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Social listening and crowdsourcing in disaster communication—A citizen-centered media and communication consumption perspective

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To secure more resilient communities in the future, it is essential to strengthen the links between all actors. Communication and active engagement are tools to do so. Based on a case study of communication practices in relation to disasters and emergencies in a Danish urban setting, this article examines the potential of applying the principles of crowdsourcing and active social listening to enhance the links between disaster management organizations and citizens. The case study is based on a triangulation of expert interviews with representatives from disaster management organizations, focus groups and surveys with citizens, as well as a media ethnographic study of interactions and conversations on local social media. The study finds that some organizations are already applying principles of crowdsourcing and active social listening, but there is a need to consider local context and media consumption in order to succeed. The study shows that though the majority of the residents in the case community are very digitalized, there are at least two obstacles for digital crowdsourcing and social listening in this setting: firstly the preferred social media is not suited for digital crowdsourcing and secondly the residents prefer to communicate through a variety of other platforms and networks as well, where digital crowdsourcing and social listening is not possible. Based on those findings, this article discusses methods to apply in addition to the digital ones to further strengthen the relations between disaster management organizations and citizens.

KEYWORDS

social listening, media consumption, disaster communication, crowdsourcing, disaster governance, citizens

1 Introduction

In this article, we advocate for a disaster governance perspective that emphasizes the importance of communication across actors in securing resilient communities (Clark et al., 2024). We further argue that societal resilience can be strengthened through stronger relations between actors (Nielsen et al., 2024), and through a more precise and better-suited understanding of citizens' media consumption and their practices for communicating (Couldry et al., 2010). We examine the use of methods inspired

by systematic crowdsourcing (Estellés-Arolas and González-Ladrón-de-Guevara, 2012; Howe, 2006) and social listening (Doshi and Garschagen, 2023; McGowan, 2021; Stewart and Arnold, 2018), and we argue that new strategies, perspectives and tools are required to integrate these methods in disaster governance practices.

In the last decades, traditional top-down and command-and-control approaches to disaster response have been fundamentally challenged. This follows a general development in public administration where the concept of governance has challenged the more traditional notion of government (Sørensen and Torfing, 2011; Torfing, 2020). In the context of disaster risk management, governance approaches are emphasizing the need for a greater focus on disaster risk management (in contrast to response), a greater recognition of local and informal governance structures and, importantly, a shift toward a more inclusive and participatory decision-making model involving non-state actors and (affected) communities (Harrison and Johnson, 2019; Liu et al., 2016; Morelli et al., 2022). Central to these ideas is the role of citizens as active agents in implementing disaster risk management policies and understanding risk management as an inherent part of citizens' everyday lives (Mees et al., 2016; Seebauer et al., 2019). If disaster management organizations intend to apply principles of governance through closer involvement and engagement of citizens, this will involve a strong focus on communication (Reuter and Kaufhold, 2018). This is the case for organizations wishing to influence people's risk perception of various hazards, their self-efficacy regarding preparation and prevention, or their practices for engagement. All of this will unavoidably require analyses of people's practices for communicating and their use of media and platforms.

Disaster communication is ideally a practice where all actors hold a mutual interest in each other, and insights from diverse perspectives are shared equally. It must not be a one-way process led solely by disaster management organizations, directed at citizens who passively receive information (Clark et al., 2024; Nielsen et al., 2024). Instead, disaster governance must incorporate the principle of two-way communication, recognizing and valuing the perspectives, knowledge, and concerns of citizens. The responsibility for facilitating this rests with disaster management organizations.

The perspective suggested in this article challenges the prevailing notion that crowdsourcing exclusively occurs on digital platforms, such as social media. We argue that it is essential to consider that citizens have diverse ways of communicating and that the consumption of news takes place across multiple platforms, media, and in various forums. Based on a Danish case study, part of the larger LINKS project (Strengthening links between technologies and society for European disaster resilience), we suggest solutions that incorporate the diverse perspectives of as many citizens as possible and acknowledge their varied practices for communication. The study investigated citizens' perceptions of disasters and emergencies, their sense of personal responsibility, and their engagement in the preparedness, adaptation, prevention, response, and recovery phases. The results from this case study thus created the background for understanding the potential of introducing new approaches that involve closer coproduction across actors, with a stronger focus on engaging citizens in disaster governance (Mees et al., 2016).

1.1 Research questions

This article focuses on how applying media and platforms, and engaging in communication processes more interactively, can support disaster management organizations in their intention to involve and inform citizens. Disaster management organizations thereby increase their ability to cope with disasters and emergencies and build a more resilient society by engaging citizens and applying resources within the community. On the background of a case study of communication practices in relation to disasters and emergencies in a Danish urban setting, we aim to answer the following questions:

> *How do citizens orient (public orientation) themselves concerning emergencies and disasters, and what role does their consumption of media, platforms and social networks play?*
>
> *What are the present practices for disaster management organizations to communicate with citizens? What are the future perspectives for applying principles of crowdsourcing and social listening among these organizations?*

The application and use of media, platforms, and networks are at the center of the analysis and do not depend on either type of incident or any particular disaster phase.

2 Case description

In this article, we take our empirical point of departure from a case study conducted between 2020 and 2023 in the Municipality of Frederiksberg, a landlocked municipality situated within the Municipality of Copenhagen, the capital of Denmark. Below, we will first describe the municipality, focusing on its demographic characteristics and citizens' experiences with emergencies and disasters. Thereafter, we will briefly describe what characterizes a case study placed within the welfare state of Denmark when it comes to studying the communicative relations between citizens and authorities. Finally, we will argue how the results of this study can be generalized and inform policies in other contexts and on a broader scale.

2.1 An urban affluent society with a low number of emergencies and disasters

The Municipality of Frederiksberg is an urban, and quite affluent, environment, as it is one of the wealthiest municipalities in Denmark. It is the most densely populated municipality in Denmark, as it covers only 8.7 km^2. There are 105,000 people living in Frederiksberg, meaning that most residents live in condominiums and have neighbors living close by. Housing prices are significantly higher compared to those in Denmark as a whole. The residents of Frederiksberg are more highly educated than the overall Danish population (Danmarks Statistik, 2019).

Denmark is a country governed by welfare state principles. Out of several definitions of a welfare state, Esping-Andersen (1990) and Bruun et al. (2017) agree that it is a society characterized by a solidarity-based redistribution of common goods. There is

a high level of trust in the authorities, and the population holds high expectations of the authorities and the state to take care of all citizens (Andersen et al., 2024). Additionally, it is a country with a very high level of digitalization (European Commission, 2022). The principles of the welfare state have however been under alteration in the past decades, with an increasing expectation for citizens to act as self-dependent within a broad number of spheres (Gullestad, 1992; Højer Bruun et al., 2015), including in matters of emergency and disaster management (Kuhlicke et al., 2020; Scolobig et al., 2015). Within disaster management organizations, this has led to an increased focus on disaster communication between authorities and citizens with the aim of raising awareness and motivating citizens to participate actively in risk reduction measures (Scolobig et al., 2015).

On a global scale, the number of emergencies and disasters that Danish citizens have experienced is low, but it is expected to rise in the years to come. The frequency and severity of storms, storm surges, and droughts are expected to increase in Denmark overall. In the capital region of Denmark, the number of cloudbursts is expected to increase by 30%−70% by the end of this century (Danish Meteorological Institute (DMI), 2024). Several emergencies have, however, already impacted the everyday life of citizens in Frederiksberg in recent years. The incident primarily referred to in the data material is a devastating cloudburst in 2011; however, as the analysis will reveal, the data material also includes accounts of an incident involving contaminated drinking water in 2021 and, most recently, a large fire in 2023.

On July 2, 2011, the municipality was hit by the worst cloudburst ever recorded in the capital area. Most of the capital area received between 30 and 90 mm of rain within 24 h, but in the city center, as much as 135 mm was measured, equivalent to 2 months of rain in a single day. This was the highest amount of rain ever measured in the capital since measurements began in 1955 (Danish Emergency Management Agency, 2012). The consequences were extensive, as the cloudburst caused severe damage to buildings and infrastructure. Approximately 10,000 households experienced power outages, while approximately 50,000 lost their district heating. The estimated cost of the damages was DKK 6.2 billion (Danish Emergency Management Agency, 2013).

On a smaller scale, in 2021, the drinking water in Frederiksberg was contaminated with bacteria as a result of a water pipe maintenance issue. All citizens in Frederiksberg were asked to boil their drinking water for a period; some had to continue doing this for up to 6 weeks until the water was declared uncontaminated again (Frederiksberg Forsyning, 2021). In 2023, a large fire in an apartment block resulted in the evacuation of 121 families and the rehousing of all since the block burned to the ground. During the fire, the smoke was visible and odorous over large parts of Frederiksberg.

2.2 Argument for frederiksberg as a case

In Denmark, and specifically in Frederiksberg, the authorities have shown a growing interest in the role of citizens and how they can be involved in preventive measures related to themselves and their homes (e.g., Danish Emergency Management Agency, 2017).

A primary focus has been on flooding as a result of cloudbursts, as it is a hazard that is expected to intensify due to climate change [Danish Meteorological Institute (DMI), 2024].

Our case study of Frederiksberg, however, reveals a low level of risk awareness and low engagement in risk reduction actions among citizens. The municipality aims to increase residents' perception of the risk of flooding in the years to come; however, survey data show that residents of Frederiksberg municipality are not concerned. Only 13% of those polled feel worried or very worried about their home flooding, while 12% reported neither being worried nor not worried, and 74% said they are not very or at all concerned about flooding (Hill, 2023). This is one reason why Frederiksberg is an interesting case to study in terms of disaster communication between citizens and authorities. Another reason is the potential in this municipality for disaster management organizations to utilize crowdsourcing and social listening to identify areas for improvement in communication. It is thereby a case of disaster communication conditions and their outcomes in a context characterized by a high general trust in authorities and a resourceful population (Andersen et al., 2024).

Although this article addresses disaster hazards and emergencies in a large city, the size of the population (approximately 115,000 residents) has not generated a sufficient number of posts on social media to apply machine learning and quantitative methods. This is one reason why we argue there is a need for extending the methods of crowdsourcing and social listening to also integrate information from sources outside social media. Further, we argue for the need to add a qualitative and nuanced component to processing, assessing, and analyzing both types of data. Frederiksberg can, therefore, be seen as a critical case to provide the basis for a deeper analysis of challenges and potentials for crowdsourcing and social listening in disaster communication in general (Yin, 1989).

3 State of art

The range of platforms and media has expanded significantly over the past few years, and people have become increasingly diverse in their media consumption practices (Newman et al., 2024). From a governance perspective, the multiplication of media platforms and outlets is likely to complicate the potential for institutions like disaster management organizations to obtain attention, as societies face a regime of "inattention" (Couldry et al., 2010), which also affects a vast number of other areas beyond disaster risk management. Although it would be easy to suggest more communication initiatives to align citizens and authorities in dealing with disastrous incidents, communication scholars stress that it is challenging to obtain "public attention" within this sphere and in general. We will, therefore, refer to Couldry et al. (2010, p. 3) and their argument that "public attention" is challenging to obtain, as it is rare for people to pay "full and continuous attention to a public world", but that the chance for "public orientation" is better. Couldry et al. (2010, p. 188) also argue that citizens' practices of orientation are mediated in "many distinct ways," as media platforms and outlets have been proliferating for several years and continue to do so (p. 4).

Literature notes the impact of technological progress on disaster governance. The advancement of social media has notably reshaped how coordination and communication processes unfold before, during, and after a disaster, while crowdsourcing technologies have altered the possibilities for data-driven governance (Migliorini et al., 2019).

One technology is crowdsourcing, which, by some definitions, is a process where the task of gathering information is outsourced to an "…undefined, generally large group of people" (Howe, 2006). The idea is that users bring what they can for mutual benefit and that people in the crowd take on this task voluntarily (Estellés-Arolas and González-Ladrón-de-Guevara, 2012). Torpan et al. (2024) stress that since risk and disaster management organizations', work with crisis management and communication is often supported by social media tools, these platforms can be utilized for crowdsourcing. The usage can relate to tasks identifying citizens' concerns regarding disaster risk reduction (Torpan et al., 2024) or through asking citizens to report or carry out collective problem-solving (Palen and Hughes, 2018). Crowdsourcing can be applied passively and actively (Clark et al., 2024).

The literature shows that the principles of crowdsourcing are applied in diverse settings related to disaster management, including awareness, early warning, assessment, risk reduction, and resilience (see Clark et al., 2024, for variations in examples of studies). In a recent review (Nielsen et al., 2024), it is analyzed how the response phase dominates studies of social media crowdsourcing in disaster management, followed by studies on preparedness, although recovery, mitigation, and cross-phase analyses are also carried out. And, depending on geographical contexts, studies describe how different platforms are used to facilitate crowdsourcing (Clark et al., 2024). Despite the efforts of researchers, Clark et al. (2024) argue that there is still a lack of both concrete tools and guidelines for disaster management organizations, as well as common methods.

Social listening is a specific approach to analyzing what is happening in a crowd of people by applying various methods, both digital and analog. There are different definitions of social listening, which will be outlined here to provide a definition that we will argue best suits the case in this article. One is that social listening is an "active process of attending to, observing, interpreting, and responding to a variety of stimuli through mediated, electronic, and social channels" (Doshi and Garschagen, 2023, p. 3), or an "external perception analysis" (Marynissen and Lauder, 2020). It is a method that pays attention, for example, to the expression of emotions, topics, and opinions among users (McGowan, 2021, p. 273), whether these are positive sentiments or sentiments such as apathy or frustration (Doshi and Garschagen, 2023, p. 1). A related method called sentiment analysis also covers these tasks but is primarily used by businesses in relation to customers and sales and aims to divide the sentiments in a large crowd into either positive, negative or neutral by using machine learning (Drus and Khalid, 2019).

The site for social listening is often conversations and interactions on social media (McGowan, 2021) or "web-based interactions" (Silva et al., 2022), which is reasonable due to increasingly mediated societies and the fast-growing and evolving use of social media. The increasing use of social media represents a shift toward "many-to-many communication" and a departure from the traditional "one-to-many communication" approach commonly employed by disaster management organizations. This is a core argument for utilizing social listening when aiming to engage and support citizens (Marynissen and Lauder, 2020).

We refer to Stewart and Arnold's (2018) argument that the active element of paying attention through social listening is to hold the ideal that "...the desired outcome of engaging in social listening is to arrive at the point of an overt response" (p. 86). We argue that social listening should result in feedback to the citizens, consumers, users, and customers whose conversations and inputs are monitored and interpreted. Marynissen and Lauder (2020) argue that such an active response might manifest as messages on social media and websites, or direct answers to individuals who request specific responses. The approach can be applied in various media and communication spheres, with the aim of engaging actively. The concept of social listening can also involve anonymous monitoring and surveying of activities among citizens, such as watching and listening without responding. Following this approach, organizations do not necessarily include feedback and active response (Stewart and Arnold, 2018, p. 86).

There are several examples of the utilization of crowdsourcing and social listening concerning disaster management in very diverse contexts, including both sudden and unforeseen incidents, as well as planned events and incidents that have been forecasted and involve a larger crowd of people. In cases where public security may be potentially compromised due to conflict, this can be foreseen through crowdsourcing (Silva et al., 2022). In other cases, there is a specific aim of crowdsourcing, such as surveying the reception and interpretation of, for example, a public campaign. In cases like this, it is relevant to assess the audience's demographics and the campaign's reach, as well as whether a campaign initiative generates a specific volume of conversations, among other factors (Silva et al., 2022). From a disaster management perspective, this is a way for managers of, for example, preparedness campaigns and disaster prevention, to become more adaptive. It is also a way to monitor a diverse set of actors and their perspectives on the distribution of responsibility between oneself and others regarding adaptation to, for example, climate change (Doshi and Garschagen, 2023).

The method can also be applied in a response phase, where the aim is to address the concerns of a large crowd of people, respond to their questions, request information, and understand their expectations of the disaster management organizations in charge. Even though Marynissen and Lauder do not explicitly refer to the applied method as social listening, they refer, in detail, to methods that aim at obtaining the same goals as social listening: Firstly, to understand the effect of crisis communication activities and to adjust the communication strategy. Secondly, to identify key questions in the crowd and to work to actively answer these questions (Marynissen and Lauder, 2020, p. 183), for example, to decrease anxiety and stress among those struck by a disastrous incident (Marynissen and Lauder, 2020, p. 177).

Yue et al. (2019) argue that since it is easy to express questions, concerns, and share information on social media, these platforms hold the potential to provide up-to-date information from citizens with diverse resources, given the low barrier for

posting. X (previously Twitter) dominates as the preferred social media platform for social listening (Doshi and Garschagen, 2023; Marynissen and Lauder, 2020; Drus and Khalid, 2019), mainly due to the use of hashtags and the crowdsourcing function. Facebook is recognized as the preferred platform by many users worldwide, although it is challenging to monitor through digital tools for several reasons (Drus and Khalid, 2019; Shah and Naji, 2023; Shah et al., forthcoming). Other media outlets, such as content communities (e.g., YouTube, Instagram), networks (e.g., LinkedIn), blogs (e.g., Reddit), or Micro-blogs like upcoming Bluesky and Threads, are also potentially relevant for crowdsourcing (Drus and Khalid, 2019), but are not as well described in the literature.

There is a focus on the benefits of these methods in relation to the application of machine learning and artificial intelligence tools on large datasets, particularly in cases where extensive datasets are available (Drus and Khalid, 2019). The use of methods such as topic wheels, word clouds, and topic clustering is argued to be relevant in cases of comprehensive amounts of data by Silva et al. (2022). Others argue for applying statistics (correlation, regression, cluster analysis, etc.) or more qualitative methods (like content analysis, social network analysis, thematic analysis), especially in relation to the analysis of X (Doshi and Garschagen, 2023, p. 3).

In this article, we apply the concept of "public orientation" to analyze citizens' actual orientation toward emergencies and disasters and to explain an essential premise for disaster management organizations to build resilience in a society. We also emphasize that it is challenging to distinguish this from their broader public orientation toward other questions and matters, with no specific reference to disasters or emergencies. To capture citizens' orientation, there is a need for ethnographic research that investigates people's daily lives as media consumers since people's relations with media have to be contextualized (Couldry et al., 2010, p. 26). This means, that just as we stress prioritizing the role of media and the importance of communication in disaster governance, our analysis will take into consideration that media consumption is often a subtle practice (Couldry et al., 2010, p. 185), and that this is the reason why it might be challenging to answer questions of how media is consumed and contributes to public orientation, and why research on media consumption, paradoxically needs to be "…moving away from an overly media-centric approach. Being part of an audience is just one out of many activities in daily life, and media is just one out of many sources of meaning and influence" (Couldry et al., 2010, p. 26).

4 Methods

The case study applies a mixed-methods approach. The principle of triangulation, which refers to a combination of research methodologies to investigate a social phenomenon, has provided many nuances (Denzin, 2012). The advantage of applying triangulation is that it offers diverse perspectives and answers to an inquiry compared to the use of a single methodology. The methods we have applied are outlined below.

In 2021, 22 expert interviews were conducted with strategically selected representatives from organizations with responsibilities within disaster management in the capital region of Denmark. This included authorities, civil society organizations, industry and news media, with the common factor being that they all worked with disaster management in relation to flooding—but also with the management of a range of other hazards. The overall subject of the interviews was information and communication with citizens specifically and decision-making in general (Nielsen et al., 2021). Although a dominant theme in the interviews was the use of digital technologies, such as social media, in relation to crowdsourcing, the interviews also explored questions of crowdsourcing in general, not just in relation to social media.

In 2022, six focus groups were conducted with citizens in the municipality of Frederiksberg. Invitations for focus groups were sent out to a large group of residents. In total, 92 residents responded to the invitation, and in the end, six focus groups were held with a total of 37 people over the age of 18 years. There was a total of 21 women and 16 men, and the groups consisted of four to nine persons. Participant ages ranged from 25 to 80 with an average age of 60 years (Andersen and Hill, 2024). In the invitation, we referred to both prior cloudbursts and the drinking water contamination, but stated that the dialogue would also relate to other emergency incidents, which participants found relevant. Heterogeneity was strived for in the arrangement of the groups to secure a variety of perspectives in the dialogue (Stewart and Shamdasani, 2015), and differences in experiences, perspectives, and concerns characterized the focus groups. All six focus groups provided insight into concerns about future emergencies, disasters, and other potential incidents, as well as the level of preparedness, resilience, and communication practices in the community, including information-seeking patterns and media consumption (Nielsen et al., 2023). Both expert interviews and focus group discussions were transcribed and then coded using a qualitative data analysis software (NVivo). The analysis of individual interviews and focus groups builds on the principles of an abductive analytical process (Blaikie, 2007). This implied that we carried out an initial analysis of specific categories like experiences with previous incidents, concerns for future ones, use of media platforms, and preferences for communication spheres. In addition, we searched for upcoming themes and unforeseen categories in the produced material, and the following significant ones appeared: the importance of people's social networks and non-digital communication. Following this, the accounts related to all of these categories were processed in accordance with the principles of meaning condensation and interpretation described by Brinkmann and Kvale (2015).

Following the focus groups, a survey was sent to 6,537 citizens of Frederiksberg in 2023, of whom 1,015 responded, yielding a response rate of 16%. Even though the response rate seems relatively low, it is at the expected level compared to similar Danish studies. In combination with the other applied methods, the survey thereby contributed obtaining valid results concerning the phenomenon studied. Of the respondents, 54% were women, while 45% were men, **1% did not wish to indicate gender**. The age group of 18–35 makes up 38% of Frederiksberg municipality but only 18% of respondents in our survey. We found that 29% of the municipality consists of residents aged 36–55, which in turn makes up 33% of our respondents. Finally, those aged 56 or above make up

33% of the municipality and 49% of our sample. When compared to the population of Frederiksberg, we observe an overrepresentation of older participants and a significant underrepresentation of younger participants in our data, despite 500 extra surveys being sent to the 18–35 age group (Hill, 2023).

To investigate citizens' activities, engagement, and interactions on current local and community-based social media, including interactions with other citizens and authorities, a media ethnographic study of interactions and conversations on local social media was conducted (Caliandro, 2017). This analysis provided insight into the trends in the interactions and how citizens interpret, create, and ascribe meaning to the content, as well as how they share information on matters concerning hazards, emergencies and potential disasters. Over an 18-month period (May 2022–November 2023), we investigated activities and interactions on both Facebook pages (those of local disaster management authorities and local news media) and in privately managed Facebook groups with a local focus. Facebook is the social media that is used by most social media users in Denmark 3,3 out of the 6 million Danes were active in one or more Facebook groups over a period of 7 months in 2022 (Analyse & Tal, 2022). Analog monitoring was carried out by the staff of the research project following the legal guidelines for this work (Shah et al., forthcoming; Shah and Naji, 2023), applying a Facebook profile created for the research project, where information about the research project was accessible to all members of the groups, and informing the moderators of the closed Facebook groups about the aim of our presence. The research project referred to in this article included preliminary tests of the use of crowdsourcing and social listening among disaster management organizations in order to understand the prerequisites for further integration of the methods in future disaster governance practices. Finally, the social media digital survey tool Retriever was applied to survey the Facebook pages, X (previously Twitter) and the news media relevant to the community.

All empirical data production in the study complies with the European Code of Conduct and Research Integrity, the Ethics Policy of the European Commission established for the HORIZON 2020 Programme, and relevant Danish and European legislation. As a project partner in the LINKS project, we have adhered to the guidelines described in the project's ethics and societal impact strategy (Bonati and Morelli, 2020). This includes principles for diversity awareness and principles of human dignity toward all participants, with a special concern for socially vulnerable groups and temporarily vulnerable groups to avoid negative impacts on the participants.

5 Communication and media consumption in relation to disasters and emergencies

We will first present the results of the present practices of disaster management organizations responsible for disaster and emergency communication, including how they are organized, how they prioritize communication, and how they utilize media and platforms. This will be followed by a description of the citizens' practices for communicating and their preferences for applying media, platforms, and networks across the disaster phases, as well as how these practices relate to media consumption and communication in the local community on a daily basis.

5.1 Disaster management organizations' practices for communicating and applying media

We will briefly introduce the findings concerning the disaster management organizations' practices for communicating in general. The interviews firstly display that there is a great deal of coordination within the organizations when communicating with citizens, which is time-consuming. Resources are a recurring theme in the interviews, as staff are required to carry out all tasks related to communication, monitoring, surveying, and potentially crowdsourcing, as well as social listening (Nielsen et al., 2024). All of these speak to a question of the digital literacy necessary to implement social media and crowdsourcing in communication practices within an organization. This requires more than "hard technical skills" to extract information from social media and crowdsourcing, and extends to questions of legal requirements (such as GDPR compliance) as well as the extra capacity within the organization to work with these technologies in conjunction with other tasks and activities. As such, resource scarcity for building and maintaining such literacy is a barrier to integrating social media and crowdsourcing into communication processes (Behl et al., 2022; Knox, 2023). An interviewee explains the following:

> "We have considered to apply Facebook, but we have also been reluctant all the way through. It is the platform that suits the needs of the citizens best, but we haven't had the resources, we are concerned that it would result in way too many questions that need to be answered" (Interviewee 1).

There is a clear division between the organizations on the question of prioritizing communication, for example, in the response phase, which is often characterized by a deficit of staff members and a lack of information about the incident. Some disaster management organizations state that in crises they prioritize communicating to the citizens (1) what they know about the situation and (2) suggestions for recommended actions for the citizens to take:

> "We decide to communicate in the very first phase, just to get it out fast, even though it is not a lot, like 'We are present, we do this and that, and as a citizen you need to do this and that'" (Interviewee 3).

These two representatives are from organizations that hold a tradition of communicating messages early in the response phase, before they have an in-depth understanding of the incident. Other organizations do not share this tradition, and interviewees from other organizations believe that their organizations are not very proactive:

> "If this is an excuse or not… it is not a tradition for us to communicate in a response phase" (Interviewee 4).

Some of the organizations work with preparedness for the variety of hazards related to their expertise, and this also involves communicating with the citizens. One example is the disaster management organizations responsible for flooding at Frederiksberg, which aim to raise awareness and engage the citizens in preparedness activities. They have for several years sought to engage citizens through campaigns, local walks, and SoMe posts. In 2021, on the 10th anniversary of the 2011 cloudburst, the municipality launched a campaign featuring posters in public spaces and Facebook posts, aimed at raising awareness about cloudburst risk (Andersen and Hill, 2024).

There seems to be an ambiguity among the organizations when it comes to which media and formats to apply. Most of the disaster management organizations that participated in the study apply social media in their communication with the public, and they do not question whether social media is an obvious choice to reach an audience. The use of social media is for several organizations a way to reach as many citizens as possible, but even though social media provides a potential for dialogue and response, it is also applied as a one-to-many medium. Some state that they prefer X (formerly known as Twitter), since Danish journalists apply X, and so it is an easy way to get the message across to the news media.

One of the interviewees stressed they, on the contrary, were worried about using Facebook since the organization holds a concern that there will be lots of posts and comments from users that they have to process and respond to:

> "I think that we recognize, that it is a platform, that we can't control. We would like to communicate in a way that we're able to manage" (Interviewee 2).

In other organizations, there is, from time to time, a reluctance to use any social media platform. An interviewee says that some members of the staff responsible for communicating are hesitant toward communicating using social media:

> "I try to train and encourage them to send updates on Twitter [now X] in case of a crisis […] Some of them only apply social media on the job. They think it is stupid that they need to communicate, but they know that they have to. It is a bit complicated […]" (Interviewee 5).

A third organization upholds the divide that communicating about preparedness and response is not taking place on the same social media platforms. If their messages concern preparedness, they apply Facebook, but communication concerning response is on X (previously Twitter).

It shows that there is quite a variation among the organizations. They all state that they prioritize communication and that they apply resources, but their efforts diverge. There are more guidelines and principles for communicating in crises than for communicating concerning preparedness. They are all aware of the benefits of applying social media in crises, but they prefer X (previously Twitter), even though a very low percentage of Danes apply X (previously Twitter) (Schrøder et al., 2022) and even though they meet almost no comments or interactions from citizens on this particular platform.

5.1.1 Non-digital and digital interaction with citizens

Some of the disaster management organizations apply very innovative ways to identify what is going on among citizens. The many initiatives can be divided into the non-digital methods and the digital ones, but in all cases, they intend to survey the feedback, sentiments, and questions among the citizens through both traditional and more innovative and untraditional methods.

One of the organizations arranges call centers for people to get in contact by phone during crises. That is a non-digital method of communication that is particularly important for some target groups, not least for older adults, and provides another possibility to crowdsource the needs of citizens. Two other organizations sometimes plan meetings with citizens on the streets, where they answer questions concerning preparedness and offer a cup of coffee. They also have plans and procedures for applying their own staff on the streets as ambassadors and sources of information in case of crises, and for the staff to report back.

Several organizations report that they utilize social media to interact with citizens but also use it to survey whether the organization is aligned with their needs. For one organization, it is a routine to monitor citizens' responses, also on Facebook, which provides them with an opportunity to identify what questions need to be answered. They had a recent severe incident, and through surveying and analyzing the feedback from citizens, they were able to find new solutions and methods to inform themselves as thoroughly as possible by monitoring call centers and social media. They reacted to the needs of the citizens as they learned:

> "Some of the residents understood the texts well […] some didn't, and then we made a map […] and some did not understand the map, because it was difficult for them to figure out […] so we made a digital list for them to search for the answer of their specific address" (Interviewee 6).

The news media are experienced in interactions with their audiences. At a regional news media, an interviewee explains how they invite citizens to share insights, reports, and pictures from incidents on the web, phone, and social media—primarily during the response phase. Additionally, they survey X (previously Twitter), all Facebook sites and groups (which is a large number) in the region, and use Snapchat to map trends and incidents, both manually and by applying digital tools. They survey the comments on the authorities' SoMe profiles to figure out which questions are asked by the citizens in crises in order to assist answering and, as much as possible, to get a precise impression of the situation, the risk and hazard, and to figure out how to handle the situation. They do report that they carry out this survey manually and not through digital tools since they do not experience that these tools add value.

Their raison d'être as news media—both on a daily basis as well as during crises—is to get information from as many valid sources as possible as fast as possible to present a journalistic product relevant to as many readers and viewers as possible. A representative from another regional news media is quite satisfied when telling of the examples, when they are the ones to provide the police with information about what is going on in the district:

> "It is often in relation to storms in the autumn that people give us notice, saying, 'This oak tree has fallen across the large highway.' Then we contact the police, inform them of the incident, and ask, 'Are you aware of this?' Sometimes they are on their way, sometimes they give us an estimated time before the road is cleared. This is a way for us to get the [sic] overview by asking the audience to report to us, and then we give the police a [sic] notice. In addition, viewers and readers send us pictures, and this helps create a great media coverage of the incident" (Interviewee 7).

Some of the authorities responsible for emergency management acknowledge that the news media are very good at getting an overview of crises:

> "This is why the news channel is on when we have an operation going. Honestly, it is foolish, but sometimes the news media know before we do [...] We see it often, they are out there with a camera even before we arrive" (Interviewee 5).

Several of the organizations trust citizens to be credible, and for the information gathered on, for example, social media to be valid:

> "In case of an emergency in a local community, and this is what we talk about in this case, I've high confidence in the information I gather on social media, actually even more than on a daily basis" (Interviewee 8).

On the other hand, we also found organizations that refuse to apply social media to survey reactions among citizens. A representative from one organization states that they only rely on information from "official sources", and he does not acknowledge social media as an official source. In their organization, they do, on the contrary, rely on information from citizens if they call by phone.

> "We try to nudge the citizens to apply official channels" (Interviewee 3).

There are several arguments for the lack of engagement in this practice. One concern is that crowdsourcing on social media will create "[...] a blurred picture instead of a clear picture of the situation" (Interviewee 5).

In this organization, the information assessed as most valid is that from the organization's own staff, even though the ability to obtain a clear overview of a situation will be very limited if an emergency or disastrous situation strikes larger areas.

5.1.2 Passive monitoring

All of the organizations say they survey news media digitally by applying programs like Retriever, Crowdtangle, and the like and that such tools can also be applied for social media, or at least parts of social media, as some tech companies have restrictions (Shah and Naji, 2023; Shah et al., forthcoming). But contrary to the idea that such insights can be applied to actively engage with a group of people, to some disaster management organizations, surveying the sentiments and sense making among citizens is first and foremost a question of taking care of their own image, avoiding critique, and

advising politicians, CEOs, and the like if the organization's image is under attack (Coombs, 2023).

Here are two different interviewees:

> "The Facebook-group called "Those of us who like Frederiksberg" ("Vi der holder af Frederiksberg"), is a group that you need to listen to, because the local politicians listen carefully to what is going on here, and if there is too much dissatisfaction, then you need to act " (Interviewee 9).

> "I follow what's going on social media, even though I'm doing it out of duty, and so does my boss. Sometimes, she calls and asks, "What is this? Are we able to manage it?" The concern is if our credibility is under attack, even if it is extremely rare that it happens" (Interviewee 5).

In these cases, surveying citizens' accounts and news media is not a question of understanding whether citizens can be better supported, informed, and act in a sound and healthy way. It is a question of securing one's own organization.

In summary, there are no examples of disaster management organizations who apply crowdsourcing (Howe, 2006) or the principles of social listening (Doshi and Garschagen, 2023; Marynissen and Lauder, 2020; McGowan, 2021; Stewart and Arnold, 2018) literally, but there are some who work in ways that include the perspectives of the citizens, take into consideration the diverse needs of the community, and adjust and correct their strategy following from the feedback they get from the residents. Others refuse to work this way and do not see the need for the inclusion of citizens' perspectives. They are, however, all familiar with digital technologies that provide the possibility for crowdsourcing, but these are, in many cases, applied for purposes that are passive and do not result in active and overt responses.

5.2 The communication and media consumption of citizens

In this section, we will present findings from the empirical work among the citizens of Frederiksberg. The ways in which they orient themselves and their practice for using media, platforms, and networks in relation to disasters and emergencies is outlined.

5.2.1 Public orientation toward disasters and emergencies

Since the point of departure of the data production was flood risk, the survey and focus groups had a special focus on this particular hazard. It did, however, turn out that the risk of flooding plays a minor role in the everyday lives of citizens, their interactions, and communication, and it seems that there is a surprisingly low public orientation toward the matter (Couldry et al., 2010).

Awareness of a risk can be accentuated by communication, and in the survey, residents are asked to what extent they discuss flood risks with other people—within close relations, the local community, and in online forums like social media. For close relations, 77% of respondents report that they rarely or never talk about future flood risks, while 19% report sometimes talking about

future flood risks. Only 4% report talking about future flood risks often or very often. The number of people who sometimes, often, or very often talk about future flood risks gets even smaller the further away the relations get. This trend can be seen in illustration 1. On social media, the percentage of people who sometimes, often, or very often discuss flood risk drops to only 3% (Hill, 2023).

Even though the numbers are low, it appears that more communication is taking place outside of social media than on it, which suggests that crowdsourcing on social media may not accurately reflect the residents' actual interactions on the subject. If the majority of people are not aware of or concerned with the risk of flooding, then it makes sense that it will not be commonly talked about, be that on social media or in person, even though the municipality would appreciate public orientation—or even attention—on the matter (Couldry et al., 2010).

This was quite different from what it was back in 2011, following the disastrous cloudburst. A participant in a focus group explains that it was the issue everybody discussed: insurance issues, rebuilding and reconstruction, prevention measures, potential new floods, and the like. The questions were covered in the news, everyone talked about it, and questions of prevention initiatives were on the agenda everywhere:

> "There was so much talk at the time. It was everywhere, not just in some forums. Everyone in the capital area was pretty upset about what happened, and if such an incident would occur again" (Focus group 6, participant B).

A participant in another focus group explains that there has been a remarkable decrease in engagement in practices for preparing for future cloudbursts among his fellow neighbors in the years since:

> "In the time following [from the cloudburst in 2011] we tried to work on how to install devices to secure the building [...] but the interest seemed to disappear [...] I've been the only one engaged, even the people living in the apartments on the ground floor seems to take it easy" (Focus group 4, participant E).

The municipality's campaign to re-raise awareness and increase the residents' self-efficacy and belief in their ability to prevent flooding was not recognized by many participants in the focus groups. One participant did, however, mention it on their own initiative:

> B: "The municipality has produced a leaflet, within the last year or so, about how to prevent floods in your home, but I don't know if everyone is aware of that one."
> Moderator: "You are the first who mentioned this campaign. Have the rest of you seen it?"
> I: "No."
> A: "Nope." (Focus group 3).

The finding on the very low intensity of communication was supported by the social media ethnographic research on local Facebook sites and Facebook groups. During the study period, there were no signs of debate concerning the risk of flooding. There are, on the contrary, significant indications in the data material that other hazards are subject to dialogue and awareness among citizens. The risk of fire in apartments in the densely populated area is heavily debated, due to both a large-scale fire that burned down a block of apartments, and several fires that have resulted in death.

The same is true regarding the risk of conventional war in Denmark, which was heightened by the 2022 invasion of Ukraine.

There is a close overlap between the findings from the social media ethnographic study and the results from the focus groups. First, regarding the risk of fire, which they discuss in several of the groups and share information about the potential causes for large fires in old buildings as seen below:

> C: "Numerous blocks in Frederiksberg, including the one I live in, were built in the 1930s [...] We don't know how many of these are at risk of fire. I know that it primarily is the responsibility of the owner of the estates, but the municipality might initiate that the estate owners investigate the risk".
> I: "I've spoken to our facility manager, who claims that we are not at risk and that fire prevention measures were taken when they rebuilt the rooftop" (Focus group 3).

They have questions and concerns, and they engage in discussions about how to prevent disasters, but it is hard to get any answers from the responsible disaster management organizations.

Around the country, the risk of conventional war and the need for bomb shelters have been debated in Denmark since the Russian invasion of Ukraine in 2022. Both disaster management organizations and Danish politicians in the parliament and the local councils refuse to engage in this debate and deny the risk of conventional war in Denmark. These denials do not distract citizens in Frederiksberg or across the rest of the country, and people continue to discuss the risks and the potential for preventing the consequences:

> "It is not every day that I wonder "will a new war break out?", but it crosses my mind from time to time [...] If they suddenly start to fight, I'm worried that we lack bomb shelters here at Frederiksberg [...] and maybe we don't even have a chance if we face a nuclear war" (Focus group 1, participant C).

This statement initiates a dialogue between participants regarding the location of safe bomb shelters in the community, the apparent lack of sufficient shelters, and whether they have a chance to safeguard themselves in such a case. However, there are no answers and no guidelines to lean on, only officials who deny the risk.

Other less dramatic scenarios, like blackouts are debated, and relevant questions are raised:

> "I'm in a wheelchair [...] and what happens if we face a power failure? [...] Is there any kind of assistance in emergencies? Are there any authorities who know where we are?" (Focus group 2, participant G).

This participant relies on the lift to escape the building and is concerned about who will support her, as the authorities are

unaware of her mobility issues and dependency on a lift that is not operational in the event of an evacuation.

Residents have a low level of engagement with the risk of flooding, and it is challenging to identify signs of communication on the matter. Their concerns and engagement in disaster prevention, however, are high regarding fires, blackouts, and war: these risks are raised by the citizens. They debate the potential of managing the risk themselves or discuss where to find the answers to potential prevention and preparedness. They formulate answers and requests, also in local Facebook groups, on subjects and matters that the disaster management organizations do not address.

5.2.2 Public orientation toward response and warnings

It is said that in crises, there is generally a heavy demand for information, which is often sparse (Coombs, 2023). In the event of emergencies and disasters, especially during response phases, citizens in Frederiksberg employ diverse strategies for finding answers to their needs and questions. They are asked where they search for information in a crisis, and they come up with a variety of answers: "news on television," "the internet," "Google," "news apps," etc.

People seek information from senders, organizations, or individuals they believe to be credible, and in the case of Denmark, news media hold a relatively high level of credibility (Schrøder et al., 2022). Disaster management organizations' websites are also a choice among some, but it is their experience that they do not get much information from these sources. They are perceived as credible sources in a crisis, but are regarded on the whole to be too slow:

> "I'm skeptical if the authorities and responsible organizations react fast" (Focus group 3, participant I).

Relatedly, 30% report using the authorities' websites, though they do not get very nice reviews from the residents:

> "The municipality's website is a lousy choice, I know, but I would try that one" (Focus group 2, participant C).
> "If you go to the municipality's homepage, you can spend an hour to find the right information" (Focus group 2, participant H).

Both the survey results in this study and other Danish studies on the matter indicate that during crises, particularly in the case of large emergencies and disastrous incidents, a significant proportion of Danes obtain information from the news media (Danish Emergency Management Agency, 2019). This study's survey results, for example, show that 72% of citizens search for information on news media websites, followed by 66% watching TV and 41% using the radio. As displayed in the first part of the analysis, disaster management organizations acknowledge that the news media convey initial information much faster than they can themselves, at least in the first hours.

The survey results appear to be relatively static, suggesting that each respondent favors certain outlets or sources. When asked in focus groups, the residents of Frederiksberg do, however, describe their approach to seeking information in crises as a processual, intuitive, and dynamic one. They provide us with an insight into how much they actually work and strive to find information in crises. Some describe how they seek information arbitrarily online; they try with a variety of keywords, but they are not necessarily able to account for the exact platforms and senders.

> "The challenge is that it is really complicated to explain. When you ask, 'Where did you find the answers?' it might have been the municipality, the utility company, or the fire and rescue service. What happened was that I googled it or found it in the news media. Because this is what you do, right? You Google, and things pop up, and then you start sorting" (Focus group 1, participant A).

Several focus group members stress that the local Facebook groups play a significant role:

> "We've these groups: Those of us who like Frederiksberg" ("Vi der holder af Frederiksberg"), "Those of us who live at Frederiksberg" ("Vi der bor på Frederiksberg"). We've different groups with a large number of members. Here, you receive some very fast updates, such as 'I heard some sirens, does anyone know what's going on?' or 'There's a fire somewhere; I smell the smoke.' It's not a long time. Somebody smelled gas, and it went like a firestorm on Facebook, and much debate about what we actually do in case of a gas outlet. Lots of people in these groups know what is going on, and they share information, and they do it fast" (Focus group 2, participant G).

However, the source of information is not always mediated and digital. Some of the other participants stated that their social network is paramount in a crisis. This is where much sense-making and information sharing take place.

Of those surveyed, 23% report getting information from friends and family via text messages, 22% receive information from phone conversations with friends and family, and 18% of respondents receive information by talking to neighbors and others in their local community. When asked how insight is obtained in a crisis, one participant stated the following:

> H: "I ask my wife"
> Moderator: "How does she know?"
> H: "She has got it from somewhere, from the internet or the local paper, or elsewhere" (Focus group 2).

The same picture can be identified in two other focus groups:

> "Some friends called me and said, 'Do you know that you shouldn't drink water from the tap?'" (Focus group 2, participant C).
> "I actually think it was my mom. She watches the news on television, so she called" (Focus group 5, participant B).

The citizens describe it as a process to find answers in a crisis. The news media undoubtedly play a significant role, as residents have experienced that they are the best providers of information.

They pay attention to the disaster management organizations' platforms, but often experience that these organizations do not communicate effectively, or that it is difficult to find answers to their questions, and the residents' expectations are therefore low. They do, however, help each other; they communicate within their own networks, sometimes offline, and sometimes on social media. They share knowledge and cross forums and media to find answers, often putting in hard work.

5.2.3 Preferences and use of platforms and forums

For a large group of people in Frederiksberg, everyday consumption of news takes place on social media platforms: more than half (54%) of respondents report reading or watching the news on social media at least once a day. Of the remaining respondents, 20% read and watch the news on social media at least once a week, while 9% do it at least once a month. To them, consumption of news goes hand in hand with their general consumption of social media content—this is a merged practice. This confirms the assumption that social media is an important way in which the majority of respondents in the survey receive news and information on a daily basis.

In this study, the most commonly used news sources on social media are news media's own social media accounts (83%) and posts made by friends, family, and others within people's social media networks (43%). Following these two, the most common ways to receive news on social media are through local Facebook groups (31%) and the social media profiles of government and authorities (28%) (Andersen and Hill, 2024).

The participants in the focus groups who use social media refer to local Facebook groups more often than the official Facebook sites of disaster management organizations. They receive updates about local news and observe that members of these groups are effective at sharing information. Besides this, offline and interpersonal communication within their own social networks with people they know is also very crucial to many:

> "I communicate via phone, text messages, and my computer. And then I talk to people. Thís is ideal for me" (Focus group 1, participant B).
> "Yes, there is plenty of knowledge in your local community and your social network" (Focus group 2, participant D).

In the Frederiksberg survey, 17% reported never reading or watching the news on social media. The focus groups additionally indicated that in crises, television and websites might be essential sources of information, but that non-digital solutions are also relevant:

> "Think carefully when choosing your friends. One of my neighbors is the head of a police department and knows everything that's going on; I can just call her and ask. Another neighbor is a physician; they are both very well-informed. Together, they are a tremendous tool to get an insight" (Focus group 2, participant D).

In addition, some participants are very critical towards Facebook in general. In their opinion the outlet should not be used by disaster management organizations:

> "Facebook can't be a medium for authorities and public institutions, because it forces us into a dependency on these companies (Tech companies, eds.). I don't have any control over what is going on. You can't force me to apply Facebook to get an insight (…) you can't force me to be informed through a company like this" (Focus group 2, participant C).

The results show that, to some extent, there is a connection between the disaster management organizations' intentions to communicate and the way residents orient themselves. However, the residents also communicate and share information—both analogously and digitally—on several matters that are not on the agenda among the disaster management organizations. It is not the case that organizations and residents share a common horizon.

6 Discussion

In the future, disaster governance principles need to integrate the question of people's media consumption and practices for communicating in general. To secure more resilient societies, a disaster governance perspective should aim to incorporate the principles of two-way communication and social listening among citizens, even though this can be a comprehensive process. The Frederiksberg case study demonstrates that social listening and crowdsourcing hold potential, but specific conditions within the context must be taken into consideration. Social listening and crowdsourcing on social media are relevant in Frederiksberg. Still, there is a significant group of residents, who do not use social media. The needs and insights of this group will not be taken into consideration if only digital tools and methods that involve web-based interactions (Silva et al., 2022) are involved.

Torpan et al. (2024) raise the concern that people not on social media and who do not apply digital technologies are overlooked when the benefits of using these platforms are emphasized. Based on the Frederiksberg research project, Nielsen et al. (2023) have described the disadvantages of an unambiguously focused approach on social media and the principles of digital crowdsourcing concerning disaster risk management. In the case of Frederiksberg, for example, elderly people, who often do not use social media, are the most vulnerable. However, in other settings and cases, a definite focus on social media will likely exclude other groups of residents.

One obstacle to applying digital crowdsourcing and social listening is that, although Frederiksberg is a city of a certain size, the preferred social media platform for its citizens is Facebook. Facebook is both technically challenging (Drus and Khalid, 2019) and, due to legal guidelines established by Meta, the tech company behind Facebook (Shah and Naji, 2023), difficult to crowdsource. Other studies demonstrate the potential for crowdsourcing and social listening, for example, on X (previously Twitter) (McGowan, 2021). However, the interactions on X (previously Twitter) related to matters in Frederiksberg are too sparse to yield any results. The digital tool Retriever was also tested; however, since it did not capture all conversations in the local Facebook groups, it resulted in

misleading insights and lacked insight into conversations related to disasters and emergencies. The manual social media ethnographic study provided much better insight into the conversations and interactions.

Suggestions, based on, for example, Marynissen and Lauder (2020) and some of the disaster management organizations involved in the case study, are to combine tools to survey and investigate questions, the need for information, and expectations among the crowd of people. This approach aims to engage actively in conversations and continuously adjust and refine the communication strategy used each time there is a reason to communicate. Good examples of social listening beyond social media include surveying conversations in call centers, gathering questions on websites, and collecting feedback from employees. More detailed suggestions for tools, guidelines, and tests of such are needed in future research. Monitoring and surveying both social media and news media are widespread practices for all organizations concerning their own image and impression management (Coombs, 2023). However, for many, this does not result in a response, a phenomenon described by Blaikie (2007).

The purposes of listening are numerous (Stewart and Arnold, 2018), and active social listening has the ability to create a sense of community among all those who deliberately express their opinions, provide insights, participate in creating insights, and follow the flow of communication (McGowan, 2021). Within disaster management, social listening offers organizations the opportunity to listen to citizens and for citizens to listen to each other when critical questions arise, as is the case in other areas (Stewart and Arnold, 2018). When disaster management organizations engage in conversations—digital or non-digital—it provides transparency and responsiveness. Even if citizens express dissatisfaction, it will likely contribute to increased credibility. A large number of the residents in Frederiksberg are resourceful, and they communicate intensely with each other. This is a resource that can be applied much more actively by organizations, for example, by engaging residents in sharing information on social networks, forums, and other media that the authorities are unable to access.

Nielsen et al. (2024) argue that all phases in the disaster cycle are relevant, even though studies on response and preparedness dominate research on crowdsourcing social media within disaster risk management. In general, there is a tendency for disaster risk management organizations to focus on preparedness and response activities at the expense of long-term recovery and prevention. This is connected to a more fundamental issue of silo thinking in the public sector combined with a tendency for organizations to be focused on emergency management rather than a broader more holistic engagement with disaster risk. In the concrete context of crowdsourcing, a significant amount of data is generated during disaster response, which holds considerable potential for informing measures for both recovery and prevention (Jamali et al., 2019).

Frederiksberg is an urban, highly digitalized and affluent city with low risk awareness and few disasters and emergencies but a prognosis for an increase, not least due to climate change. It is a case where the organization is expected to prioritize and have the resources to engage in new practices. Several organizations aim to interact and survey the residents' communication in order to respond actively, but thouhg not all. It seems that they could learn from each other, but perhaps most importantly, from less affluent societies that have experienced severe disasters and developed practices for this (Doshi and Garschagen, 2023).

The study shows that the residents' communication practices during disasters and emergencies align with Couldry et al.'s concept of public orientation (2010). Following Couldry et al., it is not very likely, or at least rare, that citizens will pay in-depth attention to all of the communication conveyed by disaster management organizations, but there seems to be a potential for the organizations to strengthen the links, and thereby the resilience in a community, by paying more attention to the concerns, questions, and needs among the citizens and by encouraging them to act themself. A way to achieve this aim is to apply the methods of social listening and the principles of crowdsourcing. It is challenging since people's consumption of media is diverse, but the case of Frederiksberg shows that there is still potential for several disaster management organizations to improve their practices in communicating and applying diverse media, including social media, as well as the principles of crowdsourcing and social listening.

Though the potential for digital crowdsourcing and social listening seems to be in place in a large urban environment like Frederiksberg, which is affluent and with a very high degree of digitalization among the residents, the study shows that there is a need for alternative methods of social listening, including non-digital methods, to gather information from the general public. Some organizations, including authorities and news media, serve as role models in this case, and other disaster emergency organizations are encouraged to follow the example they set. There is potential for all organizations to follow the principles of crowdsourcing and social listening; it does, however, require prioritization, practices, guidelines, and resources (Clark et al., 2024).

7 Conclusion

The citizens are, on the one hand, not very aware of the disaster management organizations' communication concerning preparedness and prevention. On the other hand, they often lack information in cases of crisis and emergencies and appreciate the sources of information provided by authorities and the news media, which can answer their questions. The result is that residents favor obtaining news and updates from each other through social networks offline and in Facebook groups. They also appreciate the news media broadcasting on television, the web, print, and radio, as well as the news media's social media accounts. It is quite likely that their fondness for news media stems from the news media's ability to address the questions, concerns, and requests that residents have, particularly during crises.

Based on a case study of communication practices in relation to disasters and emergencies in a Danish urban setting, this article examines the potential of applying the principles of crowdsourcing and active social listening to enhance the connections between disaster management organizations and citizens. Several scientific methods, including focus groups, interviews, surveys, and social media ethnography, were applied. These methods provide a complex and ambiguous picture of the communication processes,

media consumption, crowdsourcing, and social listening. The study finds that for residents of Frederiksberg, their communication practices concerning emergencies and disasters are intertwined with their everyday communication related to other topics, making it challenging to disentangle. They rely on sources that provide answers to their questions. The study shows that though the majority of the residents in the case community are very digitalized, there are at least two obstacles to digital crowdsourcing and social listening: Firstly the preferred social media, Facebook, is not suited for digital crowdsourcing and secondly the residents prefer to communicate through a variety of other platforms and networks as well, where digital crowdsourcing and social listening are not possible. Furthermore, the study shows that disaster management organizations are so preoccupied with communicating on their own platforms and disseminating their own messages that they miss the potential for engaging with citizens and their agendas. The research results presented thereby illustrate that there are both potential and obstacles for further integration of crowdsourcing and social listening. In too many cases, the practices of citizens and organizations for communicating are not sufficiently intertwined. Disaster management organizations, therefore, need to communicate more effectively, more frequently and more targeted to the needs of the citizens. By engaging with the perspectives of the citizens, organizations have the possibility to strengthen the links between all actors, thereby securing more resilient communities.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Ethics Committee of University College Copenhagen. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

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