the healthcare system lacked the resources to ensure effective early diagnosis and prevent the spread of infectious diseases throughout the country (39-41).

By 2019, the global community had reached a certain level of pandemic preparedness, with the World Health Organization (WHO) beginning to outline strategies for preventing the spread of a pandemic. However, in 2018–2019, pandemic prevention and preparedness systems in other countries, both in terms of health policies and programs, were still not sufficiently prepared to effectively manage COVID-19 (WHO, 2019) (42).

During the pandemic (2020-2022), the healthcare system was mobilized worldwide to prevent the spread of the virus, and international health regulations gained new importance, although at that time, their limited capabilities were revealed. During the pandemic, the Georgian healthcare system initially implemented rapid response measures, but at the peak of the pandemic, a high spread of infections and a shortage of resources necessary for disease management were still observed. At the initial stage of the pandemic, the Georgian government began to adopt temporary quarantine measures, which had a certain effect.

Immediately after the pandemic began, significant challenges such as the lack of antigen-based tests, the shortage of hospital equipment, and the population's misinformation came to the forefront globally. During the pandemic, the Georgian healthcare system closely cooperated with international organizations, including the World Health Organization (WHO), the United Nations (UN), and other structures. The partnership with international organizations gained special importance in reducing the damage caused by the pandemic (43).

Since March 2020, Georgia has been actively implementing a vaccination campaign, although this has been accompanied by delays in vaccine delivery, uneven distribution, and public skepticism. It should also be noted that the COVID-19 pandemic has had a significant impact on the mental health of Georgian citizens (44).

In 2020-2021, the country experienced a significant increase in social and economic burdens, which directly affected economic activity, employment, and the financial situation of the private sector. Despite the challenges, the Georgian healthcare system gradually achieved efficiency in implementing the vaccination campaign, although certain groups of society still maintain a skeptical attitude towards vaccination (45).

In the post-pandemic period (2023-2024), the spread of COVID-19 in Georgia has been eliminated after the initial peak, although the negative impacts of the pandemic have persisted in the country.

In the post-pandemic period, Georgia is actively working to reorganize its healthcare system to better prepare for future pandemic risks. The government has launched an initiative to improve infectious disease management processes, which will bring significant changes in both strengthening the public healthcare system and providing psychological support to the population (46).

The spread of different viral strains and associated threats in the wake of the pandemic has created new challenges for global health systems. The COVID-19 pandemic and its aftermath have shown how fragile current infrastructure and strategies are, and how regional public health systems are not sufficiently equipped to effectively manage future pandemics. During this period, international organizations, including the World Health Organization (WHO), have developed new strategies and issued recommendations aimed at improving pandemic risk management and increasing the resilience and effectiveness of public health systems.

Following the COVID-19 pandemic, the World Health Organization (WHO) has developed strategies that ensure not only the management of infectious diseases but also the implementation of more sustainable public health policies. The "One Health" approach, which integrates human, animal, and environmental health, recognizes that global coordination and close collaboration across these three components are needed to mitigate future pandemic risks. The World Health Organization (WHO) is urging countries to implement reforms that include early warning and monitoring systems, as well as rapid and effective responses to emerging viral threats (47).

In addition, modernizing the technological components of health systems is essential to address current challenges. Therefore, each country's health system must be able to integrate new technological investments, such as data analytics systems, vaccination technologies, and rapid testing methods. Technological solutions can significantly help in the rapid identification and effective management of pandemic risks, which are still a major challenge for Georgia (48).

The papers reviewed in this literature review indicate that the determinants of coronavirus infections and public health challenges in Georgia are linked to both local and global factors. The social, economic, and environmental factors present in the country influence the spread of the infection. The process of managing coronavirus infections largely depended on the preparedness of the Georgian healthcare system, the soundness of the country's legislative framework, and the quality of cooperation with international organizations. At the same time, the effectiveness of the healthcare system, the improvement of the legislative framework, and coordination with international partners were critical factors determining progress in managing the pandemic.

In the context of the COVID-19 pandemic, Georgia's

healthcare system needed to be improved in many areas. Although the Ministry of Labour, Health, and Social Protection of Georgia implemented programs to improve the functioning of the medical infrastructure in 2018-2019, a significant shortage of hospital resources was identified immediately after the pandemic began, especially in the regions and districts, which, in turn, led to difficulties in managing critical cases (49).

Georgia's experience shows that effective management of the determinants of coronavirus infections and public health challenges is possible only through an integrated approach, which requires intersectoral efforts and includes not only the medical direction but also the social, economic, and legal spheres. This approach can significantly reduce the long-term consequences of the pandemic and improve the resilience of the healthcare system to future pandemics. However, evidence-based and large-scale research needs to be intensified in order to implement appropriate and proportionate measures to manage the pandemic (50).

Conclusion

The COVID-19 pandemic has exposed the vulnerability of Georgia's public health system, which is mainly due to social and economic factors, as well as weaknesses in the healthcare system (infrastructure, human resources, crisis preparedness of medical institutions, critical equipment, etc.). The pandemic has highlighted the need for infection control and system modernization. Although the Georgian healthcare system was guided by WHO regulations and recommendations in 2018-2019, the pandemic has once again highlighted the need to update and improve strategies and management mechanisms. Preparing for the management of future pandemics requires in-depth study of the experience accumulated during the pandemic, research, professional analysis, and the development of recommendations based on scientific evidence.

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