Chapter 13

The impact of COVID-19 and sustainability governance in three different mountains regions of the world — An intercontinental comparison

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Introduction

On March 13, 2020, the World Health Organization (WHO) officially declared the coronavirus (COVID-19) as a pandemic. The pandemic had affected most of the 195 countries across the five different continents by April 29, 2020 resulting in, for instance, high fatality rates and the collapse of national health systems. It became evident that territories were not adequately prepared for pandemic disasters. Therefore countries have been taking measures to avoid further spreading of the virus (Cheval et al., 2020).

Prior to the pandemic, communities living in rural mountain areas often faced particular challenges due to the remoteness of their settlements and limited access to basic services. For this reason, a trend of depopulation and out-migration in favor of urban settings was evident in many mountainous regions. This situation has historically led to different impacts depending on the socio-economic, political, and cultural context (Alvarado-López et al., 2017). In addition, the global mountain population nearly doubled between 1975 and 2015, primarily in mountain regions at lower elevations (Ehrlich & Melchiorri, 2021).

The Global Mountain Safeguard Research Program (GLOMOS), a collaborative scientific alliance between the United Nations University Institute for Environment and Human Security (UNU-EHS) in Bonn, Germany, and Eurac Research based in Bolzano, Italy, has been researching mountain regions worldwide in collaboration with local stakeholders. This ongoing collaboration has led to several discussions on the impact of the COVID-19 pandemic in mountainous regions, with voices from around the world, particularly from southern Africa (South Africa), South America (Ecuador), and western Asia (Kurdistan Region of Iraq). The Ecuadorian Andes and Maloti-Drakensberg in Southern Africa are among the 30 most populated mountain ranges worldwide, while mountain cities in Ecuador are considered highly dense, with medium growth populations (Ehrlich & Melchiorri, 2021). The pandemic may have led to a change in urbanization trends that in some cases resulted in a return to rural mountain areas to escape the virus and economic uncertainties, and in some cases further exacerbated already existing vulnerabilities.

Therefore this paper presents, from a comparative perspective, the common local experiences of the impact of the pandemic in these countries, as well as the coping strategies and potential opportunities applied, focusing on mountain

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communities and considering the interactions between urban and rural mountain areas. Qualitative and quantitative methods were used by collecting primary and secondary data, mainly from semistructured and conversational expert interviews, cartographic data for spatial analysis, official reports, and statistics.

Mountain regions of Ecuador before COVID-19

The Ecuadorian Andes, located in one of the most important mountain ranges in the world, are characterized by their cultural diversity and biodiversity hotspots. Moreover, the presence of the Andes on the Ecuadorian territory is a determining factor in the particular structure of this South American country. Deler (2007) refers to the "Andean effect" to explain a tripartite division of the Ecuadorian space: Coast, Highlands, and Amazon. The Highlands, Ecuador's mountainous region, encompass a variety of spaces: from the capital city of Quito, with more than three million inhabitants, to barren paramos with low population density.

Historically, land use in the Andes shows unequal and inequitable socio-spatial patterns, where the ruling classes have appropriated the best lands. In contrast, the more peripheral and higher lands were given to peasant communities. Currently, a divide remains in which many of the most remote sectors in the highlands continue to be among the poorest sectors in the country, with high levels of malnutrition, lack of access to basic services, and few development alternatives. In addition, these ecosystems are under stress from anthropogenic pressures and land use change (Mathez-Stiefel et al., 2017).

Mountain regions of South Africa before COVID-19

With an area of 40,000 km^2 and an elevation of 3500 m, the Maloti-Drakensberg (MD) on the South Africa-Lesotho border is the highest and most extensive mountain system in Africa south of Mount Kilimanjaro in Tanzania (Challis et al., 2022; Delves et al., 2021). The MD lies at a crucial interface between the drier, colder, and more seasonal interior of southern Africa and its perennially productive subtropical coastal belt (Stewart & Mitchell, 2018). Archeological evidence suggests that some of the world's earliest examples of permanent human presence are found in a high mountain system in the Lesotho highlands, with recurrent occupations beginning about 80,000 years ago (Pazan et al., 2022). The current rapid socio-ecological change, increase in mean annual maximum and minimum temperatures by 0.03°C/year and 0.01°C/year, respectively (Mohamed & Mukwada, 2019), soil degradation and erosion in the MD threaten the provision of ecosystem services (e.g., water supply) to the southern African region and have led to multidimensional challenges for sustainable development (Delves et al., 2021). Similar to other smallholder farmers in mountainous regions in other parts of the world, achieving sustainable food security is an important goal for smallholder farmers in the MD region. Natural resource management is currently unsustainable, leading to landscape degradation and perpetuating cycles of poverty (Adelabu et al., 2020).

The town of Phuthaditjhaba is located on the edge of the MD on the South African side (Free State Province) on generally nonarable terrain. Phuthaditjhaba has a rich historical and cultural heritage, largely influenced by the Basotho people. The name Phuthaditjhaba loosely translates to "place of meeting of many people" (Mushonga & Seloma, 2018). It was a place of refuge during the many interethnic and colonial historical struggles and battles that shaped southern Africa. During the apartheid era (1948–94), Phuthaditjhaba was the capital of the nonindependent Bantustan of Qwaqwa. The country's bantustan or homeland system (social engineering) resulted in a wide range of social and health-care inequalities, inequities, and injustices. Furthermore, the human immunodeficiency virus (HIV) and tuberculosis (TB) epidemics have had and continue to have a particularly detrimental effect on household livelihoods in areas such as Phuthaditjhaba (Booysen et al., 2004; Cronjé & Barker, 2006) . In addition to the existing HIV and tuberculosis epidemics, the first COVID-19 case occurred in South Africa on March 5, 2020 and in Lesotho on May 13, 2020. This was followed by lockdown measures of varying severity imposed by the governments of the two countries (Munzhedzi, 2021). As of February 2, 2022, South Africa and Lesotho recorded 3,608,307 and 32,176 COVID-19 cases and 95,288 and 693 COVID-19 deaths, respectively (Johns Hopkins University of Medicine Coronavirus Resource Center, 2022).

Mountain regions of Kurdistan (Iraq) before COVID-19

The Kurds have always had a strong connection to mountain areas due to numerous conflicts in the past, such as when the Kurdish army (known as the Peshmerga) used the mountains as a shield against bombardment by the Iraqi army. The Kurdish proverb "No friends but the mountains" expresses the sense of betrayal, abandonment,

and loneliness that results from the Kurds' history as a semistate ethnic minority in the Middle East with no loyal allies. The Kurdistan Region of Iraq (KRI) is in fact not a state, but a semiautonomous constitutional entity within the federal state of Iraq.

Since the 1980s, thousands of people have left the villages and mountainous regions to move to urban areas because of the lack of services. The remaining people in these regions rely on farming and tourism to survive. The cabinet of the new Kurdistan Regional Government (KRG) has prioritized the renovation of infrastructure in villages, subdistricts, and districts in its 2019 public services agenda. To this end, schools, institutes, health facilities, and new roads will be built to facilitate access to nearby towns and encourage people to stay in their ancestral homes and work in the countryside instead of moving to the city. The implementation of this agenda is recent, so a judgment on the impact on mountain areas in the region has yet to be made.

Finally, the KRI is facing widespread semiaridization due to the increase in temperature and decrease in precipitation, with adverse effects visible in the drying of vegetation cover and surface water.

Impacts of COVID-19 in the three study areas—mountain regions

Impact of COVID-19 on health services worldwide

The comparative analysis of this paper revealed the dimension of an international problem: The WHO's *Pulse survey on essential health services during the COVID-19 pandemic* (World Health Organization, 2020) asked questions about the disruption of up to 25 essential health services using a three-point ordinal scale: *no*, *partial*, or *severe-complete* disruption. *Partial disruption* was defined as a decline in service use by 5%−50% of patients/clients, while any decline above 50% was considered a *severe-complete disruption*. The type and number of services affected by the COVID-19 pandemic varied between countries and regions. Based on information obtained from key informants in 105 countries, on average countries reported at least *partial disruption* in 49% of the 25 tracer services. Nine out of every ten countries reported at least one disruption of essential services (89%). Overall, the mean number of services disrupted per country was 11 (of 25). Among 105 participating countries, 28 reported disruptions in 75%−100% of services, 27 in 50%−74% of services, 20 in 25%−49% of services, and 19 in less than 25% of services, while only 11 countries reported *no service disruptions*. The distribution of service disruptions in WHO subregions or country income groups was uneven. Disruptions were much more frequently reported by low-income countries, although the spread was wide. The higher the income group, the lower the median proportion of disrupted services. Disruption was most common in the emergency and critical care service group (62%); followed by noncommunicable diseases (NCDs) and mental health (48%); reproductive, maternal, newborn and adolescent health, and nutrition (30%); and communicable diseases (18%). With reference to emergency and critical care, about 2 in every 10 countries experienced *partial* or *severe-complete disruptions* of urgent blood transfusion services (23%), 24-hour emergency room/unit services (22%), inpatient critical care services (23%), and emergency surgery (19%). Regarding reproductive, maternal, newborn, child, and adolescent health, disruption of routine immunization (outreach) (71%) was most common, followed by family planning and contraception (68%), routine immunization (health facility) (60%), antenatal care (ANC) (56%), sick child services (52%), management of malnutrition (52%), and facility-based births (34%). In respect to communicable disease services, disruption of outbreak detection and control (45%), TB case detection and control (42%), and continuation of established antiretroviral treatment (ART) (32%) were reported. As far as NCDs are concerned, more than half of the countries reported disruption of services for NCD diagnosis and treatment (69%), treatment for mental health disorders (61%), and diagnosis and treatment of cancer (55%) (World Health Organization, 2020).

Impacts of COVID-19 on mountain territories of Ecuador

As of April 6, 2021, 337,702 COVID-19 cases have been confirmed in Ecuador; 290,314 have recovered, 12,106 have died, and 4,898 additional deaths are likely related to COVID-19. According to the Ministry of Public Health of Ecuador MSP, 2021, 1,166,467 polymerase chain reaction (PCR) tests have been performed. The government began reporting cases on February 29, 2020, after the first case was confirmed. However, the most reliable indicator for understanding the evolution of the pandemic appears to be excess mortality. This indicator shows the extent to which mortality has increased relative to "normal" mortality, that is, the average mortality over the past 3 years.

In Ecuador, the first cases of COVID-19 appear to have been introduced through Guayaquil, the main port. This city is at sea level, where one of the highest excess mortality rates in Ecuador and the world is concentrated, especially in

April 2020. A public health emergency was declared on March 13, 2020, and the National Emergency Committee (COE) was established to coordinate the emergency with local governments. To prevent the spread of the virus, the state has adopted specific prevention measures, such as migration restrictions, cancellation of mass events, telecommuting, virtual classes, lockdowns, and others.

The spread of the virus into the mountains, at least initially, is secondary, despite the high vulnerability of this population. Nevertheless, there is evidence that "peasants, indigenous peoples, men and women who live on the base of day-by-day economics have been the most affected." Many have lost their livelihoods; some have been part of a rural-to-urban mobility process and are particularly vulnerable in major cities. Despite the impacts on their livelihoods, many rural mountain communities have re-organized and actively locked themselves down due to the weak rural health-care system which is also constrained by the lack of accessibility, roads and biosecurity elements, and access to potable water and sanitation. In addition, the outbreak limited children's access to education in schools in combination with limited access to technological tools for distance learning (Tiupul, 2020; Sierra, 2020).

According to official data, the province most affected by the number of cases is Pichincha, followed by Guayas, especially at the beginning of the pandemic. Nevertheless, the number of deaths above normal mortality can be attributed directly or indirectly to COVID-19. This mortality universe includes persons who died from coronavirus, with or without a diagnosis, as well as persons who died from other causes related to the pandemic. The latter include, for example, persons who did not have access to medical services that had collapsed due to the high number of persons infected with coronavirus. Thus the purpose of this paper is to understand the impact of the pandemic in the Ecuadorian Andean regions in terms of population mortality.

The excess mortality rate in the highlands is almost 50% higher than in a typical year (Fig. 13.1). This average includes contrasting situations such as Sozoranga, Quilanga, and Déleg, cantons in the south of the country where mortality has decreased compared to a typical year, and Rumiñahui, Oña, La Troncal, Caluma and Latacunga, where pandemic-related mortality is almost double that of a typical year. This underscores the great diversity of situations in the high Andean landscapes (Fig. 13.2).

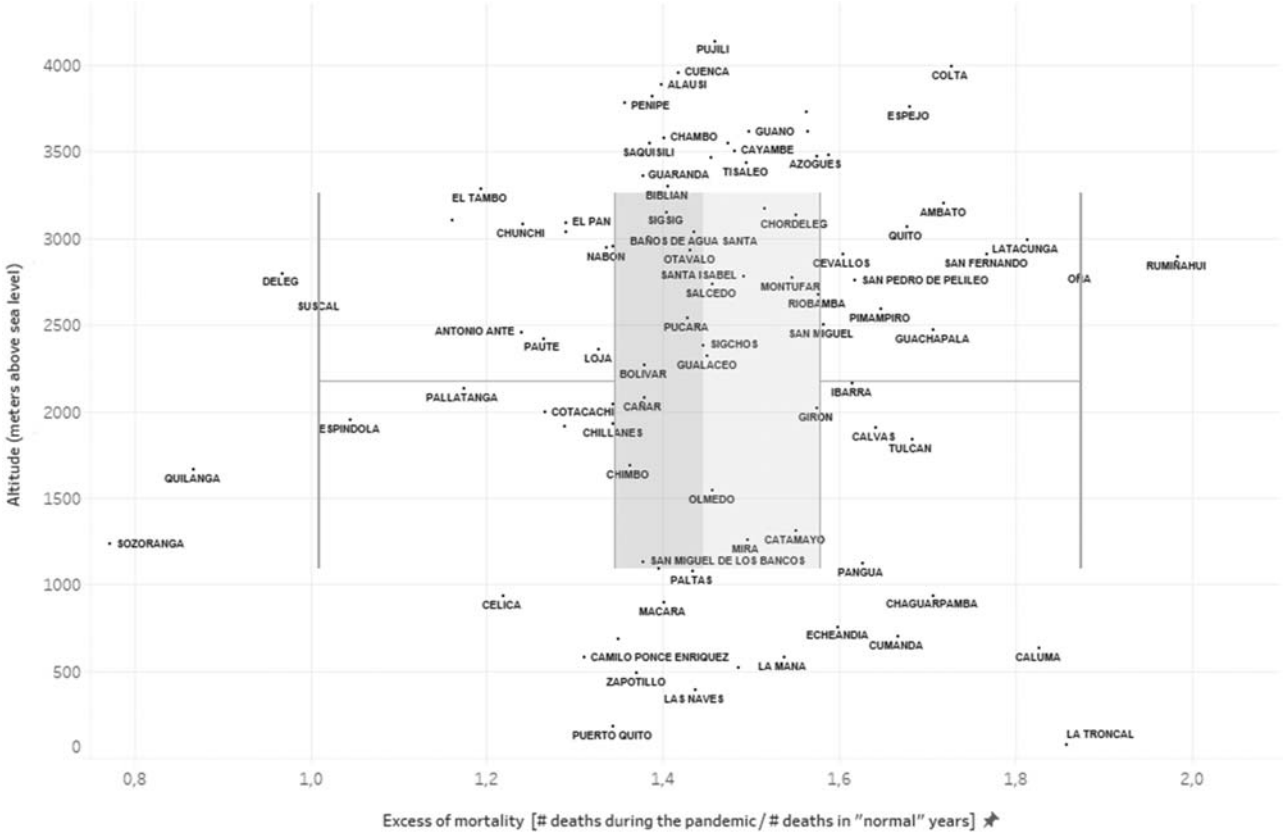

FIGURE 13.1 Excess mortality rate versus altitude (Civil Registry of Ecuador, 2021). *Civil Registry of Ecuador. (2021).* <*https://www.registrocivil.gob.ec/cifrasdefuncion/*>.

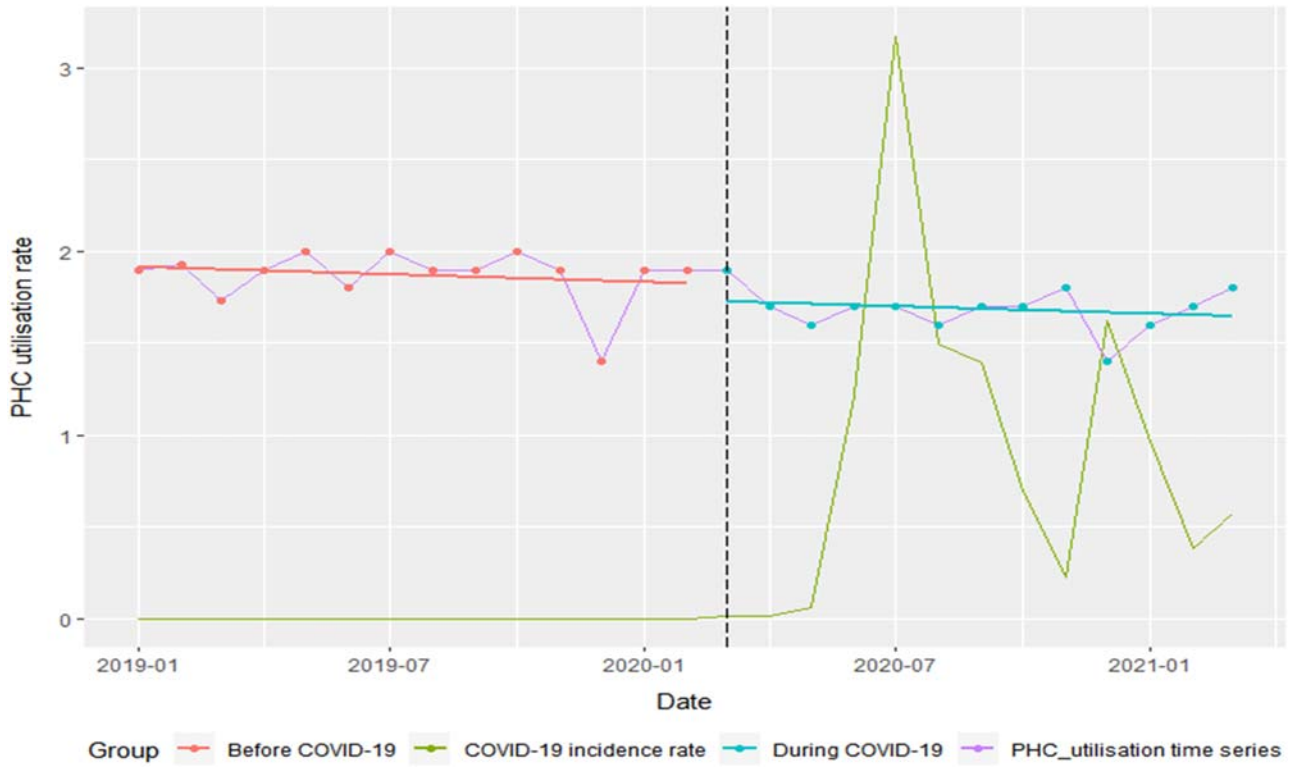

FIGURE 13.2 Decline in primary health-care utilization. *Heunis, C., Chikobvu, P., Kigozi, G., Muteba, M., Engelbrecht, M., Modise, M., Msimanga-Radebe, B., Ntombela, B., & Providence, M. (2021). The impact of the COVID-19 pandemic on essential health services in the Free State Province. 9th Annual Health Research Day. Health, disease management and health systems in COVID-19 times, Bloemfontein: Free State Department of Health and University of the Free State, 4 November 2021.*

In particular, in the provinces of Carchi and Pichincha, the most severe impact of the pandemic has been in the form of increased mortality in the highlands. The variety of excess mortality rates (Fig. 13.1) is evidence of the diversity of territorial structures and dynamics of the mountainous areas, which include the national capital, dynamic intermediate cities, rural settlements specialized in agricultural services, and areas of emigration. Each of these territories has shown different levels of resilience based on the existence and provision of infrastructure to respond to a pandemic, such as hospitals and medical centers, and in decision-making capacity.

Fig. 13.3 shows the cantons of the highlands provinces as a function of two variables: their altitude, on the ordinate axis, and the excess mortality during the first year of the pandemic, on the abscissa axis. Behind, a whisker plot showing the average and standard deviations of the statistical distribution of excess mortality. The cantons located to the right are those in which the impact of the pandemic in terms of excess mortality has been strongest. Among them are dynamic cities linked to international emigration, as well as territories with strong articulation with agro-industrial dynamics.

The national COE decentralized decision-making to the cantonal level to bring pandemic management closer to local realities. Each cantonal COE was responsible for deciding whether mobility and public space use restrictions corresponded to a red level (the highest), yellow (intermediate level), or green (the lowest level of restrictions). Although this policy provided greater flexibility and adaptation for timely and contextualized decision-making in local realities, it lacked the capacity to monitor and follow up on the local epidemiological situation. Ecuador has one of the lowest efforts for the identification of active cases. Even more complicated is the dissemination of information, since health is a central government responsibility in which local governments participate only tangentially. The municipalities with greater weight were able to access information or had the capacity to generate important strategies for the management of the pandemic. On the other hand, smaller municipalities far from the centralities, such as those in the mountains, were limited in their access to information.

With this background, an Ecuadorian government expert and an indigenous women leader also shared their perspectives on sustainability governance in the Ecuadorian Andes postpandemic through semistructured interviews conducted by the GLOMOS Team. The mountainous regions of Ecuador face the great challenge of recovering their dynamism

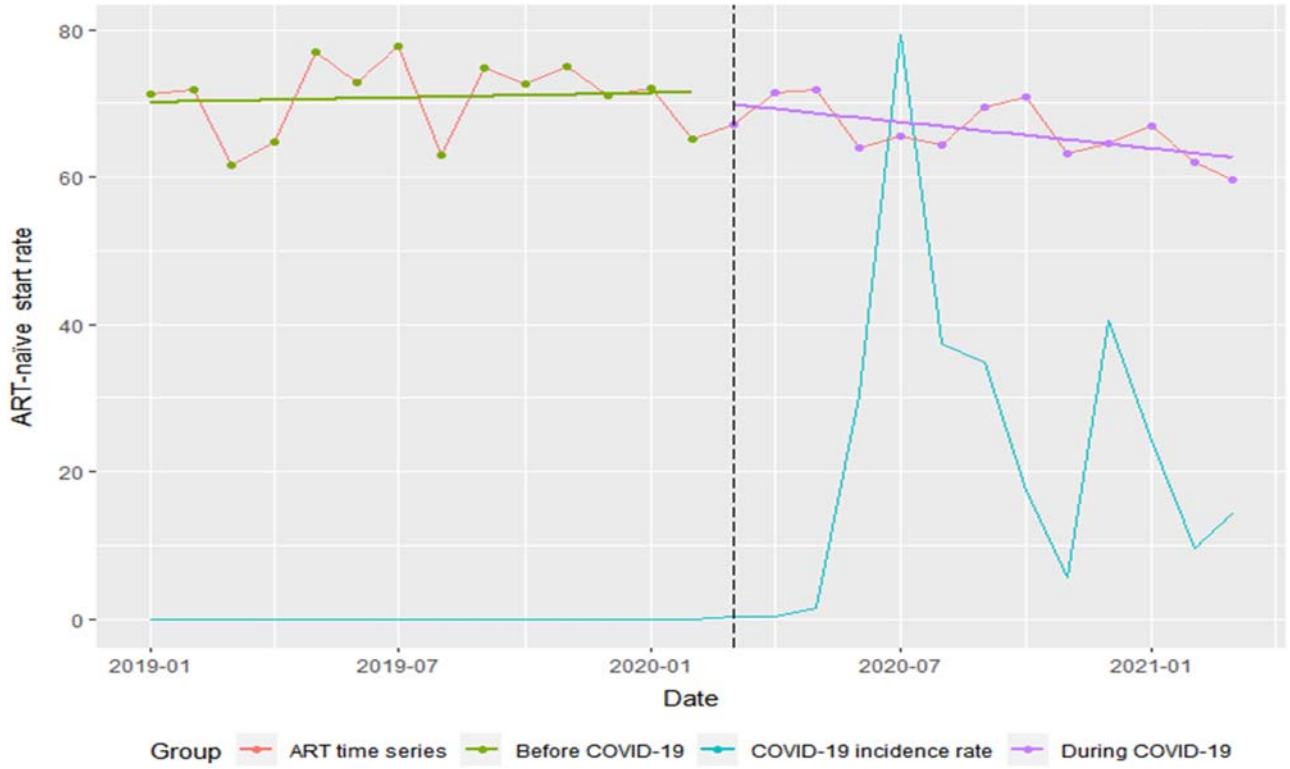

FIGURE 13.3 Decline in antiretroviral treatment-naïve patients starting treatment. *Heunis, C., Chikobvu, P., Kigozi, G., Muteba, M., Engelbrecht, M., Modise, M., Msimanga-Radebe, B., Ntombela, B., & Providence, M. (2021). The impact of the COVID-19 pandemic on essential health services in the Free State Province. 9th Annual Health Research Day. Health, disease management and health systems in COVID-19 times, Bloemfontein: Free State Department of Health and University of the Free State, 4 November 2021.*

and taking advantage of the various opportunities that the pandemic could open up, including the need to strengthen food supply networks through shortcuts and the development of ecotourism alternatives. People living in these areas feel more secure due to their coexistence with nature, access to the water springs, and their crops. Mountain ecosystems provide essential services for highland and lowland communities, such as water, food, tourism, fiber, and energy. In addition, rural mountain communities have always been organized and united, which has enabled them to form security brigades to prevent the spread of the virus and to organize community fairs to market their products. Likewise, they have used their ancestral knowledge and strengthened their preventive medicine, allowing the young to spend time with their elders and the children could be taught important values and traditions at home thus also recovering the knowledge and wisdom that had been lost (Tiupul, 2020; Sierra, 2020).

Impact of COVID-19 on mountain territories of South Africa

On February 1, 2022, the cumulative number of COVID-19 cases in the Free State Province of South Africa was 197,000 (National Institute for Communicable Diseases, 2022). The impact of the pandemic on public health-care services included a loss of recent gains in the provision of essential health services (EHSs), including an 11.8% decline in primary health-care (PHC) utilization (Heunis et al., 2021) (Fig. 13.2), and a 9.0% decrease in the number of newly diagnosed HIV-positive patients receiving ART (Heunis et al., 2021) (Fig. 13.3).

Socio-demographic and health system risk factors for COVID-19 hospital mortality in the Free State include elderly patients, patients with high care needs, patients with diabetes, obesity, and/or hypertension, and a history of tuberculosis (Muteba et al., 2021). The likely differential impact of residence and health service utilization in rural areas (including mountainous regions) compared with urban areas remains to be determined. The existing HIV and TB epidemics have traditionally had a more severe impact on the health and livilihoods of the poor who are most reliant on public health and social services, and this is exarbated by a "third" epidemic or pandemic, COVID-19. There is thus an urgent need for health-related disaster social work interventions to strengthen the resilience of vulnerable groups in the Free State (Joubert et al., 2021), particularly in the resource-scarce rural and mountainious areas of the province.

COVID-19 has created a deep sense of uncertainty and anxiety in the small town of Phuthaditjhaba as the spread of the coronavirus is getting more pronounced. As the area is predominantly poverty-stricken due to lack of development, recommended health protocols have been neglected. The houses are small and not well ventilated making it impossible for people to self-isolate for instance. In some cases, the shelters accommodate family members across generations, that is, grandparents, parents, and grandchildren, putting the lives of the older generations at risk of contracting COVID-19. The steep slopes are scenic, but construction of infrastructure such as roads, power lines, houses, water lines, recreation, and learning spaces is costly due to this topography. The community also faces social problems ranging from high youth unemployment, drug and substance abuse, prostitution, and corruption. A large portion of community members live on government grants, such as old-age, child, disability, and foster care grants. Besides government social grants, community members subsist on small vegetable gardens, informal jobs, hard-to-find formal jobs, and livestock farming.

The lockdown following the COVID-19 outbreak has hampered poverty alleviation programs such as education for children. In poverty-stricken societies, children spend their time loitering on the streets because parents are either too busy or not educated enough to teach their children at home. Idle children are involved in all social ills, such as drug and substance abuse, prostitution, and crime. Some small and medium enterprises have ceased operations, further increasing unemployment. Unemployment is also fueled by the low skill level of society members, as there are few institutions and industries that train youth in the necessary skills.

Social service delivery during the COVID-19 outbreak has remained a major challenge in Phuthaditjhaba communities. This has perpetuated the service delivery riots that are typical in postdemocracy South Africa (Ngcamu, 2019). Water supply is erratic, leaving communities without reliable water sources for months at a time. The infrastructural depreciation of water sources has forced the municipality management to supply water to society using water tanks. The unavailability of water in communities makes it difficult to comply with hygiene requirements and sanitation regulations that are critical to combating the COVID-19 pandemic. In addition, it puts the health systems of the society in danger of disease outbreaks. Further, provision of electricity in the communities has been scaled down during the winter season.

Impact of COVID-19 on mountain territories in the Kurdistan region of Iraq

As of March 20, 2021, in the KRI there have been 115,210 confirmed COVID-19 cases, 106,677 of whom have recovered, 3591 died, 4942 are active, and 238 new.

COVID-19 has severely affected both the agriculture and tourism sectors. Until recently, the KRG had ordered the tourism authority to close all tourist sites to prevent any gatherings of Kurds to contain the spread of the disease, and many businesses went bankrupt. The mountainous regions are a popular destination for tourists, especially Iraqis seeking to escape the summer heat. They offer great geographic diversity, ranging from forests filled with wildlife to skiing in the Zagros Mountains on the border with Iran. However, the effects of COVID-19 have brought public life to a virtual standstill, leaving popular tourist sites empty due to a series of containment measures, including a ban on intercity travel.

In addition, during the pandemic, the COVID-19 infection rate was much higher in major cities, posing a greater risk and causing the population to return—perhaps temporarily—to remote areas for safety reasons. In a mountainous area like Sinjar, restriction measures have affected the economic situation, where people live well below the poverty line and unemployment is widespread. The COVID-19 outbreak exacerbated the situation as people were forced to stay at home and were unable to provide for their families. Moreover, the Government has failed to support farmers affected by the pandemic; prices for their products have dropped drastically, as crops of value-depleted tomatoes and cucumbers poured into the streets of the capital city. A local farmer explained that "the coronavirus has stopped all the business, and people can no longer travel outside the city for work. The farmer's harvest is not even close to yielding a return for the effort and money spent on it by the farmer, and merchants from other governorates can't come to buy the products and take them to the other governorates. Hence, the crops and vegetables end up rotten. Before the coronavirus, people had very little income. Now, there's none." However, some argue that the safety precautions by the KRI government were necessary to keep the number of cases in the region very low. This response gained international recognition, and the WHO commended KRI authorities for their efforts to combat the coronavirus, noting the stark contrast between the relatively low number of known infections in the KRI compared to the rest of Iraq and neighboring countries such as Iran and Turkey.

The pandemic has highlighted the importance of remote areas to the community's economic and social well-being, and the low risk of the virus being spread has made these areas popular again as destinations. For this reason, it is essential that the government works with local communities in these areas to address their shortcomings and revitalize their economies. Finally, regarding climate change, as in many other countries around the world, the pandemic and lockdowns have had a positive impact on climate change in the KRI, as energy demand and greenhouse gas emissions have decreased.

Conclusions and outlook: sustainability governance in mountains

The spread of the COVID-19 pandemic worldwide has revealed existing socio-economic vulnerabilities of mountain communities and latent vulnerabilities of other parts of the world's population. COVID-19 has brought many challenges, but it also added to existing issues within the explored regions. Most remote sectors in mountain areas continue to be the poorest sectors, with a lack of access to essential services and few development alternatives. People who migrated to urban centers before COVID-19 often settled in areas that are more susceptible to the effects of the crisis. Due to the pandemic, mountain populations may have been forced to return to their rural homelands, or have chosen for safety reasons and to avoid the spread of the virus. Nonetheless, it has been challenging due to the lockdown measures and closure of roads and internal borders.

In terms of the impact of COVID-19, the three investigated mountain regions in Ecuador, South Africa, and Kurdistan (Iraq) share several commonalities: all countries have weak health systems in rural areas, pronounced rural−urban mobility patterns, water supply challenges, limited access to education for children who, moreover, lack the technological requirements for distance education, and in all countries the COVID-19 pandemic is detrimentally affecting the whole health system and the delivery of essential health services.

In addition to the commonalities as described earlier, also a number of differences among those countries have been analyzed. For instance, within the Ecuadorian Andes there is evidence that peasants, indigenous peoples, men and women who live on the basis of day-by-day economics have been the most affected and the number of deaths above normal mortality could be attributed directly or indirectly to COVID-19. In South Africa, COVID-19 has created a deep sense of uncertainty and anxiety especially in rural areas, social service delivery has remained a major challenge, and the lockdown following the COVID-19 outbreak has hampered poverty alleviation programs such as education for children. In Kurdistan, finally, the strict safety precautions by the KRI government were successful in keeping the number of cases in the region very low. The pandemic has also highlighted the importance of remote areas to the community's economic and social well-being, and the low risk of the virus being spread has made these mountain areas popular again as destinations.

Although long-term consequences of COVID-19 remain to be seen, governments and communities in the study regions must first weather a challenging period before they can alleviate the current threats to their economies, security, and health care, particularly in mountain regions. At the same time, this pandemic offers opportunities for a sustainable, equitable, and climate-resilient recovery post-COVID-19. Governments must prioritize economic recovery actions to support rural mountain communities and most vulnerable people in mountain cities—this is a clear opportunity to build back better.

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