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Preparedness for climate change in rural areas—case study in three southern Finnish villages

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The anticipated climate change is intensifying short-term extreme weather events and changing their timing and frequency. It is having harmful impacts on local living conditions, such as human safety and health. Different settlements will face different risks. This case study examines how rural residents are prepared for the short-term climate risks caused by extreme weather events in Southern Finland. It also explores how these skills can be improved through public participation, including raising awareness and knowledge sharing. The scope of the study covered rural residential areas, excluding agricultural land. The case study in three rural villages included knowledge sharing and workshops with residents, climate risk reviews based on literature and field observations, and small-scale surveys based on self-assessment on how the experienced preparedness had changed. The results demonstrate that residents in the target villages experience themselves to be relatively well prepared for climate risks. Nevertheless, awareness raising resulting in increased knowledge seemed to make a positive impact on the residents' preparedness skills in the studied areas. On average 25% of the respondents experienced that their preparedness skills had increased during the process, although this number has to be treated with caution due to small sample size and the study setting. The results encourage similar studies on a larger scale in Finnish rural areas.

KEYWORDS

climate change, climate risks, rural areas, residents' preparedness, awareness raising

1 Introduction

Warming of the climate system changes weather patterns and disrupts the balance of nature. Climate change is a slow and gradual modification of average climate conditions, that gives rise to more frequent and stronger extreme weather events, shifting conditions for plants and wildlife, and rising sea levels (Romm, 2022). Climate risks are shaped by a combination of hazards, exposure, and vulnerability. These factors depend heavily on the specific local context, as they are influenced by various environmental and socio-economic conditions in the area (OECD, 2023). According to Ruosteenoja et al. (2016), the rainfall in Finland will increase by about 4–30% for the period 2040–2069 based on the high-emission Representative Concentration Pathway (RCP) 8.5 scenario. Exceptionally, the west coast of Finland might face as much as a 20–30% increase in rainfall in winter periods. Extreme rainfall events are expected to appear more frequently in the whole Nordic area in the future (Kaslegard, 2011). In Southern Finland the areas have either a sub-arctic or a warm summer continental climate, according to the Köppen -Geiger climate classification system (Beck et al., 2018). In this area, typical trends resulting from climate change are shorter winters, warmer summers, and increased precipitation all year round (Carroll and Aarrevaara, 2018). In the long run, climate

change is likely to change the climate classification and simultaneously increase many climate risks (Beck et al., 2018), for example, damage to European rural areas due to storms, heavy snow loading and drought (Venäläinen et al., 2020; Reyer et al., 2017; Seidl et al., 2014). The risk of damage caused by wind and snow is expected to increase as climate change progresses, especially in Southern and Central Finland (Venäläinen et al., 2020; Ikonen et al., 2017). These phenomena have impacts both on the environment and on human health.

Focus on adapting and mitigating climate change is increasing worldwide (Agboola et al., 2023). A limited understanding of preparedness can lead to challenges in both mitigation and adaptation to climate change (Hürlimann et al., 2022). Thus, adapting to climate change requires preparedness, the purpose of which is to reduce vulnerability to, for example, extreme weather events. Preparedness and adaptation at the local level is important, due to the significantly harmful effects that climate change is anticipated to have on social and economic conditions, such as living conditions, safety and health (Hürlimann et al., 2022; Finnish Government, 2023; Sairinen et al., 2011). Local communities need to understand the connection between climate change and its consequences in order to experience the risks as tangible and to respond accordingly (Finnish Government, 2023; Sairinen et al., 2011). However, there has not been much research carried out, nor is there much empirical evidence available on what inspires adaptation engagement in different citizen groups (Brink and Wamsler, 2019).

In order to apply adaptation measures, the local community needs adaptation capability. Adaptation capability consists of economic and technical resources, information availability, infrastructure, social networks, participation in decision-making and values. Limited resources, lack of information and weak economic status increase vulnerability (Sairinen et al., 2011; Climate-adapt, 2023). Raising awareness about climate change can promote preparation for extreme weather conditions (Bollettino et al., 2020). According to the World Health Organization, raising awareness is based on public participation actions in which the interaction with local citizens is arranged together with sharing current information dealing with viewpoints of climate change impacts in rural areas. The aim of awareness raising is to share topical information about the situation and its requirements to locals. This kind of action is expected also to have some impact on the behavior of the target group (World Health Organization, 2024).

Climate change is a threat to both urban and rural communities. However, challenges in climate adaptation are quite different in cities compared with rural settlements. In rural environments, the capacity of citizens themselves is more emphasized, as they cannot expect similar public services to those in urban areas in risk situations (Brink and Wamsler, 2019). In addition, climate change risks of urban communities have been studied more than in the case of rural communities, especially in Finland. In rural areas the vulnerability of the local residents is connected with the high dependence on climate sensitive livelihoods and ways of living (McLeman, 2010). Rural communities might have limited access to some resources, such as material, financial and human resources, compared to larger urban areas (Choryński et al., 2022). Age distributions in rural and urban areas may also differ, which can affect the vulnerability of the area. In Finland, the rural population is aging; it is more common among people over 65 years to live in rural areas, and it is most common among people over 84 (Reimi et al., 2016). Elderly people are more vulnerable to such climate risks, such as increasing slipperiness and summer heat (Finnish Government, 2023). On the other hand, rural communities can have tight social networks. High levels of trust and familiarity in the community have been shown to facilitate disaster response and recovery (Kearley et al., 2023). Kokorsch et al. (2025) state that community narratives and memories also play a role in how climate risks are experienced. At best they serve as a guide for future preparedness, however, they can also cause an underestimation of the risks.

Rural residents may lack access to healthcare, or the distance to it may be longer (Li et al., 2017). However, they may be mostly concerned about their properties and how a harsher climate would affect their economic value instead of health effects (Kolmodin et al., 2019). Rural residents may consider the threat of climate change lower in rural areas compared to urban areas. This could be explained by several things, for example, less awareness about climate change, fewer direct experiences of its effects, because natural ecosystems provide more protection, and greater resilience in rural areas due to a closer connection with nature (Tenbrink and Willcock, 2023).

There are only a few examples of research concerning preparedness for climate change in rural areas of the Nordic countries, mostly from Sweden (e.g., Kokorsch et al., 2025; Baron et al., 2024; Eriksson et al., 2024; Kolmodin et al., 2019; Brink and Wamsler, 2019). Kolmodin et al. (2019) studied how residents in Sweden experience and prepare for climate risks and crises. They found that the rural residents expressed weak trust in the crisis management of the municipality and of local enterprises. Rural populations are generally used to managing crises on their own, because assistance from authorities usually takes a long time to arrive. However, there is also a trust in society supporting remote communities and providing help in situations of climate hazards (Kolmodin et al., 2019; Baron et al., 2024). Eriksson et al. (2024) found that the residents in a rural community in Sweden were not concerned about the increased risk of wildfires. Brink and Wamsler (2019) studied what shapes people's engagement in adaptation. They concluded that engagement is mediated by gender, personal values, worldviews and place; aspects usually not considered in public adaptation discussions.

In Finland, there has been long-term research carried out dealing with climate change, but local, specific, and solution-oriented information or expertise on adaptation in rural areas is hard to find. Research projects have dealt with adaptation actions of municipalities and regions (see, e.g., Hildén et al., 2022; Gregow et al., 2021). However, more detailed information is needed on how climate change will affect daily lives and communities, and where it would be worth investing in adaptation (Hildén et al., 2022). Therefore, this study has focused on the adaptation of rural communities to climate change in Finland, because it is a unique perspective.

This article presents a community case study of three Southern Finnish village areas. The research questions are to examine (1) How rural residents experience they are prepared for climate induced risks and (2) How their preparedness can be increased by raising awareness. It describes a study comprising practical reflections on perspectives for increasing awareness and public engagement in climate change. The focus is on short-term climate risks in Finland caused by extreme weather phenomena, such as storms, high winds, heavy rains and heat waves (Tuomenvirta et al., 2018). The study concentrates on risks affecting the living

conditions of residents. Examples of the risks considered are power outages, trees falling on buildings and roads, slipperiness in the yards and roads, lack of well water and pollution and health hazards caused by heat. Risks related to agriculture are not included in the scope of this paper, because this study aims to include all village residents, not only those who are involved in agriculture, like farmers.

The structure of the remaining part of the manuscript begins with presenting the context of the research, including the methods used. This is followed by a presentation of the results and a discussion. At the end, the research outcomes are summarized, and opportunities for future research in the area are highlighted.

2 Context

2.1 Study areas

The case study villages are situated in the region of Kanta-Häme and Päijät-Häme in Southern Finland. In those regions, the annual average temperature is between +4.5 and +5.5 degrees Celsius, while the annual precipitation is mostly between 600 and 700 mm. The local climate has already become 0.6 degrees warmer during the period 1991–2020 compared to the period 1981–2010 (Climate guide, 2022).

The population in Kanta-Häme is about 170,000 (Regional Council of Häme, 2022), and that of Päijät-Häme is about 206,000 (Regional Council of Päijät-Häme, 2020). Rural areas are suffering from population loss. In the whole Häme region, the number of seasonal residents can rise to as high as 60,000 per month (Ministry of Agriculture and Forestry of Finland, 2023). The case study village areas are all situated in "rural areas close to urban areas" according to the rural–urban classification (Helminen et al., 2014; Figure 1).

2.2 Methodology and data collection

This research was conducted as multiple case studies, in which three village environments were studied using several data collection methods, such as (1) knowledge sharing in workshops including informative presentations and interactive discussions with residents, (2) small-scale surveys for the residents and participatory observation, and (3) climate risk reviews including desk research, information exchange with village residents and field observations of the physical environment. The progression of the case studies is described in Figure 2.

Case study was selected as the research approach because it can be used for investigating a complex phenomenon through conducting qualitative, applied research (Yin, 2014). Case studies are usually utilized in social sciences when there is a need to better understand a phenomenon. When a case is studied, an entire process should be covered (Eisenhardt and Graebner, 2007). The validity of a case study is increased when a variety of data collection methods are used (Eisenhardt and Graebner, 2007; Yin, 2014).

Knowledge sharing (1) was implemented in two workshops, which were organized in all the village areas studied, one at the start of the process and one at the end. The purpose of the workshops was to improve the preparedness skills of the residents by residential inclusion and the raising of awareness related to climate risks. The awareness raising through knowledge sharing with village residents in workshops included elements of participatory action research, such as expert presentations by, for example, the university, public rescue services, the wellbeing services county and the Martha Association (non-profit organization well-known for its dedication to educating the public in matters of home economics). Representatives from local municipalities also participated in the workshops.

The workshops were organized in collaboration with local village associations and held in village halls. The associations widely invited residents to participate in the workshops. To maximize participation, the workshops were scheduled in the evening and held in familiar local settings with the support of community organizations.

In the workshops, the impacts of storms, heavy rains, floods, winter slippage, frost, and other climate phenomena on residents' safety were presented, along with information on how to enhance preparedness for such events. The presentations included, for example, information about the equipment to keep at home in case of a power outage or storm, and how to prepare for the summer heat extremes. Informative printed materials and brochures, such as a "Guide to preparing for climate risks" (prepared by the authors of this paper), were distributed to the residents in the workshops or other ways to raise awareness.

In both workshops, the climate risks were discussed with the residents though a topic framework based on desk research. In the first workshops, the attendees were divided into smaller discussion groups of 3–5 people, to identify local climate phenomena and risks, focusing on topics as roads, housing, and energy distribution. The second set of workshops focused especially on the results of the local climate risk

FIGURE 1
Presentation of the case study process in village areas.

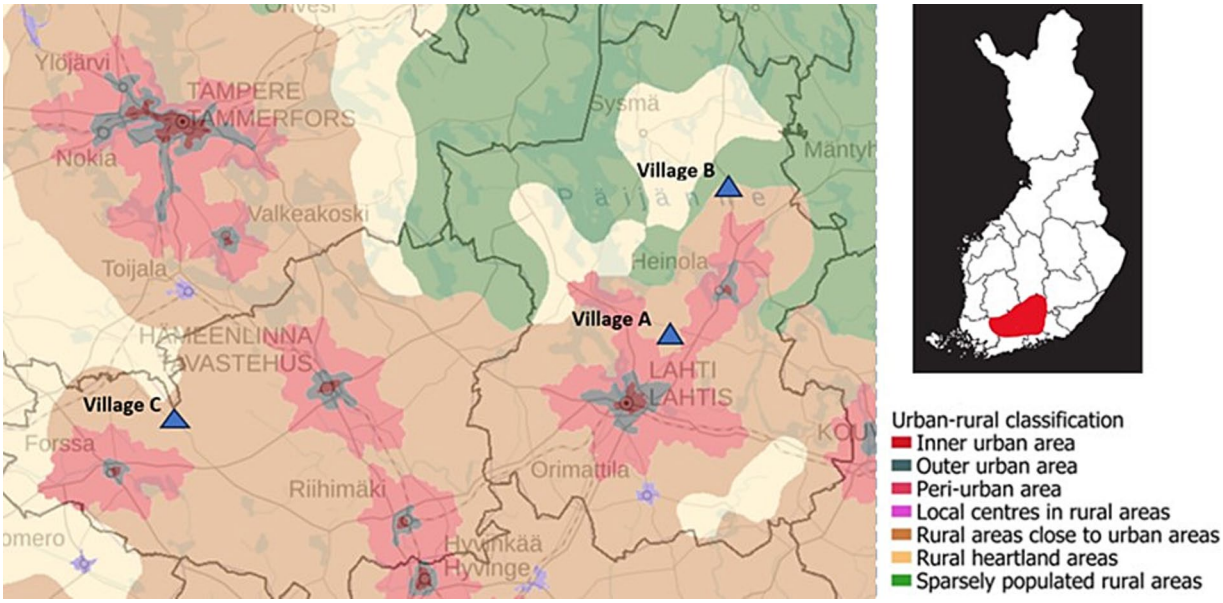

FIGURE 2
Location of the case study villages including the urban - rural classification in Kanta-Häme and Päijät-Häme regions (National Land Survey of Finland, 2023; Finnish Environment Institute, 2018) (Background map: Finnish Environment Institute CC BY 4.0).

reviews for risk prevention and preparedness. In this case study, participatory observation during the workshops and discussions with the residents enabled the researchers to better understand the local circumstances.

A small-scale survey (2) was included in this community case study because it is a useful method to collect information efficiently and anonymously with standardized questions (Munn and Drever, 1990). As a qualitative research method, in which the researcher takes part in the activities, interaction and events of the group to be studied, it was effective for this purpose (Dewalt and Dewalt, 2011). Participatory observation allows the researcher to study non-verbal expression of feelings, terms used in communication, and it strengthens other research strategies, such as interviewing and surveys (Kawulich, 2005). According to participatory action research, there is a need to reflect on the collected material between the different phases of the research process (Kindon et al., 2007).

With the small-scale surveys implemented at the workshops, the level of preparedness skills of the residents and the impact of information sharing activities were investigated. At the beginning of the first workshop (WS1), residents were asked in an anonymous survey how they are currently prepared for certain climate risks on the household level and risks to the entire village on a scale of 1–4. It was possible to leave blank the sections that were not considered to apply to oneself. At the end of the second workshop (WS2), residents were again asked to reassess their level of preparedness for the climate risks in question, but also whether their preparedness had improved as a result of the shared information. The survey forms are presented in Supplementary Tables 1, 2. Because the number of participants in the surveys was relatively small, the data analysis is descriptive only.

Climate risk reviews in all village areas were carried out in between, and as part of, the workshops. It included desk research (3) on potential climate risks, field observations of the physical environment and participatory observations of the resident perspectives to view the outcomes from a local point of view. Desk research was applied in mapping climate risks, as it combines a traditional literature review and the processing of existing materials, such as analysis, synthesis and comparison to draw conclusions (Stanisław et al., 2023). The desk research material included assessment of the Geographic Information System (GIS) data sets to define local climate risks using QGIS software. The results of the climate risk review were compared with the preparedness skills of the residents.

The basic information of the studied village areas and details of the case studies are presented in Table 1.

3 Results and discussion

The climate risks investigated in this case study were mainly short-term climate risks of events that have already occurred in recent decades in rural Häme. On that account, it could be assumed that residents living in rural areas are used to being prepared for these risks, for example, of falling trees and power outages. However, climate change is intensifying extreme weather events, changing their timing and increasing their occurrence in the future. Therefore, the goal of raising awareness along with this case study was to ensure that rural residents are aware of the trend and have sufficient preparedness skills. The preparedness level of the residents at the beginning of the study, the implemented activities to ensure the sufficient preparedness level and impact of the activities are presented in the following section. All quantitative results should be considered indicative, because the number of participants in the workshops and, thus, also in the small-scale survey was relatively low (Table 1), and not all residents who participated in WS1 necessarily participated in WS2. Although the number of respondents was statistically small, the workshops represented the village communities well, considering the total populations of these villages.

TABLE 1 The basic information and case study details of the three case village areas.

	Village area A	Village area B	Village area C
Basic information	Number of permanent residents		
	400	50	250
	Number of leisure residents		
	2,000	200	250
	Distance of the nearest city centre		
	15 km	25 km	25 km
	Land use		
	Forest 70%, agricultural land 8%, water bodies 15%, built environment 4%*	Forest 83%, agricultural land 3%, water bodies 12%, built environment 2%*	Forest 50%, agricultural land 20%, built environment 4%*
	Water supply and sewer systems		
	Both municipal and own systems	Own systems	Both municipal and own systems
Details of the case study process	Workshop 1		
	September 2022,	March 2023,	October 2022,
	18 participants,	15 participants,	17 participants,
	Main topics:	Main topics:	Main topics:
	Home emergency supply and forest related risks	Home emergency supply information package	Information about home emergency supply and water related climate risks, such as well maintenance, floods, and blue-green algae
	Climate risk review results		
	Power outage risk decreased due to underground cabling, frost damage on the roads increased, heat and wind effects in the buildings and wind damage on the roads	Less power outages due to underground cabling, more challenges related to slipperiness, snow, ice ridges and frost heave on the roads, heat and wind impacts in built environment	Most significant on the roads because of wind damage of trees, some leisure apartments and power lines also vulnerable to the wind damage of trees, flood risk
	Workshop 2		
	December 2022,	June 2023	May 2023,
	13 participants,	11 participants	5 participants
	Main topics:	Main topics:	Main topics:
	Rescue service introduced practices in major accident situations and preparation tips related to studied climate risks.	The wellbeing services county introduced how to prepare for heat waves and preparation tips related to studied climate risks	Presentation of the climate risk results and related action proposals

*Finnish Environment Institute (2021).

3.1 Village area A

Based on the WS1 results, the residents of village area A experienced that they are the most prepared for the risk of slippage with regard to their own yards. More than half of the participants responded with the highest option 4 "I know how to prevent and act in a risk situation" and a third answered option 3 "I have taken some measures to be prepared." Residents felt they were the least prepared for flooding in buildings and blue-green algae. Of these risks, about half of the respondents chose option 1 "I have not even thought about preparing."

According to the results of the small-scale survey, preparedness skills improved in all the studied climate risks. The experienced preparedness level improved the most related to power outages, flooding on the buildings, detachment of roofing materials in storms, and a shortage or lack of well water. In all of these, the proportion of those who chose option 4 was about 30% higher after the awareness raising activities than at the baseline level, where the corresponding proportion varied between 6 and 22%. Of these risks, the proportion of the respondents who chose option 4 or 3 in the WS2 varied between 53 and 92%. The results were partly in line with the climate risk review, which found that the drying up of well water and power outages were significant climate risks in the village. Based on the small-scale survey of WS2, residents also responded that their preparedness skills had increased for both.

Flooding inundations into buildings had not occurred in village area A at the time of the review. Probably bringing the matter up for discussion in the workshops helped to initiate the thought process among the residents and thereby improved preparation. The lack of well water is a common problem in village area A. It is possible that sharing knowledge and bringing people together to talk about this issue has increased preparation skills through peer-to-peer learning.

3.2 Village area B

In village area B, based on the small-scale survey results of WS1, the residents were well prepared for power outages and slippage in their own yards, for which 60% of the respondents chose option 4 and 27% option 3, and for a tree falling on a building (47% of the respondents chose option 4 and 33% option 3) among the climate risks considered in this study. The lowest level of preparedness was for blue-green algae (33% of the respondents chose option 1 and 20% option 2), flooding on the road (13% of the respondents chose option 1 and 27% option 2) and frost heave (20% of the respondents chose option 1 and 27% option 2). About a third of respondents experienced that blue-green algae and flooding on the road are not relevant risks to them.

The results of the small-scale survey indicate that the information sharing activities in the area were useful. The climate risk assessment revealed that in village area B, the most significant climate risks were frost heave, flooding on the roads and the occurrence of slippage and icy patches on the roads. In village area B, the highest improvement in awareness occurred with regard to flooding on the road (in WS1 7% of the respondents chose option 4 and in WS2 the corresponding proportion was 18%), trees falling on buildings (in WS1 47% of the respondents chose option 4 and in WS2 64% chose option 4) and also with regard to slippage risk on the road (in WS1 27% of the respondents chose option 1 and in WS2 only 9% chose that option). In the workshops, the discussion about the conditions of the main road was lively, and these results may have arisen due to these discussions and possible road maintenance agreements.

3.3 Village area C

Based on the small-scale survey results of WS1, the residents of the village area C experienced that they are the most prepared for power outages and the slipperiness of their own yard among the climate risks considered. Related to these risks, more than half of the participants responded with option 4 "I know how to prepare act in a risk situation" and more than a third chose option 3 "I have taken some measures to be prepared." Furthermore, no one considered power outages and the slipperiness of their own yard irrelevant to them. It was in line with the results of the climate risk review, which also found an increased risk of power outages and slippery conditions due to more frequent wind damage and winter temperature fluctuations. Instead, the respondents felt they were the least prepared for blue-green algae, 29% of the respondents chose option 1 "I have not even thought about preparing, and regarding the flooding risk on the road, 24% answered with option 1.

WS2 had a significantly smaller number of participants than the first, thus, the results of WS1 and WS2 are not compared. However, based on the small-scale survey results of WS2, at least 1–3 of five respondents in each climate risk category experienced that their preparedness skills had improved. It can be stated that some small-scale impact was achieved with the implemented actions.

3.4 Impacts of awareness raising activities

In general, based on the small-scale surveys and participatory observations, the residents' preparedness skills were already at a good level at the beginning of the process. However, the preparedness skills of the residents seemed to have improved in terms of certain climate risks between the first and the second workshop, which may very likely be a result of the awareness raising activities that were implemented. Raising climate change awareness has been found to promote preparing for extreme weather conditions (Bollettino et al., 2020) and the results of this case study support this.

The compiled results of WS1 are presented in Figure 3 and those of WS2 in Figure 4. The preparedness skills of residents improved the most regarding the shortage or lack of well water (in WS1 28% of the respondents chose option 4 and in WS2 the corresponding proportion was 48%), flooding in buildings and flooding on the road for which about 10% of the respondents chose option 4 in WS1 and 28% chose option 4 in WS2, deterioration of the hygienic quality of well water (WS1: 28% chose option 4, WS2: 41% chose option 4), and frost heave (WS1: 18% chose option 4, WS2: 28% chose option 4). These risks occur less often, which can explain why they may not yet have been considered as much. Instead, preparedness skills related to power outage, slippage in one's own yard, blue-green algae, and health hazards were practically at the same level in both workshops. Of these risks, apart from that of blue-green algae, preparedness skills were already at a relatively high level. A possible explanation is that these risks occur relatively often and are easy to observe.

The latter survey included a section questioning in each climate risk category whether the respondents experienced that their preparedness skills had improved during the process (Supplementary Table 2). On average a quarter of the 18 respondents experienced that their preparedness skills had increased due to the information received during the process. There were some differences regarding the climate risks in how many of the respondents now experienced that their skills had increased. A larger proportion of respondents (39%) experienced that their skills had increased in relation to frost heave, health hazards caused by heat and slippage in one's own yard compared with other risks. Instead, only 17% of the respondents experienced that their skills had increased in relation to blue-green algae, flooding in buildings, detachment of roofing materials in a storm, deterioration of the hygienic quality of well water and shortage or lack of well water. These results partially differ from the other results. There was no apparent correlation between the self-evaluation of the respondents and the changes in the categorization of preparedness (1–4). It may be the consequence of the low numbers of respondents.

It is important to keep in mind that the residents' answers are based on their acquired knowledge, which does not necessarily correspond to reality. As Kokorsch et al. (2025) also point out, a collective and cultural memory can be significant in shaping the experience. It can be difficult to understand how climate change will affect the conditions in the future. The results on the preparedness skills are mainly based on the villagers' own perceptions. Thus, it remains an open question as to what the actual preparation skills in the case of even more unexpected and powerful extreme weather events would be. One of the main challenges is to ensure that communities are resilient enough to face the consequences of climate change (Agboola et al., 2023). Different extreme weather event simulations could demonstrate more precisely to the residents what can be expected in the future. These demonstrations could include, for example, flooding of the roads and built environment.

As Hürlimann et al. (2022) state, a limited understanding of preparedness to address climate change action may limit the possibilities of being well adapted to the changes that will occur. Thus, it is important

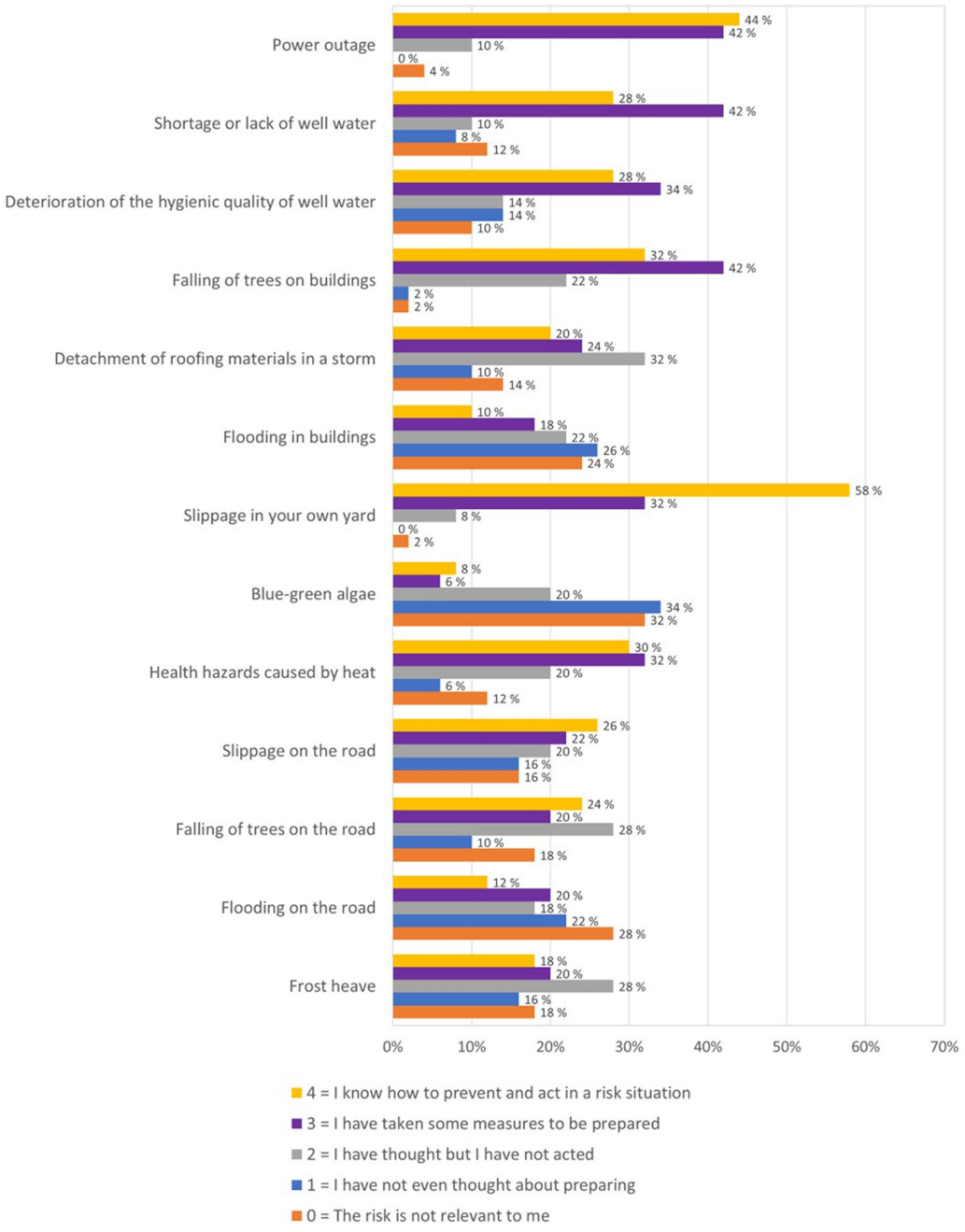

FIGURE 3
The experienced preparedness of all residents who participated in the first workshops (n = 50). The results summarize findings from all three villages.

to increase awareness. The workshops revealed that some attendees were skeptical about climate change overall. On the other hand, the residents mostly agreed that winters are now milder and therefore, there is more slippage. The increase in heat was also noticed, for example, through the fact that more cooling air heat pumps have been installed.

Based on participatory observation, it can be stated that attending village residents were interested in the theme, as the discussions related to the topics were active. The condition of the roads occasionally caused a heated discussion due to annual frost heave damage and limited public resources for road maintenance. It can be that active discussion and peer-to-peer learning reflected in the results as an improvement in preparedness. As noticed also by Kearley et al. (2023), rural communities can have tight social networks, which may support the interest in joint preparedness.

4 Conclusion

The results of this community case study indicate that, in general, rural residents in the studied village areas are prepared for potential climate risks, but the preparedness skills were also improved through the public participation including awareness raising activities. The

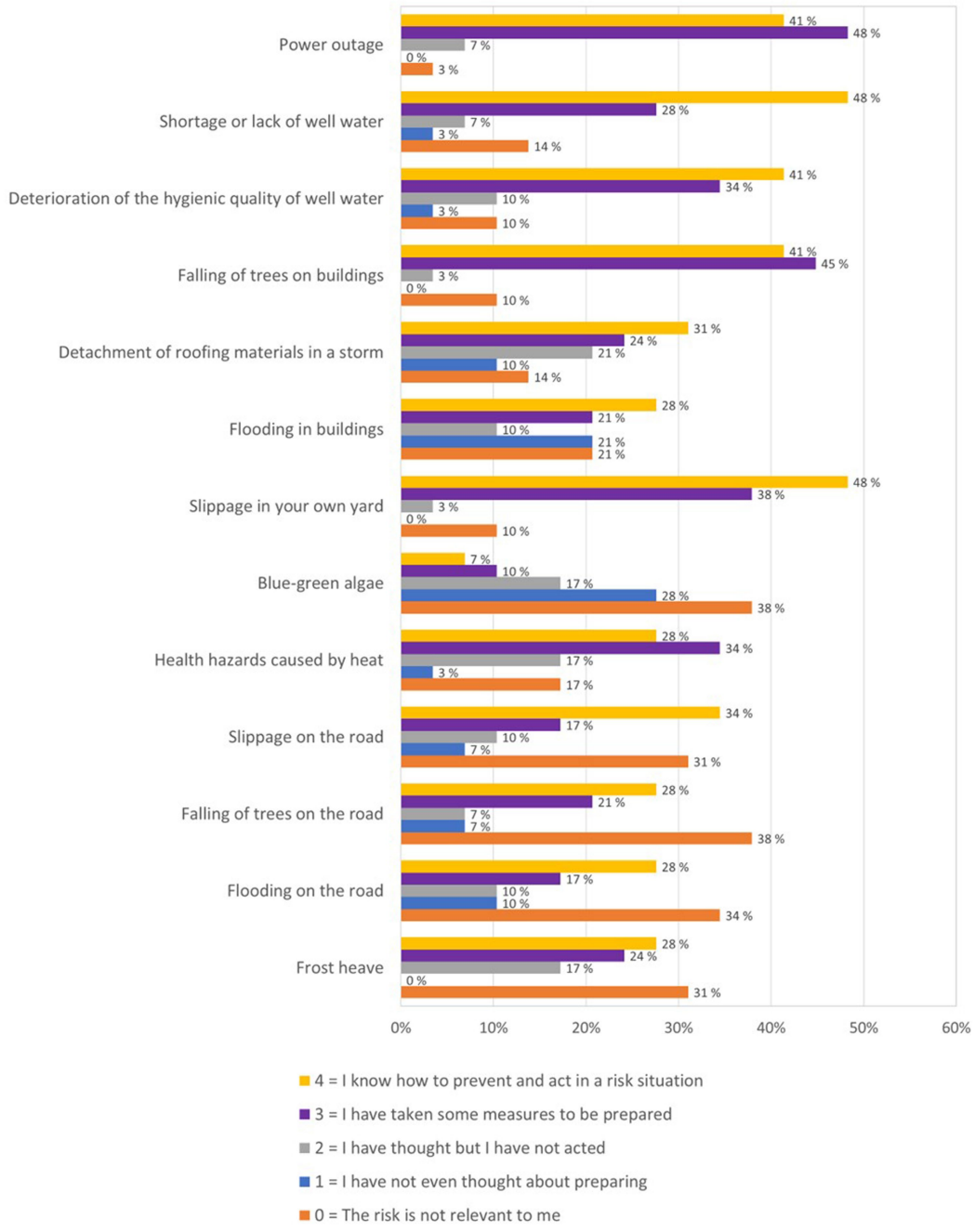

FIGURE 4
The experienced preparedness of all residents who participated in the second workshops (n = 29). The results summarize the findings from all three villages.

residents are used to taking responsibility and cooperating without significant dependance on authorities to provide help in all situations. However, in terms of preparedness, based on the results of the study the residents need more understanding of the risks related to blue-green algae, flooding, and slippage. Regarding flood risks, preparedness skills improved during the process. In general, it can be evaluated that the workshops and other actions implemented to raise awareness of climate risks and preparedness were useful. However, it should be considered that results are only indicative, because the sample was small, and the participants may have been partially different in WS1 and WS2. Currently the residents consider themselves to be adequately prepared for climate risks that they have experienced before, but residents are unable to objectively assess preparedness for unprecedented climate-induced threat situations.

During the case study, it was observed that engaging with residents directly and conducting participatory workshops were effective methods for raising awareness of climate risks. It was also assessed that, as the researchers came from a higher educational institute, they were perceived as neutral compared to, for example, municipal authorities. Therefore, it is assumed that residents were able

to speak openly about the climate risks. A familiar environment, cooperation with other neighbors, and a neutral organizer are all presumed to encourage lively discussions in the workshops.

Regarding the assessment of preparedness levels, the small-scale survey proved to be the most effective among these three methods. However, the study would have benefited from a stronger commitment from the participants in the research process. It would have been advantageous if all the same individuals had responded to both small-scale surveys. Additionally, the case study could have been supplemented with personal interviews.

Positive impacts were achieved by raising awareness, so similar activities should be promoted in the future as well. Additionally, more regular follow-up observations of the local climate and its changes are needed. Different research methods and approaches, such as participatory action research, could support the continuous development in rural areas. Furthermore, cooperation between local and regional authorities and residents on good practices in increasing rural awareness would be fruitful to study on a larger scale, like between different regions in rural Finland. It would also be interesting to compare the situation in rural areas in different Nordic countries facing similar climate challenges. Climate risks and climate safety seem to be topics that bring people together and are thus common interests of a community.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Written informed consent was not obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article because the participants verbally provided informed consent to participate in this study. No identifying information about the participants is revealed in the study.

Author contributions

JR: Formal analysis, Investigation, Methodology, Writing – original draft. KT: Formal analysis, Investigation, Methodology, Writing – original draft. SV: Conceptualization, Methodology, Supervision, Writing – original draft. EA: Conceptualization, Methodology, Supervision, Writing – original draft.

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Conflict of interest

JR was employed by Häme University of Applied Sciences Ltd. KT, SV, and EA were employed by LAB University of Applies Sciences Ltd.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fclim.2025.1548983/full#supplementary-material

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