

COVID-19 and local community resilience in the Westfjords of Iceland

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ABSTRACT

Remote Arctic communities have often been depicted as being particularly vulnerable to the challenges of disasters, with their location and lack of infrastructure exacerbating risk. This study explores the characteristics of local resilience in the Arctic using the case study of the communities of the north-western Westfjords. A total of 42 semi-structured interviews were carried out with various community members, seeking to uncover the features of inbuilt resilience that contribute to successes and vulnerabilities. These were transcribed, coded, and categorised in relation to an integrated framework for assessing community resilience in disaster management, which groups topics via the themes of environmental, social, governance, economic, and infrastructure. All themes played a role in the success of local coping strategies, with easy access to the natural environment central to physical and mental well-being. Despite this, vulnerabilities of the community were evident, including insufficient local healthcare workers during a severe COVID-19 outbreak in a care home, the absence of a local quarantine hotel, and insufficient information in foreign languages for non-natives of Iceland. The general trend of following rules and expert advice was demonstrative of strong social capital, with locals trusting those in charge, nationally and locally, to manage the pandemic.

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Introduction

The emergence of the COVID-19 pandemic in 2020 led to extensive health and socio-economic damages, presenting challenges to communities the world over [1,2]. The creation of resilient communities is not merely about enabling them cope, but is also about the role of protective factors, such as strong social networks, which can support all people and communities in managing, adapting, and recovering well to shocks such as a pandemic [3]. This need is particularly acute in the communities of the Arctic, where the features of remoteness, limited infrastructure and extreme weather conditions often exacerbates risks and constrains response opportunities [4–7]. The negative consequences for human well-being of limited resource capacity during the COVID-19 pandemic have been evidenced in a multitude of ways, such as the difficulties of maintaining mental health services reliant on fly-in and fly-out workers [8], complexities and stress involved in the management of micro-sized enterprises [9], youth coping challenges in Inuit communities [10], and rising household violence [11]. Equally, there have been documented reports of inbuilt community resilience contributing to the successful management of the pandemic response

effort, for example, through social solidarity and community connectedness in Qanuinnigtsiarutiksait, Manitoba, where the development of Inuit-centric primary healthcare services proved highly useful when tracking COVID-19 infection rates and ensuring equity in relation to access to testing and vaccinations [12].

Given the often-reported incidence of conceptual ambiguity regarding the properties of social resilience [13] and mixed reports in terms of the fortitudes and vulnerabilities pertaining to Arctic communities in handling the COVID-19 pandemic, deeper analysis is necessary to better understand (a) the characteristics of inbuilt resilience that contribute to success stories, and (b) the deficiencies that undermine the capacity to cope and adapt. A useful means of evaluating both (a) and (b) is the integrated framework for assessing community resilience in disaster management presented by Teo et al. [14]. This framework envisions resilience as forged on a bedrock of environmental, social, governance, infrastructure, and economic properties, which are linked to specific key areas and variables. Using this framework to guide our evaluation, this study provides a qualitative inquiry focused on the case study of

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communities in the north-western part of the remote Westfjords, the most sparsely populated region of Iceland, evaluating the extent to which inbuilt community resilience facilitated coping and successful adaptation to the COVID-19 pandemic.

Section 2 of this paper sets out details pertaining to the case study location and provides a summary of the impacts of COVID-19 on the Westfjords, before outlining the integrated framework of community resilience by Teo et al. [14], the semi-structured interview approach to gathering qualitative data, and how the framework guides deductive coding of the data. Section 3 sets out the thematised results, with Section 4 discussing the practical and policy-making implications of the study. Section 5 outlines a brief conclusion and considers areas for future research.

Materials and methods

Case study

The Westfjords are a remote, mountainous, and sparsely populated region in Iceland. The focus of this study was

on the communities in the north-western part of the Westfjords (Figure 1), including the de facto capital of Ísafjörður (population of 2,672 in 2021) and nearby coastal towns of Bolungarvík, Flateyri, Hnífsdalur and Þingeyri, all of which have a population of less than 1,000 inhabitants [15]. The population consists mainly of local non-indigenous people and immigrants, but the percentage of immigrants and their children has increased significantly in a relatively short time [16], now being 22.3% in the Westfjords region, the largest group being people from Poland [17]. However, the population density in the region is low, or only 0.8 persons per square mile [18].

Although fisheries continue to make a strong contribution to the economy of these towns, the significance of this sector has declined in recent years and tourism, especially via cruise ships, has expanded, as well as fish farming. In contrast to the rest of Iceland's population, the municipality of Ísafjarðabær, which encompasses Ísafjörður, has a younger demographic, with a high proportion of immigrants. Geographically and in terms of infrastructure provision, the case study exemplifies many of the challenges faced by many

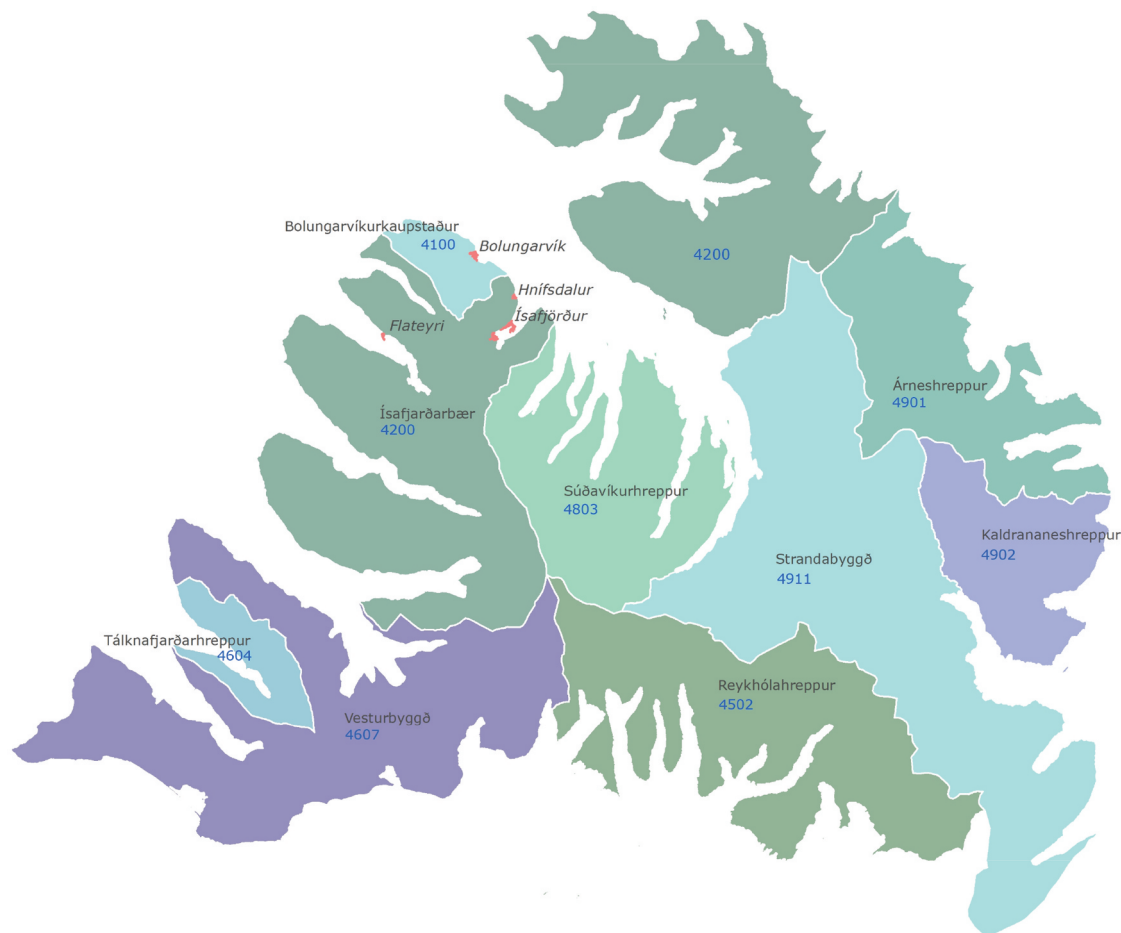


Figure 1. Map of the Westfjords region (including municipality populations). Sourced from the national land survey of Iceland [15].

Arctic communities, being remote and resource dependent, with only a few key industries and one small hospital. There is limited transport connectivity to the rest of Iceland by air and road, with both options frequently unavailable throughout the year due to inclement weather and dangerous travelling conditions, especially during winter times [4,6].

Evaluative framework

The evaluative framework used in this study is sourced from Teo et al. [14], as shown in Table 1. The framework takes a multidisciplinary lens and is thus inclusive of features such as ecological resilience that are often overlooked in other resilience-focused models of disaster management [14]. It consists of five thematic areas, which are linked to key areas and variables, the latter providing indicators of community resilience, defined by these themes: environmental, social, governance, infrastructure, and economic. Grouped together, the five thematic areas cover the functioning of a community during a disaster event such as a pandemic. As Teo et al. [14] note, the key areas and

variables are broad in scope, but their relevance and relative importance will vary with respect to the case study under examination, leaving scope for the removal or addition of factors to the set outlined in Table 1.

Thus, this study both draws on the framework but also provides a test of its real-world applicability in a case study setting.

Interview materials

A total of 42 semi-structured interviews were conducted, mostly in-person during October 2021, with 4 carried out online via Teams and Zoom in the latter part of October. The timing of the interviews was deliberate, occurring in the aftermath of two waves of the COVID-19 pandemic that had affected the local communities. Events were still fresh in the interviewees' minds, but sufficient time had likely passed since the initial impacts, providing time for lessons to be learned.

Interviewees were identified using purposive sampling [19] and snowballing, the latter with the aid of a knowledgeable local employee at the University Centre of the Westfjords, located in Ísafjörður, who

Table 1. An integrated framework for assessing community resilience in disaster management [14] p.4).

Theme	Key themes	Variables
Environmental	Natural environment (Location related characteristics which contribute to community survival and recovery)	<ul style="list-style-type: none"> • Local soil • Water • Land characteristics
	Built environment (Location relate characteristics that contribute to community survival and recovery)	<ul style="list-style-type: none"> • Protective measures • Geographical location
Social	Demography (Community profile/characteristics that influence community resilience)	<ul style="list-style-type: none"> • Age • Disability • Gender • Education • Wealth
	Social capital (Quality of relationships among individuals and at community level that contribute to community resilience)	<ul style="list-style-type: none"> • Bonding • Bridging • Linking
	Cultural characteristics (local, regional and national)	<ul style="list-style-type: none"> • Values • Beliefs • Expected behaviours • Roles and responsibilities
Governance	Community policies and procedures (robustness and comprehensiveness of government frameworks)	<ul style="list-style-type: none"> • Resource allocation and adequacy • Clarity of roles and responsibilities • Disaster preparedness
	Planning (Ability of government to prepare communities to withstand/overcome/recover from disasters)	
Infrastructure	Individual mobility (Ability of people to move to secure places and obtain essentials)	<ul style="list-style-type: none"> • Food • Water • Shelter • Health • Power • Water • Sewage • Communication
	Community services (Robustness of essential services)	
Economic	Economic vitality of the community (Ability/opportunity to revitalize/reenergise the local economy)	<ul style="list-style-type: none"> • Diversity of industries
	Individual means of livelihood (Ability of people to seek suitable employment)	<ul style="list-style-type: none"> • Availability of jobs to suit dignity • Availability of alternate employment

helped ensure that the interviewees were from diverse groups of local citizens. Interviews included civil protection and emergency management workers, healthcare and nursing home workers, tourism operators, the port authority, local employees in fish processing and fish farming, a town mayor and other governance officials, university students, an artist, and a telecommuter.

A copy of the interview framework is provided in Appendix A. The main aims of the framework were to gather information regarding the public health measures that had been implemented locally to address the COVID-19 pandemic; the variety of experiences of local people of the public health measures; the coping strategies of locals; the impacts of the COVID-19 pandemic on foreigners and immigrants in the communities; and what could be learned from the experience in terms of future policies and public health measures. Where it was relevant to the interviewees' experience, the interviews also focused on specific issues that occurred locally during 2020 – a COVID-19 outbreak on a fishing vessel, a nursing home outbreak, impacts on the local immigrant population, and effects on students and staff at the University Centre of the Westfjords.

Analysis

The interviews were mostly carried out in Icelandic and then transcribed and translated into English. However, some were carried out in Polish and English, the former with the support of a local interpreter. After all interviews had been transcribed and translated into English in November and December 2021, these were analysed using MAXQDA 2020 software. The framework of Teo et al. [14] was used as the basis for thematic analysis of the data, which was carried out in the following chronological order recommend by Castleberry and Nolen [20]: (1) compiling, (2) disassembling, (3) reassembling, (4) interpreting, and (5) concluding. Thematisation was carried out in the period March to May 2023. The approach to the analysis was both deductive and reflective, since the aim was to both apply the framework and

test its real-world applicability to the case study. Codes and sub-codes were defined and re-defined to ensure they captured the model's structural conceptualisation of themes, areas, and variables, whilst ensuring that the analysis reflected the full breadth of the dataset [21,22]. Key codes were captured and displayed in a word cloud to provide a visual representation of the most frequently appearing words and phrases in the data [23]. These were then categorised with respect to the five themes in Teo et al.'s integrated model.

Results

The integrated framework [14] has in the following section been subdivided according to the key areas of the framework.

Environmental aspects supporting community resilience

The environmental aspects, or themes, of the integrated conceptual framework for assessing community resilience in disaster management includes the natural environment and the built environment, see Table 1. According to Table 1, the natural environment variables are local soil, water, and land characteristics, while the built environment entails protective measures and geographical location [14]. Drawing from the interviews, the key variables evident in this category from the local study are shown in Table 2.

To provide more context for the variables presented in Table 2, some will be emphasised through direct quotations, while others are only explained in the main text, to keep the paper of a reasonable length. To start with, less pollution was mentioned as a positive aspect of the pandemic.

Less cars, less traffic, less pollution, inland waters are clearer and there is more fish.. (Interviewee #4)

Furthermore, weather conditions were discussed from various angles, both as protective mechanism and as

Table 2. Environmental aspects and variables [14] p.4).

Environmental aspects	
Natural environment	Built environment
Carbon footprint reduction, less pollution	Distance working
Weather conditions	Housing arrangements
Harsh environment	Housing shortage
Mental and physical well-being	Peripheral settlements
Outdoor activities (exercises)	Public buildings and infrastructures
Social activities	Quality of house constructions
Remoteness	Quarantine hotel
Thin population	Transportation infrastructure (harbours, roads, flights)
Freedom	Waste facilities
	Working facilities

a risk factor. Long experience in dealing with harsh and extreme weather, including avalanches and sea accidents, contributes to the resilience of the local people. The proximity to nature as a coping mechanism was important. It was mentioned in the context of breathing of mountain air and exercising outdoors, and how it influences mental and physical well-being and nurtures the relationship with family and friends. The interviewees mentioned activities such as walking, jogging, running, hiking, skiing, fishing, biking, and riding of snowmobiles. Interviewees furthermore appreciated the freedom outdoor activities entailed and the social aspect, although social distancing rules were respected. The thin population, due to fewer cruise ship tourists in the area, was brought up in the context of outdoor activities.

I do not know how many mountains I have hiked this summer. (Interviewee #41)

You go out and walk for five minutes then you are out in the nature. (Interviewee #1)

It was easy to meet friends outside your home, go for a walk but keep a distance. (Interviewee #30)

Extreme weather conditions and darkness were brought up, such as the potential negative impacts in the case of an unmanageable wave of the pandemic, in cases of sending blood samples for analysis to Reykjavík, or for negative psychological impacts.

The uncertainty was that all mountain roads here were closed and there was a very limited diagnostic capacity at the National hospital virology department. This meant that it took two days, and sometimes more, between the time we took the sample until the time we got the result. And that means we were always one step behind in knowing who is infected, meaning those having to quarantine. (Interview #9)

The built environment, in relation to the environmental aspect, can contribute to local community survival and recovery, and thus community resilience in case of disasters [14]. However, this factor differs depending on the type of disasters, whether they are due to natural disasters or epidemics, where it is important to reduce the risk of the spread of an epidemic, both at home and in the case of working arrangements, rather than seeking physical shelter from the harshness of nature. In the case of housing arrangements, it depended on the size of houses and number of people living in them if they were able to self-isolate or quarantine, in some cases for a long time, or if specific arrangements had to be made. This was the case for international students studying at the University Centre of the Westfjords. A lack of a quarantine hotel was mentioned as an issue, but also types of facilities and infrastructures in the area

such as the local hospital, nursing homes, swimming pools and gyms, harbour, road, and flight infrastructures relevant for local citizens and tourists, such as the ones on cruise ships. In the Westfjords, the availability of housing in general depends on the number of tourists in the area at any given time. However, housing shortage was mentioned as an issue, although there were fewer tourists in the area during the first waves of the pandemic.

Having one infected student is bad, it changes the whole course but having four or five is a big problem in Ísafjörður because there's just simply isn't the space to put these people, there's a big housing shortage. (Interviewee #42)

We have three floors with bathrooms on each floor. It would [therefore] be really easy for us [self-isolate]. (Interviewee #25)

Working facilities determine whether interviewees had to work from home, could carry out distance working, or were able to go to work.

I thought it was amazing being able to come to work. Compared to the spring when I was working in the University centre when I was just completely working from home. (Interviewee #6)

The geographical location and peripheral settlements were seen as a potential way of protecting people from the outside environment if needed, although drastic measures, such as completely closing off communities, were not taken. However, given the limited service provided in some of the villages, such as in the case of necessities, consumption, trade, and geographical location was also seen as a risk factor. The possibility of placing contaminated waste in landfills was mentioned as an issue that local authorities had to deal with during the pandemic.

It is possible to close these smaller settlements to outsiders very quickly. You know, in many cases, just blocking one road and you've just isolated it. So, people do not come in and people do not go out. (Interviewee #33)

You know the shelves, becoming very empty in the grocery after a few days where there's been no transport or something. (Interviewee #39)

What measures can be taken to get rid of [contaminated] garbage, for example. It is possible to create a landfill in the Westfjords, if it is not possible to drive the waste to the capital area or something like that. Of course, we received instructions from the chief epidemiologist and these government agencies. (Interviewee #2)

The importance of swimming pools and gyms, as a part of the public infrastructure and built environment, was

frequently mentioned by interviewees, and that they had to be closed for periods of time during the pandemic.

Social aspects supporting community resilience

The analytical framework, see Table 1, suggests three categories for identifying social aspects: demography, social capital, and cultural characteristics. These are explored in Table 3, with two additional categories identified during the analysis of the interview transcripts – impacts on people and vulnerable groups – reported afterwards in Table 4.

The demography of the interviewees differed a lot, ranging from the native population born and raised in the Westfjords, Westerners who have temporarily moved away for study or work, and Icelanders who have moved to the region, to foreign students and immigrants who have settled in the Westfjords or live there temporarily. Foreign interviewees came from Canada, England, Germany, Ireland, Netherlands, Poland, Sweden, Taiwan, and the United States. In small communities the societal roles are of great importance, as people generally carry many hats, having roles both with work and leisure activities.

We all have many roles in the society A lot of people need to have a lot of hats. (Interviewee #10)

Social capital entails the quality of relationships among people and at a community level that contributes to community resilience. Many such aspects were brought up in the interviews, both entailing positive and negative aspects. Gathering limitations, isolation, quarantine, and social distancing influenced the quality of such relationships negatively, such as in the case of living arrangements, housing, working, and studying conditions, and leisure activities and social gatherings. In the case of family and friends, some did not have their extended family members nearby, and relationships were impacted by restrictions and gathering rules, and many reported more time spent with family members, on some leisure and social activities, or the importance of friends and the support they provided. Peoples' relationship and trust in authorities was also brought up in this context, particularly in the case of the Polish community, and how it can affect their attitudes and compliance with rules and regulations.

Yes, I think everyone just took this very seriously. Like before, for example, when there was a 5-person assembly ban here. People generally took it very seriously. (Interviewee #19)

I actually found there to be a bit of a difference between groups regarding trust towards the authorities. At least I think Icelanders here have generally trust towards the authorities and believe that these are the right orders. (Interviewee #19)

Table 3. Social aspects and variables [14] p.4).

Social aspects		
Demography	Social capital	Cultural characteristics
Foreign students	Cohesion, consensus	Adherence to rules
Icelanders moving to the region	Contagion shaming	Adaptability
Immigrants	Gathering limitations	Country comparison
Native population	Learning	Fairness
Native population, temporarily moving away	Relationships	Informed discussion
Societal roles	Trust in authorities	Intolerance
		Self-discipline
		Social pressure
		Solidarity
		Toughness

Table 4. Social aspects and variables, additional themes.

Social aspects	
Impacts on people	Vulnerable groups
Isolation, quarantine, health implication	Elderly people
Consumption and working habits	Foreign students
Freedom	Migrant workers, immigrants
Gathering rules	Pregnant women
Humility	People with disabilities
Hygiene routines	Social conditions
Leisure activities, nature-related activities, resourcefulness	Young people
Living arrangements	
Precautions	
Sense of security	
Social effects, lack of tolerance	
Working and studying conditions, work life balance	

We do not have any extended family here. And you do not want to be traveling a lot between parts of the country in a pandemic ... I did not meet friends and acquaintances. You know, because most people only meet their closest family, and we're not closely related to anyone here, except for my husband's grandparents. (Interviewee #19)

This had a profound effect on us as a family. We are six, and five of us had a confirmed COVID infection. All but the youngest. Three of us have chronic symptoms, or side effects to this day. So, this has had a profound effect on our lives. Changed our quality of life really, for all three of us. (Interviewee #20)

Families kept together, and I think there was no long-term harm involved, that you had to spend more time with the family. On the other hand, I think it has strengthened bonds. (Interview #33)

We grew closer as a family. We went for walks a lot and were trying to do something. (Interviewee #6)

But those who quarantined, for example, others were bringing food and other things, and leaving it on the stairs, and friends were baking and bringing to them. (Interviewee #41)

Polish society was not quite the same. They felt so that they were rather listening to directives from Poland, that might not have applied to the situation here. (Interviewee #19)

Support, caretaking, cooperation, consensus, and empathy from fellow community members was also evident, but also experience of so-called "contagious shaming", where people felt a guilt or a shame after testing positive for COVID-19 and having brought an infection into the community. The smallness of the communities made it easy to reach out to others, whether between individuals or between authorities and citizens, or to provide support. The learning element was also brought up in various contexts, such as in the case of children and sanitation, and how well the local communities were equipped to deal with trauma based on societal memory the 1918 Spanish flu, and due to previous experiences which increased cohesion.

That was the hardest for me, how there were stories that went around the towns ... I found it most difficult of all. (Interviewee #20)

But what was good regarding the children, was that we were always washing our hands and sanitizing, which meant that the children were not sick. And that was actually the best thing came out of this, I think. (Interviewee #34)

There was complete cohesion. For example, when we were in isolation, we received many unexpected deliveries. Food deliveries. And everyone was happy to help,

which is perhaps more common in small towns. (Interviewee #20)

No, I think it's better suited because it's this small town feel that creates more cohesion. So, I think society works better together in crisis management. Or at least I've experienced it. (Interviewee # 19)

Comparisons between Iceland and other nations were frequently brought up, with a favourable discussion about the national conditions and cultural characteristics compared to other countries, such as in the case of adherence to rules, fairness, and informed discussion about the pandemic situation.

I think Iceland is doing a very good job because it seems that there are measurements in place and people are aware of what they are. I think Iceland is doing a good job. (Interviewee #13)

People can become very misinformed by social media. Not necessarily in Iceland, I feel this is more in other countries. (Interviewee #42)

Furthermore, solidarity, unity, and toughness were brought up in the context of previous experience with past traumas, unkind natural forces, and isolation of communities, but also intolerance as the pandemic dragged on. Social pressure, social solidarity, responsibility, and adaptability, both of local citizens and immigrants, were also evident, especially concerning the following of ever-changing rules to keep the society safe and the economy running as smoothly as possible. Increased self-discipline was also mentioned in this context.

Maybe it's because of our history of avalanches and shocks and other things. That people are more aware of such threats, external threats. So, I think it's a little bit embedded in the community soul here. That people just deal with all these shocks quite well. And I think this is something in the culture, the community here. (Interviewee #33)

This kind of toughness here. We are of course located remotely, and people just have to keep going. (Interviewee #24)

We Icelanders are so incredibly good at sprinting. But we are not so good at running marathons ... We're tired, everyone's kind of annoyed. (Interviewee #10)

Because it was in the very first wave. I think there was a lot of pressure. (Interviewee #22)

The additional categories of strengths in the social theme – impacts on people and vulnerable groups – are explored in [Table 4](#).

COVID-19 impacts on people were discussed from various aspects, positive and negative, ranging from precautionary approaches to isolation, quarantine, and illnesses. Working and studying conditions were also

discussed frequently. Those struggling with health implications, or the death of family members, did not have tolerance for the views of people who regarded the virus as a mild one. In some cases, people experienced more balance in their lives, due to working conditions or less pressure to take part in social activities.

I was obeying the rules ... special precautions you just take extra care not to be risks to yourself or anyone else. (Interviewee #42)

I watched the doctor stand outside in the blizzard getting dressed in the protective wear to come in. ... I was quite grateful that we were well cared for. The infection control team was wonderful. And the doctors who called me. All of us were very well taken care of. That is not something we can take for granted. (Interviewee #20)

I got sick and had shortness of breath and such, had difficulty breathing. I was completely scared, you know, do I need to be admitted? Do I have to go to the hospital or something? But I was more afraid of the people around me. (Interviewee #20)

I am more annoyed by the views of others regarding the pandemic. Like when people talk about this as being no issue. It's a little annoying to me. I have had a very hard time talking to people who think this is not an issue. (Interviewee #24)

Social effects were also mentioned, such as when other citizens avoided contact to reduce the risk of infection, or implications in the case family togetherness, such as by communicating with elderly relatives. Isolation was not just discussed as a prevention mechanism, but also in the case of social effects. Appreciation of social communication was also brought up at times when rules were less strict. The strict 5-person assembly ban, or a gathering rule, set when an outbreak in a nursing home occurred was commonly mentioned, as other regions never had to follow such strict rules. This strict rule was very challenging for people, such as in the case when they could not meet their loved ones, including old relatives, or attend funerals. Nevertheless, solutions were found so people could attend funerals or follow them online.

I know people who were just tormented because it was so hard not to meet people. It just was not coping. But those who have the other character type, this was just a pleasant time. Everyone was at home studying, doing their thing. (Interviewee #41)

Like with these technical aspects. I could watch a funeral on Saturday while I was at work, just had it next to me on a screen. Because I could not attend. (Interviewee #8)

Leisure activities and hobbies were of importance as a coping mechanism, but for those not using the opportunities to exercise outside, the situation could be challenging. Small social gatherings, when allowed, were also meaningful for people. The significant of freedom was also mentioned, and how people became creative in finding ways to socialise despite assembly bans.

I started knitting like so many, which helped my mental health. (Interviewee #20)

We usually meet in smaller groups. (Interviewee #33)

But my wife is resourceful, and she invented remote bingo. And I recorded when she was drawing numbers and the other families were watching live. Then we had prizes that we just put out in the yard and the grandchildren came and picked up the prizes and took them home. (Interviewee #11)

Living arrangements also mattered, but they could either make the situation easier or worse. In some cases, these positively influenced the sense of security. Consumption and working habits in some cases deteriorated during isolation or quarantine, while hygiene habits improved. Humility and open-mindedness, thinking about the broader context of life, was also brought up.

I think it was better mentally and socially for me to be here because I knew that I felt safer in Iceland and that I would always have this building to come back to work or like and the other students here as well. (Interviewee #35)

I survived. My consumption of alcohol went up significantly. I ate much more, I'm a stress eater. So, I think, physically, it was not good. (Interviewee #32)

Personally, what I liked is that the whole world slowed down, and I was actually hoping for it to be a bit more sustainable that people realise that you don't have to travel all the time from A to B, and you can very well create your own nice home without going to Spain every winter. (Interviewee #28)

In terms of vulnerable groups, the isolation of elderly people, the senior citizens, made them susceptible to the effects of the pandemic, according to the interviewees, particularly those suffering from dementia. Those who lived alone were even more isolated than those in a nursing home, and some self-isolated to reduce the likelihood of infection. This had negative effects on their social conditions and mental health well-being. The situation was also challenging when losing and burying deceased loved ones. In addition, changes in service provision were also challenging for this age group.

This of course took a toll on the people in Berg nursing home. Both while all this was going on and then this isolation from the relatives. For people who may be dealing with dementia, it is very difficult to be alone all of a sudden. (Interviewee #20)

That was mainly what was difficult for us in the pandemic when she died. Not from COVID but just due to other reasons, and there was a 10-person assembly ban. ... It was very complicated and difficult for the old man to be forced to have it the way it was. Quite different from what they had imagined all their lives. (Interviewee #38)

Young people were regarded as a group negatively impacted by the pandemic, because of reduced social activities important for their activities and wellbeing, and potential future effects on their physical and mental health.

This was toughest for my oldest kids. Like with school, having to be in home schooling. That did not go too well. (Interviewee #20)

Children have been dropping sports and leisure activities. (Interviewee #20)

The potential impacts on pregnant women and the fetuses were mentioned, particularly regarding the possible effects of vaccinations on fetuses when vaccinations started, and information regarding potential impacts were limited. Restriction rules also had implications in the case of support during maternity care, ultrasounds, and childbirth. People living in poor social conditions were also mentioned as a possible group at risk, as well as people with disabilities.

It was a bit unclear in the beginning whether pregnant women should receive vaccinations or not. At first it was so vague and then it was recommended to everyone. But this created a bit of anxiety and tension. (Interviewee #19)

Then those people who likes can't get the vaccine, because of their disability, thus you know, compromised. (Interviewee #36)

Some groups were seen as vulnerable because of potential outbreaks due to proximity in their living or working arrangements, such as in the case of foreign students, or in a kindergarten. One grave situation that emerged was an outbreak of the pandemic on a fishing vessel, Júlíus Geirmundsson, when the vessel was not sailed to shore immediately, and instead it was kept at sea until the majority of the fishermen became ill.

The student group is vulnerable because they all live together in a number of houses, and almost none of them live on their own. (Interviewee #42)

We were told to wait in the boat for 24 hours. Yeah, for a while and together 48 hours after we tested, and they didn't know what to do. (Interviewee #38)

Lack of social networks and lack of information at the beginning of the pandemic was seen as an issue for migrant workers and immigrants, such as within the Polish community in the region.

Perhaps the proportion of foreigners who often did not understand the rules and therefore did not follow them as much. But then things started to improve, and information began to appear in Polish and English as well. But at first it was a bit just aimed at us Icelanders. Everything in Icelandic. (Interviewee #20)

On the positive side, there was evidence of rising empathy level within the society, and that people were more willing to discuss challenges related to isolation, such as anxiety and depression, and seek support.

Governance aspects supporting community resilience

Table 5 outlines the categories and topics pertaining to the governance theme and community resilience.

It was evident from the interviewees that the communities were insufficiently equipped to handle the immediate impacts of the COVID-19 pandemic in its early stages, particularly in the case of the infection in a nursing home in Bolungarvík, called Berg, when additional health workers had to be flown in from Reykjavík. However, overall, the interviewees were of the view that the health workers were effective.

I thought the doctors were doing very well and the nurses. When we called and sought out guidance, and especially when this came up in Bolungarvík. They had answers readily available and were firm in telling us what we should do. They had no speculations, or maybe this or that. It was just clear. And you need answers like that in a pandemic like this. There isn't a yes, no, maybe. You just need answers on what is allowed and what is not. (Interviewee #34)

Some companies came up with innovative solutions to continue operations. In a fish processing company, thermometers were brought in to measure the staff at

Table 5. Governance aspects and variables [14] p.4).

Governance aspects	
Community policies and procedures	Planning
Chains of command	Adaptability
Clarity of roles and responsibility	Collaboration and teamwork
Communication	Disaster preparedness
Innovation	Information dispersal
Logistics	Responsiveness
Resource allocation and adequacy	Scale

the start of the working day, striving to try and reduce the potential for group infections.

And in the big fish factories they bought thermometers to measure the temperature of the staff when they came in the mornings. And in the beginning, it was a bit controversial, that this was symbolic of how profit driven the companies were. That they did not intend to lose staff on sick leave. But this revolved around the fact that since people had to work close to each other, there was no other way. No one wanted to be responsible for infecting 50 people. (Interviewee #41)

Clear and regular communication was identified as being central to the effectiveness of local governance, emphasising a clarity of roles and responsibility. This was predominantly carried out at the national level by experts and dispersed via Iceland's specific website for this purpose, covid.is, but also on sites belonging to the health institutions and news agencies.

Then the health institution and the civil defense had a page. So, during a period, when everything started to go awry in Ísafjörður and Bolungarvík, very clear information began to appear on the health institution's page. So, when needed, information came from there and from the Civil Defense. So, people could get local news and then of course they just followed all the mainstream media. This was, of course, the main topic of discussion. How many infections are there today? (Interviewee #41)

The theme of disaster preparedness and community members being ready for whatever situation is unleashed was frequently discussed by interviewees, and this was explained as a predisposition towards adaptive crisis management – as explained earlier, the Westfjords region is frequently cut off due to bad weather and has suffered from catastrophic coastal avalanches in recent decades. Interviewees were of the view that the communities were not prepared specifically for the COVID-19 pandemic, as such, but had an underlying capacity to adapt to and be ready for any challenging situation.

I was well prepared for the fact that we had had bad weather there in January, February. And I was driving an old car and there was a little snow in the valley. And I was getting stuck and such, so it was just hard to get produce. So, I just went shopping and stocked up on enough produce for many weeks in February. Like, enough coffee so that it would last me until the summer and all such necessary items. Then the pandemic arrived here in early March. And then I was just, I just had everything. (Interviewee #23)

Had to take a lot of decisions, and in such instances, you use the strengths of such a small community. I made all kinds of decisions, for example, you felt that the older people were worried because this concerned the nursing

home. And older people were considered, in the first steps, at high risk. So, as a reaction to that, which I do not know whether was right or wrong, was to call all senior citizens in Bolungarvík. So, I just put together a team. And it was completely unorganized, there was no administration in it. (Interviewee #1)

Another strength of the communities concerning decision-making related to the short chains of command and ease with which new ones could be determined organically without the complexities that might be experienced in more highly populated and bureaucratically complex regions.

So, we've just decided on the chain of command, so to speak, so it's kind of flowing down that way. But then all of a sudden you have a bubble here and you are making all kinds of decisions like calling Sólveig and asking her to call some people. Completely disorganized and is not specified in any rules and completely unclear what the effect is, good or bad or what. But you just make decisions like that. And I made a lot of decisions like that. But, of course, it is maybe possible to do these things in small places where the connection is closer, while not doable in Reykjavík?. (Interviewee #1)

The ease with which the communities could respond to common rules and collaborate, despite limited health-care infrastructure, was cited by interviewees as a hallmark of the successful response to the pandemic.

These common rules for nursing homes have helped us tremendously. All these consultation meetings with the Medical Director of Health and the Epidemiologist and all this, this helps a lot. And I think the more information, the more help, the better. Not everyone needs to come up with a solution of how best to do this. We're just doing this together. I think it's the big lesson, spreading information and collaboration. (Interviewee #10)

Some criticised the lack of local flexibility in interpreting rules concerning gathering restrictions, even when the majority of the cases were in Reykjavík and there were none in the communities of the Westfjords.

Infrastructure aspects supporting community resilience

Table 6 summarises the categories and topics specific to the infrastructure theme and community resilience.

Many interviewees contended that it was easy to isolate and shelter from the pandemic within their existing domestic residence, and that the lack of people in the communities conveyed advantages.

Easy to isolate. Easy to be isolated from others. We do not have a lot of people here. (Interviewee #31)

Because there are only two of us in the home, we can separate completely. We would each have a separate

Table 6. Infrastructure aspects and variables [14] p.4).

Infrastructure aspects	
Individual mobility	Community services
Access to food	Communication
Healthcare infrastructure	Leadership and decision-making
Information Technology	Multiple roles
Shelter	

bathroom and bedroom. It would work out. However, there is a shared kitchen so that the person who is not in isolation would have to cook for the other. (Interviewee #2)

Although the pandemic did not overwhelm healthcare infrastructure, apart from arguably in its earliest stages, the interviewees were of the view that this could have easily happened if the situation had worsened.

I think the only thing I am worried about is the capacity of the hospital here. Something, in case something is happening, do we have the ability to capacity to take care of all the patients? That is the only thing I am wondering. Because the resource is not designed for controlling this pandemic. (Interviewee #31)

In some cases, there were insufficient resources locally to satisfy the procedures, such as the lack of available housing or a quarantine hotel for infected locals. This was a particular problem for those living in shared accommodation, such as the students at the local university centre.

I mean the institution is responsible for sort of segregating and isolating at-risk students because in Ísafjörður there's no, there's no central body coordinating that. There is no quarantine hotel. So, the University Centre and their limited number of staff, they have only seven and actually less who are full-time. (Interviewee #42)

The University Centre has two apartments, maybe three but only two that it has full-time access to. So, you have the issue where if you start segregating these people where do you put them for isolation?. (Interviewee #42)

In other respects, the operations of the University Centre were largely unaffected, predominantly due to the flexible use of teleconferencing software when gathering restrictions prevented the teaching of students in person.

We use a lot of teleconferencing equipment. I think it has not changed much as a result of covid, but of course. It is very easy for us to communicate through teleconferencing equipment. (Interviewee #3)

The managers of the University Centre also helped to coordinate access to food for infected students, efforts that were recognised by the students.

The coordinated efforts to get us food and get us more frequent access to testing so that we could finish the quarantine up faster was quite good. (Interviewee #12)

Other workers in the communities were also able to take advantage of Information Technology to take on multiple societal roles more easily during this highly stressful period.

For example, I was called and asked to be an interpreter on site. But I saw that it works over the phone very well too. I do not have to spend a lot of time like this. But it is possible to do it this way and it is possible to believe such cases and examples. And it is possible to do all sorts of things through digital methods only. (Interviewee #16)

Leaders in the community adopted a flexible and rapid approach to the provisioning of local community services and the spread of information, highlighting the importance of effective communication.

Had to take a lot of decisions, and in such instances, you use the strengths of such a small community. I made all kinds of decisions, for example, you felt that the older people were worried because this concerned the nursing home. And older people were considered, in the first steps, at high risk. So, as a reaction to that, which I do not know whether was right or wrong, was to call all senior citizens in Bolungarvík. So, I just put together a team. And it was completely unorganised, there was no administration in it. (Interviewee #1)

Economic implications affecting community resilience

Table 7 highlight the main economic activities mentioned in the interviews and how they affected, positively or negatively, community resilience during the pandemic.

Impacts on local businesses and industries were brought up in the interviews, both positive and negative aspects. In some cases, the companies were able to adjust their business models, thus enabling them to survive or thrive. In some cases, wages had to be cut as revenues decreased. When business operations started to grow again, such in the case of visiting cruise ships in Ísafjörður, there was a shortage of staff as summer workers had not been hired. Also, various means of protection were introduced in accordance with current regulations and restrictions to minimise the risk of infection among employees. Also, companies in the fishing sector had to explain existing rules for employees of foreign origin, such as by using graphics and figures. Furthermore, due to use of teleconferencing equipment, online meetings were viewed

Table 7. Economic aspects and variables [14] p.4).

Economic aspects	
Economic vitality of the community	Individual means of livelihood
Culture, leisure, and sport activities	Alternate employee
Education	Blurring boundaries
Farming	Flexibility in working arrangements
Fishing, fish processing and aquaculture	Loss of jobs
Public service	Migrant works
Real estate, leasing of properties	Mental health, stress, and depression
SMEs, e.g. art and crafts, service companies, start-ups	Productivity
Tourism, e.g. cruise ship tourism	Reduced employment rate
Trade and services	Relocation
	Remote working, digital nomads
	Types of jobs

positively, in many cases saving financial resources and time. The importance of local public support for the survival of businesses was also brought up.

We have kept operations unchanged in a way, but revenues decreased, and wages have decreased. (Interviewee #31)

We organized, divided us into two groups and were working on separate days. (Interviewee #3)

All export gateways for fresh fish just closed. Then, in fact, suddenly, those who could cut pieces and freeze them and sell them into the grocery stores, they could persevere. (Interviewee #41)

There is the financial impact that this has had on tourism in particular. Admittedly, they have not been particularly clear. Public funds have been used to help people out. So, you do not see any poverty or anything like that. (Interviewee #9)

On the negative side was the blurring between the work and private lives of people, and the impacts if rules were not followed. On the positive side there was also large investment in key sectors during the pandemic, mainly the fishing industry.

The distinction between work and private life becomes more blurred when you work from home. You get up and throw laundry into the washing machine and stuff. (Interviewee #33)

There are large investments in the fishing industry in the town now. Huge investments, great development. (Interviewee #1)

In the case of individual means of livelihood, the capacity to find suitable employment, or finding alternative employment, impacted people differently. While some lost jobs, or suffered from reduced employment, others experienced increases in their workload. Furthermore, the types of jobs also played a role. Those working for authorities were in safer positions than those who were self-employed, for example, small services providers, artists, or contractors, or those working for private

companies, including within the tourism sector. Flexibility in teaching kept the education system going. Health services were also kept running with practices considerate of the rules in force at any given time. Furthermore, some private companies, mostly those in primary processing of seafood and seafood related products, managed to keep operations going by changing their practices and introducing flexible working arrangements. The same applied to the possibility of remote meetings and remote work, even enabling people to stay in Iceland while working as digital nomads across national boundaries. This also opened the opportunity for young people to relocate home. In some cases, people had to find alternate employment, given the impact on their former jobs.

We have kept operations unchanged in a way, but revenues decreased, and wages have decreased. A decision was made by Ísafjörður municipality, and the Port Authority, to try to lower wages instead of laying off people. (Interviewee #31)

I was working a lot in tourism, but this made me turn elsewhere. I started doing something else. (Interviewee #22)

Workwise, I had never been busier, things were crazy. (Interviewee #41)

My husband went to 50% work during a period there in the beginning of the pandemic because his company lost business. But then it recovered, and it has not had any lasting effect on us. (Interviewee #19)

And we just see it right here, we have young people coming here who are taking their work with them. People who are in good positions or entrepreneurs. People from the public sector. These people are coming here and working remotely. (Interviewee #1)

The implication was also in the case of productivity, such as when people were working from home and simultaneously taking care of small children. In other cases, productivity stayed the same or improved, and positively impacted family and leisure time. There were

also implications for healthcare workers and their families, who experienced a great burden due to the importance of not getting infected, ensuring they protected the vulnerable groups of people.

Of course, parents then also have to take time off work and they might be able to work from home, but we all know it's not so easy to be productive when you're also looking after children. (Interviewee #42)

So, even though I was in isolation, my productivity was high, because of technological advancements. (Interviewee #33)

In some cases, the impact on income was profound. For those experiencing reduced employment or job losses, governmental support was of great importance.

It was a huge reduction in our income. I had to go to a 50% job, from 100% down to 50% when I started working. My husband had a severe reduction in income, which we are still actually working through. (Interviewee #20)

My husband could apply to get his salary partially compensated because his work reduced significantly. And I think there were some payments that people received that I think have come in handy. At least I have not been criticising these restrictions or anything that has been done. (Interviewee #20)

It should, however, be noted that the boundaries between work and private lives blur when people work from home, with examples of some people even working when in isolation and perhaps ill. Health-related, work-related and financially-related experiences were brought up by interviewees, as well as depression, stress and mental health issues, particularly in relation to quarantine and isolation.

Then, of course, the distinction between work and private life becomes more blurred when you work from home. You get up and throw laundry into the washing machine and stuff. (Interviewee #33)

Yes, it was a lot of stress. Related to my work. (Interviewee #16)

I would be more worried about something like mental issues in this small community, more than just the COVID virus itself. And also, there were many who were just at home, very depressed I would say. (Interviewee #16)

In addition, migrant workers were seen to be in a vulnerable position, not supported by their social network, and predominantly staying in Iceland due to economic needs.

Just come and work, work, work. And save up money to send money back home. I think this group has been more vulnerable to the directives. Potentially because they are so economically driven in what they are doing. Must get to work. There is a completely different profile regarding mental well-being and other things. Migrant workers in Iceland, I think there should definitely be a separate study in itself. (Interviewee #33)

Discussion

What are commonly perceived to be disadvantages in tackling a pandemic – remoteness and limited infrastructure – were often voiced as strengths in the Westfjords. Access to beautiful nature, opportunities for recreation and leisure, and a small population made it practicable for people to prioritise their physical and mental well-being. Equally, the readiness to tackle a crisis, something that has been familiar to locals over the decades, lent the communities an attitude of flexibility and inbuilt resilience with which to confront an often escalating and fluctuating situation. Moreover, these attitudes, the limited chains of command and general attitude of rules-obeyance, ensured that the governance of the pandemic was generally perceived to be effective. Creative solutions were evident to ensure that the economic damage of the pandemic was limited, with pay reductions preferred to the redundancy of employees and extensive use of teleconferencing software to ensure that business and teaching activities could continue. Inevitably, the lack of pre-planning for the pandemic and limited infrastructure presented challenges in terms of the handling of its manifestations. An insufficient number of healthcare workers necessitated the flying in of additional staff from Reykjavík during a particularly severe outbreak linked to a care home and the absence of a quarantine hotel was problematic, especially when students at the local university centre, who lived communally, experienced infections.

The findings add to the wealth of evidence that is emerging concerning the challenges faced by local communities in addressing the wide-ranging implications of the COVID-19 pandemic [1,2]. Although this study was focused on the local community strengths that underpin resilience during a pandemic, which included strong social capital and solidarity, in line with the findings of South et al. [3], it also deepened understanding about vulnerabilities. The remoteness of the Westfjords and limited healthcare resources always exacerbated risks and reduce the speed with which the most serious outbreaks could be tackled, echoing the determinations of Eichelberger et al. [5], Jóhannsdóttir and Cook [6], and Petrov et al. [7]. The potential for

a crisis situation to emerge that was too severe for locals to handle was ever present, and indeed it manifested during the early care home outbreak, leading to the need to add fly-in and fly-out workers from Iceland's capital city of Reykjavík [8]. The challenges in managing businesses and employees were handled adroitly through a combination of national support to cover unemployment and wage losses, and businesses generally preferring to reduce wages rather than layoffs Jóhannsdóttir et al. [6]. Once again, this was demonstrative of flexibility and humility in dealing with the many challenges brought about by the pandemic, and this adaptability was perhaps reinforced by the pre-existing familiarity of locals with handling multiple roles in order to keep the community going. Although many of the entrepreneurial challenges of managing business during the pandemic echoed those found in the study by Vinberg and Danielsson [9], there was nevertheless the sense that many benefited from the pandemic, particularly in the fisheries and tourism sector. The former received increased investment and the latter benefited from hitherto unseen levels of domestic tourism, which helped to offset the lost income from cruise ship visitors.

The framework of Teo et al. [14], provided a useful means of evaluating the thematic character of local community resilience in disaster management. However, in the real-world setting of a local community during a pandemic crisis, the authors found that some topics were irrelevant and other parts needed to be broadened, such as in the cases of the natural environment and impacts to people and vulnerable groups of society. In the case of the natural environment, the role of soil, water and land characteristics did not feature, unless one considers the mountainous landscape of the Westfjords as contributing to the physical and mental well-being of the locals. However, more geographical aspects and characteristics, such as the weather, remoteness, thin population, isolation, and so on, were highly relevant to the coping capacities of the interviewees. Equally, the topics of power and sewage in the community services category of infrastructure were not pinpointed as being relevant by any of the interviewees. Regarding the aspects that needed to be expanded, the three categories of demography, social capital and cultural characteristic were insufficient to capture the breadth of topics discussed – it was necessary to add two more: impacts on people and vulnerable groups. This was necessary to report the underlying vulnerabilities of the communities, especially marginal groups who may not have been identified by many of the native, Icelandic residents. Vulnerabilities concerned foreign residents who spoke no or limited Icelandic and, in some cases, struggled to receive

information about the pandemic in its infancy, and university centre students who, when infected, were often required to move into different accommodation due to the lack of a local quarantine hotel. Migrant workers were reported as being vulnerable due to reductions in income, which was often the only reason why they were resident in the Westfjords' communities. The vulnerabilities pertaining to the lack of a quarantine hotel and economic turmoil for migrant workers also hints at another main feature evident in a real-world setting – the overlapping nature of the thematic categories. Insufficient infrastructure in the built environment led to vulnerabilities for certain social groups, whereas others could easily adapt if placed into quarantine and isolation in their domestic residence.

Regarding the limitations of the paper and its methodology, in addition to the need to broaden the analytical framework to encompass the topical extent of the interview materials, the reliance on purposive sampling may have led to some minority groups, not known to the fixer, being excluded from our analysis. Equally, given that the interviews were conducted in the midst of the pandemic, some issues may have been too raw and emotional for the participants to discuss, and given the closeness of the small communities in the Westfjords, they may have felt unable to discuss certain topics despite the assurance of participant anonymity. In addition, the interviews only represented a snapshot of opinion in a single month, and further pandemic outbreaks occurred after October 2021. This study is not able to provide a portrayal of the coping mechanisms and local community strengths associated with those incidences, which may have further strained the diminishing levels of patience with gathering restrictions that were already reported to be emerging in October 2021.

Conclusion

This study applied an integrated framework for assessing community resilience in disaster management, exploring the features of inbuilt resilience that contribute to successes and vulnerabilities in the context of local communities in the north-western Westfjords that were experiencing the effects of the COVID-19 pandemic. The study both draws on the framework but also provides a test of its real-world applicability in a case study setting. Based on the findings from 42 interviews with local community members in October 2021, the study finds that social capital and easy access to nature for leisure and recreational experiences were some of the most dominant features that underpinned local community resilience and well-being. The aspects of social solidarity and togetherness

in the face of a crisis were hallmarks of the local communities, recognised by the interviews as deriving, at least in part, from a history of natural disasters in the Westfjords. The evaluative framework was broadened by the authors to encapsulate aspects pertaining to impacts to people and vulnerable groups, which was necessary to reflect the specific challenges faced by marginal groups, particularly foreigners, in the Westfjords during the COVID-19 pandemic. This study constitutes an important reference for comparative studies, and pursuant work to this research could involve a follow-up study to investigate the resilience of the communities 1–2 years after the end of the pandemic.

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Data availability statement

The data used in this study will be made available upon request.

Informed Consent Statement

Written informed consent was obtained from all subjects involved in the study. Ethics approval was not needed given the nature of the study (SHV2021–041 and 587,043), instead it followed guiding rules on research practice set by the Scientific ethics committee of the University of Iceland.

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