Dissertation submitted for the PhD degree

Preparedness in Everyday Life

A social practice perspective

Nina Heidenstrøm

University of Oslo

Faculty of Social Sciences

Department of Sociology and Human Geography

Ekstremværet har fått et navn
Det heter Ødeleggelse.
Det er fredag tredje oktober
og stormen stanser fly og biler
stenger broer
senker båter
bryter telefonforbindelser
slår ut fjernsynskanalene
mørklegger husene
i noen timer
lever vi
i en ideell verden
Tomas Espedal, Året, p.130-131

The extreme weather has been given a name
It is called Destruction.
It is Friday the third of October
and the storm stops airplanes and cars
closes bridges
sinks boats
cuts off phone lines
knocks out the TV channels
blacks out houses
for a few hours
we live
in an ideal world
Tomas Espedal, Året, p.130-131 (my translation)

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Summary

This dissertation studies preparedness from a practice theory perspective. Preparedness is a concept that describes the resources to manage potential disastrous events. The logic of preparedness as a risk management strategy is that disastrous events will occur at some point, and when they do, society needs to be as best equipped as possible to handle them. Existing preparedness research stresses that for a household to be prepared is to be in an active state of awareness and to implement measures such as stocking supplies, rehearsing, and planning. The main interest in this dissertation, however, lies with how the performance of everyday practices matters to our understanding of household preparedness. The main objective is to go beyond measuring predefined preparedness resources, in order to provide in-depth knowledge also about the embedded resources of everyday practices that can be mobilised during disruptions.

People understand and manage risks in their socially and culturally situated everyday lives. Social practice theory entails that everyday life is understood as made up of continuously performed socially shared practices. A practice is a bundle of interconnected social and material elements: competences of knowing how to act, meanings including conventions, values, and motivations, and material objects and structures. When a practice is performed, the practitioner draws on these bundles of elements in a routinized manner. A practice perspective on everyday life emphasises the importance of practical knowledge, socially shared beliefs, and material surroundings as well as their interconnectedness. In such a view, preparedness can be regarded as the outcome of participation in a set of social practices.

This dissertation explores preparedness in a practice perspective empirically, focussing on how Norwegian rural households coped with extensive electricity and ICT infrastructure breakdowns caused by extreme weather events, and how rural and urban households without such experience prepare for future breakdowns. Infrastructure breakdowns affect everyday life in households. Electricity, for instance,

is used to cook on electric stoves, use washing machines, electric heating, cooling and ventilation, water pumps, radios, and TVs, and charge computers and mobile phones. By answering the research question: *How do Norwegian households prepare for and cope with extensive infrastructure breakdowns using their social, cultural, and material resources?* I seek to understand how infrastructure breakdowns are managed within the context of everyday life.

A sequential mixed methods design of case studies and a survey is conducted to understand household preparedness. First, Case Study I explores how rural households in Lærdal coped with hurricane Dagmar in 2011 and the Lærdal fire in 2014, supplemented by a case study of how Swedish households coped with the storm Ivar in 2013. Case Study II explores how rural households in Grue and urban households in Oslo with and without previous experience prepare for future infrastructure breakdowns. By means of performance-based interviews, walk-alongs, and visual methods, the case studies bring together information about how practices that matter to preparedness are performed. Second, a web survey (N=1005) constructed from the qualitative analyses test the prevalence of preparedness resources in different groups.

Four articles that study household preparedness are produced. Article 1 introduces the concept of *informal household preparedness* for the purpose of creating a framework to study preparedness in everyday practices. It demonstrates how a combination of qualitative approaches can be used to empirically study the informal expressions of preparedness. Article 2 makes use of the concept and methodological approaches proposed in the first article to empirically explore which practices bear in them social, cultural, and material resources to prepare for infrastructure breakdowns, and how these matter to household preparedness. Article 3 uses the mixed methods design to study the importance of one particular resource found in the second article – embodied competences – and how it varies between and within households. Article 4 moves focus to engagement in preparedness by looking at how responsibility for preparedness is divided between households and other actors.

Informal household preparedness is grounded in social practice theory, which brings forth a novel view on preparedness. First, the informal approach suggests that preparedness is more than active planning and the resources embedded in practices should be recognised. Such resources include previous experience with restricted access to infrastructure, the ability to mobilise material resources during outages, local geographical knowledge, and mobilising social networks. Second, it suggests that preparedness is not always reflexive. Even with a low level of awareness of and engagement in preparedness, people might still be prepared. This entails that preparedness should be studied using methods that are designed to grasp what is done as well as what is said about preparedness. With a focus on these doings, or performances, the dissertation suggests that we gain a deeper understanding of preparedness by seeing it as a performative resource concept.

The concept of informal household preparedness provides important insights into both the tacit and the explicit resources and barriers within households when they are faced with extensive infrastructure breakdowns and offers a more nuanced understanding of preparedness. It should be of interest to local and national policymakers, non-governmental organisations, and industry actors within the energy and ICT sectors, that all take part in preparedness strategies. The dissertation calls for attention to policies that include the experiential knowledge of households when designing risk management strategies.

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I felt a bit more comfortable in the research field dealing with energy consumption practices. Here, I have sought inspiration for this dissertation, and been so fortunate to meet Anders Rhiger Hansen from the Danish Building Research Institute. I am sincerely grateful for all our talks about what it means to be a sociologist, and for your never-ending enthusiasm for my project and our collaboration. An email exchange that began in 2017 evolved into Article 3, and your contribution was essential.

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Nina Heidenstrøm,
Oslo, February 2020.

Chapter 1

Introduction

This dissertation studies household preparedness for breakdowns in the electricity and ICT infrastructure in Norway. Electricity powers modern day-to-day life. We heat, ventilate and light our homes with electricity, store food in fridges and freezers, cook on electric stoves, use mixers, toasters and coffee makers, and do our laundry using washing machines and tumble dryers. Electricity powers global communication systems that further enable us to use the internet, send emails and text messages, and watch and share entertainment, news and countless sources of information. These technologies are available to us at the flick of a switch. Once familiar, they tend to slip to the back of our minds and the practices they produce seem a natural part of our lives. Infrastructure disruptions, however, bring visibility to these practices – the ordinary activities that keep our lives going. Without infrastructure, our homes quickly become cold and dark, the food in our fridges and freezers goes bad, we are unable to cook hot meals, the water stops running from our taps, and we are unable to get in touch with our friends and family or obtain information from our phones and computers.

How do households cope when infrastructure breaks down? Although this question is not a refined research question, it captures the essence of what this dissertation is all about: the resources households draw on

to cope with infrastructure breakdowns. Governments think a great deal about such resources and use the term 'preparedness' to describe the advice they give and measures they implement to enable households to cope. What would we find, however, if we were to compare governments' views of what those resources are to an analysis of what households plan to do or actually do in the event of an infrastructure breakdown? This dissertation adopts a social practice perspective to demonstrate that what people use to cope during infrastructure breakdowns consists of much more than what is typically associated with preparedness.

Infrastructure breaks down for a multitude of reasons. Many breakdowns are caused by technical or human error but the destruction that follows from political violence (e.g. war or terrorism) and from the wetter and wilder world we live in as a consequence of climate change are also among the major causes (Boin & Smith, 2006; IPCC, 2018). Such calamities often turn into multiple failures that present ordinary people with extraordinary situations. Electricity and ICT have been defined by the European Programme for Critical Infrastructure Protection (EPCIP) as 'critical infrastructures', meaning that they are large-scale systems without a single owner or operator that supply fundamental services that society needs to function. Their reliability directly affects the well-being of citizens by providing access to a wide range of services, as well as upholding large-scale economic and market systems. In a sense, critical infrastructures produce the normality we are used to in the developed world. Infrastructures' criticality to modern life makes breakdowns an eventuality that societies must prepare for.

In many developing countries, infrastructure disruptions are commonplace, and the level of reliability never reaches a point where infrastructure is taken for granted (Graham, 2010). In developed countries, however, infrastructure flows beneath and seamlessly connects a myriad of social processes, creating complex systems of people and technologies. The dependence on infrastructure now established in developed countries could lead to a loss of knowledge about living off-grid for future generations. It is therefore of great importance to gain knowledge about the current level of preparedness

for infrastructure breakdowns in the population and use this knowledge to implement effective measures that will increase future preparedness.

Within the context of a Nordic research project[1] that aims to understand the role of households in managing loss of critical infrastructure, this dissertation sets out to explore how Norwegian households cope with extensive infrastructure breakdowns. I draw on two qualitative case studies from the project: Case Study I, comprising interviews with rural households that have experienced two extensive infrastructure breakdowns during hurricane Dagmar (2011) and the Lærdal fire (2014), supplemented by a case study of how Swedish households coped with the storm Ivar (2013), and Case Study II, comprising interviews with rural and urban households with and without previous experience about preparedness for future infrastructure breakdowns. Additionally, I use a web survey that maps preparedness resources among Norwegian households (see Chapter 4).

Most developed countries expect citizens to be prepared. This is echoed in the growing use of the term 'resilience', which has penetrated the political discourse on societal security (Bergström, 2016; Tierney, 2015). Tierney (2015) argues that resilience has become a scientific and policy trend that supports a particular kind of solution to reduce vulnerability. Preparedness is one risk management strategy suggested under the umbrella concept of resilience, and a plethora of articles deal with how societies prepare for crises and disasters. Perspectives range from the global level to nation states, local communities and down to the household and individual level.

In my review of the literature (see Chapter 2), I found the idea of household preparedness – the resources ordinary people hold and use to deal with crises and disasters – underdeveloped and under-researched. Preparedness is traditionally associated with the extraordinary and is about the pre-event actions that can be implemented to minimise the

[1] HOMERISK: Risk Management Strategies when Households Face Collapsing Electricity and Digital Infrastructure. Financed by the Norwegian Research Council and SAMRISK II programme, grant.no 238059. www.homerisk.no. The consortium was led by Consumption Research Norway (SIFO), and the Mid-Sweden University and University of Iceland were project partners.

consequences of all types of disruptions, from minor and short-term emergencies to long-lasting disasters. Preparedness is most commonly understood as one phase of the holistic process of crisis management, where it is preceded by mitigation and followed by response and recovery (Boin & McConnell, 2007). What is prominent in most empirical studies is a top-down and normative understanding of preparedness. By top-down, I mean that the studies use definitions established by policymakers and organisations, where preparedness is seen as an active state of readiness (Lakoff, 2007; Staupe-Delgado & Kruke, 2018). Households are expected to follow the same preparedness regimes as formal institutions, which include a high level of awareness, planning, rehearsals, drills and supply stocking to deal with unforeseen events. By normative I mean that the studies conclude that a high level of preparedness is obtained when the predefined resources are in place, and that this makes the household more resilient (Baker, 2013, 2014; Baker & Grant Ludwig, 2018; Kirschenbaum, 2002).

The theoretical baseline for household preparedness studies is mostly psychology-oriented behaviourism, meaning that individuals are seen to behave rationally according to their knowledge base, and that increasing awareness will increase preparedness behaviours (Tuohy, Stephens, & Johnston, 2014). I have labelled this paradigm *formal preparedness*. The problem with adopting a formal preparedness perspective, however, is that it rarely considers that preparedness is also shaped by the context in which actions are performed, and that these actions are not separate from other actions, social norms, cultures, systems and institutions. Although we should not disregard the systematic and linear process behaviouristic models, they lack the capacity to account for all the complex and interwoven strategies that people mobilise when something happens. This line of reasoning led to the main, overarching research question for the dissertation: *How do Norwegian households prepare for and cope with extensive infrastructure breakdowns using their social, cultural and material resources?*

1.1. A social practice perspective on preparedness

A good place to begin increasing our understanding of the concept of preparedness in research, as well as in local and national policy, is with what I have labelled *informal preparedness*. Informal preparedness is inspired by studies of risk and everyday life that emphasise the importance of contextual knowledge (e.g. Horlick-Jones, 2005; Tulloch & Lupton, 2003; Wynne, 1996) (see Chapter 3). It recognises that what is understood as risky in one context (a specific time, place and socio-cultural situation) might not be the same in another context. Our understandings of risk and the strategies we use to deal with risk are continuously contested and shaped by the cultural and social context of our day-to-day lives.

Informal preparedness has its theoretical grounds in social practice theory, which engages with the social and cultural frames that produce certain ways of acting (Schatzki, 1996, 2002) (see Chapter 3). All social life is understood as being rooted in and developed through practices and their interlinkages (Nicolini, 2017). A practice can be defined as organised constellations of interconnected elements (forms of knowledge, meanings and motivations, and materials) that are routinely performed through the doings and sayings of people who are seen as practitioners (Cetina, Schatzki, & Von Savigny, 2001; Reckwitz, 2002b; Shove, Pantzar, & Watson, 2012). Many practices are performed within the household, which is here understood as a socio-material cluster of interlinked practices.

A practice is more than merely the practitioner's discursive understandings of the world. It foregrounds the importance of the body and how skills become embodied, shared practical understandings of knowing how to act in each situation, and the material surroundings and objects. The social world therefore consists of both sayings (language) and doings (performances). The performance of practices often happens in a routinised manner, i.e. something that is done on a regular basis.

This dissertation differs from the common understanding in the field in that it examines preparedness in the context of everyday life. From the

perspective of social practice theory, I posit that preparedness cannot merely be understood as an active and reflexive state of mind where households execute predefined actions, such as stocking supplies, constructing response plans and being aware of governmental preparedness information. Preparedness must also include the many resources households possess through performing their everyday practices, such as spending time in cabins with restricted access to infrastructure, social relationships and networks, dealing with the daily weather conditions, or manoeuvring through the landscape and built environment in their local community. These practices are often taken for granted in preparedness research because they are everyday activities rather than actions to deal with specific risks. Informal household preparedness aims to emphasise preparedness as being interwoven in everyday life. It opens up a very different view on preparedness, seeing it more as the elasticity of these practices in the form of a built-in capacity to uphold everyday life (Trentmann, 2009).

Informal preparedness entails that: (i) preparedness is understood as practical competences in performing routine everyday practices; (ii) these competences are formed through practitioners' situational understanding and engagement with social and material surroundings.

This dissertation offers a systematic study of the informal preparedness resources and constraints that exist within households. Bringing the social practice perspective on preparedness into the current understanding of preparedness will contribute to increasing our knowledge about actors with no defined roles in formal crisis management and preparedness systems, and the resources they are able to mobilise.

I argue that implementing informal household preparedness in local and national crisis management and preparedness plans would lead to a more nuanced understanding of the population that these plans are created to protect. Existing preparedness policies can thus be better attuned to the preparedness resources that are already in place in households, and support those households found to lack such resources.

This view calls for a recognition, as well as an integration, of informal preparedness in preparedness policy.

1.2. Critical infrastructure in a modern society

The social practice perspective entails a specific view of infrastructure. Infrastructures such as electricity and information and communication technology (ICT) are often understood in terms of their physical constituents and, at least today, the logical rules programmed into it. Such a view can arguably lead to a narrow understanding of what critical infrastructure is as a whole and what makes it work in a society. A broader view is useful when considering a phenomenon like household preparedness for infrastructure breakdowns because here, we are interested in how people interact with and are part of infrastructures.

Infrastructures can be understood as networks of socio-material connections that are deeply embedded in, and at the backstage of modern practices (e.g. Bennett, 2005; Graham, 2010; Larkin, 2013; Matthewman & Byrd, 2014; Perrow, 2011; Silvast, 2017; Star, 1999). From this perspective, infrastructures are material in that they are built networks (grids, power lines and poles, wires and cables) and social in that they are the base from which modern economic and social systems operate (Larkin, 2013). Howe et al. (2016, p. 7) remind us that infrastructure is more than the sum of its solid parts:

> Common sense tells us that infrastructures are rigid: pipes, roads, poles, and stations. And yet infrastructure also necessitates the 'softer' powers of human skills, competencies and expectations. In this way, infrastructure is 'sticky', even as its materiality might feel impenetrable.

These multi-layered and complex networks of social and material features are made to serve human purposes, such as to enable communication across large spaces and provide warmth and a means to cook food. However, while infrastructure progressively plays a vital role in our daily life and work to ensure a comfortable modern lifestyle, it also produces new risks. As the interconnectedness of complex infrastructures grows, they become more vulnerable to cascading failure

for a range of systems (Byrd & Matthewman, 2014; Howe et al., 2016; Matthewman & Byrd, 2014; Perrow, 2011; Pescaroli & Alexander, 2018). According to Edwards (2003), the standard explanation for infrastructure breakdowns is either technical or human error. However, the 'either/or' strategy conceals what is really an interconnected system of technologies, individuals, social norms, culture and traditions, regulations and environmental conditions (Graham & Thrift, 2007; Matthewman & Byrd, 2014; Nye, 2010).

For sociologists, disruptive events have provided a source for better grasping the deeply embedded ways in which our day-to-day lives are organised (Blok, Nakazora, & Winthereik, 2016; Guggenheim, 2014). At the micro level, for instance, ethnomethodologist Harold Garfinkel used 'breaching experiments' to unveil the taken-for-granted rules and norms of social situations (Garfinkel, 2008). Stirring up what usually remains unstated reveals the naturalised structures that form the background of a certain way of life. If we take this a step further, we can learn about some of the mundane social features of everyday life by looking at how it is performed without access to critical infrastructure. What would a day without mobile phone coverage or electricity look like? What can that tell us about how our lives are organised, and about our preparedness for these extraordinary conditions? Although we know that infrastructures are now embedded in our everyday lives, we know very little about what happens to everyday life when they break down, and what sort of resources households have and use. We therefore need to gain a better understanding of households' resources in order to improve future preparedness strategies.

1.3. Research objectives

The overall objective of this dissertation is to provide in-depth knowledge about the role of social practices in our understanding of preparedness for extensive infrastructure breakdowns in Norwegian households. That means looking at how household practices bring social, cultural and material resources into play when households cope with infrastructure breakdowns. Coping strategies are defined as the performance of preparedness, whereby the resources households use are

manifestations of their level of preparedness. The main research question, *how do Norwegian households cope with extensive infrastructure breakdowns using their social, cultural and material resources?* is further specified in two sub-questions:

1. How can preparedness be empirically investigated as part of the daily practices in households?
2. What forms of social, cultural and material resources do Norwegian households use when they are faced with extensive infrastructure breakdowns, and how do these differ between households?

Whereas the first two sub-questions emphasise informal household preparedness, a third research question deals with the relationship between formal and informal preparedness:

3. How is the relationship between formal and informal preparedness represented in the performance of social practices in Norwegian households?

Four journal articles explore household preparedness from a theoretical, methodological and empirical viewpoint, and each article underscores the importance of recognising informal preparedness as part of the resources our society possesses for dealing with extensive infrastructure breakdowns:

Article 1 '*Informal household preparedness. Methodological approaches to everyday practices'* answers to Sub-question 1 by offering an analytical framework that provides a means to grasp the informal aspects of preparedness not commonly visible in preparedness studies. Through three approaches; performance-based interviews, walk-along tours and photography, I illustrate how a research design that interlinks these approaches can reveal important preparedness resources in the event of extensive infrastructure breakdowns. The article makes a significant contribution to the scarce number of in-depth preparedness studies by offering a concrete toolbox to be applied across contexts. Findings from such in-depth studies should also be used as a basis for

larger surveys that measure the type and amount of informal preparedness resources.

Article 2 *'Coping with blackouts. A practice theory approach to household preparedness'* answers to Sub-question 2 by demonstrating how practice theory can be used as a sensitising device to foreground the social, cultural and material resources of informal household preparedness. Drawing on the three key elements of a practice: competences (knowing how to do something), meanings (why we do it) and materials (how materials are used in order to do it) in an analysis of Case Study I, the article demonstrates that understanding preparedness as part of practices reveals the interconnectedness between practitioners' understanding of infrastructure breakdowns, their competences for dealing with them and the materials they use. It adds to existing research by providing a systematic account of why and how these resources matter to preparedness.

Article 3 *'Embodied competences in preparedness for blackouts: Mixed methods insights from rural and urban Norwegian households'* moves the focus onto competences and how they affect the level of preparedness. By means of Case Study I & II and the survey, this article answers to Sub-question 2 by providing a detailed account a preparedness competence for dealing with extensive infrastructure breakdowns, and demonstrating that this competence vary between different types of household and between practitioners within a household. While prior research has concluded that issues such as previous experience and strong social networks increase preparedness, there is a notable lack of research on *how* they increase *what type* of preparedness, and how multiple practices interconnect to shape a preparedness competence. The article provides a more nuanced understanding of how competences affect preparedness, and how they come into play during an extensive outage.

Article 4 *'"Someone will take care of it". Households' understanding of their responsibility to prepare for and cope with electricity and ICT infrastructure breakdowns'* uses data from Case Study I & II to answer research question 3 that explores the relationship between formal and

informal preparedness. Drawing on the engagements of practitioners about preparedness for infrastructure breakdowns, the article shows that framings of responsibility affect how preparedness is performed. The key argument is that households are prepared even though they do not engage in preparedness, and that this needs to be accounted for in future preparedness policy. Households in local communities are therefore recommended to have an active role in planning.

1.4. Outline of the dissertation

This introduction has presented the background and context of the dissertation, as well as the research objectives, and briefly summarised the main argument in each article. In Chapter 2, I outline the concept of household preparedness, emphasising the lack of theorisation and its fragmented use in empirical studies. Chapter 3 draws on insights from social science risk studies and social practice theory to suggest a more mature theoretical framework in order to help increase our understanding of household preparedness. Chapter 4 gives an overview of the research design, methodology, data material and ethical considerations. Chapter 5 summarises the four articles and their contribution to the field, whereas Chapter 6 goes on to present the overall conclusions of the dissertation, point out its limitations and suggest future research.

Chapter 2

Preparedness

This chapter introduces current understandings of the concept of preparedness. Preparedness is about the many forms of resources a society holds to manage a potential crisis or disaster. The concept is used to describe this apparatus of resources at all societal levels, from large-scale structures such as national states and down to the micro-level of individual preparedness. It appears in fields such as risk studies, emergency-, and disaster studies, security studies, public health studies, and organisation studies. I firstly use insights from security studies to explain the logic of preparedness in past and current risk management policies and go on to provide a brief outline of how preparedness has been communicated to Norwegian citizens. The ways in which citizens prepare has mainly been investigated in disaster studies, and a second section offers a critical view on preparedness from the perspective of disaster studies, summarised in the concept of formal preparedness. Finally, I review some of the findings from empirical studies of preparedness that use the formal preparedness perspective and the few existing studies that go beyond this to include wider social processes.

2.1. Anticipating the future

Preparedness can be seen as a logic for approaching the uncertainties of societal security. It offers risk management experts a way of dealing with the uncertainties of the future by bringing them into the present, where comprehensible interventions can be designed (Lakoff, 2007). According to Lakoff (2007), preparedness becomes the preferred approach, along with precaution and pre-emption, to manage events that you cannot predict the occurrence or consequences of. Risk management strategies such as preparedness stems from anticipation strategies of World War II and the subsequent Cold War (Adey & Anderson, 2012). Today, and particularly in the post-911 security environment, the concept of preparedness has been spread to other contexts and now aims to address a much wider array of potential events that include natural hazards (Collier & Lakoff, 2008; J. Walker & Cooper, 2011).

The ethos of preparedness is that a catastrophe will occur at some point, and when it does, we had better be ready to cope with it. Lakoff (2007, pp. 253-254) summarises how preparedness views with the uncertainties of the future:

> Preparedness assumes the disruptive, potentially catastrophic nature of certain events. Since the probability and severity of such events cannot be calculated, the only way to avert catastrophes is to have plans to address them already in place and to have exercised for their eventuality – in other words, to maintain an ongoing capability to respond appropriately.

Governing through this logic means that efforts are not being made to stop an event from happening, but rather to protect the population against the potential consequences should that event occur (Anderson, 2010; Aradau, 2010a). Whether we need to prepare is not questioned within this logic, but rather how and for what we should prepare (Lakoff, 2005). Preparedness is therefore about acting in advance of the uncertain future in one specific way - to minimise the effects of a disruptive event. The uncontrollable characteristics of potential catastrophic events have created a policy of *a continuous state of*

readiness. Readiness is sought through performing 'techniques of preparedness', such as early warning systems, drills, simulations, scenarios, and exercises (Collier & Lakoff, 2008). These are performed within a networked system of national, regional and local institutions that are given preparedness related tasks (Anderson, 2010).

There is a growing literature on how preparedness as a risk management strategy used in modern societies affects the way in which we deal with crises and disasters, and constitutes a critical discussion of how we imagine future catastrophic events to be and how these imaginaries motivate preparedness (e.g. Anderson, 2010; Aradau, 2010a; Aradau & Van Munster, 2007; Collier & Lakoff, 2008; Lakoff, 2005, 2007). Drawing on a Foucauldian or governmentality perspective (Lupton, 2013; O'Malley, 2009, 2013a), these studies are interested in the ways in which risk is produced and reproduced through discourses, strategies, institutions, and practices in modern societies. As such, preparedness can be understood as a series of discourses and practices with the underlying rationality of readiness (Aradau & Van Munster, 2007). According to O'Malley (2013b), strategies such as preparedness are promoted with a view to creating individuals (or subjects) that prosper when living under highly uncertain societal conditions. Preparedness understood as readiness aims to produce *resilient* individuals.

Resilience can be defined as society's ability to adjust to a new physical, social and psychological reality after an event (Manyena, 2006; Manyena, O'Brien, O'Keefe, & Rose, 2011; Paton & Johnston, 2006).[2] It has become a key concept (or buzzword) in risk management policy and in a range of research paradigms (J. Walker & Cooper, 2011). Tierney (2015) compares it to sustainability, a concept that like resilience features heavily in today's policy. Although sustainability spurred

[2] Resilience is often seen in relation to 'vulnerability'. While those who are able to control risks are seen as resilient, those with fewer abilities are more 'vulnerable' (Adger, 2006; Blaikie, Cannon, Davis, & Wisner, 2005 [1994]; Bolin & Kurtz, 2018; Cutter et al., 2008; Gallopín, 2006), with reference to the pre-event characteristics of those groups. Vulnerability has been criticised for stigmatising groups, for example genders, social classes, health groups, and ethnic groups, and for producing normative practices reproduced within those groups (Montelius & Nygren, 2014; Nygren, Öhman, & Olofsson, 2015).

discussions about how to construct the future, it became an umbrella concept without a defined meaning. What is a sustainable society? And what is a resilient society? Resilience is not something in itself, it tends to appear in various forms ranging from general discussions about ways to govern down to risk management strategy documents or preparedness plans. It is simply filled with meaning according to the specific problem it is applied to (Anderson, 2015). Resilience in research and policy has, for example, been criticised for producing a neo-liberal discourse where responsibility for managing risks is shifted from the authorities to individuals (Bergström, 2016; Chandler, 2013; Reid, 2013; Tierney, 2015).

While resilience can be understood as an overarching security concept, since it does not imagine and plan for specific scenarios, preparedness is much more tangible and concrete (O'Malley, 2013b). Readiness can be managed through plans and policy instruments and operationalised into checklists and advice for the public. However, what tends to happen is that some preparedness strategies are given primacy while others are not included. For households, I argue that what I have labelled 'formal preparedness' has been given priority by the authorities, and that this logic is reproduced in empirical studies of household preparedness. Before turning to the latter, I will briefly review how citizens have been addressed in Norwegian preparedness policy.

2.2. The role of citizens in Norwegian preparedness policy

Based on the understanding of preparedness as a state of readiness, a substantial effort has been made in both research and policy to manage risk through preparedness plans (for an overview, see Alexander, 2015). In accordance with the aforementioned perspective on preparedness as something that reproduce specific discourses and subject positions, Clarke (1999) concludes in his research on how governments plan for disasters that most plans act as a form of rhetoric designed to convince readers about a specific view on risk. However, research on emergency and preparedness plans within the context of disaster studies has largely focused on improving plans by accounting for different types of actors and contexts (Alexander, 2002; Aven, 2016; Dynes, 1994; Perry &

Lindell, 2003, 2006). With regards to citizens, emergency plans play an informational role, and include measures to ensure effective communication to citizens.

In the following, I give a brief overview of how citizens have been referred to in the most recent communication about preparedness from the Norwegian authorities. This is important because it clarifies the authorities' expectations of citizens in terms of preparedness. The review is by no means exhaustive. For a detailed description of the Norwegian societal security regime, see for example Engen et al. (2016), and for a detailed discussion of the role of households in the Norwegian risk regime, see Throne-Holst, Slettemås, Kvarnlöf, and Tomasson (2015). I use the term 'citizen' instead of 'household' in this section, simply because households are not referred to as a unit in these documents.

Norwegian citizens have a general statutory 'duty to help' in emergency situations (Engen et al., 2016, p. 294), and are seen as active subjects with access to important resources. This is of particular importance when citizens are first responders at the site of an event (Kvarnlöf, 2015). Beyond this, citizens do not have any formal role in societal security strategies. They are often referred to as actors who need protection and information, and are given a passive role (Throne-Holst et al., 2015). Citizens are nonetheless increasingly addressed in policy processes relating to societal security, recently as part of the renewed defence concept 'total defence' (Norwegian Directorate for Civil Protection, 2018b).

'Total defence' (Totalforsvaret) was a central concept in the Norwegian defence strategy during the Cold War. In brief, 'total defence' means that the society as a whole supports the armed forces' efforts in the event of an invasion. Today, the total defence concept aims more than ever to strengthen the bonds between all actors taking part in overall societal preparedness and crisis management (Ministry of Defence and Ministry of Justice and Public Security, 2018). In Norway, these include the military defence and civil preparedness work performed by, among others, national and local authorities, industry actors and citizens. The

total defence concept thereby entails an active participation from the civil society. The Cold War has ended, however, and in more recent revisions of the total defence concept, the Norwegian government more clearly seeks to prepare its citizens.

This recent focus on citizens in societal security policy depicts a trend in the current preparedness strategies in Norway. Preparedness is becoming more explicit through the authorities' communication to citizens and through an increased media focus. For example, the website 'Kriseinfo' ('Crisis Information') is a resource base for information about ongoing emergencies, crises or disasters, and is continuously updated with information from the authorities. In addition, it contains general information about how individuals should prepare for different types of crises. In 2013, the Norwegian Directorate for Civil Protection (DSB) also launched the website 'Security in Everyday Life' ('Sikker hverdag'). The site offers information about crisis management and preparedness and includes a separate page on preparedness for infrastructure breakdowns. In 2018, DSB released a new brochure concerning citizen preparedness that was distributed to all Norwegian households. The brochure, entitled 'You are part of Norway's emergency preparedness', contained lists of supplies that should be stocked, advice on how to use them, important phone numbers and examples of citizen preparedness.[3] According to DSB, the Norwegian information campaigns were launched due to a lack of preparedness among the general population, as found in the Directorate's survey on 'citizens' own preparedness for events that can occur at home' (Norwegian Directorate for Civil Protection, 2018a, 2018b), and thus aim to strengthen such preparedness.

Non-governmental organisations such as the Red Cross also take part in preparedness communication to citizens in Norway, for example, they recently issued a newsletter stating that 'if the electricity disappeared or you become isolated for several days due to extreme weather conditions, you should be equipped to cope on your own for a few days'

[3] Similar communication strategies can be found in the other Nordic countries, and in Sweden the brochure 'If crisis or war comes' from 2018 has been criticised for reproducing a neo-liberal preparedness policy (Kvarnlöf & Montelius, under publication).

(The Norwegian Red Cross, 2019). Furthermore, a search in the media archive Retriever's database confirmed that use of the phrase 'preparedness' has gradually increased in media articles in Norway, from 1,134 articles in 2000 to 8,465 articles in 2019. While this discourse is not the core object of study in the present dissertation, it affects how Norwegian households understand their own responsibility for being prepared and reflects how they engage in preparedness. Pointing to a strengthened focus on preparedness makes it even more important to gain a deeper understanding of the resources ordinary people hold and use.

2.3. Formal household preparedness

So far, I have presented a critical perspective on preparedness, conceptualised as a risk management strategy that aims to produce a constant state of readiness. Importantly, this perspective stresses that preparedness is not an objective procedure to reduce societal risks. Certain types of preparedness are produced within specific social and cultural contexts. This argument also applies to research. Preparedness is used in various conceptual frameworks, such as the disaster management cycle (Khan, Vasilescu, & Khan, 2008), which are derived from specific research paradigms. In the case of *household* preparedness, the most dominant is probably the American based 'disaster studies' tradition (see the review by Lindell (2013) or *The Handbook of Disaster Research* edited by Rodríguez et al. (2007)). In the following, I draw on several studies that are critical to how preparedness has been conceptualised, theorised and used in empirical studies within this tradition, to construct the concept of *formal preparedness*, which I argue is a top-down, normative, pragmatic, and individualistic view of preparedness.

More broadly, Tierney (2007) argues that unlike other risk-related research fields where substantial efforts have been made in theorising, a strong applied focus has come in favour of further sociological theorising within disaster studies. From the onset of disaster research in the 1960s, systems theory and organised behaviour were dominant perspectives, in which disasters were defined as events that caused

material, economic and human losses within a society. As events, disasters were understood to be limited in time and space, and as something out of the ordinary. The event-based view on disasters produced the type of knowledge that the economic funders of disaster research wanted: how can a disastrous event help us to better pre-event planning within governmental bodies? Moreover, how can we use this information to create new courses, plans and advice in different sectors? What is overlooked in this perspective, however, is that these events are intertwined with ongoing social processes and that disasters do not necessarily have a defined start or end point. Kirschenbaum (2002, 2006) has also argued that disaster research uses a preparedness concept that has evolved from bureaucratic structures and reflect the language used by public administration. Such bureaucratic pragmatism has resulted in a variety of definitions of preparedness, simply because it varies across social and cultural contexts.

From a disaster studies perspective, Staupe-Delgado and Kruke (2018) have provided an extensive review of the concept of preparedness. They observe the immaturity of preparedness in particular as a theoretical concept (see also Gillespie & Streeter, 1987; Sutton & Tierney, 2006), claiming that it is a result of the applied focus within the field. The theoretical underpinnings of the concept of preparedness are rarely discussed. Staupe-Delgado and Kruke (2018, p. 213) argue that as a consequence of not having this theoretical discussion, preparedness research is conducted with a number of pre-phrases such as emergency preparedness, disaster preparedness, individual preparedness or household preparedness, or is replaced by similar concepts such as readiness and contingency management. To my understanding, researchers do not always reflect on the implications of these additional or alternative terms, and the literature therefore ends up with inconsistent terminology. An example is the lack of clear distinction between studies that use the individual and those that use the household as their unit of analysis of preparedness in the general population, indicating that the difference between them is not reflected on.

Preparedness also tends to be merged with competing concepts in other fields such as (climate change) adaptations. This leads to internal contradictions within and between fields. According to Staupe-Delgado and Kruke (2018), preparedness is not one coherent object of study, but rather an abstract concept in need of operationalisation to be empirically investigated. There is therefore a need to pay greater attention to which aspect of preparedness that is being studied and that we do not take for granted that one concept encompasses preparedness as a whole.

Baker (2013, 2014) and more recently Baker and Grant Ludwig (2018), have argued that the concept of preparedness is commonly understood as what they categorise as 'traditional preparedness', defined as actions such as response plans, drills and rehearsals, stocking supplies and creating emergency kits, with the expressed goal of reducing the consequences of potential disasters. They argue that this is a top-down approach to preparedness made from the point of view of the authorities and different organisations.

Most empirical studies understand preparedness as an *active state of readiness* to deal with a particular risk. As such, preparedness entails 'planning, establishing resources, developing warning systems, skills in training and practicing, and almost any pre-disaster action which is assumed to improve the safety or effectiveness of disaster response' (Gillespie & Streeter, 1987, p. 157). It is generally believed that to be prepared means to actively engage in pre-event actions to reduce risk and ensure a higher level of safety (Baker, 2013, 2014; Baker & Grant Ludwig, 2018; Uscher-Pines, Chandra, Acosta, & Kellermann, 2012). Consequently, being passive means to ignore the risk and thus be unprepared. This definition stems from recommendations provided by policymakers, organisations and other actors. The definitions used in the United Nations International Strategy for Disaster Reduction (UNISDR), and by the Federal Emergency Management Agency (FEMA), the Red Cross, and national and local governmental actors are all based on the above-described logic of readiness.

The consequence of these operationalisations is a preparedness concept that enforces a certain preparedness practice (Blake, Marlowe, &

Johnston, 2017). Levac, Toal-Sullivan, and O'Sullivan (2012), for example, provide an extensive review of individual emergency preparedness where they state that 'one of the most effective ways to mitigate the effects of a disaster is through proper household preparedness' (p. 727). The use of the word 'proper' implies that preparedness is a concept that could be proper or improper based on policy makers' expectations of the division of responsibility between actors, and formed by their role in the bureaucratic system. For Kirschenbaum (2002), this means that preparedness studies to date have inherited a bureaucratic pragmatism, failing to integrate the cultural situatedness of preparedness. Furthermore, Blake et al. (2017) claim that existing preparedness plans produce one preparedness mode that does not recognise that different resources are available to different people. As a result, empirical studies often conclude that an actor has a low or high level of preparedness based on measurements of a predefined and normative concept.

Interestingly, preparedness strategies recommended for households are frequently the same as those for organisations and governments. Households should, for instance, have a family emergency plan written down and rehearsed, engage in training for different disasters, stock supplies, and assemble an emergency kit. Reviews of household preparedness studies, such as Levac et al. (2012), Nojang (2015) and Kohn et al. (2012), all point to the lack of a clear definition of preparedness. According to Kohn et al. (2012), however, most scholars agree on two fundamental preparedness tasks for individuals and households: a set of emergency supplies and a personal or family emergency plan. This type of operationalisation leads to a conception of preparedness that sees it as an attribute of households (Kirschenbaum, 2002). As a result, the resources and constraints that are included in empirical studies are restricted to those that measure the level of this type of preparedness, while social and cultural factors are often neglected. These include types of knowledge that are not directly associated with preparedness, the division of labour between and within households, the flow of social and material resources in social networks, improvisations, cultural and social norms that produce certain practices

that might seem irrational and so on. Eiser et al. (2012, p. 13) phrase this quite simply; 'when conceptualising preparedness, it is important not to see it as an all or none process'. There is, in other words, good reason to think of preparedness as not merely an attribute of households but as a coming-together of many forms of taken-for-granted and preparedness-unrelated resources.

Disaster studies address social and behavioural aspects of preparedness. For individuals and households, these include perceived risk, personal experience with disasters, hazard proximity, and the financial, time and knowledge cost of adjusting to potential risks (Lindell, 2013). Sutton and Tierney (2006, p. 14) review the concept of preparedness from this tradition, stating that household preparedness is usually measured with behavioural metrics focusing on six dimensions: hazard knowledge, formal and informal response plans and agreements, life safety protection, property protection, emergency coping and restoration of key functions, and initiation of recovery. Within this paradigm lie important prerequisites for how preparedness is understood (Tuohy et al., 2014). The behaviouristic paradigm on which most preparedness studies are based is critiqued further in Chapter 3.

If we understand household preparedness as a set of predefined measures that are attributed to an individual, then these can easily be measured, and their prevalence can be tested against a range of variables to produce a model of the determinants of preparedness. Uscher-Pines et al. (2012, p. 172) question the utility of these surveys, stating that:

> Typically, the measures included in these surveys are those that are the easiest to collect and have, on their face, a putative link to preparedness. But it is far from clear that the behaviours these surveys purport to measure are the most salient measures of citizen preparedness.

This view is confirmed by Tuohy et al. (2014, p. 301), who argue that 'much of the disaster research on preparedness has remained focus on measuring population characteristics that predict or influence

individual behaviour and individual adoption of official recommendations'. There is clearly a need to improve our understanding of preparedness beyond this behaviouristic and attribute-based view. I believe this shortcoming gives good reason to question the conceptual underpinnings of quantitative studies of household preparedness and that this constitute a substantial lack within the field.

There are very few qualitative in-depth studies concerning preparedness. Diekman, Kearney, O'Neil, and Mack (2007) note that, to their knowledge, no studies have used qualitative methods to examine household emergency preparedness. In Kohn et al.'s (2012) review of personal disaster preparedness, only four of 36 reviewed articles were qualitative. These were based on semi-structured interviews and focus groups. Although Levac et al. (2012) do not describe the study methods used in their review, the elaboration of their results in frequencies, indicates that the majority of studies were quantitative. The authors note themselves that 'an important aspect of consideration in reviewing the above studies is that individual or family preparedness cannot be determined exclusively by the amount of supplies on hand' (Levac et al., 2012, p. 728). Lindell and Perry (2000) also report that in most quantitative preparedness studies, social context is not measured. Interestingly, the few qualitative studies that do exist are based on large samples of telephone interviews or a high number of focus groups, and use quantitative methods to analyse their data. Examples include J. S. Becker, Paton, Johnston, and Ronan (2013) and Diekman et al. (2007), who quantify quotations concerning different perceptions towards preparedness.

Based on the critical discussions of preparedness above, I have defined a formal preparedness perspective consisting of the following key characteristics:

- *Top-down*: The concept of preparedness stems from policy discourse, and the definition used is adopted from policy documents written by the authorities and organisations.
- *Normative*: The logic of readiness is the baseline from which preparedness is understood, also for households.

- *Pragmatic*: Preparedness is operationalised as a set of concrete attributes of a household.
- *Individualistic*: Preparedness is explored using statistical models that correlate individual perception and behaviours.

In sum, most existing empirical studies of household preparedness are rooted in a behaviouristic paradigm where an a priori definition of preparedness is tested using statistical modelling. However, important insights can be gained from studies dealing with the social determinants of preparedness within this paradigm, as well as those that go beyond it. These are outlined in the next section.

2.3.1. Prevailing knowledge about the social aspects of preparedness

From the field of disaster risk reduction, there has been extensive research on the individual and social determinants of household preparedness (e.g. Basolo et al., 2008; J. S. Becker, Paton, Johnston, & Ronan, 2012; J. S. Becker et al., 2013; J. S. Becker, Paton, Johnston, Ronan, & McClure, 2017; Bourque et al., 2013; Diekman et al., 2007; Donahue, Eckel, & Wilson, 2014; Kapucu, 2008; Lovekamp, 2006; Murphy, Cody, Frank, Glik, & Ang, 2009; Nojang, 2015; Paton, 2007; Paton & Johnston, 2001; Paton, McClure, & Bürgelt, 2006; Perry & Lindell, 2003). A common finding in these studies is that even though respondents were aware of a risk, they did not prepare (in the formal sense) in order to minimise the impact of a potential disaster. Paton and McClure (2013) argue that although the risk management logic would be to prepare in order to avoid a risk as soon as that risk is identified, this is not necessarily the case for households. Preparedness in the form of constant awareness, active planning, or community engagement is seen as too time consuming compared to the perceived level of risk. This also means that if a specific event is seen as likely, people are more inclined to prepare for it (Lindell & Perry, 2012). Consequently, informing citizens about risk (increasing awareness) will not always lead to preparedness.

The risk awareness-action gap arises because households appoint a variety of meanings to what it means to be prepared. This is confirmed

in a study by J. S. Becker et al. (2013) who found that respondents were more likely to own resources that had a range of everyday uses than a designated preparedness resource, but that they overestimated their level of preparedness. This was because they had not maintained their material supplies once they had acquired them, or refurbishments made to protect the home against damage. If households already considered themselves prepared, they were also less likely to seek information or adapt their existing preparedness to accommodate government advice.

Studies have also pointed to the discrepancy between actual and perceived preparedness (Basolo et al., 2008; Bourque et al., 2013; Paton, 2003; Russell, Goltz, & Bourque, 1995). Actual preparedness was defined as the extent to which an individual engage in preparedness related activities, while perceived preparedness is defined as intentions to prepare. Russell et al. (1995) argue that perceived preparedness is not a sufficient indicator of preparedness as it rarely correlates with actual behaviours. Paton, Smith, and Johnston (2000) further argue that perceived preparedness is correlated with risk perceptions. If the risk is perceived to be low, then individuals believe they are well prepared, which in turn leads to less actual preparedness efforts. Paton (2003) claim that if intentions to prepare can be increased, this might lead to actual preparedness behaviours.

Work has also been done to identify factors that influence how different individuals cope with and prepare for disasters (Bolin & Kurtz, 2018). These include income (Fothergill & Peek, 2004), gender (Enarson, Fothergill, & Peek, 2007), ethnicity (Lovekamp, 2006), and age (King, 2000). In general, these studies find that individuals with a high income or level of education, women and older people take more preventive actions than their counterparts. The effect of previous experience has also been investigated and although the findings vary somewhat, most studies report a correlation between previous experience and present preparedness behaviour (Adeola, 2009; J. S. Becker et al., 2017; Bourque, Mileti, Kano, & Wood, 2012; Diekman et al., 2007; Mileti, 1999; Siegrist & Gutscher, 2008).

Wachinger, Renn, Begg, and Kuhlicke (2013) find that previous experience of a disaster along with trust in the authorities, have the greatest impact on an individual's risk perception. The above-mentioned socio-demographic factors only represent amplifiers or mediators to this relationship. However, they do point to the important fact that a high level of perceived risk does not necessarily lead to a high level of preparedness. If a past event had severe consequences, individuals were more likely to prepare for a similar future event, while if they had not personally experienced any damage they did not have the same increase in risk perception. J. S. Becker et al. (2013) also find that previous experience leads to higher preparedness, but often only for the same type of threat they had experienced rather than on a general basis.

The above-mentioned studies have contributed greatly to a more nuanced understanding of why some household do not prepare, and why groups cope differently with disasters. However, many of them follow a behaviouristic approach with little room for the wider socio-cultural context in which these behaviours take place. Additionally, the studies rarely address *how* preparedness is performed, but rather suffice with measuring the level of formal preparedness in households. In what follows, I review some of the studies that aim to go beyond the behaviouristic paradigm and include wider social processes.

Kirschenbaum (2002) propose a more comprehensive method for studying how a range of social and cognitive factors affect preparedness. Kirschenbaum argues that preparedness is in fact comprised by several separate factors and should not be understood as one coherent concept. Four overarching categories from which to measure preparedness are therefore suggested: (i) attributes (supply stocks, other material resources); (ii) knowledge (e.g. first aid skills); (iii) planning (emergency and evacuation plans), and; (iv) protective actions (e.g. access to a shelter). The level of preparedness framed as these four categories are predicted by a further six independent variables; social and cultural background, sociodemographic characteristics of the individual, previous experiences with disasters, past disaster behaviour, and risk perceptions.

The importance of 'emergent groups' in disaster recovery has long been recognised (Drabek & McEntire, 2002, 2003; Quarantelli, 1984; Stallings & Quarantelli, 1985; Sutton, Palen, & Shklovski, 2008). Emergent groups are made up of people within a community that spontaneously come together during a disaster to provide aid to those affected. Emergent phenomena disprove common disaster myths such as widespread panic, looting and other types of anti-social behaviour, as well as the dominant command and control model that is commonly used in policy strategies (Drabek & McEntire, 2003; Imperiale & Vanclay, 2019). Dynes (1994) points to the fact that such strategies must be based on what people actually do during a disaster, and that policies would be more effective if the citizens' resources are included. An extension of this perspective includes research on improvisation and creativity during disasters, in particular in organisations (Kendra & Wachtendorf, 2003a, 2003b, 2007; Wachtendorf, 2004). Organisations have been found to use existing capabilities in new ways during disasters, and responding organisations are advised to explicitly foster creativity as an important component of crisis management plans.

In addition to emergent groups, much research has been devoted to understanding how social capital in communities affects the level of preparedness and ability to cope with disasters (e.g. Chamlee-Wright & Storr, 2011; Cheshire, 2015; Kim & Kang, 2010; McEntire & Myers, 2004). These studies predominantly draw on the work on social capital conducted by Putnam (1995), who defines social capital as a high level of moral obligations, social values (e.g. trust) and social networks within a community. Such attributes also lead to a 'sense of community', increasing the level of trustworthiness amongst community members. Those with previous experience from disasters have, for instance, important knowledge that can be shared across the community (Paton, 2007; Paton & McClure, 2013). A high level of social capital is therefore associated with a high level of resilience. For the specific case of preparedness, Paton, Bajek, Okada, and McIvor (2010) find that sense of community positively affect preparedness (see also Kim & Kang, 2010).

A weakness with most studies on community resilience, however, is that they predominantly focus on social capital, neglecting the much wider array of practices that are at play during a disaster and that might contribute to preparedness. Rademacher (2013) is one of few who goes beyond the sole focus on social capital, and in a study of local community capacities and engagement in a farm community in the US, she highlights four types of community capital: human (education, knowledge), social (networks, norms, trust), physical (capacity to maintain infrastructure, buildings, farmland), and financial (money, loans, credit). She also argues that community resources could be inactive or active, positive or negative. By stressing the inactive and negative resources, the study calls for attention to a more nuanced mapping of community preparedness resources.

Baker (2013, 2014) takes the work on community capitals into account and proposes the concept of 'situated preparedness', in contrast to 'traditional preparedness', in order to better understand the role of the implicit practices that consist of the resources people use to cope with a disaster. Also drawing on studies of improvisation suggesting that people tend to respond to change through adaptation rather than by following plans (e.g. Kendra & Wachtendorf, 2003b), Baker finds that the students who were interviewed used existing skills and social networks that could become useful in a disaster. Situated preparedness is understood through Giddens' theory of structuration to demonstrate that most of what we do is made up of implicit (practical consciousness) and not explicit (reflexive) actions. This is in contrast to traditional preparedness that only considers explicit actions. Using structuration to explain what people do gets us to the point where actions are not always reflexive, but are rather conducted under a set of predefined rules. However, as the following chapter demonstrates, the advances made in theories of practice indicate that rule-following is not sufficient to understand non-reflexive actions. The interconnectedness of explicit and tacit knowledge, embodied competences, socially shared meanings and values, and our material surroundings together form a complex interplay in which preparedness is performed.

In a more recent study, Baker and Grant Ludwig (2018) draw on the concept of 'ontological security' by Giddens (1991) to explain why people tend not to be prepared. The same approach is used by Harries (2008), who argues by means of a discourse analysis of interview data about flood risks, that people avoid engaging in preparedness because it challenges secure places such as the home. Continued awareness about risks leads to a state of insecurity and choosing not to prepare is a strategy employed to supress this insecurity. Harries also argues, in accordance with Zinn (2008, 2016), in favour of focussing more attention on emotions in order to understand risk responses. Contrary, Diekman et al. (2007) report that engagement in preparedness give a higher sense of control over some risks. In these studies, the individual is at centre stage, explaining the low level of preparedness with the reflexive individual who seeks to avoid risk. In the next chapter, I propose abandoning the idea of the reflexive individual and present a theoretical framework based on recent advances in practice theory along with a focus on how risk is part of everyday life. These contribute to gaining a better grasp on household preparedness, and in particular the performative aspect of preparedness that is seldom reflexive.

The studies reviewed in this chapter belong to either security studies or disaster studies and function as a backdrop for understanding the overall preparedness field. There are obviously many research fields I have not touched upon here (e.g. climate change adaptations, disaster vulnerability, and more general disaster research beyond the scope of preparedness). Furthermore, there are many studies concerning infrastructure, blackouts and households, risk knowledge, and trust that provide important insights into household preparedness that are reviewed more briefly in the four articles of the dissertation. I take the contributions from this chapter, as well as from the articles, with me to the next chapter, describing the theoretical framework of the study.

Chapter 3

Theoretical framework

The previous chapter discussed the formal perspective on household preparedness, with emphasis on the critiques that it is top-down, normative, pragmatic and individualistic. This chapter presents a theoretical framework that can be used to understand preparedness as an interwoven part of everyday life, which I have labelled informal household preparedness. The framework differs from the formal perspective on preparedness by proposing to take socially shared practices, rather than individual attitudes and subsequent behaviours, as the analytical starting point.

Social science perspectives on risk and everyday life (Tulloch & Lupton, 2003) and theories of social practices (Schatzki, 1996) are used to strengthen the fundamental claim that there is already a mode of preparedness found in the everyday practices of households that is distinct from the formal perspective. A good place to begin this discussion is with theories of risk, and how risk is defined. The chapter goes on to how theories of risk deal with the role of culture, individual decisions and knowledge about risk. From this, I propose that theories of social practice can aid in strengthening the focus on social and cultural context, as well as decentring the role of individuals. Together, perspectives on risk and everyday life and social practices form the theoretical baseline for the concept of informal household preparedness.

3.1. Defining risk

Risk says something about uncertain outcomes in the future (Markowitz, 1952; Renn, 1998, p. 51). There are comprehensive discussions about the definition of risk, and as the concept is widely used across disciplines and understood in relation to the specific field's research history and background, there is always a need to specify how risk is defined, or which 'camp' a study belongs to (Zinn, 2009). According to Hansson and Aven (2014), research about risk can be divided into two main categories: (i) risk analysis as knowledge about insecurities and how these can be handled within a specific place, process or event, and (ii) risk theorising and the development of methods, techniques, concepts and frameworks to understand risk. Whereas the former predominantly lies within the natural sciences, the latter has largely been developed within the social sciences.

The most obvious epistemological difference in risk conceptualisations is between realism, where risk is seen as having an objective size in the physical world that can be measured, and constructivism, where risk is not seen as something in itself, but as being constructed in the social world. Risk studies originated from a post-war need for systematic consideration of the dangers related to developing new technologies such as space programmes, nuclear power plants and chemical processes (Renn, 1998). Early risk research operated with a clear cut distinction between 'objective risk', which could be measured empirically, and 'subjective risk', which is an actor's perceptions of uncertainty (Adams, 2001; Jasanoff, 1999). This positivist approach to science, where positive facts based on logical interpretation of empirical evidence prevails over metaphysics, still dominates risk research in fields such as engineering, chemistry, biology and epidemiology, but also in some social science fields such as economy (Jacobs & Dopkeen, 1990).

Reith (2004) claims that a major part of the risk literature treats risk in a positivist way and without further reflection: 'Running through much of the literature is an implicit acceptance of 'risk' as a real or quasi-real phenomenon, and an assumption that it exists as something that can be "experienced", "produced" or "measured" as if it were an a priori reality'

(p. 385). Using the famous novel by Bruce Chatwin as a metaphor, Jasanoff (1999) similarly argues that the positivist position is the 'songline' of the risk research field. This view entails that: (i) risk is something that exists independently of our understanding of it; (ii) that experts' knowledge about risk can be separated from lay people's knowledge; and (iii) that the actors dealing with risk are rational.

3.2. Social science perspectives on risk

The social sciences have challenged this positivist view on risk. Contrary to the positivist ideal of tidying reality, social science risk studies have insisted on understanding risk as a complex social phenomenon. Extensive discussions of four main directions within the social sciences; risk perception, the risk society thesis, the governmentality perspective and the socio-cultural perspective, can be found in e.g. Lupton (2013), Zinn (2004, 2006, 2009), Taylor-Gooby and Zinn (2006). There are significant differences in the various directions' epistemological position on risk. Risk perception is the closest to the realist perspective, the risk society thesis takes a critical realist approach, the socio-cultural perspective takes a constructivist position, even though it claims that risks exists as an objective size, whilst the governmentality perspective takes a purely constructivist position. However, for the purpose of this dissertation, what follows concentrates on how culture, individuals and knowledge are understood by risk perception studies and the risk society thesis, before presenting the 'cultural turn' as a critique of this view, where risk is understood within the experienced everyday life.

As shown in the previous chapter, risk perception studies have had a significant impact on how preparedness is investigated empirically. I therefore begin by reviewing this theoretical position and lay the grounds for a central critique of behaviourism. I then turn to the risk society thesis by Beck (1992) and offer an analysis of why risk management strategies such as preparedness occur in late modern societies. Finally, I describe how the heterogeneous body of cultural perspectives on risk, or 'the cultural turn', has contributed to a more nuanced understanding of how risk is woven into all aspects of everyday life, directing critique towards the purely cognitive causality models

used in risk perception studies and the grand theorising of the risk society thesis (Zinn, 2009).

3.2.1. Risk perception

Slovic's widely cited article 'Perception of Risk' (1987) was written as a counterargument to the sixties' one-sided positivist view on risk. Slovic argues that risk is a mental construct used to handle the insecurities and unpredictabilities of modern life. Risk perception is a subjective assessment of the probability of an event, and of our consideration of the consequences this event might produce. The 'psychometric paradigm' is proposed as a taxonomy that offers quantifiable maps of factors and correlations between factors that affect how a risk is perceived by an individual, which in turn explains cognitive limitations. These include psychological factors such as self-efficacy, anxiety levels, emotions, material resources and socioeconomic factors. Further input came from the work of Tversky and Kahneman (1975), who argue that individuals are affected by cognitive biases in their decision-making. These are holes in the knowledge base of the individual that prevent them from making rational decisions about risk. 'Bounded rationality', which is the idea that individuals are limited by knowledge gaps and cognitive biases, along with individualised cultural values and habits, is then used to explain why individuals make seemingly irrational decisions.

Risk perception has had an enormous influence on risk research in the social sciences, as well as in policymaking. One possible reason for this, is that it offers causal or correlative models based on mechanisms for human action that can be applied to almost any situation, and that produce quantifiable results. It sticks to the natural sciences belief in developing universally applicable knowledge. This makes risk perception models highly attractive and suitable for empirical studies. Using experiments to empirically confirm or discard these models, risk perception studies cultivate the idea of tidying reality. However, it is important to note that more recent research in this tradition has opened up for the social and cultural differences in risk perceptions, such as the work of Pidgeon and colleagues that aims to integrate individual perceptions and the socio-cultural context (Parkhill, Pidgeon, Henwood,

Simmons, & Venables, 2010; Pidgeon, 2012; Pidgeon, Simmons, & Henwood, 2006).

Although the risk perception paradigm challenged early risk studies, sociological perspectives of risk are critical to how the socio-psychological approach treats risk knowledge and explains behaviour. Tulloch and Lupton (2003, p. 8) argue against bounded rationality:

> Sociocultural meanings tend to be reduced to 'bias', contrasted with the supposedly 'neutral' stance taken by experts in the field of risk assessment, against whose judgements lay opinions are compared and found wanting. Risk avoidance in this literature is typically portrayed as rational behaviour, while risk-taking is represented as irrational or stemming from lack of knowledge or faulty perception.

There are two core points to be followed here. Firstly, Tulloch and Lupton claim that risk perception research unknowingly reproduces a realist perspective on risk where expert knowledge surpasses lay knowledge. There is thus a need to be much more aware of what a study defines as risk in order to avoid reproducing a particular rationality a priori (Henwood, Pidgeon, Sarre, Simmons, & Smith, 2008; Lupton, 2013). This also affects the types of risks that are studied. As argued in the previous chapter, preparedness studies tend to reproduce the formal definition of preparedness and do not account for the preparedness measures identified by respondents themselves.

Secondly, risk perception research takes its starting point in the individual, who is seen to behave in a more or less rational way to manage a predefined risk. A first major problem with this view is that it does not acknowledge that individuals are positioned in a social world where sociodemographic factors such as class, ethnicity, gender, age, occupation, geographic location and so on significantly affect how people deal with risks (Nygren et al., 2015). A second problem is that people do not deal with one risk at the time. This is particularly important to acknowledge in studies based on experiments, where people are removed from the complexities of their social lives and placed in unrealistically simple settings. A third problem is that such studies

presuppose that people make some sort of choice about risk, and that their goal is to minimise the risks that researchers have defined as being important to minimise. A fourth problem is that the theory is based on a correlation between how a risk is perceived and individual behaviour. If such a correlation is lacking, it is explained by information deficiency, which again points to the first problem; that there is only one type of correct information out there. I return to the problems with behaviourism and how they have been addressed by the risk and everyday perspective, as well as by theories of practice, towards the end of the chapter.

3.2.2. Risk society and reflexive modernisation

Instead of treating risk as something that is produced in the cognitive processes of the individual, the influential societal diagnosis conducted by Beck (1992) treats late modern society as a 'risk society'. Beck argues that risks are produced as an unintended consequence of societal processes in late modernity and marks the distinction of the risk society in its incalculable nature. The globalised late modern world is characterised by a magnitude of complex risks that cannot be predicted. They are globalised and flow through cross-national social and economic systems, and they have potential long-term consequences. When risk is experienced as omnipresent, society will attempt to analyse, prevent and manage these risks. Preparedness can be seen as a risk management technique in societies that are preoccupied with risk.

Risk Society captured the mood of the developed world in the 1990s. It was published at a time when the severe environmental effects of pollution was at the core of political debate, and the Chernobyl disaster was fresh in mind, along with the aftermath of the economic recession in the 1980s (Mythen, 2007). In the book, Beck makes a clear distinction between early and late modernity. Late modernity refers to significant social and political changes in the developed world, including the end of the Cold War, the rise of welfare state regimes, globalisation and the information revolution, which stand in clear contrast to early modernity. Beck posits that although the social and political changes in late modernity produce 'goods' (higher level of employment, better health

care systems, better housing etc.), the unintended consequence of goods are 'bads', defined as problems that are triggered by these changes, such as environmental pollution and economic crises (Beck, 1992, p. 48). Contrary to previous eras where risk was understood in relation to nature and was often seen as fate and thus uncontrollable in line with religious beliefs, or as being controlled by nation states, late modern risks are seen as being produced by social processes and intertwined in a number of global institutions.

In this late modern era, Beck (1992), in line with Giddens (1991) and later with Lash (Beck, Giddens, & Lash, 1994), argues that society has become reflexive because these social processes and the consequences they produce are subjected to constant evaluation also by the individual. The unquestioned belief in scientific knowledge from the Enlightenment era has now been replaced by fragmented knowledge from a range of sources, resulting in a shift of responsibility from nation states to individuals to seek and evaluate knowledge and to make beliefs for themselves. In late modernity, the individual has been released from the strict norms of the industrial society and into a world of continuous choice and reflexivity about risk – a state of ontological insecurity. In this state, the world is experienced as fragmented. Meanings, relationships and identities are unstable and always shifting, and the level of trust in institutions is low.

The reflexive late modernity is a confluence of several intertwined societal tendencies. In the Fordism or Taylorism era, standardised mass production using unskilled labour led to vast economic growth and material advancement. Whereas individuals in pre-industrialised societies were skilled at producing goods for their own survival, industrialism shifted skills from the individual to the system, splitting production into manageable tasks and following machine-like routines. The consumption of highly standardised goods grew in accordance with workers' wages, allowing a larger share of society to participate in the market. Along with the increase in wealth, industrialisation also resulted in increased environmental pollution, nuclear radiation and other technological risks, as well as risks such as unemployment since workers were now replaceable. In the post-Fordism era, a greater

variety of cheap products and services gave the impression of individual choices for the affluent (Bauman, 2000 [1991]). Now, products are marketed to niches rather than masses, women have entered the labour market and production has been globalised. The economy has undergone a transition from producing goods to producing services, giving rise to a post-industrial 'service economy' (Bell, 1976; Ritzer, 1992). Whereas the industrial society produced the same goods for everybody, the individual was now presented with choices, creating a form of individualised inequality.

According to Beck (1992) these structural processes produced a shift from early modernity with class-based societies, where social positions or 'standard biographies' structured the lives of individuals based on past generations, to late modernity, where individuals are forced to create their own life biography from scratch, the 'choice biography', or 'life politics', as Giddens (1991) phrases it. Bauman (2000 [1991]) wrote that this individualisation of society is a liquid modernity where social institutions and the authorities could no longer serve as solid frames from which to guide the individual's life.

While the social order was produced and reproduced by a small elite in early modernity, the legislative authority of this elite was replaced by experts in late modernity. The state ceased to have regulative power over knowledge, making knowledge contestable and always open to different interpretations. Experts now serve as 'interpreters' of knowledge in their highly specified fields (e.g. risk management), and the individual is dependent on this interpretation to make sense of the social world, including risks (Giddens, 1990). Lay or experiential knowledge about risk is downplayed in favour of scientific and technological expert knowledge. For Beck, this is the basis of modern risks as we can no longer defer our knowledge to that of the authorities. As a result, individuals must constantly deal with risks themselves in their everyday lives by continuously evaluating the validity of expert knowledge. Risk is now internalised in modern lives and is no longer measurable as a concrete and physical danger (Parkhill et al., 2010).

Reflexive modernisation emphasises the importance of individual choice when dealing with risk, and has been widely criticised for underemphasising the role of social structures (see Dawson, 2012 for an extensive review). Risk is put at the centre of the reflexive individual life, with a lack of attention to the reproduction of class positions (Bourdieu, 2013 [1984]) through institutional processes, and to the ordinary routines of everyday life where risks are not reflected on (Mythen, 2007). However, it is worth noting that Beck and Giddens do recognise the larger social processes that force individual choice. In contrast to the cognitive models of risk perception studies, the risk society thesis acknowledges that risk exists as part of complex social processes and not merely as cognitive perceptions, and Beck is therefore critical of how risk experts position lay knowledge as deficient, and merely require more information to be accurate. Also, for Beck, culture is important as a way of stating that risk is contextual. Starting with a realist position where risk is understood to exist independently, he adds cultural relativism by arguing that risks are conceptualised differently in different parts of the world (Lupton, 2013). Beck says little about social inequalities (Mythen, 2007), however, and generally argues that risk hits all levels of society in similar ways because the consequences of modern risks can be highly dispersed in time and place (Beck, 1992, p. 36).

While the risk society thesis provides an overall frame to explain why late modern societies are filled with risk management strategies such as preparedness, it says very little specifically about how individuals live with risk (Lupton, 2013). Grand theorising like the risk society thesis tends to make general statements with limited empirical evidence, and with little emphasis on the micro-processes that are influenced by class, gender, location, age, ethnicity and so on (Alaszewski & Coxon, 2008, 2009). Beck, for example, overemphasises the negative aspects of risk, while 'risk taking' can also be beneficial (Lyng, 2004). In the following, the focus is therefore shifted towards theories of risk and culture that aim to foreground empirical studies of everyday life.

3.2.3. Risk, culture and everyday life

Empirical studies of risk and everyday life generally take a socio-cultural perspective towards risk, drawing on the seminal work of Douglas and Wildavsky (1982) who are affiliated to a Durkheimian tradition, representing a form of structure functionalism. Douglas and Wildavsky argue that dangers exist in an objective sense (realism), and that they are transformed into risks within a cultural context (constructivism). Risk is produced in relation to the present structure and is key to understand cultural boundaries; us and them, pure and polluted. This argument springs from Douglas's earlier work on purity and danger (Douglas, 2003), which proposes that people are supplied with a shared set of intentions in an effort to protect themselves against the 'others'. Culturally shared risks are a way of protecting the boundaries of communities and their way of life, and what is defined as risky is thus based on that community's morality. The function of risk is then to maintain social order by excluding others and defining its members (Lupton, 2006).

Whereas socio-psychological risk perception studies situate culture in the mind of the individual, Douglas explains cultural relativism through a grid/group model (Wilkinson, 2001). In this model, ideal types of cultures are linked to dominant approaches to risk by combining two dimensions: the group dimension is the extent to which individuals identify themselves and act according to the norms of a particular social group, while the grid dimension is the extent to which external regulations have been imposed in the individual's life (Zinn, 2004). The model presents four ideal types that constitute different risk approaches: hierarchists, egalitarians, individualists and fatalists. Their central functionalist assumption is that how a society is organised produces a specific view of risk. Unlike Beck and Giddens, Douglas and Wildavsky do not see risk as a unique trait of late modernity, but see how we perceive risk as a continuation of earlier historical periods, and emphasise the cultural function of risk as a device for collective solidarity (Wilkinson, 2001).

Not surprisingly, the structuralist socio-cultural approach has been critiqued for its construction of distinct categories from which we make sense of the world. Scholars such as Kasperson et al. (1988); Renn (1998); Renn, Burns, Kasperson, Kasperson, and Slovic (1992), for example, discard the cultural approach since people do not live through mutually exclusive categories. Rather, we belong to more than one category according to the social roles we take on. This purely structuralist framing limits our understanding of more dynamic social processes in which people make sense of risk (Boholm, 1996). Moreover, the socio-cultural approach tends to separate technical risks (e.g. an infrastructure breakdown) and the cultural responses to these risks. Such a distinction could overlook important aspects such as how technical risks are defined and produced within the expert system of risk management and how these definitions affect practices (Silvast, 2013).

Taking the function of culture into account, it is possible to adopt an approach that to a greater degree accounts for the complexities of everyday life. Lupton (2013) makes the important point that in everyday language, risk has an entirely different use and meaning than when used in risk analysis. Consequently, the risk researcher must always bear in mind that risk is part of everyday language, used and understood within specific contexts and situations (Henwood et al., 2008). How risk is part of everyday life is far more complex and dynamic, and demands in-depth studies (Tulloch, 2008; Wall & Olofsson, 2008). Wilkinson (2001, p. 2) writes that although the contrasting approaches of Beck and Douglas each provide valuable knowledge about how risk affects the social world, 'they are by no means sufficient to account for all the complex and contradictory ways in which people perceive and respond to the risks they face in the social contexts of day-to-day life'.

Frequently referred to as a 'cultural turn' in social science risk research, thick descriptions of experienced everyday life have gained prominence. The book *Risk and Everyday Life* by Tulloch and Lupton (2003) has in some sense become a starting point for empirical research on living with risk. Their argument is that: (i) risk is a social construct without predefined characteristics; (ii) knowledge about risk is 'mediated

through social and cultural frameworks of understanding, and [is] therefore dynamic, contextual and historical' (2003, p. 12); and (iii) risk knowledge is mediated in the same way within both expert and lay discourses. By means of in-depth qualitative interviews, Tulloch and Lupton (2003) examine what ordinary people themselves define as risk, and how they concurrently manage numerous risks. They begin with an open-ended approach, asking interviewees to talk about what they associate with risk. Their focus here is on people's own practical sense-making about the world they inhabit, and whether risk discourses affect these sense-makings. Risk is then always associated with a particular situation and derives from a particular social and cultural context. Tulloch and Lupton's main findings indicate that risk is associated with general decision-making and with the potential negative outcome of an action, and that risk changes in different situations and in different life phases.

Another important finding that is often used as an argument against predefined risk frameworks is that the interviewees also saw risk as something positive (Lyng, 2004). Such research is important to confirm the multiple meanings of risk among various actors, and to substantiate the fact that there is not one expert definition of risk (Lupton, 2006). The importance of lay people's knowledge in understanding and managing risks is imperative (e.g. Healy, 2004, 2006; Horlick-Jones, 2005; Lidskog, 2008; Wynne, 1996). Lay people's knowledge is experiential, and their risk view is constructed on the basis of daily encounters with risk in various forms, ranging from geographical locations, the built environment and the body (see Article 1).

While the everyday perspective on risk supports in-depth and situated studies of risk, there are three important shortcomings of such studies. The first is that risk is still at the centre of attention. To study risk is in itself a certain way of seeing the world, and it should not be taken for granted that risk is at the centre of people's lives (Wilkinson, 2001). The second is that risk is understood by the individual, although as part of a cultural and social context. Risk then, is also managed by the individual through strategies such as sense-making (Wall & Olofsson, 2008), or 'in-between strategies' where trust, intuition and emotions

play a role (Zinn, 2016). The third is that risk is understood as something people talk about. Recently, there have been some theoretical advances within the everyday perspective on risk that go beyond how risk is understood discursively, and instead look at how our understandings of risk are performed in everyday life (e.g. Boholm, Corvellec, & Karlsson, 2012; Corvellec, 2009; Giritli Nygren, Öhman, & Olofsson, 2017; Montelius & Nygren, 2014). Drawing on the 'doing gender' concept of Butler (1990), Nygren et al. (2015) examine how risk is embodied in the performed practices of individuals, and particularly how power relations are reproduced in these practices. Their perspective differs from that of cognition or reflexivity and points to how normative conceptions of risks play out in the context of heteronormativity. The concept of performativity can further be used to overcome the challenges of the risk and everyday perspective. In the following, I propose that theories of social practice provide a way of understanding how risk is embedded in everyday life, beyond the methodological individualism of most risk studies.

3.3. Theories of social practice

Practice is a term used in a range of disciplines including philosophy, history, social and cultural anthropology, and sociology, to understand the significance of human activity in the social world, focusing on issues such as 'the nature of subjectivity, embodiment, rationality, meaning and normativity; the character of language, science and power; and the organisation, reproduction, and transformation of social life' (Schatzki, 2001, p. 1). A huge diversity of applications means that there is no such thing as a unified practice theory. Rather, there are lines of thought that follow the same ontological basis. For most practice theorists, the fundamental unit of analysis is the practice itself and the social world is understood to be composed of practices (Schatzki, 1996).

At a general level, a practice can be defined as 'arrays of human activity' and what connects these activities (Schatzki, 2001, p. 2), which entails a focus on practical activity as a means of taking part in the social world, and not on rational decision-making and reasoning, individual motivations or minds. Accordingly, the ontological basis of practice

theories questions individualist explanations (Warde, 2016a). Rather than the positivist approach on cause and effect of variance theories, practice theories have a processual ontology stating that the social world is constantly evolving through processes and not through single cause and effect relations. This view necessitates that the social world be analysed through the interconnectedness of practices. Language, institutions, actions, roles, norms, emotions and so on are therefore always understood as being embedded in and acted out through socially shared practices.

The methodological individualism of proponent psychological and economic theories have increasingly come to dominate interpretations of human activity, most clearly demonstrated by the revival of 'behaviourism' (Warde, 2016a). Behaviourism was largely discredited in the 1960s and 70s, in an era where the social sciences had a strong focus on norms and values, but regained prominence in the 1990s, partly due to the processes and changes captured by theories of late modernity and reflexive modernisation in which the reflexive individual takes centre stage. At its most instrumental, behaviouristic studies are modelled after a positivist view of science, using quantitative modelling to predict and explain human behaviours as merely a reaction to a specific situation. In economic modelling, for example, the individual is portrayed as a sovereign market actor who is free to make decisions, and to choose a desired product or service (Shove, 2010; Southerton, 2013). In cognitive psychology, behaviouristic modelling has been used to study risk perceptions where the individual is portrayed as an actor who comprehends, considers and makes decisions in a state of uncertainty (Lupton, 2013). Drawing from the cognitive modelling of Kahneman (2011), behavioural economics – perhaps most known for the concept of 'nudge' – has become a central explanatory model of human activity within many social science research fields, as well as in policy.

A renewed interest in practice can be seen as a response to the revival of behaviourism. For Reckwitz (2002b), the appeal of practice theories is the rejection of both 'homo economicus', where human action is explained as individual intentions, and 'homo sociologicus', where human action is seen as a result of social norms and values (p. 245).

Reckwitz places practice theories in the field of cultural theory, seeing action as the performance of symbolic structures of knowledge. As opposed to other cultural theories, however, which emphasise the importance of language, discourse and interaction, practice theory places analytical focus on the practice itself and understands the social world as being made up of the continuous performance of practices. From this view, we can gain insight into the habitual reproduction of specific ways of seeing the world.

Theories of practice offer a view on the social world by considering norms, values and mental constructs, as well as bodily dispositions and material surroundings (Lizardo, 2009). As such, practice comprises (at least) four integrated elements that determine how we act in the social world: (i) we act according to predefined norms of correct actions, (ii) we act because a particular action matters to us, (iii) our bodies learn how to act correctly, and (iv) our relationship with the material world produces certain actions.

3.3.1. Three phases of practice-based theories

The long history of practice-based theories in the social sciences can be followed by looking at three main phases or generations. The first phase used practices to bridge actors and structures, the second theorises the concept of performance, while the third and present phase has aimed to construct an analytical toolbox to be applied in empirical studies (Lizardo, 2009; Nicolini, 2012; Postill, 2010; Warde, 2014). I review the two first phases, briefly demonstrating how they lay the theoretical grounds from which the third phase constructs its concepts, before outlining the third phase concepts in more detail.

The first phase of practice theory was concerned with finding a way to avoid methodological individualism (the social world consists of individual actions) and methodological holism (the social world consists of structures that produce actions) (Lizardo, 2009). The two most prominent social theorists to be associated with this phase are Giddens (1984), who proposed structuration theory, and Bourdieu (2013 [1984]), who proposed the concept of habitus to explain how actions are produced by social structures and changed by individuals. In his theory of

structuration, Giddens (1984) claims that social structures are reproduced because subjects with the same understanding of the world act out these understandings. How to act them out is defined by explicit formal rules and informal rules that are 'procedures implicated in the practical activities of day-to-day life' (p. 21). Rule-following was critiqued by Wittgenstein in his famous example of a construction site where a labourer yells 'brick!' and the correct brick is given to him in the correct manner. Wittgenstein then argues that tacit knowledge on how to perform this action is interwoven in language and that rules alone cannot fully explain the act of handing over a brick. Adding to this, Bourdieu (1977, 1990, 2013 [1984]) established the concept of 'habitus' that he uses to explain why we do not have to remember a set of rules every time we act. These rules, he argues, are based on practical know-how and skills that are internalised in our bodies. The body then becomes the device from which socially and culturally determined predispositions are acted out.

In the second phase, scholars were concerned with theorising performance. Here, we find important contributions from Butler (1990), Ortner (1984), and perhaps most dominating, Schatzki (1996, 1997, 2002) and Cetina et al. (2001). Schatzki draws on the social philosophy of Wittgenstein, where practice is seen as 'the site of the social', meaning that the social world is constituted by practices that are interwoven and form fields of practice. What follows from this is that action can only be understood in relation to a specific practice (Postill, 2010).

In the flow of activities we carry out in our everyday lives, we can identify sets of repertoires that are performed together as a coordinated entity, recognisable across time and space (Røpke, 2009). Schatzki (1996) defines this entity, a practice, as 'a temporally unfolding and spatially dispersed nexus of doings and sayings' (p. 89). As such, the analysis of practices must be concerned with practical activity as well as the representations of such activities (Warde, 2016a, p. 82). Individuals are 'carriers' of these practices but also the performers of them. Individuals can adapt and change the practices they perform. They stop performing some and start performing others, and they have individual reasons for participating in certain practices (Warde, 2016a). In order

for practices to exist, they must be performed over and over again, and changes in performances change practices (Shove et al., 2012; Warde, 2005).

Schatzki develops a full conceptual framework of the elements of a practice. He suggests that human action is performed as a set of three interlinked elements that form a practice, and that these practices are linked to form wider constellations of practices, or fields of practices. The first element, 'practical understandings' is closely linked to Giddens's (1984) concept of 'practical consciousness' and to Bourdieu's (1990) concept of 'practical sense', and consists of embodied knowledge on how to act in a specific context. With this knowledge, the actor knows how to identify and react to something in the social world, and practically perform the action required. It is not the action, but the ability to perform the action that is of importance here, and such ability belongs to a specific practice. The second element, 'rules', on the other hand, are explicit rules on how to act, such as laws, regulations, written statements, instructions and so on, made to create a specific order to a practice and to correct action. The third, 'teleoaffective structures', manifests in what ways actions matter to people (Schatzki, 1997, p. 302). We act because we express a certain purpose, desire, belief or expectation. Importantly, these are not the characteristics of an individual subject, but the appropriate purpose of a particular action that governs what makes sense to do when performing a practice. Unlike rules, teleoaffective structures are not made explicit but represent all possible hierarchies of ends and projects within a practice. As such, they are normative because they suggest a certain way of performing (Schatzki, 1996, p. 101). Finally, Schatzki also adds 'general understandings', which is more difficult to define because, contrary to the former elements that belong to and hold together one specific practice, general understandings are shared regimes that are expressed through multiple practices (Schatzki, 2002, p. 86). They resemble discourses because they are overarching systems that produce many practices.

In a third phase of practice theory, efforts have been made to bring together insights from the first two phases and construct a set of

concepts to be used in empirical studies. Warde (2014) points out that these conceptualisations have produced different foci in different research fields. The following account of the third phase is based on how practice has been used to understand various forms of consumption, including consumption of electricity and ICT.

3.3.2. Practice as an entity and practice as performance

Empirical studies look at practices in two main ways; (i) what constitutes a coordinated entity, and (ii) how it is performed. The widely used definition by Reckwitz (2002b, p. 249) captures both these aspects:

> A 'practice' (Praktik) is a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge.

As Schatzki (1996) suggests, a practice consists of elements that are interconnected. Using Reckwitz's definition, these elements become more comprehensible:

1. Forms of bodily activities: the way the body learns and performs a practice, how it handles objects, as well as talks and moves.
2. Forms of mental activities: the social and symbolic significance of participating in a practice such as motivations to participate, beliefs, engagements and emotions.
3. Things and their use: all objects that are applied in a practice such as technologies, tools, products, the body, infrastructures and materials.
4. A background knowledge: socially and culturally shared understandings and skills that are needed to perform a practice appropriately, and practical understandings to perform a practice competently.

Unlike Schatzki, Reckwitz brings in the ways in which practitioners engage with their material surroundings when they perform practices (Reckwitz, 2002a). I will return to the significance of materiality below.

Shove et al. (2012) represent a further effort to simplify the elements of a practice for the purpose of empirical studies. They state that a practice consists of:

1. Materials: The body, things, infrastructures and technologies
2. Competences: All forms of knowledge and skills
3. Meanings: All forms of mental activities

In studying practices as entities, emphasis is placed on how the elements are interconnected, and how these connections are reproduced or changed. For example, understanding wood heating as a practice requires an analysis of what materials take part (ovens, matches, lighters, wood, the home itself, the physical persons who perform the practice), the consumption of these materials, how they are being used to provide heat (when is heating done, who does it, how does it interact with other everyday activities), and the reasons for heating in a particular way (to attain comfort, save money, sustainability etc.). Furthermore, a practice is always connected to other practices, forming bundles, or to elements from other practices, and to the rhythm of everyday life (Shove, 2009; Southerton, 2013; G. Walker, 2014).

Practices as entities cannot exist without being performed. Schatzki (1996, p. 90) writes that a performance 'actualizes and sustains practices in the sense of nexuses'. When we study performance, we study the understandings and meanings of practices that are unfolded by the individual carriers performing them. In feminist theory, for example, Butler (1990) demonstrates that gender is a repeated performance of norms and values that are associated with being male or female. When individuals are recruited to a practice, they are enrolled in the socially shared way of understanding and carrying out that activity, including the emotions or desires that come with it. Going back to the example of wood heating, when heating our homes, we take over the shared norms of what it means to be comfortable in the form of indoor temperature (Gram-Hanssen, 2011; Shove, 2003). These performances are rarely fully reflexive. We might reflect on why we are heating our home (to

avoid being cold), whereas the activity of heating is performed using our bodies and without reflection.

However, performance is not all about reproduction. Warde (2005, p. 141) explains that practices 'contain the seeds of constant change... as people in myriad situations adapt, improvise and experiment'. Importantly, social practices do not represent patterns of actions that are simply adopted by the individual. Practitioners draw on their previous experiences, their learned knowledge and skills, and their available social, cultural and economic resources when they perform practices, as well as considering how the practice is interlinked with other practices. As such, some people adopt certain practices and not others, and some are skilled while others are amateurs.

Contrary to a behaviourist approach, where individual behaviours change, changes in behaviour lie within the practice. How practices are performed over time can be studied by looking at what are known as 'trajectories', made up of small modifications, through performance and through a specific combination of elements. We can follow practices over time through performance to identify their 'careers', as well as their disappearance. Heating practices, for example, have changed after the introduction of electricity infrastructure.

3.3.3. Integrative and dispersed practices

As an entity, practices themselves can be the object of study, but practices can also be used as a lens to understand a specific issue. This brings me to the differentiation suggested by Schatzki (1996) between integrative and dispersed practices, which is crucial to consider when studying preparedness as practice. An integrative practice is a complex bundle of elements that together make up a practice to be performed by practitioners (such as wood heating). Warde (2016b, pp. 41-42) summarises the common criteria of integrative practices in the following way: (i) the entity is recognisable and makes sense to talk about; (ii) people perform the practice in more or less the same way within a social and cultural context, and correct performance can be identified; and (iii) the practice is something beyond the individual's mind and goes beyond the sum of their doings and sayings.

Dispersed practices appear within many practices rather than as one integrative unit of elements. They are woven into other practices and into nexuses of practices, following the teleoaffective structure (or meaning) of the practices of which they are part. Schatzki uses questioning, ordering, greeting, and describing as examples of dispersed practices that are solely governed by practical understanding (or competence), and not by other elements of an integrative practice. They are dispersed because they only exist within other practices, and not as a recognisable entity. Importantly, people are usually engaged in an integrative practice when they carry out a dispersed practice (Schatzki, 1996, p. 99).

The importance of studying preparedness as a dispersed practice is further discussed in Chapter 6.

3.3.4. Living in a material world

Whereas early practice theorists were rarely occupied with materiality, more recent accounts see materiality as being an integrated part of all practices (Shove et al., 2012). Reckwitz (2002) defines it as 'things and their use'. Materiality is not to be treated as a background for where the social is performed, or as a mere instrument. Materiality is in fact active in shaping the social. The inclusion of materiality in practice theory also challenges the sole focus on texts, images, signs and language employed by other cultural approaches, such as discourse theories (Nicolini, 2012).

With inspiration from neighbouring theories such as Science and Technology Studies (STS) (Asdal, Brenna, & Moser, 2001) and Actor Network Theory (ANT) (Latour, 2005), practice theory brings the material surroundings to the foreground (Gram-Hanssen, 2011). Materials are understood and used by practitioners according to shared norms of how to skilfully use them, and materials themselves can be said to come with predefined scripts that are performed or challenged by practitioners (Akrich, 1992). Using wood heating as an example again, a wood stove has rules for how it should be used (e.g. ventilation, placement of the logs) and the practitioners need skills in how to combine materials in order to light it, and must act according to norms

of comfort (e.g. an indoor temperature of 22 degrees) when regulating the use intensity and frequency.

Electricity and ICT infrastructures are forms of materiality that are embedded in many daily practices (G. Walker, 2014). Shove, Watson, and Spurling (2015) state that infrastructures are connective in linking places and in bridging many different practices. Electricity infrastructure powers technologies that are used in different practices, while ICT connects technologies to create digital communication. Infrastructures are collective in that they provide services for many users, and in a way that produces a specific culture.

Studying energy consumption, Shove (2003) makes the point that we do not actually consume infrastructure directly, but that it rather enables other outcomes. As seen in the example above, we consume energy to be comfortable. Outcomes are realised through technologies such as sockets and wires that provide dwellings with energy, and through products such as ovens and boilers that provide the desired service (Shove & Walker, 2014). The social norm of comfort then affects the purchase and use of energy technologies, shaping the construction of the energy system. This can be seen, for example, in the growing digitalisation of communication, new energy technologies in the form of power banks, or chargers on public transport that ensure a fully-charged phone throughout the day. Infrastructure should therefore not be studied in itself, but be conceptualised as an integrated part of social practices that constitute societies and carry norms related to ways of living.

The material orientation in practice theory also adds to the risk and everyday life perspective in its focus on how our material surroundings shape risk understandings and preparedness practices. Everyday risk studies tend to concentrate on the cultural conceptualisations of risk and how they are articulated. Although the cultural turn has led to more qualitative risk studies that draw attention to the social and cultural processes shaping how risk is interpreted in different contexts, it rarely looks at how materials are active in these interpretations.

This dissertation considers materiality in two ways: (i) as the invisible electricity and ICT infrastructure service that is unstable under certain conditions, and (ii) the things that are directly used to perform electricity and ICT dependent practices, such as ovens, light bulbs, fridges and freezers, and the things that replace them when the electricity disappears, such as candles, wood ovens, matches and so on.

In studying preparedness for infrastructure breakdowns, understanding how a practice such as heating can continue without one of its material elements is of importance, as well as how other materials become resources because they take over the task of infrastructure. When materiality changes, the practitioner also needs other competences to perform the practice, and the organisation of the practice, as well as how it is linked to other practices, changes.

3.4. From individual behaviour to social practices

The arguments made so far propose a shift from understanding the social world as something made up of individual behaviours to applying a framework that accounts for the shared understandings of how social life is performed. Figure 1 summarises this argument, focusing on how different risk perspectives and social practice theory deal with the role of culture, individual decisions and the status of knowledge.

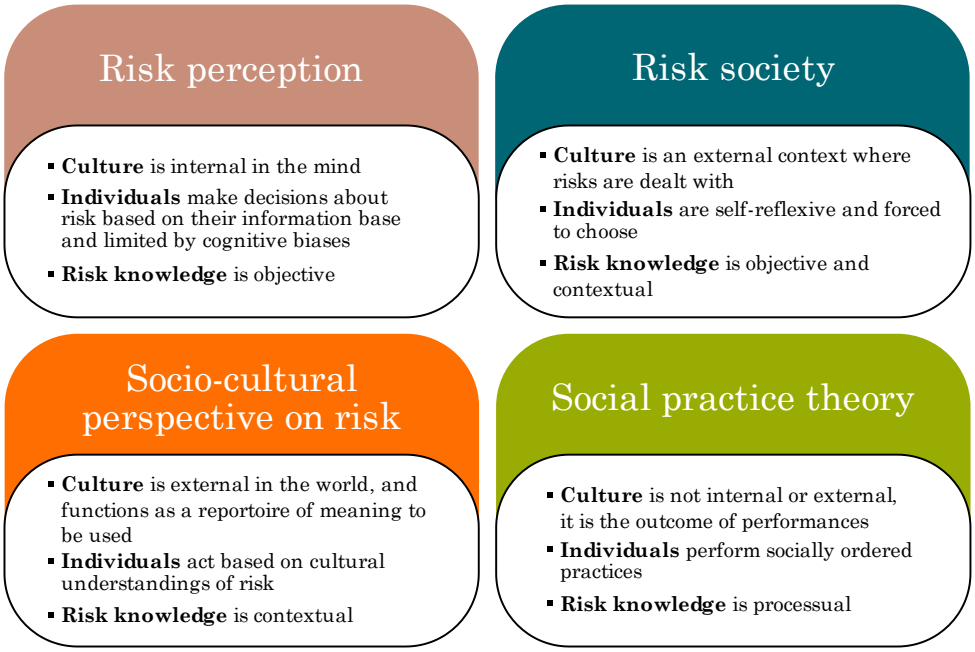

Figure 1. The role of culture, individuals and knowledge

Although there has been a shift, firstly from rational behaviour to bounded rationality in risk perception studies, secondly from bounded rationality to a mix of rationality and contextual behaviour in the risk society thesis, and finally towards a rejection of rationality in the socio-cultural approach, social practice theory might be considered the most radical critique of behaviourism as it completely discards individualism. In the following, a criticism of behaviourism is given from the viewpoints of both the risk and everyday life perspective and social practice theory, focusing on what forms of knowledge this view produces in relation to preparedness. This is important because household preparedness is predominantly understood within the framing of behaviourism.

The portfolio model can be used as a starting point for explaining the fundamental claims of behaviourist approaches to preparedness. A portfolio is a relatively stable set of individual beliefs that does not change between contexts (Whitford, 2002). The individual uses the portfolio in any given situation to determine how to act, and acts upon the desire to support their pre-existing beliefs. According to this model, all actions have purpose and are thus rational. To be rational entails to have a knowledge base from which to choose alternatives, including

knowledge about the consequences of each alternative. The psychometric risk analyses discussed above, follow this logic and understand the individual as a rational investigator of risks that are perceived and acted on. In this context, people are presented as actors that calculate risks, and make decisions about how to act.

Bounded rationality is introduced to explain why people do not always act according to what experts define as the optimal risk management strategy (e.g. to be prepared). When people deviate from the goal of preparedness, they do so because their emotions or habits hinder them from acquiring the correct knowledge to make the right decision. This would imply that there is a rational way of responding to an objective and definable risk out there, and that risk experts are able to define this rational way. This forms a hierarchical relationship between expert and lay knowledge, and reduces all actors to rational individuals with the intention of avoiding risk by employing preparedness measures (Tulloch & Lupton, 2003).

Understanding preparedness from a behaviouristic view entails that: (i) enhanced preparedness is the desired outcome; (ii) enhanced preparedness should be accomplished in one particular way, which is readiness; (iii) when it is not, individual explanations are sought. Such a view on preparedness limits the scope of policy measures to attain enhanced preparedness. Most often, risk management strategies have been directed towards the overall population, foregrounding risk awareness (Tuohy et al., 2014). Such public education strategies have been understood as an important measure to increase societal resilience under the assumption that if citizens are informed about and encouraged to adopt preventive actions, they will do so and be less susceptible to harm (see Chapter 6).

The critique from the everyday risk perspective and social practice theory suggests that the level of perceived risk (attitude) cannot be transferred to the level of preparedness (behaviour), and that changing attitudes (common measures being more information about preparedness, increased level of awareness) do not necessarily lead to changed behaviour (increased preparedness). The problem is that the

social world consists of more than single behaviours, and that changing attitudes and increased access to information do not necessarily change behaviour. Something else gets in the way. The patterns of actions that together constitute everyday life are also shaped outside the individual and consist of more than active decisions. These routinised actions shape the way in which we deal with risk.

The next chapter outlines the methodological approach used in the dissertation to grasp these practices and how they matter to understand preparedness.

Chapter 4

Research design and methodology

An empirical study of informal preparedness calls for methods that produce data about everyday practices. Article 1 develops an analytical approach that captures the social, cultural and material resources of everyday practices to prepare for electricity and ICT infrastructure breakdowns. The analytical approach is inspired by the everyday risk perspective (Tulloch & Lupton, 2003) and social practice theory (Schatzki, 2002), and by methods that emphasise the performance of practices: (i) performance-based interviews (Halkier & Jensen, 2011; Hitchings, 2012); (ii) walk-alongs (Carpiano, 2009; Kusenbach, 2003); and (iii) visual methods (Pink, 2007). While combining language-based methods with visual and performance-based methods is quite common in studies of everyday practices, including for infrastructure dependent practices (e.g. Leder Mackley & Pink, 2013; Madsen, 2017; Pink, 2011; Pink & Mackley, 2012; Strengers & Maller, 2011, 2012), they have, to my knowledge, not been used together to understand household preparedness for infrastructure breakdowns.

The data collection in this dissertation has been conducted within the methodological framework of the HOMERISK project[4]. From this starting point, Article 1 accounts for the three above-mentioned methods and more specifically argues for how their interconnectedness provides an analytical framework from which to grasp informal preparedness. In this chapter, the three methods from Article 1 are presented briefly, while the research process, data collection and data material are given primacy. Finally, I discuss validity in the sense of trustworthiness of the data and consider research ethics.

4.1. Research design

The research design is based on the theoretical framework of risk and everyday life and practice theory, as presented in Chapter 3. The following section discusses three foci of this framework: (i) everyday life; (ii) methodological situationalism; and (iii) dispersed practices, and how these informed the data collection in the two case studies and the survey.

Situational and embodied methodological approaches are gaining attention in risk research, broadening the view of how risk shapes and is shaped by everyday life (e.g. Henwood et al., 2008; Olofsson & Zinn, 2018; Parkhill et al., 2010; Wall & Olofsson, 2008). These approaches discard the cultivation of the rational and decision-making individual that the field is still dominated by (Reith, 2004) and insist instead on studying risk as something constructed within a culture, context or situation (Parkhill et al., 2010). Methodologically, this implies that risk cannot be fully understood independently from what goes on in everyday life – risk is too deeply embedded in our language and bodies, and is formed and changed during a life course (Nygren et al., 2015).

As Chapters 2 & 3 have demonstrated, preparedness is one way of managing and understanding risk also in the context of everyday life.

[4] The methodological framework of the project consists of field work with a case-based research strategy, tour narratives, document content analysis, surveys, and qualitative semi-structured and conversational interviews to understand the risk management strategies of households facing breakdowns in the electricity and digital infrastructure in Norway, Sweden and Iceland.

By employing social practice theory to the study of preparedness, this dissertation stresses that preparedness is not only understood or talked about, but also performed in socially shared practices. Practice theory proposes turning the focus away from individual understandings (methodological individualism) and towards the shared practices as the primary unit of analysis (methodological situationalism) (Schmidt, 2017). Individual actors perform practices, meaning that they act skilfully in using materials, their bodies and language to produce, modify or change a practice (Halkier & Jensen, 2011). The combination of the bundles of elements and the performance of them are the subject of interest for practice theory (Halkier, Katz-Gerro, & Martens, 2011). While minimising the importance of the individual, practice theory does not exclude the variations between individual practitioners. On the contrary, practices are cultural and time specific, and the individual actor may have acquired different skills, as well as reasons to be committed to any one practice (Warde, 2016a).

Although many practices can be studied as integrative units of elements, such as cooking, cleaning, eating and so on, preparedness should rather be considered a dispersed practice, or as elements of several different practices that, combined, comprise preparedness (Schatzki, 2002). Unlike integrative practices that are performed for a specific purpose, dispersed practices rarely have a purpose themselves, but centre around one action, and rely on the overarching purpose of the practices they are part of. Preparedness can be seen as present in most infrastructure-dependent practices as an alternative way of performing a task (e.g. heating) without infrastructure (e.g. from electric to wood heating) to obtain a purpose (e.g. indoor comfort). The analytical starting point for the dissertation is therefore that preparedness for infrastructure breakdowns exists and is embedded in everyday practices as social, cultural and material resources.

4.1.1. Data collection techniques

In this study, I use three methods to examine informal preparedness as dispersed practices:

- *Performance-based interviews* were conducted in the homes of families, focusing on questions about concrete performances of practices such as heating, cooking, cleaning, lighting, communicating and so on with and without infrastructure.
- *Walk-along sessions* are tours of each room in the home that were conducted together with the participants. Rooms, objects and physical persons spurred stories about coping without infrastructure at home, and about the importance of infrastructure in everyday life.
- *Photographing* material preparedness in the form of objects and their placement, and the participants demonstrating usage of these objects gave visual documentation of preparedness and detailed accounts about materials and their use.

The advantages of the interconnectedness of these methods for shedding light on dispersed practices are thoroughly discussed in Article 1. The article demonstrates that rooting the interviews in the material surroundings produced stories about the coping strategies used during infrastructure breakdowns, as well as the preparedness resources and constraints within the household.

Whilst the qualitative approaches offer knowledge about which social, cultural and material preparedness resources and constraints exist within the everyday practices of households and *how* they enhance or reduce preparedness, a quantitative approach can be used to map the occurrence of these pre-identified resources and constraints among the overall population. It may seem like a big leap from in-depth qualitative approaches to a survey for the purpose of understanding how practices form preparedness, not least because the basis of practice theory is to study performativity. The choice of methods reflects the interpretation of a theoretical framework, and some practice theory scholars would argue that observation is the only way to gain knowledge about performativity (e.g. Martens, 2012), while others use practice theory as a vocabulary to emphasise what is said and done routinely in everyday life (e.g. Hitchings, 2012; Nicolini, 2017; Sedlačko, 2017). Whether or not you can learn about practices by talking about them is a fundamental

discussion amongst practice theory scholars. This dissertation applies the pragmatic approach, and argue that it is possible to gain knowledge about preparedness practices using a mix of qualitative and quantitative methods (see Article 3).

Although the methods used to understand practices and their performance have primarily been qualitative, more quantitative studies are being published (e.g. Anderson, 2016; Browne, Pullinger, Medd, & Anderson, 2014; Hansen, 2018; Southerton, Olsen, Warde, & Cheng, 2012; Warde, Cheng, Olsen, & Southerton, 2007). These studies often use existing accounts of practices and further explore aspects such as their frequency, intensity and trajectory changes over time and across spaces. They say little about the details of how a practice is performed but they provide important knowledge of how practices are distributed among the population.

An important prerequisite for using mixed methods to understand household preparedness was the sequential approach, where practices or elements of practices concerning preparedness were identified during the qualitative case studies, and thereafter formulated as survey questions. For example, the survey question 'I/we have knowledge about the local terrain and how the weather (wind, rainfall, temperature) can be here' was formulated based on our recognition of the importance of local geographical knowledge for preparedness. Surveys are a method that can produce comparative data about how certain performances relevant to preparedness belong to certain groups (e.g. that rural households respond that they have more knowledge about the local environment than urban households do), and how these performances are connected within groups, which can be difficult to capture in smaller samples.

Browne, Medd, Anderson, and Pullinger (2014) argue that methods also have political implications, and that shifting or combining methods could have a political function. Using the case of household water consumption, they argue that such consumption is often understood using behaviouristic explanatory factors that are measured using statistical modelling, and that such behaviours can be changed through

policy interventions like cost efficiency programmes, education and technological solutions. Using a mixed methods approach of qualitative interviews and survey data based on a practice theoretical framework, they present water consumption as being intertwined in practice, while still telling the story in the data language of numbers, familiar to policy makers. This, they argue, opens a window of opportunity to discuss multiple ontologies within a familiar language. Their case is highly applicable to preparedness, which is consistently understood as individual behaviour in research and policy. A practice-oriented survey in combination with qualitative case studies might therefore aid in shifting focus from people to practices in preparedness research and policy, within a familiar framework.

4.2. Research process

Within the overall framework of HOMERISK, my research interest lay in understanding how household preparedness was integrated in everyday practices and could be understood as a dispersed practice. This interest was influenced by my previous work on sustainable consumption practices (e.g. Gram-Hanssen, Heidenstrøm, Vittersø, Madsen, & Jacobsen, 2017; Hebrok & Heidenstrøm, 2019), which used a specific understanding of everyday practices, as presented in Chapter 3. My two previous research topics, energy consumption and food waste, are both understood as dispersed practices; they are the result of how many practices are performed throughout a day, and about our everyday rhythms. Within this framing, there are a huge number of studies that are concerned with infrastructure-dependent practices and sustainability (e.g. Bartiaux, Gram-Hanssen, Fonseca, Ozoliņa, & Christensen, 2014; Chappells & Shove, 2005; Gram-Hanssen, 2011; Hargreaves, Nye, & Burgess, 2010; Henwood, 2019; Jacobsen & Hansen, 2019; Powells, Bulkeley, Bell, & Judson, 2014; Shove et al., 2015; Strengers, 2012; Wallenborn & Wilhite, 2014), some of which deal with blackouts (Ghanem, Mander, & Gough, 2016; Rinkinen, 2013; Silvast, 2017; Trentmann, 2009). Searching for relevant literature on household preparedness for infrastructure breakdowns, returned many studies that measured formal household preparedness, (see Chapter 2), but

almost none that studied preparedness as practices. Recent publications by Baker (2013, 2014); Baker and Grant Ludwig (2018) are noteworthy exceptions, although they apply Giddens's theory of structuration (1984), as well as his concept of 'ontological insecurity' (1991).

In the two qualitative case studies, the researchers in the field were required to actively participate, and knowledge was generated from the construction of narratives between the researchers and participants. This production of situated knowledge is the aim and the strength of fieldwork studies (Flyvbjerg, 2006). When embarking on the fieldwork, I brought with me the theoretical narrative of practice theory that insists on always focussing on the seemingly unimportant aspects of everyday life – those small actions that often disappear in stories about spectacular events. Consequently, there are an array of dimensions that I have not focussed on, asked much about, or written about in this dissertation, although they were significant to the study participants. However, that is also the nature of qualitative research. I enter the field with skills acquired from previous research work and readings and conduct the practice of fieldwork based on these.[5] A qualitative analysis is thus a way of understanding the field by actively using the social theories at hand.

4.3. Data collection and material

An overall aim of HOMERISK is to compare how different households deal with infrastructure breakdowns (horizontal comparison) and how formal actors such as local and national authorities understand the role of households in dealing with infrastructure breakdowns (vertical comparison). The dissertation focuses on horizontal comparison between households along three aspects: (i) rural/urban; (ii) experience/no experience with outages, and (iii) dwelling and family characteristics.

[5] It is worth noting that although I describe my own pre-understandings here, several other researchers also participated in the data collection with their own understandings and research aims. The interconnectedness of the three methods is a demanding procedure, and the project team had therefore decided that two researchers should participate in the case study interviews. I participated in all nine interviews in Case Study I, three of which I conducted alone, and 13 of 16 interviews in Case Study II. A further four researchers from the Norwegian project team participated in the data collection. The Swedish case study was conducted by the Swedish project partners.

The HOMERISK project collected qualitative data about households' risk management strategies in six case studies across Norway, Sweden and Iceland. This dissertation uses data from one case study comprising Norwegian households in a rural area that experienced extensive infrastructure breakdowns during hurricane Dagmar in 2011 and the Lærdal fire in 2014 (Case Study I), and one case study concerning rural and urban households preparedness for future infrastructure breakdowns (Case Study II). These are supplemented by one Swedish case study concerning rural households that experienced the storm Ivar in Article 2. Although there could be several interesting comparative elements between preparedness in rural Norway and Sweden, the article demonstrates that households in the two countries were very similar in how they coped with the extensive outages using their social, cultural and material resources. It is argued that this is due to the similar infrastructure regimes, as well as similar household characteristics (rural community, detached dwellings and alternative heating sources). Details of the Swedish case study can be found in Article 1.

The interview guide developed by the project team for Case Study I consists of performance-based questions, and, learning from this case study, a new guide was developed for Case Study II.[6]

Based on the findings from the qualitative data collection, the project team designed a web survey to test the occurrence of preparedness measures and risk management strategies across different households in the three partner countries. Article 3 uses the Norwegian web survey.

Figure 2 shows the dissertation's data sources, which will also be presented in detail in the following sections.

[6] Interview guides for Case Study I & II can be found in Appendix 1.

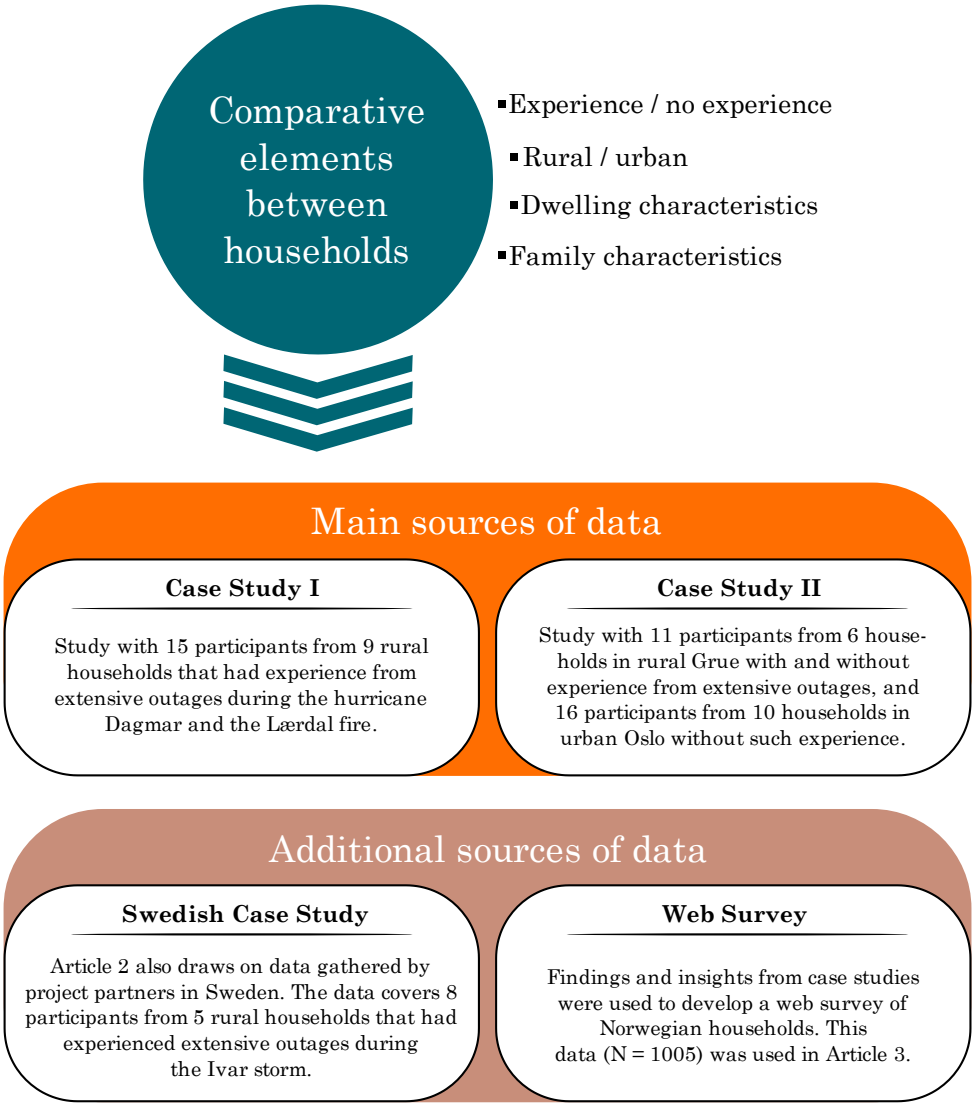

Figure 2. Data sources

The research design and data sources are used in the four articles as shown in Table 1.[7]

[7] Appendix 2 provides a detailed overview of the participating households and the data collected in each household including the family composition, participant's age and gender, interview length and number of photographs taken. In the articles, the participants are referred to by household number (1-30), gender (W, M) and location.

Table 1. Research design in Articles 1-4

Article	Research question	Methods	Data material
1. Methodological approach	How can the informal expressions of household preparedness be studied by looking at everyday life?	In-depth interviews with a photographed walk-along session	Case Study I & II
2. Preparedness practices	How do rural households in Norway and Sweden cope with electricity infrastructure breakdowns at home?	In-depth interviews with a photographed walk-along session	Case Study I Case Study Sweden
3. Embodied competences	In what ways are embodied competences part of household preparedness, and how do they differ between and within households?	In-depth interviews with a photographed walk-along session Regression analysis Factor analysis	Case Study I & II Web survey
4. Engagement	Why are Norwegian households not engaged in preparedness?	In-depth interviews with a photographed walk-along session	Case Study I & II

4.4. Case Study I: Hurricane Dagmar and the Lærdal fire

Creswell (2007, p. 73) defines a case study as '(…) the study of an issue that is explored through one or more cases within a bounded system'. Hurricane Dagmar in 2011 and the Lærdal fire in 2014 are two events from which household preparedness for extensive infrastructure breakdowns is explored. The cases are studied through several information sources to form a case description, although focus remains on interview data on how households in Lærdal experienced the two extensive outages. Thus, it is not a 'holistic analysis' of the whole event, but an 'embedded analysis' of one specific aspect of the case; the infrastructure breakdowns (Creswell, 2007). The study aims for in-depth and context-specific knowledge about coping with infrastructure breakdowns. The infrastructure breakdowns followed from the hurricane and the fire are here described in brief.

On Christmas Eve 2011, The Norwegian Meteorological Institute issued an extreme weather forecast to several counties in Western Norway,

warning of strong winds and floods. What became known as hurricane Dagmar hit the west coast two days later, on the 26 December, with wind gusts of up to 55m/s. It was fourth in a line of five extreme weather events that season, and it caused severe damage to large areas in Norway, Sweden and Finland. The hurricane affected both coastline and inland areas. Rooftops were blown off and loose objects, such as outdoor furniture, roofing panels, trees and trampolines, caused damage to buildings and vehicles. One of the participants from the case study recounted her experience of Dagmar:

> *There were 10-12 of us here; we were having a family party. The atmosphere was great, and at a Christmas party, you have lots of candles, right. A nice table with candles. Then suddenly, whoops, we lost the electricity, but there's light here anyway. It was just a bit cosy. But then we feel like, oh, it's a bit too much that wind – it's pounding quite heavily. I remember I was sitting by the window, feeling the wind blowing hard on the window. It was not very nice, and we started receiving messages on our phones, and understood that this was quite fierce. Then, my sister's neighbour called and said that she should come home because 'the rooftop on your father's house has blown off! (…)'. She replied that they would get a taxi home, but there were no taxis. The roads were closed, and the power was out and there were trees lying everywhere* (Woman, 55, Lærdal).

Hurricane Dagmar affected a range of infrastructures. Roads and tunnels were closed, ferries were cancelled, and blown-down trees led to extensive power outages. The outage affected over 570,000 households, of which 35,000 lost their electricity supply for more than 24 hours. A major telecom outage left approximately 31,500 subscribers without a landline, 12,000 without internet, and 728 base stations lost power, with backups depleted within four hours. The backup systems did not have enough battery capacity to uphold their services for the length of the outage. This left the region with reduced mobile coverage and implicated the emergency communication network, which used the same physical infrastructure. In addition to strong winds and difficult terrain that made the infrastructure restoration difficult, the authorities, as well as

electricity and telecom companies, were unable to contact their service personnel and inform end users (Norwegian Communications Authority, 2012; The Norwegian Water Resources and Energy Directorate, 2012). Almost 25 per cent of Norwegian households had to deal with the implications of Dagmar.

Three years later, a community in Western Norway, that had already felt the consequences of hurricane Dagmar, experienced another severe infrastructure breakdown. On the evening of the 18 January 2014, a fire started in a house in Lærdalsøyri. It began as an ordinary house fire but would become Norway's most extensive fire since the Second World War. Lærdalsøyri is situated at the innermost of the longest fjord in Norway, the Sognefjord, and is surrounded by mountains that fall steeply towards the valley and the fjord. The winter season had been dry, and the community had experienced strong winter storms. In Lærdal, the east wind travels through the valley and can produce strong gusts when it strikes the mountain walls. These conditions rapidly carried the flames across the garden and to the surrounding houses. During the next hours, 17 homes (40 buildings in total) were destroyed, and 681 people were evacuated. None were severely injured, but 270 people were admitted to hospital (Norwegian Directorate for Civil Protection, 2014; Steen-Hansen, Hansen, Bøe, Mikalsen, & Stensaas, 2014). The night of the fire was described by the study participants as a deadly combination of fire and wind:

> *I went over to the site of the fire and thought that this is huge, really huge. And totally out of control. It was so windy. The wind was blowing in the other direction, but a rain of fireballs, sparks, huge balls of fire, came towards me. I was just ten meters from the fire, and it wasn't even hot, because the wind was blowing so strongly. I tried to help, carried buckets of water, but I kept thinking that this will never work* (Woman, 48, Lærdal).

An hour and a half after the fire started, the main power station burnt down and left the whole community without electricity. About an hour

later, the fire destroyed Telenor's[8] telecom building, leaving 38 base stations out of service and causing loss of internet connection and mobile coverage within the community and in the surrounding areas (NRK, 20.01.2014). Two days later, Telenor managed to restore 2G and 3G coverage by using mobile base stations. Temporary solutions for securing mobile and internet coverage were in place after approximately 40 hours but remained unstable for about a week after. Stabilising the electricity supply was highly critical as temperatures dropped to -5C°, and, two days after the fire, 400 homes were still without electricity. The power generator supplying the remainder of the community did not have the capacity for average consumption levels. Without access to internet or telecommunication, local authorities therefore placed the following note on notice boards, shops and in mailboxes across the community urging households to restrict their electricity consumption:

> *Lærdal now receives electricity via a generator, and all residents must reduce their electricity consumption to a minimum. The following are appropriate measures: Do not use washing machines, minimal use of dishwashers, turn off all lights that are unnecessary, remember outdoor lights, lower the temperature in rooms you do not use, reduce water use – it will affect the sewage system, reduce hot water use. We do not know when we will regain full electricity supply.*[9]

The note demonstrates the vital role of infrastructure for modern day-to-day life to function and how some activities, like communication, become even more important during crises. It also brings forth the question of what role households play during crisis situations where infrastructure breaks down.

4.4.1. Data collection and material in Case Study I

Three years apart, hurricane Dagmar and the fire affected nearly all households in Lærdal. In 2015, the project coordinator and myself

[8] Telenor is the largest telecommunications company in Norway, established by the Norwegian government in 1855 (then known as 'Telegrafverket'). Today, Telenor is partially privatised, although the Norwegian government still owns 54 per cent of the shares.
[9] This note was given to us during an interview with the local authorities.

visited Lærdal three times and interviewed families who had experienced both the hurricane and the fire. In January, the two of us met with a 'key informant' who was recruited through my personal social network. She had relations to the municipal crisis management team and could provide us with a general overview of the sequence of events during the fire and of relevant documents. She further assisted us in recruiting three affected families that we interviewed in March, and helped us connect with the local volunteer central, the technical division in the municipality, and the media coordinator who further referred us to a local shop owner. The latter four were also interviewed and their knowledge about the events is used as background material in the dissertation. From these interviews, a further six households were recruited, three of which were interviewed in May, and three of which I interviewed in September.

A key focus was to understand how these families coped without electricity and ICT during the fire, and how their resources came into play in that context. The sample therefore consists of households with direct (evacuated, damaged homes) or indirect (not evacuated, living nearby, provided assistance) experience with the fire, and with direct experience (damaged homes or affected by the infrastructure breakdown) with hurricane Dagmar. A further aim was to seek variety across age groups (17-84 yrs.) and gender (eight women and nine men), as well as to interview several household members, although this was only possible in five of nine households. As the primary interest of the project was infrastructure breakdown during the fire and during hurricane Dagmar, we decided that we would not contact the families who had lost their homes during the fire.

4.5. Case Study II

Whereas Case Study I produces data about how rural households coped with infrastructure breakdowns, Case Study II is designed to horizontally compare households based on previous experience with infrastructure breakdowns, residential area and dwelling and family characteristics.

Although the Norwegian population is increasingly concentrated in and around the largest cities, a strong political focus on and commitment to regional development means that almost 60 per cent of the population lives outside urban areas (Ministry of Local Government and Modernisation, 2018). There are important differences between dwellings in rural and urban areas of Norway. Rural areas are dominated by detached dwellings with wood stoves for non-electric heating, while urban areas are dominated by apartments where, according to Statistics Norway, only 66 per cent of Norwegian households have access to an alternative heating source (Statistics Norway, 2014). Furthermore, the weather and climate conditions vary significantly between regions.

To investigate how the rural-urban and household differences mattered to preparedness, the project team strategically selected two areas in Norway in which interviews would be conducted.

Grue municipality (pop. 4,948) was selected because it is a rural area with contrasting characteristics to Lærdal, ensuring data from a broader range of geographical and societal conditions. Contrary to the steep and windy Lærdal valley, Grue lies in a forest area in eastern Norway. It has stable weather conditions and an average temperature of 2-4°C, but with cold winters. There have been few extensive infrastructure breakdowns there, but hurricane Dagmar also affected some households in this area. The municipality belongs to Hedmark County, which in 2017 experienced an average of 2.7 electricity outages per customer (Norwegian Water Resources and Energy Directorate, 2017). About 25 per cent of the population lives in the centre of the municipality, Kirkenær.

The capital, Oslo, was selected as an urban area. With its 1.5 million inhabitants, it is by far the largest city in Norway, and where important societal functions such as the parliament are located. Central Oslo lies at the innermost of the Oslo fjord and has stable weather conditions with an average temperature of 7°C. In 2017, the city experienced an average of 0.4 electricity outages per customer, which is significantly lower than

in the rural areas (Norwegian Water Resources and Energy Directorate, 2017).

4.5.1. Data collection and material in Case Study II

Between February and April 2016, one co-researcher from the project team and I visited six households in Grue that were all recruited by Norstat recruitment agency, and had been purposively selected to cover different family compositions (as per Silverman, 2013). A main interest was to explore whether preparedness was understood and performed differently in younger families with children living at home (three households, 39-51 yrs.) and older households without children living at home (three households, 59-70 yrs.). Several household members were interviewed in five of the six households. Dwellings in Grue are almost exclusively detached, and the recruitment agency was therefore not able to recruit participants from different types of dwelling, or from those without an alternative heating source. Moreover, some of the interviewed households had experienced hurricane Dagmar in 2011, and some had had experienced other extensive infrastructure breakdowns.

Between September 2016 and October 2017, five researchers from the project team contributed to the data collection from ten household visits in Oslo. Two households were recruited through the project team's social network, one via a Facebook group discussing societal security, and the remaining seven by the recruitment agency Norstat. The sample aims to cover different age groups (22-70 yrs.), and family compositions (four with children living at home, six without). Additionally, families from different types of dwellings were recruited (six apartments without alternative heating, one detached house with wood heating and two apartments with wood and gas heating).

4.6. Web survey among Norwegian households

The qualitative material from Case Study I & II explored *how* practices form preparedness, and the analyses indicated that factors such as previous experience, existing local geographical knowledge and social networks were significant to determine the level of preparedness in a household. Furthermore, material resources were found to be strongly

linked to usage skills. These competences are found to increase practitioners' abilities to cope with extensive infrastructure breakdowns. On this basis, a number of the questions in the HOMERISK survey were designed to systematically measure the level of competences across the population in Norway, Sweden and Iceland (Browne, Medd, et al., 2014; Browne, Pullinger, et al., 2014).

Article 3 employs data from the representative web survey (N=1,005) that was conducted among Norwegian households in September 2016 (see the project report by Storm-Mathisen & Lavik, 2016 for a full description of the survey including the questionnaire). Whereas the report takes the findings from the case studies from all partner countries as its starting point, the article only uses the Norwegian data, which consists of respondents who were recruited by the recruitment agency Norstat's panel and randomly selected on the basis of two criteria: (i) age between 20-80; and (ii) responsibility, fully or in part, for the household economy, based on the presumption that this would also entail an overview of the household's material preparedness resources. Of the Norstat panel, 85 per cent is recruited via national representative telephone surveys, and randomised respondents from the panel were invited by email. With 98 per cent internet access in Norway, the overall population should be represented (Statistics Norway, 2018b).

4.7. Data analysis

In this section, I provide an overview of how the data material from the three sources (Case Study I & II and the survey) was analysed. Detailed accounts of these analyses can be found in Articles 1-4.

Data collection in Case Study I & II resulted in two types of data material: audio recordings and photographs. All of the household visits were audio recorded and transcribed. Transcripts included all spoken words as well as laughter and other identifiable sounds. Pauses were not included. The transcriptions were coded in HyperResearch based on a three-step analytical strategy that is presented in all four articles: (i) writing down words and phrases from transcripts; (ii) categorising them into codes to be used in HyperResearch; and (iii) constructing

theoretically informed concepts. Figure 3 gives an example of the three-step analytical strategy.

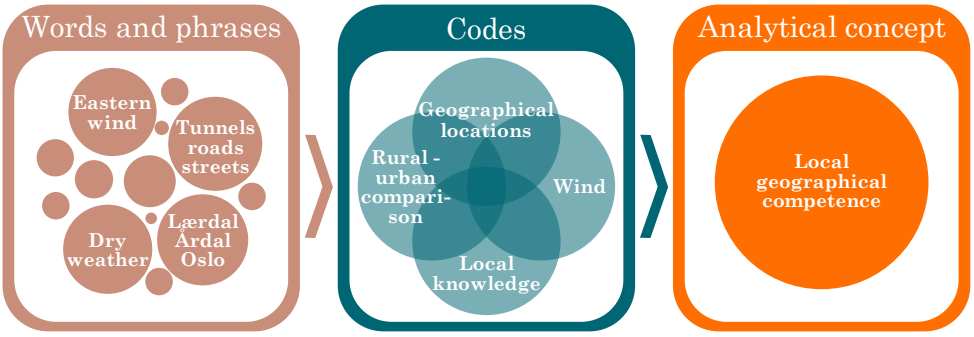

Figure 3. Procedure for analysis of 'local geographical competence'

This inductive approach allows themes and stories to emerge from the raw data (as per Thomas, 2006). In the analytical conceptualisation that followed, attention was paid to how preparedness was performed through the constituents of a practice – competences, meanings and materials – and how the risk of extensive outages was understood through narratives. The analytical concepts also served as a 'conceptual generalisation', whereby I have used the qualitative material to construct concepts that are relevant beyond the specific case (Tjora, 2013, p. 209).

The photographs taken during the walk-along tours were of material objects relevant to the households' preparedness, their placement in the rooms, and demonstrations of them by the participants. In the analysis, the photographs were catalogued according to material resources and restraints, such as 'alternative heating source', 'food storage', 'radios', batteries' and so on. As demonstrated in Article 1, the photographs themselves revealed interesting similarities between the material preparedness resources, both in type, placement and how they were acquired and maintained. Figure 4 shows some examples of photographs taken of material resources that the participants and researchers identified together.

Figure 4. Examples of photographs from the household visits[10]

In disaster studies, previous research has shown that sociodemographic variables such as gender, age and ethnicity are significant to people's ability to cope with crises and disasters (Enarson & Fordham, 2000; Enarson et al., 2007; Fothergill & Peek, 2004). The survey provided an opportunity to study the relationship between such variables and expressions of informal preparedness (e.g. through previous experience, local geographical knowledge and social networks). In Article 3, 18 questions were selected to construct two models, one on 'formal

[10] All the photographs are taken by the Norwegian research team.

preparedness' and one on 'informal preparedness'. These were used in a regression model to analyse how they differed between rural and urban areas, age groups, genders and levels of education. The questions we included and the analysis of the quantitative data, which was conducted by my co-author, can be found in Article 3.

4.8. Trustworthiness

All forms of research processes have the fundamental purpose of constructing consistent arguments that correspond to the data and that are convincing. Contrary to quantitative research that has a somewhat explicit set of rules for validating research, qualitative approaches apply several different procedures. Some use the quantitative terminology of validity and reliability, while it has been argued that such terms are not congruent with the nature of qualitative inquiry (Creswell, 2007). Others have used the concept of 'trustworthiness' (see Golafshani, 2003 for a detailed discussion), which entails using other methods, theories, researchers or stakeholders to consider your research.

In this dissertation, three approaches are used to consider trustworthiness. Firstly, two researchers participated in 22 of the 25 Norwegian case study interviews in order to conduct interviews and walk-alongs and take photographs simultaneously, in the best possible way. The interviews were discussed between the researchers after each visit. Secondly, combinations of data sources have been used to study household preparedness. Methodological triangulation within the framework of qualitative methods is sought by using walk-alongs together with interviews, in order to concretise and provide details about the stories concerning preparedness (Denzin, 2012; Pink, 2007, 2009). Article 3 uses a sequential mixed method design (Creswell, Plano Clark, Gutmann, & Hanson, 2003) where a web survey was developed based on findings from the qualitative data collection. Thirdly, several researchers have been part of the data collection and analysis processes. For example, the codes generated from Case Study I were used by my co-author of Article 2 to analyse the Swedish case study of the storm Ivar. The quantitative analyses were conducted by my co-author of Article 3, and in Article 4, my co-author has read the coded material and

participated in 11 interviews from Case Study II. In sum, I argue that these strategies contribute to ensuring a rigorous review of the data material.

4.9. Ethical considerations

The Norwegian Centre for Research Data (NSD) has approved the data collection in the HOMERISK project and it has been carried out in compliance with the guidelines for research ethics in the social sciences, humanities, law and theology (NESH, 2016). The same procedures for obtaining consent were conducted in every interview. At the start of the interview, the participants were provided with an information letter, informed about the project, asked if the interview could be recorded, and informed about anonymity and transcriptions along with their right to withdraw from the interview at any time. To ensure that the participants had a clear understanding of what they consented to, the researchers went through the consent form at the end of the visit.[11] Hence, the participants had the opportunity to consider whether they wanted to withdraw or delete the whole or sections of the interview or the photographs that had been taken. All the participants signed the consent form, which consisted of an introduction to the project and its financial source and objectives, the research topics, interview context, data collection techniques, and storage of data material. The form also included a separate consent for use of photographs internally in the project group, and in dissemination activities (Banks & Zeitlyn, 2015).

None of the participants were familiar with the use of photographs in research, which made it important to thoroughly explain the dissemination activities they would be used for; from scientific articles, popular science articles, newspaper articles, and a project exhibition at the Norwegian Museum for Science and Technology (Wiles, Clark, & Prosser, 2011). The researchers conducting the interviews asked permission to take photographs before the walk-along session and specified that faces or other specific characteristics of the participants or their homes would not be photographed. However, permission was

[11] See Appendix 3 for the full consent form.

asked to photograph people's hands holding or pointing to material objects, or that included people, in order to capture the interaction between human and material objects. Photographs were taken in 24 of the 25 Norwegian households. One household did not consent to photographing.

Visiting the families at home gave us information about them that they themselves had not necessarily reflected on. The NESH guidelines for research ethics (2016) state that the researcher must respect the privacy of their informants and their family life, and exercise particular caution in the use of sensitive information about health, politics, religion and sexuality. During the visits, the researchers gained insight into financial issues based on the type, size and location of the families' homes, as well as ownership of land and expensive products such as cars and equipment (Bashir, 2018; Elwood & Martin, 2000). The homes also provided information about the families' cultural capital based on their aesthetics. This additional knowledge and context gained by conducting interviews at home are valuable to the study and although it has not been concretised in any way, it forms part of my situational understanding.

The following chapter presents the results from the four articles, which are all based on the theoretical and methodological frameworks discussed in Chapter 3 and 4, and on the understanding of preparedness discussed in Chapter 2.

Chapter 5

Summaries of the articles

The four articles study the relationship between preparedness for extensive infrastructure breakdowns and everyday practices from a theoretical, methodological and empirical position. *Informal household preparedness* serves as the conceptual focus in all the articles. Table 2 gives an overview of the articles.

Table 2. Overview of the articles

Title	Theoretical perspectives	Findings	Main argument
1. Methodological approach *Informal household preparedness. Methodological approaches to everyday practices*	▪ Risk and everyday life ▪ Social practice theory	Methods that foreground performance will produce data beyond normative understandings of preparedness	Performed preparedness is based on existing competences, meanings and materials, and differs from formal preparedness
2. Preparedness practices *Coping with blackouts. A practice theory approach to household preparedness*	▪ Social practice theory ▪ Literature from energy consumption research	Preparedness exists in practices as embodied competences that are enhanced by previous experience and mobilised through	Preparedness is not a static asset of a household, but constantly interwoven in

		material resources in rural households, even though infrastructure breakdowns are not understood as risky	everyday practices
3. Embodied competences *Embodied competences in preparedness for blackouts: Mixed methods insights from rural and urban Norwegian households*	▪ Social practice theory ▪ Literature from energy consumption research	An embodied competence is important to the level of preparedness. Competence is increased through previous experience, local geographical knowledge, and social networks, but these vary between genders and generations within households, and between rural and urban households	Embodied competence is a key factor to determine the level of preparedness in a household
4. Engagement *'Someone will take care of it'. Households' understanding of their responsibility to prepare for and cope with electricity and ICT infrastructure breakdowns*	▪ Social practice theory ▪ Literature from risk, trust and engagement research	Engagement in formal preparedness is low in most households. The authorities and industry are seen to be the responsible actors. Informal preparedness is nevertheless performed in households	Future policymaking must recognise the informal preparedness in households and facilitate active participation by household members

5.1. Article 1: Methodological approach

Article 1 answers to Sub-question 1, which is: '*How can preparedness be empirically investigated as a part of the daily practices in households?'* The article provides a methodological approach for studying the informal aspects of household preparedness, seen as a dispersed practice connected to several different everyday practices.

The article sets out by claiming that existing research inherits policy definitions of preparedness that are normative and top-down, and where household preparedness is understood as an active state of readiness to manage crises or disasters. Readiness is operationalised as concrete measures such as awareness of preparedness plans, ownership of a family emergency plan and emergency kit, and stocking of supplies. In

the article, this is labelled 'formal preparedness'. 'Informal preparedness', in contrast, is defined as being interwoven in the everyday practices that households perform. In this sense, preparedness consists of the social, cultural and material resources that are not predefined as preparedness, but that are used to uphold everyday life during blackouts. The article uses insights from the risk and everyday life perspective that acknowledges the complexities of living with risk. However, it is argued that there remains a lack of methods that aim to study the embeddedness of risk beyond how it is spoken of by individuals. From this starting point, three approaches – performance of everyday practices, materiality and visualisation – are proposed as tools that can be used to grasp preparedness as a dispersed practice. The three approaches have been used in Case Study I & II and in the Swedish case study, all consisting of at-home visits to households.

Performance of everyday practices is the focal point in a study of informal household preparedness. However, as a dispersed practice, preparedness measures can be found in many daily activities, but cannot be directly observed in the same way as integrated practices. Instead of observing one performance, focus can be directed towards performances by using what is known as 'practice-based talk' in an interview situation. In this case, the participants were encouraged to tell their stories based on their experiences with previous infrastructure breakdowns, and act out future scenarios. An important prerequisite for this technique was to present everydayness as an interview focus at the introduction of the interview session.

Materiality points to the active engagement with the material aspects of a household such as the dwelling and its rooms, technologies, objects and the people present, as well as infrastructures outside the home such as mobile towers, base stations, cars, equipment and so on during the interviews. This brings the interview closer to actual performances since material objects spur concrete stories about that object. Materiality was interconnected with practice-based talk in 'walk-along' tours in and around the home, where the families showed the researchers their material preparedness objects and talked about the acquisition, storage, use and maintenance of these objects. They were also asked to show the

researchers how they would perform practices such as cooking, heating and lighting without infrastructure.

Visualisation is used to document informal preparedness in the form of photographs of material preparedness items and their placement. The photographs were taken during the walk-along tours and revealed similarities between households in the types of items they owned, how they were stored and who had acquired and maintained them. The photographing itself stimulated detailed stories about the role of material resources in their own preparedness or previous experiences with breakdowns simply because we lingered on specific objects during the tours.

Taken together, the three approaches steer the interviews towards everydayness. They reveal significant differences in how practices were performed in the different households, and these different performances display differences in level and type of preparedness. The methodological approach offers a novel framework for studying preparedness beyond the discursive narratives of those affected and contributes to a more nuanced discussion about the focus of preparedness studies.

5.2. Article 2: Preparedness practices

Article 2 answers to the first part of Sub-question 2, which is: *'What forms of social, cultural, and material resources do Norwegian households use when they are faced with extensive infrastructure breakdowns, and how do they differ between households?'* The article finds an embodied blackout competence, the ability to mobilise material resources, and the understanding of extensive outages as pleasant rather than dangerous to be important resources.

The differentiation between formal and informal preparedness outlined in Article 1 is used, with the addition of a literature review of existing preparedness studies that are criticised as being top-down and normative, policy-oriented and lacking a focus on performativity. By means of data from Case Study I and the Swedish case study, the practice perspective is used to explore how households coped with

infrastructure breakdowns during hurricane Dagmar, the Lærdal fire and the storm Ivar. Coping strategies are understood to be the performance of preparedness.

The analysis is organised along the three core elements of a practice: competences, meanings and materials. Firstly, an *embodied blackout competence* is found to be enhanced by previous experience of blackouts during crises, childhood experiences with blackouts, as well as experiences from living with restricted access to electricity in cabins and on camping trips. The embodied blackout competence was also increased through geographical knowledge of the local infrastructure, local social networks, and was linked to acquisition and maintenance of material resources. Secondly, the high level of competence among the rural households led the families to *normalise blackouts*, finding them to be without significant impact on their daily lives, even stating that they were cosy. However, this meaning was dependent on information about the severity and duration of the blackout, and the level of preparedness in their household. Thirdly, households *mobilised materials* belonging to a variety of practices. These became relevant for preparedness after being used during a blackout but are dependent on the blackout competence to be mobilised.

More broadly, the article claims that the dominant formal perspective offers a too narrow view of preparedness, and that the practice perspective broadens and deepens our understanding. This is arguably an important theoretical contribution to the study of household preparedness. The article furthermore recommends policymakers to include household members as competent actors in future policy.

5.3. Article 3: Embodied competences

Article 3 answers to Sub-question 2, which is: *'What forms of social, cultural and material resources do Norwegian households use when they are faced with extensive infrastructure breakdowns, and how do they differ between households?'* The article finds that an embodied competence consists of previous experience, local geographical knowledge, and social networks. Rural households were found more

competent than urban households. Finally, men and women had different competences, as did different generations.

Article 2 argued that an embodied blackout competence increased the level of preparedness. In line with this finding, Article 3 takes a step further to specify what forms of knowledge and skills increase or reduce the level of the embodied blackout competence. Case Study I & II were used to explore in more detail what types of competence mattered and whether they were shared or embodied. This resulted in three recurrent forms that were found to increase preparedness for infrastructure breakdowns:

Previous experience with extensive outages, and from living with restricted access to infrastructure over a period in cabins or on hiking trips, as well as childhood practices when the electricity and ICT infrastructure was less developed than today.

Local geographical knowledge of how the local infrastructure is embedded in the community in the form of power lines, tunnels, roads, mobile base stations etc., and of the climate and weather conditions and how these conditions might affect the built and natural environment and cause infrastructure breakdowns.

Social networks of multiple strong and weak relations within and between families, neighbours, friends and acquaintances, with a formal role that might be significant in attaining information and knowledge about the infrastructure. Additionally, these networks fostered a flow of material resources such as generators, cars, tractors and other equipment between households.

To gain a broader understanding of how these constituents differed within and between households, 18 questions from the web survey were used to construct one embodied competence of the three above-mentioned forms, and one formal competence. The findings indicate that there was generally a low level of formal preparedness, consisting of respondents' knowledge about local meeting places and preparedness plans, governmental information and their own family emergency plan.

Both the qualitative and quantitative material confirmed that rural households had a higher level of embodied blackout competence than urban households did, and thus a higher level of preparedness for infrastructure breakdowns. The urban households had experienced far fewer outages, they lived in smaller dwellings and thus had fewer things, and they had less extensive social networks.

Within households, we found interesting gender differences. Men tended to have more technological skills than women, while women had more extensive social networks. However, the data also indicated that competences belonged to the household and not to the individual practitioners. If a household member knew how to use a generator, this competence was included in another household member's account of their preparedness.

The article contributes to the preparedness literature by providing an in-depth discussion of forms of preparedness that there is little detailed knowledge about. For example, although research has found previous experience to be of importance to preparedness, little is known about how it is important. Furthermore, the importance of a sequential mixed methods design, where bottom-up explorative methods identify the elements of preparedness before they are mapped, constitutes a novel perspective on household preparedness.

5.4. Article 4: Engagement

Article 4 answers to Sub-question 3, which is: *'How is the relationship between formal and informal preparedness understood in the performance of social practices?'* The article finds that households had a low level of engagement in formal preparedness measures. They trusted formal actors, in-between actors and informal actors to manage infrastructure breakdowns. However, as article 1-3 have shown, the households employed informal preparedness strategies.

In this article, the framing of blackouts as normal presented in Article 2 is further investigated. A key finding from Case Study I & II was a low level of perceived risk of blackouts, and a subsequent low engagement in formal preparedness measures. Previous studies have shown that

lack of engagement is related to the distribution of responsibility for preparedness. One reason for the low level of engagement in preparedness might be the trust-based risk culture in the Nordic countries, where the authorities are trusted to take responsibility for managing risks through techniques such as preparedness. The analysis shows that the households saw the overall responsibility for preparedness as belonging to three main groups: *formal actors* (the authorities and energy and ICT companies); *in-between actors* (janitors, personal contacts in the industry or the authorities); and *informal actors* (their own and other households). Preparedness measures such as water supplies, emergency plans, and rehearsals, activities directly related to preparedness, were believed to be unnecessary in a household because they relied on other actors to manage an outage using formal measures, as well as their own competence to predict and act correctly. The main response strategy of the households was to wait until something happened, but when an outage did occur, they used their informal preparedness resources to deal with it.

In line with Article 3, differences were found between rural and urban households in terms of their level of engagement. The rural households expected less help from formal actors during breakdowns and expected to have to wait for much longer than the urban households did.

Based on these findings, the article provides concrete suggestions for policymakers within risk management, particularly related to critical infrastructure. Firstly, households are unlikely to actively seek information about preparedness or be more aware about preparedness measures after information campaigns. Secondly, future policies must recognise the aspects of preparedness that are embedded in everyday practices by engaging with citizens at the local level. Thirdly, those policies should follow an accessible everyday language. Fourthly, 'citizen-state contracts', where the local population are given permission to help using the equipment they have at hand, while still being insured by the authorities, should be considered in some areas.

5.5. Summary of concepts and empirical findings

Figure 5 shows the main line of argument in the dissertation including key concepts from the four articles. The basis of the argument is that household preparedness can be studied both as 'formal' and 'informal'. Formal household preparedness is the degree to which a household actively draws on formal resources to cope with infrastructure breakdowns. Informal preparedness is the degree to which a household copes with infrastructure breakdowns by using their already existing social, cultural and material resources that are embedded in everyday practices. While the level of formal preparedness can easily be measured in quantitative surveys, there is a need for methods that produce data about the performance of practices in order to gain knowledge about informal preparedness.

A practice perspective on preparedness reveals that an embodied blackout competence increases the level of preparedness, and that previous experience, local geographical knowledge and social networks increase this competence. Material preparedness resources are mobilised in the household after it has experienced extensive outages. When the level of preparedness is high, outages are considered unproblematic, while they are considered problematic when preparedness is low. Formal preparedness is considered the responsibility of the authorities and industry.

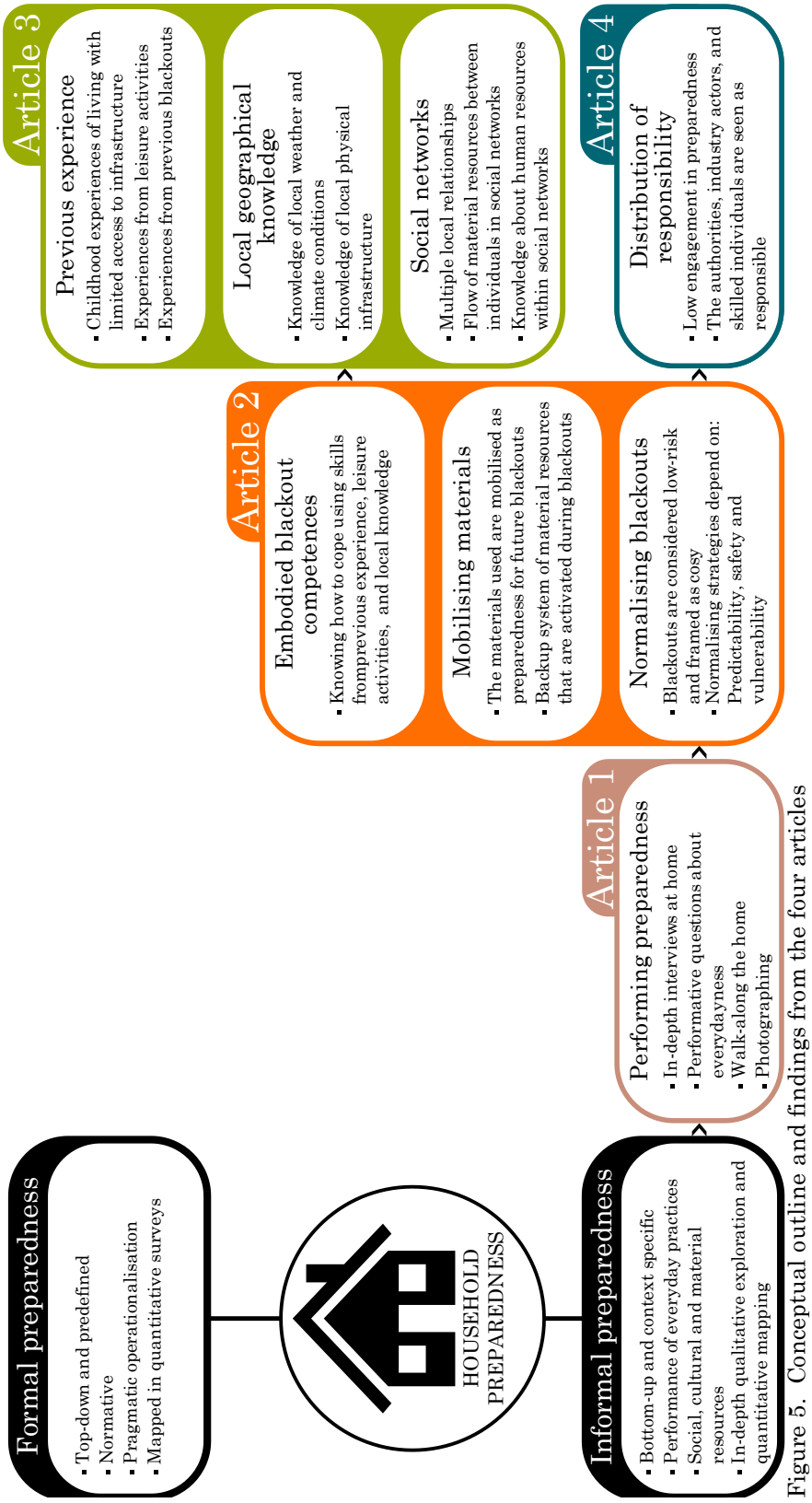

Figure 5. Conceptual outline and findings from the four articles

Chapter 6

Conclusion

This dissertation shows that informal household preparedness is a useful concept to understand what makes a society prepared for critical infrastructure breakdowns. It is therefore an important aspect of preparedness. Rather than think of individuals as risk minimising rational agents, it views risk as embedded in socially and culturally shared practices. It captures the fact that risk might not be steering our lives.

The research objectives of the dissertation were to study how preparedness for infrastructure breakdowns is integrated in the everyday practices in Norwegian households, asking the main research question: *How do Norwegian households cope with extensive infrastructure breakdowns using their social, cultural and material resources?* The main contribution of this dissertation to the field, is the concept of informal household preparedness, which has been accounted for theoretically and methodologically and used empirically over the course of four articles.

This chapter discusses the main implications of informal household preparedness. In what follows, implications are explored in three parts. The first addresses the conceptualisation of preparedness, and the importance of including the performance of everyday practices. The second addresses the unit of analysis in preparedness studies,

demonstrating the utility of a household perspective. The third addresses policy implications, including specific suggestions to include an informal preparedness approach in future policy. Finally, I consider limitations of the study and some possible ways ahead for future research.

6.1. Preparedness as a performative resource concept

Combining an everyday perspective on risk with social practice theory has proven a fruitful starting point to understanding household preparedness. Studies of risk and everyday life have critiqued the positivist notion of finding universal frameworks undisturbed by historical, cultural and political processes from which to understand risk. Concepts such as 'risk' or 'preparedness' are socially constructed within research and policy paradigms and operationalised in documents, models, plans and analyses developed by those known as 'risk experts' (Jasanoff, 1999; Reith, 2004; Tulloch & Lupton, 2003). If preparedness is a social construct, then it becomes important to study how it is constructed in different contexts and by different actors.

The dissertation finds that even though households do not see themselves as prepared, they perform practices that are relevant to preparedness. The study participants associated the term preparedness with things that did not concern them, such as plans and documents. Preparedness had no place in their everyday language, as shown in Article 4. Article 3 further demonstrates that awareness of local preparedness plans and meeting places and governmental information was generally low, as was ownership of a family emergency plan. When applying a predefined preparedness concept, the level of preparedness is low.

Instead of starting with the concept as it has been constructed in risk management policy (top-down) and study how it is implemented at the household level, I have explored preparedness as something based in the everyday life of households (bottom-up). All practices could be relevant to preparedness, and this view recognises that. Using the practice perspective on everyday life as an analytical framework also entails that preparedness is not studied as individual choices or behaviours in this

dissertation, but as something that belongs to socially and culturally shared practices that are performed by individuals. The dissertation suggests that we can gain new knowledge about the preparedness resources and barriers in households if we study how practices are composed, performed, moved and interlinked, and how they are reproduced, changed or disappear.

From a social practice perspective, everyday life consists of practices that are continuously modified. When the electricity infrastructure breaks down, it causes trouble for all electricity-dependent practices. However, the findings from the articles indicate that everyday life does not fall apart during outages, but rather that the rhythms of how we perform our everyday lives change. Within practices, there is therefore an elasticity that is mobilised when infrastructures fail (Trentmann, 2009). Pivotal in my analysis is therefore that preparedness in everyday life is performative and not merely discursive. Informal preparedness can thus be conceptualised as *performative resources that form a built-in degree of elasticity to cope with the consequences of outages for everyday practices*. Preparedness should be considered a performative resource concept because preparedness is not something we have, it is something we do.

Preparedness as performative resources is highlighted in the articles in different ways. In Article 1, I use three methodological techniques to foreground performances in empirical studies of preparedness. A combination of practice-based talk, walk-alongs at home and use of visual methods strengthens the focus on performances in the interview setting.

In Article 2, we highlight the interconnectedness of material resources and competences, the latter defined as knowing how to perform a practice. We argue that it is insufficient to map the amount of material resources in households, because many material resources need competences to be mobilised. Material objects should therefore be considered a resource when they are connected to knowledge of how to use and maintain them. Most of the materials the participants showed us during the walk-along tours were not associated with preparedness

but had their function as an integrated part of the household practices. However, new interlinkages of materials were made based on previous experience with infrastructure breakdowns. Households that had such experience generated new meanings for the material resources they had used during the breakdowns, giving them a new status as preparedness resources. Using these materials during a breakdown is thus a way of performing preparedness, because new practices are established.

In Article 3, we argue that an embodied competence of knowing how to act skilfully is important to the level of preparedness. Competences pervade all practices, and most accounts of practice theory agree that our habitual everyday life is performed using practical understandings of knowing how to act. This means that we do not reflect on every action we perform, but rather perform them by applying culturally and socially defined procedures of how to act in each situation (Warde, 2016a). These competences are seen to be internalised in the bodies of the actor (Bourdieu, 1990) or in their connections with material infrastructures, technologies and objects (Shove et al., 2012). Households were prepared through performing practices that were related to infrastructure. In practices such as heating, lighting, cooking, cleaning etc. we saw a built-in competence of how to perform them without infrastructure, generated from previous experience with outages, cabin life with restricted access to infrastructure, or from childhood experience of living with a less developed infrastructure. Knowledge about the local surroundings that influenced how other practices are performed, in particular weather and climate conditions and how these affected the local physical infrastructure, increased the level of preparedness. The ability to mobilise social bonds between neighbours, friends and family also increases preparedness, in addition to allowing a flow of material resources that reduces the relevance of private ownership of resources.

Article 3 also shows that by looking at performances, we can also say something about how the level of preparedness differs between people. A low level of preparedness is not merely the result of a lack of awareness or implementation of preparedness measures, but a consequence of the types of practices people engage in and are skilled in

performing. This view contributes to explaining why rural households have a higher level of preparedness than rural households.

Finally, in Article 4, performativity is emphasised by looking at the practices that are not performed. Households were found to be little engaged in preparedness, when it is defined as planning activities and a high level of awareness and readiness. The lack of water supplies in households, for example, was an expression of this low level. Water supplies were seen as a resource associated with preparedness alone, and was not part of any other household practices. Resources such as firewood, canned food, candles, batteries and so on that are used in other practices were present in most households.

When entering a home, it is difficult to think of preparedness as the outcome of one particular performance, or a single structure with clear boundaries. It seems to make far more sense to see it as the composition of multiple practices that are performed within the home. Preparedness as performance, then, is much more fluid than the clear-cut and systemic approaches that dominate the research field today. A further implication of understanding preparedness as performative is therefore that preparedness is scattered across many practices. Preparedness as a dispersed practice carries the teleoaffective structures, or meanings, of the practices of which it is part (Schatzki, 1996). This point is important because it shows that preparedness is not a single practice to be performed. However, the existence of a dispersed preparedness practice does not exclude the existence of an integrative preparedness practice. It could be argued that *formal* preparedness is an integrative practice because it consists of meanings (to be ready and aware), materials (plans, documents and websites, supply stocks), and competences (how to implement formal preparedness at home, rehearsals, drills, workshops). Although the findings in Article 4 indicate that preparedness is not performed in an integrative manner in households, many studies have looked at how preparedness is performed in formal institutions (Anderson, 2010; Aradau, 2010b; Aradau & Van Munster, 2007; Collier & Lakoff, 2008). *Informal* preparedness, however, is sensitised towards the integrative practices of which it is part. When people carry out integrative practices that are

infrastructure-dependent, these practices bear with them competences, meanings and materials that are not performed for the purpose of preparedness, but that nonetheless matter to the state of preparedness. Article 2, for example, shows that leisure activities such as hiking and cabin trips, and wood heating are integrative practices that also contain preparedness resources because practitioners acquire competences to cope without critical infrastructure, own material resources needed to perform these practices, and also learn more about the meaning of simple living and being able to cope on one's own. Here, preparedness can be seen as a dispersed practice within integrative practices, while it is also constituted by other dispersed practices, as demonstrated in Article 3 where we look at how competences that are used across practices matter to preparedness.

Understanding preparedness as performed practices does not imply that to study formal preparedness as individual behaviour is wrong or that it does not yield any interesting results. Instead, the interesting question is what more can be learned when different theories are foregrounded. This dissertation has demonstrated that thinking about preparedness as something that belongs to practices rather than to the individual, changes the scope of resources that are out there to cope with crises or disasters. As such, it has attempted to redefine the starting point for studying preparedness and shown what happens when we start with everyday life (bottom-up) rather than with official advice on preparedness (top-down).

6.2. The utility of a household perspective

The concept of informal household preparedness puts the household as a primary unit of study. In this section, I discuss three important findings from the dissertation suggesting that the household is a useful analytical framing from which to understand informal preparedness for breakdowns in the electricity and ICT infrastructure. The first is that preparedness is understood as being closely linked to the household as a social and material unit. The second is that preparedness is shared between members of the household unit. The third is that preparedness varies between household types. These findings suggest that there are

multiple connectivities to be highlighted from a household perspective. These include connectivities between the practices performed within a household; connectivities between practices and practitioners; relational connectivities between genders, generations and within social networks; and connectivities between households and infrastructures.

6.2.1. The household as a socio-material unit

The first argument for why preparedness for infrastructure breakdowns should be studied from a household rather than an individual or family perspective is that people interact with materialities. Although the concept 'household preparedness' is commonly used to frame studies of preparedness measures among citizens, the household as a social and material unit is rarely taken into account (Guldåker, 2009). Studies tend to focus on one or the other, and not the linkages between. On the one hand, the family has been recognised as an important social institution, where aspects such as kinship and the division of labour produce certain preparedness behaviours. Also, the importance of social capital in communities to enhance preparedness is widely recognised. On the other, material preparedness such as access to food, batteries and generators is commonly used as a measure to determine the level of preparedness in households. How the family as a social institution interacts with the material surroundings of the home, and with products, technologies and infrastructures, has yet to receive attention in preparedness studies.

Scholars in the field of security studies also make this point, albeit more generally, when addressing overall societal preparedness. Specifically, Aradau (2010b), Lakoff (2005), and Adey and Anderson (2012) show that the resources emphasised in preparedness documents are primarily technical. With respect to infrastructure, most preparedness plans aim to produce a resilient technical system, but leave out the practices, norms, values and logics of the social world. These scholars propose looking more closely at the materiality of preparedness in order to take a more serious look at what escapes the discourses. Both what we do and the materials we engage with are as important as what we say, as can be seen in Aradau (2010b), who finds that the securitisation of critical

infrastructure is based on an understanding of this infrastructure that is produced through what she frames as 'material-discursive practices'.

Studies of individuals or households, understood as social relations or family, have stripped preparedness from its grounding in socio-materiality and ignored the capacity of localised everyday life to affect preparedness. An important contribution of this dissertation is that it suggests understanding preparedness within the household, seen as a stable unit made up of a cluster of interlinked practices that are both social and material. A household is therefore not the same as a family, which is only defined by its social characteristics (Guldåker, 2009). A household is also interconnected with systems of infrastructures, including electricity and ICT, through a range of materials. Electricity and ICT is not consumed directly, but they power the technologies of the home and we use these technologies to ends such as to communicate, be informed and to feel warm and comfortable (Shove & Walker, 2014).

Preparedness for infrastructure breakdowns is a product of the interconnectedness of social and material aspects within the household. Throughout the articles of this dissertation, therefore, the material world of generators, wood stoves, lamps, batteries, houses, cars, mobile phones, water, landscape, base stations and power lines has been connected to interactions, previous experience, social networks, engagement and responsibility. The way in which electricity and ICT flows through everyday practices becomes evident only when we make this connection between the social and material world. From there, we can start looking into the resources that are mobilised to replace the components of everyday practices that go missing when infrastructures break down.

6.2.2. Differences within and between households

The dissertation has focused on three comparative elements between Norwegian households: experience/no experience with extensive infrastructure breakdowns; rural and urban households; and different characteristics of dwellings (size, alternative heating sources) and families (couples with and without children, older and younger households, and single households).

The second argument for studying the household in preparedness studies is that preparedness is the product of practices that are distributed among household members. In Article 1 and Article 3, we give examples of differences between genders. While men were more likely to be responsible for items such as generators, flashlights, fuel, wood, batteries, cars and tractors etc., women were more likely to be responsible for candles, food and beverages, and of having an overview of the household's stock of supplies. Article 3 also shows that younger participants relied on their parents' preparedness resources, even after they had moved out. Additionally, household members considered their own preparedness to be that of the household. For example, women's extensive social networks were also a social and material resource for the other household members. These findings have some important implications. Firstly, that single households might have a lower level of preparedness than households with more than one individual. In 2018, 39 per cent of all Norwegian households were single households (Statistics Norway, 2018a), meaning a large share of households might have few preparedness resources. Secondly, that younger and less established households might be less prepared than households with older members, larger dwellings and more experience, but that younger households are still linked to their parents' preparedness. Thirdly, and most importantly, that preparedness should not be considered an individual task. The totality of social, cultural and material resources within the household and between connected households come into play to cope with infrastructure breakdowns.

The third argument for studying the household is that preparedness is performed in different ways in different households. The most prominent finding from these horizontal comparisons is that rural households have a higher level of preparedness for infrastructure breakdowns than urban households, regardless of experience with extensive outages. Rural households tend to live in large detached dwellings with more storage space for long-term supplies of food, firewood, camping gear, gasoline, generators, batteries, candles, flashlights and so on. Moreover, 86 per cent of detached dwellings have wood heating, compared to 22 per cent of apartments (Statistics Norway,

2014). A large share of urban households lives in smaller dwellings with less storage space and only electric sources of heating.

In addition to the material resources, Article 2 and Article 3 demonstrate that rural households were engaged in their immediate surroundings, including weather and climate conditions, because they affected daily practices. Rural households were also knowledgeable about the physical infrastructure, such as roads and tunnels, wells, power lines and base stations nearby, and knew how they might be affected by weather and climate conditions such as winter storms. While weather, climate, geography and the built environment was a central topic in the interviews with rural households, it was much rarer in the interviews with urban households. This is also the case for social networks. In the rural households, the extensive number of ties was a preparedness resource. These are not necessarily strong ties, such as those between family members and close friends, but also include weaker ties such as those between neighbours, other community members as well as their social networks (Granovetter, 1977). Social networks provided people to contact or be contacted by, including people with relevant knowledge and information, and people who owned material resources that could be shared. In the urban areas, social ties were not connected to the local area in the same way, making it more difficult to mobilise them during an outage without access to digital communication or means of transportation. Finally, in article 4 we found that household members from rural households saw themselves as being able to cope without infrastructure in the long term because of their material resources and extensive experience with outages, and that they did not expect immediate help from the authorities or other actors. In contrast, urban households expected the authorities to provide aid within a short period of time.

Figure 6 illustrates the three comparative elements: (i) experience/no experience, (ii) dwelling and family characteristics, and (iii) rural/urban households. For dwelling and family characteristics, I have put emphasis on age because younger people are associated with the characteristics of a low level of preparedness. Further important differences include those between genders, as stated above, but there is

no indication that one gender has less preparedness resources than the other.

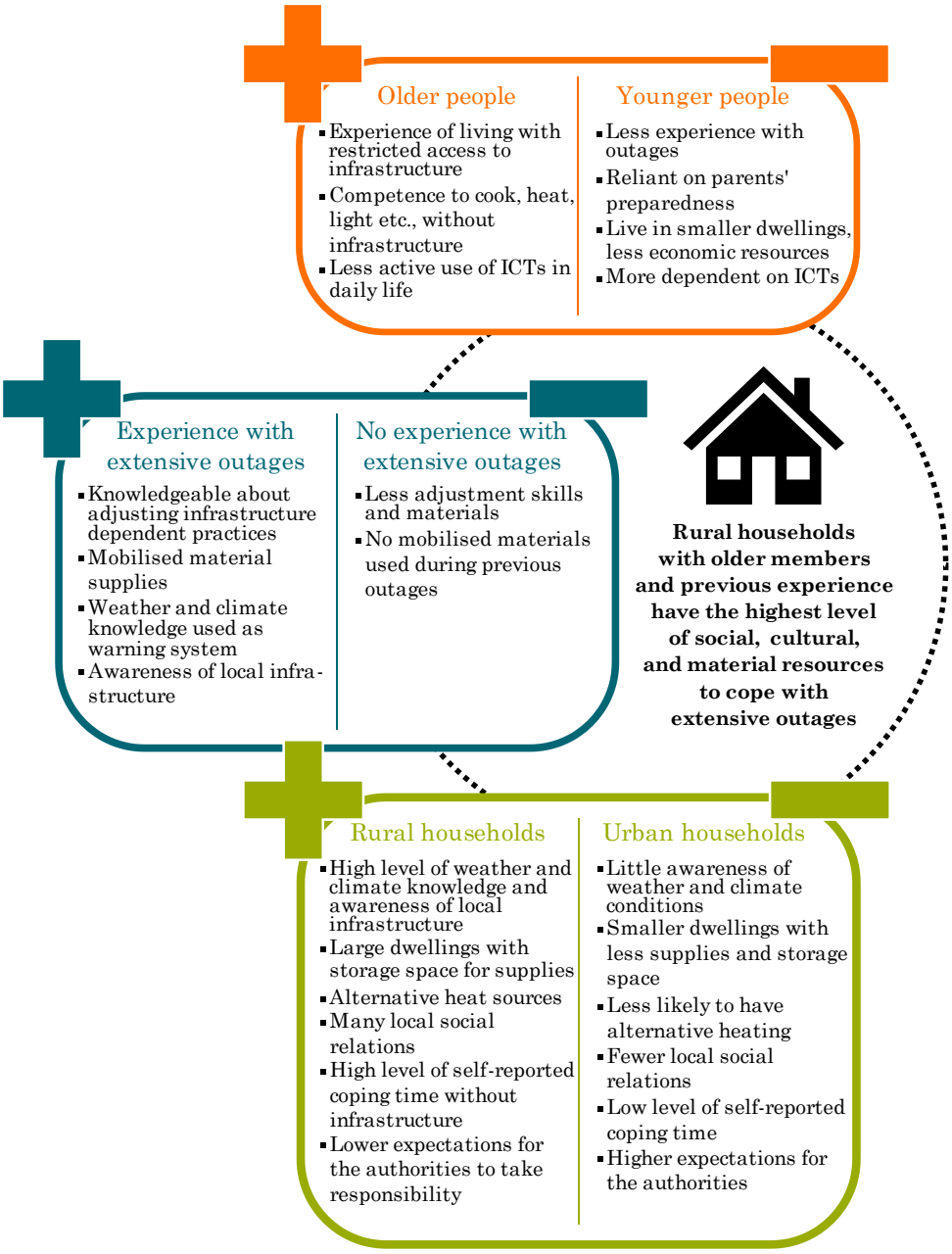

Figure 6. Three comparative elements

As discussed in more detail below, current risk management strategies state that educating the public leads to better preparedness. The findings from this dissertation suggest that such strategies cannot

assume uniformity among the population. Lupton (2013, p. 130) notes that even though characteristics such as gender, age, occupation and socio-economic status are used to identify more vulnerable population groups, this process does not necessarily involve individual monitoring, such as in a health context. Rather, the whole group is targeted through mass campaigns that rely on the individual reducing this vulnerability.

A key conclusion from the social practice perspective on preparedness is that preparedness for infrastructure breakdowns should be understood at a household rather than an individual level, and within the local cultural and social context. The findings add to the scarce literature on household preparedness in the Nordic countries (existing studies include Guldåker, 2009; Palm, 2009; Rinkinen, 2013; Silvast, 2017; Wamsler & Brink, 2015). Specifically, it offers a comparative approach along the three dimensions of experience, location, and dwelling and family characteristics. Our understanding of preparedness in general would benefit from more studies where the household is the unit of analysis, and I encourage researchers to discuss the possible units of analysis and what each perspective entails in their studies.

6.3. Implications for risk management policy

Table 3 summarises the empirical findings from the four articles according to seven topics of relevance and how these findings can be used to improve future policymaking. The following section discusses these implications with regards to the dominant policy framework.

Table 3. Summary of key findings and policy suggestions

Topic	Key findings	Policy suggestions
Formal preparedness	▪ Extensive outages were believed to be unlikely ▪ Governmental websites and documents were generally unfamiliar ▪ Emergency kits and evacuation plans were not present in households ▪ Few had rehearsed evacuation ▪ Many had large supply stocks of food and wood ▪ 1 of a total of 25 interviewed households stored water. The participants do not store water because their household practices do not require them to	▪ The limited impact of information campaigns should be acknowledged. Communication should take place with (and not to) citizens ▪ Low level of formal resources is not equal to a low level of preparedness. Future policies must consider the reasons for this low level ▪ Measures to access water in the local area should be highlighted in future communication
Division of responsibility	▪ The authorities, and energy and ICT companies were seen as responsible for dealing with extensive outages ▪ Electricity and water were understood to be common goods ▪ Preparedness was a household and not an individual task ▪ Household preparedness was restricted to their own dwelling and social network ▪ Women were generally responsible for material supplies associated with female domestic labour while men were responsible for technologies ▪ Those with resources to do so would help with rescue work, but were not always permitted to	▪ The distribution of responsibility for preparedness between formal and informal actors should be detailed ▪ Policies should be directed towards households and not individuals ▪ 'Citizen-state contracts' where individuals can contribute with material supplies, local knowledge and skills, but still be insured by the state, should be considered ▪ Inventories of private owned material resources such as generators and farm equipment could aid in infrastructure recovery work
Performance of electricity-dependent practices	▪ Previous experience with restricted access to electricity led to greater preparedness ▪ Access to alternative heating, such as wood stoves, was the most important measure to maintain daily life ▪ Weather and climate knowledge was used to predict outages	▪ Focus on the security benefits of wood heating should be considered in sustainability discussions of residential energy consumption ▪ Knowledge of use is as important as owning material supplies. Local knowledge should be

	▪ Camping gear was used to cook, heat and light the home ▪ Materials used during outages were mobilised for future outages	incorporated in future plans ▪ Early warning systems could contribute to mobilising material preparedness measures ▪ Competences to sustain everyday life without infrastructure are important, and should be emphasised in exercises and scenarios, as well as in plans
Performance of information and communication practices	▪ Information about the duration of the outage was important to households ▪ The need to communicate became greater during an outage ▪ Households expected access to information via digital sources ▪ Mobile coverage was more important than electricity supply ▪ Local geographical knowledge was used to access ICT infrastructure ▪ Information spread through social networks ▪ Power banks to increase battery life on mobile phones were common	▪ Information from the authorities should be accessible in digital and analogue forms ▪ Information about how mobile coverage can be accessed, and providing alternative methods of connecting to the internet, should be key concerns ▪ Future plans should incorporate local knowledge on the potential effects of weather and climate
Social networks	▪ Strong networks such as families and friends sought together during outages ▪ Existing neighbour relations were activated during blackouts ▪ Extensive networks of knowledgeable people (e.g. municipal employees, janitors, local teachers, nurses and doctors) were activated ▪ 'Everybody knows everybody' was a key resource ▪ Social networks increased sharing of material supplies	▪ Ways of promoting social networks in rural and urban contexts should be considered ▪ Access to local residents with expert knowledge about the event may reduce insecurity and provide detailed information. This could be achieved in support groups ▪ Sharing of expensive material resources should be promoted
Meanings about infrastructure breakdowns	▪ Many households saw themselves as highly capable of dealing with outages ▪ Outages were framed as cosy and did not produce panic ▪ Pleasant outages are determined by their	▪ Informing the public about the expected duration of an outage should be a priority ▪ Seeking ways to encourage communities to help each other would be beneficial

	predictability, duration and the household's access to coping resources	and should be done at a local level
Differences in the level of preparedness	▪ Young, single, urban households were the least prepared group ▪ Households without any experience of outages were less prepared than those with such experience ▪ Rural households are generally more prepared in terms of material supplies and competences than urban households ▪ Older people had more supplies and competences in dealing with restricted access to electricity ▪ Women and men had different preparedness resources ▪ Social networks were more widespread in rural areas, but similar networks can be found in urban neighbourhoods ▪ Families with children had stronger social networks than families without ▪ Rural households had more knowledge about climate, weather conditions and the local infrastructure than urban households ▪ Larger dwellings had more material supplies than smaller dwellings ▪ Dwellings without wood heating were less prepared	▪ Information campaigns directed at the overall population do not account for these differences ▪ Future policy work should consider demographic differences and seek to develop preparedness plans at a local level where these can be considered ▪ It would be beneficial for the local population to participate in developing new preparedness plans, which will increase formal and informal preparedness ▪ Local preparedness plans should include measures to strengthen social networks, local geographical knowledge and competences in using, sharing and maintaining material supplies

The promotion of preparedness by risk management experts has predominantly been directed towards awareness. The underlying assumption is that if individuals are more aware of risks, they will be more likely to adopt precautionary behaviours to reduce those risks (Harries, 2008; Tuohy et al., 2014). Information-deficit models of public understanding, on which this view is based, claim that lay people are ignorant of expert risk knowledge and irrational in their response to risks (Owens, 2000). If people understood more about risk, they would be better prepared. Risk communication has therefore first and foremost been a one-way process based on the assumption that preparedness will

increase if the public is well-informed and educated. These are obviously important actions for governments to take, but rest on the theoretical stance that people act rationally based on what they know, and that increasing their knowledge will lead to more preparedness actions. Underpinning this logic is also an expectation that individuals must take the responsibility to be prepared. This belief has served as the basis of numerous information campaigns to the public. Although still dominant in policy, this model has been extensively criticised in various fields, including risk knowledge (Brown, 2016; Healy, 2004; Horlick-Jones & Prades, 2009; Horlick-Jones, 2005; Jasanoff, 1999; Wynne, 1996), and climate change adaptations and sustainable consumption patterns (Shove, 2010; Spurling, McMeekin, Southerton, Shove, & Welch, 2013; Strengers, 2012). This dissertation shows that a social practice perspective on household preparedness reveals a wider set of social, cultural and material resources and barriers that determine preparedness, that deserves further attention.

It could be argued that recent disaster risk reduction (DRR) frameworks have taken into account wider social processes as an important part of people's understandings of risk and preparedness (Scolobig, Prior, Schröter, Jörin, & Patt, 2015). Frameworks that advocate community resilience, supporting local communities to reduce their vulnerability by inclusive participation in policy making, are widely recognised also in disaster studies (Imperiale & Vanclay, 2019). The Hyogo Framework for Action (ISDR, 2007) and the UN Disaster Resilience Scorecard for Cities (UNDRR, 2017) recognise that catastrophic events are not merely natural or technical, but must be considered as being interwoven in contextual social and cultural processes. As such, there is no uniform way of reducing the risk of these events across cultures, and individuals and communities possess valuable knowledge about local risks.

Substantial investments have been made to create a 'culture of resilience', and also a 'culture of preparedness' in primary disaster risk reduction strategies (Kapucu, 2008). These appear to have become buzzwords in several European research programmes, and are used to address factors including social, economic and environmental sustainability, as well as coping with catastrophic events (Anderson,

2015; Benadusi, 2014; Bergström, 2016; Seville, 2008). What is great about the buzzwords is that the word 'culture' has been added. However, Benadusi (2014) makes a critical assessment of how culture has been added to these policies, and points to several important factors. Firstly, 'culture' is not easy to quantify. This is also echoed in the many studies of preparedness that struggle to include everyday practices. How can we measure know-how, embodied skills, localised social networks, or the practice of wood heating or local weather conditions? What tends to happen is that culture becomes a normative concept. The second important factor is therefore that policies often treat culture in a mechanistic way, such as by using it to reinforce the division between expert knowledge and local experiential knowledge. Culture, then, represents the local practices within communities, as opposed to scientific knowledge about risk. Lay people are seen to have incorrect understandings, and experts must inform them so that they will make better choices (Scolobig et al., 2015). Thirdly, Benadusi (2014) points to the language used in disaster risk reduction plans, which is often bureaucratic and far removed from everyday language. This is consistent with our findings in Article 4, where the participants associated the term 'preparedness' with government policy language. The language produces a certain discourse where formal preparedness activities are emphasised, while everyday practices are downplayed. Finally, Benadusi (2014) addresses how lay knowledge is used in policies. It seems that when lay knowledge is consistent with technical expertise, it is considered useful, meaning that it contributes to producing the most effective plans to become more resilient. When it is not, it tends to be ignored. In sum, the many proposed participatory techniques of learning disaster risk reduction (simulations, trainings, workshops, exercises and so on) have built on the idea of context-specific cultural knowledge, but often end up reproducing the formal approach to preparedness.

This dissertation has not laid all these issues to rest, but it has shown that preparedness should not be exclusively defined as an active state of readiness. It is also routinely performed through the practices of everyday life.

In the table above, I have used the phrase 'local', which is very much in line with how recent disaster risk reduction policies have been framed. Local often means that plans and strategies are produced at the municipal level, and that the public is invited to participate in these processes. However, as argued by Benadusi (2014), these are not sufficient measures to account for localised practices. One further suggestion would be that local participatory processes are steered by the public, and that local authorities should share their decision-making power with the local residents (Scolobig et al., 2015). This contributes to more meaningful and relevant risk management plans and strategies within the community.

In addition to local participatory processes, information about preparedness for households should be grounded in what makes sense for the practitioners to do (Strengers & Maller, 2012). This is different from designing awareness programmes and information campaigns that aim to create a constant awareness. Infrastructures can instead be highlighted as important enablers of everyday practices, and becoming aware of how they do so could contribute to increased preparedness for when they break down. By applying this perspective also to policy, infrastructure-dependent practices can be used as a starting point from which to define the level of household preparedness, and further to point to the resources used in these practices when infrastructure breaks down. The social practice perspective makes visible how systems of infrastructure are intertwined with everyday practices in ways that both reduce and increase households' level of preparedness.

The informal preparedness concept clearly differentiates between the practices of actors with a formal role in the preparedness system, such as the authorities and various organisations, and informal actors such as households. It makes perfect sense for a clearly structured system such as a municipality to have emergency and evacuation plans and to train for potential dangers, but it would not make much sense for households to do the same because households rely on different types of resources to cope. Resources such as lay knowledge about local preparedness should be considered in future policies. How a space is experienced socially and materially, for example, is of great importance

because it produces contextual knowledge about the resilience and vulnerabilities of that place. The dissertation therefore suggests a connection between formal and informal preparedness measures. It recognises the importance of continuously updated preparedness and crisis management plans at all societal levels, from municipalities, counties and the national state, but proposes that the informal resources of households are also included in these plans.

6.4. Limitations

Given the focus of this study, several empirical, methodological and theoretical limitations should be mentioned. The HOMERISK objective to study how households cope with and prepare for infrastructure breakdowns yielded a broad range of starting points that were all highly interesting and important. To construct a feasible study, I firstly chose to focus on preparedness and to understand the coping strategies used by the household members who had experienced hurricane Dagmar and the Lærdal fire to investigate the performance of preparedness. Secondly, I used electricity and ICT breakdowns as a case, meaning that this study is not one on infrastructure per se. Nevertheless, I have used important insights from studies of infrastructure, and energy and ICT consumption, to understand how infrastructures are interwoven in our daily practices.

Empirically, an important limitation is the sole focus on households. Other actors such as the authorities, industry actors, organisations and so on, and their relations with households is of great importance and has not been emphasised in the dissertation. A system approach that studies these connectivities, norms and power dimensions, would provide valuable information on the reproduction and change of preparedness and energy regimes within a social and cultural context (see for example Kemp, 2016; Petermann, Bradke, Lüllmann, Poetzsch, & Riehm, 2014).

Post-event data collection is a noteworthy methodological limitation in this dissertation, as well as in most studies of crises and disasters (Killian, 2003). Instead of observing how the participants acted during the outages, the data consists of interpretations of the events. The Lærdal fire had severe social, cultural and economic consequences for

the whole community. I am aware that the findings in my study are produced through a community narrative and might downplay some of the challenges the local residents encountered when they handled the infrastructure breakdown (the community narrative in Lærdal after the fire has been discussed by Andresen, 2017). It does not make sense to ask the participants to 'demonstrate preparedness'. The methodological approaches discussed in Article 1 are designed to overcome the above limitation. However, these approaches still produce linguistically expressed practices and there will always be a difference between actual doings and spoken-about doings (Storm-Mathisen, 2016). Alternative methodologies could include diaries of infrastructure use (e.g. that participants log every interaction with electricity or ICT infrastructures during a day, and log one day without infrastructure), visits before and after a major breakdown (this is obviously difficult to plan), or preparedness biographies on how households' understanding of the risk of breakdowns changes over time (e.g. before and after having children, in different dwellings and locations).

Theoretically, the important role of power relations has been downplayed in my application of practice theory. Other approaches, such as Butler (1990) and Foucault (1977), have a strong focus on how power is reproduced in practices, which would be an interesting aspect of discussions on why households have a low engagement in preparedness. Here, the governmentality perspective on risk also adds to the understanding of how risk is reproduced as an element in these power relations (O'Malley, 2009). Also, the dissertation mainly engages with routines. Studies of social practices have tended to entirely discard the cultural theories that engage with constructions of identity, symbolic consumption and language in favour of routines (Evans, 2018). Connections between discourses and practices, for example how the discourses surrounding preparedness and resilience affect routines and rural and urban identities, are also of great importance to understand household preparedness.

The study could also be conducted using other theoretical approaches. Many studies of infrastructure use Actor Network Theory (ANT) (e.g. Bennett, 2005; Guldåker, 2009; Larkin, 2013; Silvast, 2017; Star, 1999),

that seeks to follow the actors and actants that form the naturalised networks of infrastructures. When infrastructures break down, the black boxes become visible and we can study how the nodes in the network are interconnected. Guldåker (2009), for example, provides a comprehensive study of households managing the storm Gudrun in Sweden, arguing that their likeliness to manage such events relies on the capacities of a range of actors and actants to add and mobilise within existing networks. Heidenstrøm and Storm-Mathisen (2017) used ANT to unravel how households communicated during the Lærdal fire. As mentioned in Chapter 3, practice theory is inspired by the materiality focus used in ANT and the active role this plays in the performance of practices. Yet, they differ in focus. Whereas ANT attempts to identify how networks are assembled through the agency of both material and human actors, practice theory looks for how practices are reproduced by human actors' performance.

Finally, there are fields of research not considered in the dissertation that provide important knowledge about household resources. Firstly, in climate change research, the resource concept of 'adaptations' has come further in exploring how ordinary people deal with the consequences of climate change and an uncertain future. Adaptation studies provide a long-term perspective on the resources used to manage the effects of climate change (see Adger et al., 2009; Eriksen, Nightingale, & Eakin, 2015; Ford, Berrang-Ford, & Paterson, 2011; IPCC, 2012; Strengers & Maller, 2017; Toole, Klocker, & Head, 2016; Wamsler & Brink, 2015). Adaptations do not use the same event-based logic as preparedness. The consequences of climate change are already happening and will continue to happen. Exposed communities slowly adapt their way of life to changes in the surrounding environment such as heavy rainfalls, increased water levels, and longer draught periods. Secondly, 'capacities', or 'adaptive capacities', are used to frame the resources and strengths of any actor to obtain a goal. P. Becker and Hagelsteen (2016, p. 267) divide capacities into 'hard capacities' that include technical and sector-specific resources directly applied to a specific goal, and 'soft capacities' that include social and relational resources. Thirdly, while I have used 'coping' as an expression of

preparedness, some studies investigate indigenous coping strategies when dealing with natural disasters, but almost exclusively in developing countries (e.g. Deen, 2015; Paul & Routray, 2011). These studies conclude that groups with higher socio-economic status are better at coping, although ingenious strategies reduce vulnerability within exposed groups. My decision to focus on preparedness stems from the overall objectives of the HOMERISK project, but also from an aspiration to challenge the analytical frameworks and focal points within preparedness studies to date, that sets the agenda for current risk management policies.

6.5. Future research

While this dissertation has provided a new lens through which to understand the interconnectedness of social, cultural and material resources in household preparedness, it also raises several important questions that call for further research. A central issue is the empirical exploration of a social practice perspective in other risks besides critical infrastructure breakdowns. It would be highly interesting to apply the framework to households living with pollution or varying climate or geographical conditions, such as flood exposed areas, and to households living with technological risks, such as nuclear power plants.

While I have mainly compared experience, location and dwelling characteristics, there are other comparative aspects such as gender, age, education, income and ethnic groups that need to be studied in more detail. For example, are there different preparedness resources in single male and female households? How does income affect the level of material preparedness resources? Does level and type of education, for example technical or non-technical, affect preparedness? Are social networks mobilised in different ways in different ethnic groups? Comparative data from other energy and preparedness discourses would also provide knowledge about the importance of culture in household preparedness. For example, in developing countries, infrastructures are less stable and secure, and are often provided by companies that are untrustworthy (Graham & Thrift, 2007), while in countries such as the US, a different resilience policy is practised than that employed in the

Nordic countries (Kapucu, 2008; Tierney, 2015). What type of preparedness practices are produced in these contexts?

In a Norwegian context, research on the implications of recent changes in the preparedness regime should be devoted attention. Studying whether the preparedness brochure issued by DSB in 2018, mentioned in Chapter 2, has led to lasting changes in the type and level of household preparedness will provide important knowledge on the effectiveness of such information campaigns. As the data in this study was collected in 2015-2017, it offers a pre-intervention starting point for such a study. A recent review of preparedness for power outages also calls for research on the significance of information campaigns to increase preparedness levels (Rubin & Rogers, 2019).

Lastly, future research should aim to establish arenas where the local population and policymakers meet to develop preparedness and crisis management plans that are rooted in a common understanding of the local area. Examples of such arenas are forms of deliberations, forums and workshops intended to ensure the active role of locals in policy processes, as well as identifying their important social, cultural and material preparedness resources.

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Article 1

Methodological approach

Article 2

Preparedness practices

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ORIGINAL ARTICLE

WILEY

Coping with blackouts: A practice theory approach to household preparedness

Nina Heidenstrøm[1,2] | **Linda Kvarnlöf**[3]

[1]Consumption Research Norway, Oslo and Akershus University College, Oslo, Norway

[2]Institute for Sociology and Human Geography, University of Oslo, Oslo, Norway

[3]Department of Social Sciences, Risk and Crisis Research Centre, Mid-Sweden University, Östersund, Sweden

Correspondence
Nina Heidenstrøm, Consumption Research Norway, Oslo and Akershus University College, Oslo, Norway.
Email: nina.heidenstrom@sifo.hioa.no

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The article focuses on how rural households cope with blackouts caused by winter storms. We approach household preparedness using a practice theory perspective, and argue that preparedness is mundanely preformed as part of everyday practices. The data material consists of at home visits to 14 households from Norway and Sweden. The results demonstrate that households cope with blackouts by activating and mobilising competences, meanings and materials belonging to different practices, and that this is an ongoing process to ensure the continuation of everyday life during disruption. The article concludes by arguing for the need to bring forward studies on *informal preparedness activities*, in a research field where household preparedness tends to be framed using a top-down perspective on crisis management.

1 | INTRODUCTION

A dominating trend in crisis management regimes worldwide is to consider individuals and households as important actors in the crisis management system (Levac, Toal-Sullivan, & O'Sullivan, 2012). In the Nordic countries, both policy documents on crisis preparedness and risk communication initiatives increasingly address individual citizens and households (Throne-Holst, Slettemås, Kvarnlöf, & Tomasson, 2015). The concept of *household preparedness* has been launched in both local and global crisis management systems to emphasise household responsibility and capability of reducing risks and carry out coping strategies when they are threatened by a crisis or disaster. However, a large part of the research on household preparedness does not consider the everyday life practices in which these households operate. Instead, pre-established policy definitions of preparedness have formed the starting point for studies of households' abilities to prepare for and manage crises and disasters (e.g., Basolo et al., 2008; Kapucu, 2008; Levac et al., 2012; Siegrist & Gutscher, 2008; Terpstra & Lindell, 2013; Thieken, Petrow, Kreibich, & Merz, 2006). Consequently, these types of studies often conclude that households lack relevant material resources, as well as formal knowledge of crisis preparedness. This top-down approach to household preparedness is heavily biased towards official and policy oriented definitions, and often fails to recognise the performativity of household preparedness.

In order to recognise *informal preparedness activities*, we draw attention to what households actually do when they cope with disruption, particularly emphasising the often taken for granted activities. Thus, this is a study of the manifestations of household preparedness: a study of *how* preparedness was performed.

The article aims to understand how rural households in Norway and Sweden cope with electricity infrastructure breakdowns at home. We understand electricity infrastructure as interwoven networks that form the backdrop of modern living, facilitating the movement of electricity between technologies (Larkin, 2013, p. 328). Even though it requires work from a range of actors to function (Silvast, 2013), very few people actively engage in infrastructure in everyday life (Bowker & Star, 2000; Star, 1999). Electricity is, however, a prerequisite for the workings of many daily practices such as cooking, cleaning, heating, and lighting. It is through these practices that infrastructure can be studied; not as electricity per se, but as an enabler of practices (Pink & Mackley, 2012; Shove & Walker, 2014).

Although society's reliance on electricity infrastructure dates back to the early 20th century (Nye, 2010), the increasing complexity of the infrastructure and interdependencies with other infrastructures such as Information and Communication Technology (ICT) (Höst, Nieminen Kristofersson, Petersen, & Tehler, 2010; Kjølle, Utne, & Gjerde, 2012) makes it more vulnerable (Boin & McConnell, 2007; Byrd & Matthewman, 2014; Perrow, 2011). Even though blackouts have been rare, they might occur more often and for

longer periods of time in the future as a result of terrorism or natural disasters caused by climate change (IPCC, 2012). The more interwoven and complex these enabling infrastructures become, the more difficult it will be to prepare for blackouts. Accordingly, providing knowledge on how different actors understand and manage them will be important in future preparedness work (Howe et al., 2016).

Employing qualitative walk along interviews, we suggest turning focus away from what we understand as a "traditional preparedness regime," towards an "everyday life perspective" acknowledging the importance of social, human, and material resources intertwined in the daily activities of households. We use social practice theory to illuminate the ways in which preparedness is part of the many practices households perform daily. By separately exploring the elements that constitute a practice; meanings (our engagements and beliefs), materials (products, technologies), and competences (embodied skills, knowledge), we identify important but often unspoken aspects of how households cope with extensive blackouts. By further exploring the interplay between these elements, we gain a deeper understanding of their type and level of preparedness; to what degree households are able to absorb disruption while still carrying on with their daily lives (Trentmann, 2009). Here, households are understood not as mere recipients of support during blackouts, but as active agents that work through an event by activating and mobilising competences and materials, and construct and reconstruct meanings about blackouts.

2 | PREVIOUS RESEARCH

2.1 | Household preparedness

The research literature in this field addresses preparedness in a very broad sense, and is concerned with all types of emergencies and disasters: from domestic fires and hurricanes to terrorist attacks and natural disasters (Kapucu, 2008; Levac et al., 2012). Even though Perry and Lindell (2003) argue that emergency and crisis preparedness (at any level) should be understood as a dynamic rather than a static process depending on the social and cultural context, a large part of the literature still uses formal definitions of household preparedness (Baker, 2011; Basolo et al., 2008; Kapucu, 2008; Lemyre, Lee, Turner, & Krewski, 2007; Levac et al., 2012; Sutton & Tierney, 2006; Terpstra & Lindell, 2013), that are both normative and top-down oriented. Although pre-established definitions are needed to constitute and carry out crisis management plans at a policy level, they also lead to studies merely emphasising the need for emergency management actors to train, educate, and inform households in formalised preparedness actions (Baker, 2011; Kapucu, 2008). In Kohn et al. (2012), disaster preparedness knowledge is defined as the degree to which families have an "emergency plan," and if they own the contents of a "preparedness kit."

A trend in studies on household preparedness is to apply formal definitions of preparedness in questionnaires addressed to individuals, in order to examine the amount of emergency supplies at hand, where subsequently the results are described as levels of household preparedness. However, and as other studies have pointed out (e.g., Paek, Hilyard, Freimuth, Barge, & Mindlin, 2010; Perry & Lindell, 2003), household preparedness cannot be determined exclusively by the amount of emergency supplies at home. Such studies are unable to grasp whether households have acquired these items purposely for managing emergencies, or for other reasons, or if in fact the items listed in these questionnaires are the most important preparedness products for a family, or if they are actually used during an emergency. Contrary to the field of consumer research that focuses on the *usage* of products and services in households, household preparedness studies seldom take into account the implementation of preparedness.

In later years, research has begun analysing the complexity of household preparedness, particularly by assessing the significance of social capital for community resilience. Networks, family, neighbourhood, and local community have been identified as important resources in strengthening household preparedness (Brunie, 2010; Diekman, Kearney, O'Neil, & Mack, 2007; Kim & Kang, 2010; Paton & Johnston, 2001; Rooney & White, 2007). Although this research has increased massively during the last ten years, *how* households prepare for and manage crises has not been sufficiently elaborated theoretically or empirically (Donahue, Eckel, & Wilson, 2014; Rademacher, 2013). According to Diekman et al. (2007, p. 495), the field lacks an understanding of the role of individual households, and how these households themselves recognise and experience preparedness (see also Hawkes & Rowe, 2008; Henwood, Pidgeon, Parkhill, & Simmons, 2011).

2.2 | Households' role during blackouts

There are a few studies dedicated to understanding how a society copes without electricity, most of them conducted in North America, addressing the 2003 blackout in New York (e.g., Beatty, Phelps, Rohner, & Weisfuse, 2006; Bennett, 2005; Goodman, 2005; Nye, 2010; Scanlon, 2003). In his book *Disrupted Cities*, Graham (2010, p. 3) emphasises the importance of studying blackouts:

> *Studying moments when infrastructures cease to work as they normally do is perhaps the most powerful way of really penetrating and problematising those very normalities of flow and circulation to an extent where they can be subjected to critical scrutiny.*

Similarly, Nye (2010) argues that these ruptures enable an alternative viewpoint of the social construction of modern society, highly dependent on a web of infrastructures to work. Rinkinen (2013) makes use of these insights to examine whether Finnish households' heating habits have the potential to change in a more sustainable direction after a blackout. Her study finds that heating practices were rearranged, but sustained during the outage. While Rinkinen uses blackouts to examine whether practices can become more sustainable after experiencing everyday life without electricity, we aim at using blackouts to explore in what ways everyday practices such

as heating, food storing, cooking, and lighting can be part of household preparedness.

Blackouts have seldom been addressed within the household preparedness and crisis management literature, with a few exceptions. Palm (2009) points to the unclear role and responsibility of households during outages. While both the government and electricity companies expect households to be prepared, households do not believe themselves to be responsible. In his study of the storm Gudrun in Sweden, Guldåker (2009) finds that households actually accounted for large parts of the crisis management, but they represented different resources than the professional managers (see also Helsloot & Beerens, 2009). This indicates that preparedness must be understood based on how it is perceived by different actors.

Silvast (2017) has studied how Finnish households understand blackouts in a crisis context, and finds that they are framed as normal events that are manageable as long as they do not cause everyday life to stop. Ghanem, Mander, and Gough (2016) follow this line of inquiry, seeking to understand the resilience of UK households for blackouts. The authors show how resilience can be achieved through modifying everyday electricity-related practices. In risk and crisis literature (e.g., Ainuddin & Routray, 2012; Benadusi, 2014; Ferdinand, O'Brien, O'Keefe, & Jayawickrama, 2012; Joerin, Shaw, Takeuchi, & Krishnamurthy, 2012), resilience is often used to refer to the abilities or features where individuals, households, or communities are being described as either being or not being resilient in terms of *recovering from*, rather than coping with, a crisis or disaster (for a critical discussion on the concept of resilience see for example Bergström (2016) and Olofsson, Giritli Nygren, and Öhman (2016)). More so, as resilience has its origin in policy documents on crisis management, making it part of the top-down notion of crisis management, we find it hard to apply the concept when approaching crisis preparedness from a household perspective. Instead of understanding preparedness through resilience, we apply a bottom-up approach trying to grasp how households themselves perform preparedness.

3 | A PRACTICE THEORETICAL LENS

In order to go beyond the traditional top-down preparedness approach, and to emphasise the work households do during a blackout, we draw on the theoretical concept of practice (Bourdieu, 1977; Giddens, 1984). Practice theory is not one unified theory, rather it is a range of efforts to bring out the taken for granted doings of ordinary people in everyday life. Schatzki (1996, p. 89) phrase it as "a temporally unfolding and spatially dispersed nexus of doing and sayings." Practice theories thus differ from sociological approaches focusing on normative structures, as well as from economic theories focusing on single actions by rational individuals (Reckwitz, 2002). It gained increasing relevance as a counterweight to the extensive focus on identity construction and symbolic consumption among specific groups in the 1990's, by instead emphasising the habits and routinised actions of the majority. As a cultural theory focusing on symbolic knowledge structures, practice theory has its analytical starting point in the practice, defined by Reckwitz (2002, p. 249):

> *A "practice" (Praktik) is a routinized type of behavior which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, "things" and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge.*

Here, practice is understood as a package of the mundane activities inscribed in our bodies (e.g., heating the home), the materials that are connected to these (e.g., wood stoves, panel ovens, kerosene burners), motivations of individuals in these activities (e.g., sustainability, economy, comfort), and formal and informal knowledge (instructions, manuals, and how to light a fire) (Shove, Pantzar, & Watson, 2012). In line with Shove et al. (2012, pp. 22–23), we understand practice as an entity of three elements. *Competences* are culturally shared understandings of skills to perform a practice that include practical consciousness, know-how, bodily skills, and background knowledge. *Meanings* are the social and symbolic significance of participating in a practice, and include our mental capacities, emotions, motivations, beliefs, and engagements. *Materials* are things that belong to a practice such as objects, infrastructures, technologies, tools, products, and the body.

This toolbox allows us to focus on social and material aspects of everyday life. Practice theory shifts focus from individuals to packages of doings and sayings that exists beyond the individual. Individuals are seen as practitioners that are performing the practices, and they are also able to change or redefine them (Shove et al., 2012). A practice is never a unit separated from other practices, it is always intertwined, and its elements are included in many different practices that are part of a larger context in which they are performed (the skill of lighting a fire on a stove at home is also used for a camp fire) (Warde, 2005). Our aim here is therefore not to define units of practice, for example, what a "preparedness practice" could be, rather it is to say that preparedness is interwoven in many of the practices that households perform, and that they are reorganised when households face blackouts. This means that instead of counting emergency supplies at home, we argue that *household preparedness is something that is mundanely performed as part of already existing practices.*

When a blackout occurs, everyday life is interrupted, but it does not stop. Trentmann (2009) argues that there is a built-in elasticity of everyday life that absorbs these disruptions, and that by looking at this elasticity of how practices change or stay the same, it is possible to identify the vulnerability or robustness of households. Blackouts might be utilised for getting information on what a household requires to function, and what it can do without (Wallenborn & Wilhite, 2014); a "moment of reflexivity," both for household preparedness research and for households themselves. The practice theory approach recognises tiny pieces of work done by households, and sheds light on two aspects of household preparedness: (i) the

ordinary activities and resources of families in everyday life that are implicitly a part of their preparedness for blackouts, and (ii) how these activities and resources come into play when families need to cope with a blackout.

4 | CASE: WINTER STORMS IN RURAL NORWAY AND SWEDEN

The study is based on fieldwork in Norwegian and Swedish rural areas, where households have experienced long-term breakdowns in the electricity infrastructure. We treat the data material as one case because of the similarities between the two countries' energy regimes (mainly electricity for household consumption, part of the same electricity market Nord Pool) (Statens Energimyndighet, 2013; Statistics Norway, 2014), geography (long and cold winter seasons during which winter storms that causes blackouts tend to occur), and crisis management and preparedness regimes (citizens are expected to be prepared) (Cornia, Dressel, & Pfeil, 2014; Throne-Holst et al., 2015).

In December 2011, the hurricane Dagmar hit the coast of Western Norway. It was a so-called "thousand-year storm" that reached far into the country and caused massive tree falls over the power lines. 1.3 million citizens lost their electricity supply, 14.000 for more than 48 hrs. The hurricane also took out 475 base stations. In January 2014, the inhabitants of a small village in Western Norway experienced another extensive blackout during a house fire that spread rapidly due to a winter storm and a dry winter season with little snow. Fourty-two buildings burnt down, including the base stations for electricity-, and ICT-supply. The fire damaged the main power line, causing a three-day power outage.

In December 2013, the hurricane Ivar caused a blackout for 60.000 citizens in the north of Sweden due to extensive tree falls. While the majority of the affected households got their electricity back within 24 hrs, over 1,000 households were without electricity for more than 5 days. Similar to Dagmar in both strength and extent of damage, Ivar took out critical infrastructure including roads, trains, electricity, and telecommunication. After the storm there were persistent problems with electricity, ICT, heating, and drinking water supply.

5 | METHOD: WALK ALONG INTERVIEWS AT HOME

Grasping the informal preparedness activities that took place during these blackouts, and that we argue is part of households' everyday practices, requires digging. Most of the households in this study were rather unengaged in infrastructure, energy consumption, and blackouts. Rather, electricity is seen as an enabler of various tasks, something that is always supposed to be there, and if not someone else will take responsibility for fixing it. Thus, it was not obvious to them why researchers would be interested in how they heated their home without electricity. The second challenge in this study is that it is rarely possible to study a blackout as it takes place. Retrospective interviews consist of *re-enactments*, stories of how a blackout was handled, rather than enactments, the actual handling that took place and that can only be studied by observing a household during a blackout.

We meet these challenges by applying several methodological strategies. First, we are in line with Hitchings (2012) who argues that it is possible to study practices using language-based methods if sufficient time is used to explain the type of knowledge relevant and why. *Practice-based talk* means formulating questions of performativity (e.g., what did you do, what did you use, who were you with) that opens up and give space to these stories. The household interviews were unstructured in the way that it followed the storylines of the interviewees, and at the same time contained questions that were directed towards *how* a task was performed (e.g., how were you able to light up a room without electricity?). However, language-based methods have limitations. We are unable to observe the bodily performance of these practices, making it challenging to grasp the work that households did to cope with the blackout (e.g., whether or not a family found it difficult to light a fire, how often they actually opened the freezer, or how meals were prepared without electricity). These are important aspects of household preparedness, hence we further employed two strategies for enabling households to articulate this work.

The walking and talking interview is a methodological strategy for demonstrating the performance of practices during an interview situation, so-called "walk along" (Carpiano, 2009; Kusenbach, 2003; Pink, 2007). This means to walk together with the interviewees where the practice under study is performed, connecting the articulation of the practice to the physical environment. For our study, this meant walking with them in their homes when they showed us what worked and not during the blackout (e.g., a radio), how they used which alternative technologies (e.g., generators, candles, wood stoves), how they employed social networks (e.g., walked over to neighbours, friends) how they used existing knowledge (e.g., using gas burners, knowing the local infrastructure), and how this changed their normal activities (e.g., longer time to heat, cook, spending time reading instead of watching TV or using the Internet).

Photographs of materiality (such as heating technologies, food storage strategies, alternative lighting, radios, flashlights etc. and the placement of these) on the walking and talking tours served two purposes. First, the pictures are used as research material together with transcripts in the analysis as well as in the overall dissemination of the project. Second, and perhaps even more important, the photographing was significant in itself. Taking time to show objects, sites, and explain movements slowed down the tour, and triggered storytelling rather than brief answers to predefined questions.

The data material consists of 14 interviews as described in Table 1, conducted between March and September 2015. In Sweden, the research team used their social network to recruit a primary contact who recruited household 10–14. In Norway, the research team was put in contact with a municipality employee that became a key informant. She directly recruited household 1–3, and through

TABLE 1 Data material

Identification	Household characteristics	Interview context
Household 1, Norway	**Woman (55)**[a], Man (55), two adult sons (not living at home) living in a detached house.	At home interview including a walk along photograph tour. 2 hrs, 15 min recording, 10 photographs.
Household 2, Norway	**Woman (48), Man (52), Daughter (17), Son (25)** living in a detached house.	At home interview including a walk along photograph tour. 1 hr, 41 min recording, 14 photographs.
Household 3, Norway	**Woman (52), Man (52),** two teenage sons living in a detached house.	At home interview including a walk along photograph tour. 2 hrs, 48 min recording, 25 photographs.
Household 4, Norway	**Man (45), Woman (unknown age),** son (10), new-born daughter living on a farm.	At home interview including a walk along photograph tour. 2 hrs, 5 min recording, 76 photographs.
Household 5, Norway	**Man (69), Woman (66), son (30)** living in a detached house.	At home interview including a walk along photograph tour. 1 hr, 13 min recording, 14 photographs.
Household 6, Norway	**Man (84),** Woman (82) living in a detached house.	At home interview including a walk along photograph tour. 1 hr, 47 min recording, 24 photographs.
Household 7, Norway	**Man (72),** Woman (73) living in a detached house.	At home interview. 1 hr, 14 min recording.
Household 8, Norway	**Woman (17), Woman (17)** from household 2 who is her friend were interviewed together.	Interview in the home of household 2. Second visit. 1 hr, 20 min recording.
Household 9, Norway	**Man (72),** Woman (70) living in a detached house.	At home interview including a walk along photograph tour. 1 hr, 45 min recording, 23 photographs.
Household 10, Sweden	**Woman (52), Man (49), Son (13)** living in a detached house.	At home interview including a walk along photograph tour. 1 hr, 16 min recording, 5 photographs.
Household 11, Sweden	**Man (55), Woman (54),** Daughter (20), living in a detached house.	At home interview including a walk along photograph tour. 45 min recording, 5 photographs
Household 12, Sweden	**Man (49), Woman (35),** Daughter (teenager), Son (teenager), living in a detached house. Woman and children lives part-time in the house.	At home interview. 45 min recording.
Household 13, Sweden	**Man (55),** Woman (54), living in a detached house.	At home interview. 1 hr, 45 min recording.
Household 14, Sweden	**Woman (53),** living in a detached house.	At home interview including a walk along photograph tour. 1 hr, 50 min recording, 7 photographs.

[a]Interviewees in bold.

her and two other interviewees extended network, household 4–9 were recruited. All were affected by one or more of the winter storms. When referred to, interviewees are identified by household unit, gender (F/M), and age. The Norwegian Centre for Research Data has approved the data collection, and all participants signed a written consent after the interview containing a separate section for consenting to use of photographs. All interviews were fully transcribed.

HyperResearch was used as a tool to assemble the analysis. The interviews were coded in a three-step process. In step one, inductive codes were generated based on words and concepts used by the interviewees. In step two, these codes were grouped according to the project's research questions, resulting in 23 categories including "infrastructure," "knowledge," and "social networks." In the final step, the three elements from practice theory were used to identify the aspects of informal household preparedness activities as presented in the analysis below.

6 | INFORMAL PREPAREDNESS

In the following sections, we seek to illuminate the *informal preparedness activities* that households took part in during blackouts, and how these were shaped by households pre-existing preparedness, as well as how they shape future preparedness. Consistent with the aim of practice theory, we focus on the seemingly obvious and taken for granted parts of household preparedness, and attempt to argue why and how they matter. We directly apply the three elements from practice theory: competence, meaning, and material, and their interconnectedness to bring out the essential substance of informal preparedness activities in households.

7 | EMBODIED BLACKOUT COMPETENCE

In their extensive review of the preparedness literature, Kohn et al. (2012, p. 228) find that previous experience is an important factor for a high level of preparedness. However, what experience consists of and how it takes effect in a new crisis has rarely been studied (Levac et al., 2012). We find that previous experience with blackouts is a tacit form of knowledge embodied in peoples' day-to-day lives that can be activated during disruption. An interviewee who talked about blackouts in his childhood phrased it as follows:

> *From the old days, we lost the electricity a lot here. Because in the old days the power line stretched to*

> *Årdal [a near-by village] and it was often damaged by rockslides. When I was a kid here, it got dark all the time, one or two days and then the electricity returned. Then we had the oil lamps over here, and a primus for cooking. Two of the oil lamps are still here. We don't have oil on them now, but this is the kind of thing we are used to from when we were kids (. . .). So, this is in fact an old thing, it lies within us from that time (H9, M72, Norway).*

His past experiences induced knowledge and awareness of how the local infrastructure works; where the power line runs, that it at one time was vulnerable for rockslides, and how long a blackout would normally last. Furthermore, the competence generated by these experiences is linked to material resources; oil lamps and a primus that the family knew would be necessary for managing future blackouts. Living with the possibility of blackouts has resulted in an unconscious capacity to deal with them (see also Silvast & Virtanen, 2014 that compare households to electricity companies, arguing that tacit knowledge take exclusive priority for households' managing blackouts). The households activated and thus utilised their competence when a new event occurred, like this family explained:

> *We always do it like this when we lose electricity, because we have experienced that quite a few times over the past couple of years. Then, we always do this: Don't open the fridge, don't open the large freezer. We don't have to open that at all. And be careful with the fridge and the small freezer. Then the food might last. And close all doors, we usually do that right away. And of course light candles and battery candles. And the fireplace (H3, F52, Norway).*

Without electricity, the family initiated their capability to deal with the blackout and worked towards making daily life continue. There is an adaptation of the practices (storing food, eating, lighting, and heating) that are usually performed with electricity infrastructure. Without it, they continue, although in a slightly different way through employing the competences from previous experiences and the materials acquired as a result of them, as well as those at hand in the household.

Practices are always performed by practitioners belonging to a specific historical and geographical context (Shove et al., 2012). Both the above quotes indicate that the knowledge households employ during a blackout is a place specific "localised practice.". This finding is observed in both Norwegian and Swedish rural areas, as this interviewee talked about:

> *I am from a small town way into the forest that often experienced electricity breakdowns. It is on the end of the power line, and that caused many breakdowns. So I don't worry when I lose my electricity supply. And if you see that the lights start blinking, you just fill the bathtub and buckets with water. We always do that when we suspect a blackout (H4, M55, Sweden).*

Knowledge of the local infrastructural system, as well as the potential consequences for end users, played a significant role in households' handling of its disruptions, and is considered part of the material knowledge of place. However, knowing place also include social knowledge, as an interviewee exemplified:

> *It wasn't a problem. Everyone in this village is so helpful if something were to happen. They know you, right, so you can go home with groceries from the store and pay for it the next day. (. . .) It's not difficult, everyone knows everyone (H2, F48, Norway).*

It seems to be a rather strong storyline in the rural households that they experience themselves as more able to cope by having a different sense of place both materially (geographical knowledge, knowledge of infrastructure locations, roads, tunnels, meeting places etc.) and socially (knowing neighbours, where people live, whether other villagers are at home, who has many and few resources to cope etc.), than urban dwellers (Guldåker, 2009, p. 284; Silvast, 2013, p. 155 briefly touches upon these differences). These possible differences between rural and urban household preparedness will be addressed as a next step in the project.

7.1 | Elements from leisure activities are used to deal with blackouts

A similar embodied blackout competence like that of previous experience and place, can also be found in other practices that contain many of the elements that are used to manage blackouts. Cabin life and leisure activities were key practices from which households activated competences when they dealt with blackouts. The existing practices households take part in during outdoor activities (lighting a fire, using candles, and flashlights, cooking with gas, sparse water use etc.) became significant in a new context when electricity dependent technology no longer worked. In Sweden and Norway, cabins have traditionally been basic cottages without electricity and water supply. Even though this has changed during the past two decades, many households had experienced basic cabin life:

> *It's not a problem for us. We spend a lot of time in the woods and in nature and have a lot of stuff. We have a cabin in the middle of the forest, so we have a lot of resources. Even though we don't think about it, we have all that stuff (H1, M49, Sweden).*

> *We used the camping stove [for cooking]. We are used to that, we spend a lot of time hunting and being outdoors. So we managed just fine. For a day or two (H7, M72, Norway).*

During blackouts, households in both Sweden and Norway also used material resources from leisure activities. They had gas burners, camping stoves, flashlights, headlamps, and candles stored at home which they normally brought with them on camping, hiking, or hunting trips or to their cabins. These resources were activated because households knew how to use them, how to cook with a gas burner, and how to light a wood stove. Competences and materials from other practices that are performed at different times (vacation or leisure time, not everyday life) and in other places (cabin or outdoor, not in the home) were given significance in a new context when the electricity disappeared. Having experienced cabin life also contributed to normalising blackouts.

8 | NORMALISING BLACKOUTS

The embodiment of a localised "blackout competence" contributes to normalising future blackouts. Normalisation is part of households' meanings about them, in practice theory defined as the emotions, motivations, and symbolic significance for the practitioner of participating in a practice (e.g., the importance of feeling safe, independent, well-prepared) (Shove et al., 2012, p. 23). By being able to adapt everyday practices instead of breaking them, households did not consider blackouts as dangerous or risky: "(. . .) so then we lost the electricity, and that was no surprise. We were almost certain that it would disappear for a few hours when the weather was bad" (H7, M72, Norway). They have become part of a range of events that might occur, but that households are capable of handling within the normality of everyday living: "In our household, we *of course* lit a fire in the fireplace over there in the living room to keep us warm, and then there were *ordinary* candles that we used" (H6, M84, Norway, emphasis added). These competences and materials are totally taken for granted, as the wording "of course" in many stories indicate, they are interwoven parts of everyday life.

8.1 | Cosiness as a normalisation strategy

Many of the households even framed blackouts as a cosy or pleasant experience. This might serve as a coping strategy for dealing with them, to make them less intimidating and dangerous. One interviewee said that:

> *There was peace and quiet. It was completely quiet. And we had water. And we had a woodstove. So we kept the fire burning and it was really warm and cosy at home. And we played games in the evening. Lighted some candles and played cards. And went to bed a little earlier at night. It was a good couple of days. Even if we play games often, we did it more now. And you can read with a flashlight as well. And you could hear the clock. Tick-tack, tick-tack. It was nice. No sounds from the fan or from the fridge. It was all quiet (H4, M56, Sweden).*

The experience is made pleasant rather than intimidating, and in this work, they draw upon both material and social resources. Candles are used both in everyday life and during blackouts as a means for light and for cosiness, and are a part of how households adapt to and normalise loss of infrastructure. Like the majority of the interviews, the quotes above also have in common that the situation is shared with others, many times family. In some cases, the blackout made families come together, doing things that they not normally do as often, activating social resources: "We played a lot of cards. We do it on other occasions as well but not as often as we did before" (H4, M56, Sweden). Everyday life rhythm changes and the blackout are considered an opportunity to engage in more time consuming practices, but the habits are adapted within the frame of normal everyday living.

However, the normalisation of blackouts is dependent on households' ability to manage without electricity through their competence. Furthermore, their acceptance of blackouts is determined by *predictability;* knowing how long it might last and why it had occurred, *safety;* not being alone, or knowing the whereabouts and safety of family and friends, and *vulnerability;* not being responsible for disabled or elderly people, young children or farm animals. Even though many of the stories frame blackouts as unproblematic and even pointless to talk about, this meaning only occur when they are capable of managing the event. A blackout was thus considered acceptable if households were able to manage them, have information about their durance and feel safe (see also Silvast, 2017).

9 | MOBILISING MATERIALS

So far, we have illustrated that an embodied and place specific blackout competence was used to cope with blackouts, and that this in turn contributed to normalising them. We find that the materiality of preparedness is equally unspoken and taken for granted, and that even though households do not buy preparedness objects or create a family emergency plan, they might be rather well-prepared anyway. The bits and pieces of material preparedness for blackouts were integrated in everyday practices (Rinkinen, 2013 calls them "backup systems"). These are resources that households do not necessarily think of as "preparedness items", or even think of at all, like when this household was asked about being prepared:

> *Candles, yes. Flashlights, yes. Water as well. And we also have a first aid kit. No radio that runs on batteries and no alternative mobile charger. We have extra electricity and heat, we have that. And sleeping bags and warm clothes. For hygiene, we have wet wipes. And a camping stove. We have enough food to get by. We don't have a lot of cash, however. But none of these things have been acquired in case of an electricity breakdown (H2, M55, Sweden).*

Some materials become visible when a blackout occur; when they are needed, they are given a new meaning and put into new practices to function in new ways. After having experienced a blackout, these objects become visible as tools for managing without electricity, and become part of the household preparedness capacity. However, new links between materials and competence are not always created. The resources might in fact be inactive during a blackout, even though they are available (Rademacher, 2013), as this household realised:

> *We thought that we couldn't use the barbeque because of the wind outside. But now, a few years later, I've thought that we could just have moved it inside and used it there. Of course. We did not think about that back then. It's just gas, and it creates heat as well (H3, F52, Norway).*

Material preparedness is dependent on the householders' competence in order for them to be activated, and illustrates the importance of acknowledging the interconnectedness between the elements (competence, meaning, and material) of informal preparedness activities. Being prepared thus also entails being able to use the material objects at hand. The quote also demonstrates that formal knowledge plays a significant part in household preparedness, as using gas burners indoors is potentially dangerous. Information about the use of available materials is thus needed to mobilise them correctly.

Previous experience with blackouts affects materials as well as competences. Changes in the material component of being prepared occurred as a consequence of feeling unable to cope during previous blackouts, when everyday activities became difficult to carry out. A Norwegian household discussed the importance of knowing where stuff is:

> *F52: When we go down to the basement, we can just grab them and we have the headlamps there as well. We became conscious of if after Dagmar, that we need those headlamps available.*
>
> *M52: We have a fixed spot for camping lights on the top of the fuse box, and a fixed spot for the headlamps.*
>
> *F52: We have been very conscious about it, told it to the kids as well. And we have a radio with batteries. I have never thought about that as important before (H3).*

This is a way of mobilising materials for blackouts, to make them ready for another event. After the hurricane Dagmar, this household became alert to the importance of headlights and a battery radio, and activated them by giving them fixed places at home. It requires competence and creativity to identify, utilise, and acquire materials, and to incorporate them into everyday life, making materials prepared. Figure 1 shows a way of mobilising materials. The family used their hallway bureau as a preparedness central, keeping matches, headlights, flashlights etc. ready in case of an emergency.

10 | DISCUSSION AND CONCLUSION: THE INTERCONNECTEDNESS OF HOUSEHOLD PREPAREDNESS

In this article, we have argued that household preparedness tends to be framed using a top-down and formalised perspective on what preparedness is, and should be. We recognise the recent attention turned towards social capital as being an important asset for dealing with emergencies or crises, but suggests broadening the perspective and including not only social aspects such as community and

FIGURE 1 Mobilising materials. Photographs taken by the authors [Colour figure can be viewed at wileyonlinelibrary.com]

networks, but also their interconnectedness with human and material aspects in an everyday life perspective. In order to understand what we characterise as *informal preparedness activities*, we have introduced a practice theory approach that has allowed us to empirically illustrate some of the taken for granted doings in rural households in Norway and Sweden during a blackout. The three core elements of a practice, competence, meaning, and material, have been used to distinguish the practices in which preparedness is part, how their elements connect with other practices, and how they are performed during a blackout.

We found that previous experience with blackouts contributed to normalising them, even making them enjoyable, if they were perceived as manageable. The blackout competence also produced an awareness of materials that could be activated and mobilised for future events. This "moment of reflexivity" during and after a blackout made the performance of informal preparedness visible, which in turn has the potential of changing the practices that are part of household preparedness. Coping with blackouts may cause the elements interwoven in informal preparedness activities to shift, or to be rearranged in new ways to deal with future events. The ability to reorganise, stretch, and change the rhythm of interconnected electricity dependent practices during disruption is an indicator of the level of preparedness (Trentmann, 2009).

Using practice theory to unravel the mechanisms at play during disruption has illuminated the implicitness of household preparedness. Practice theory implies the study of a practice. However, we find that preparedness is not a coherent practice; rather preparedness consists of elements (materials, competences, and meanings) that are parts of other practices. Preparedness is as such not a static asset of a household, and we suggest understanding it as *an interwoven ongoing process within the performance of everyday practices*.

Whilst the findings of this study points to the significance of informal preparedness, there were some important limitations. The qualitative approach offers in-depth understandings of informal preparedness activities in these households during winter storms, but is based on a small sample size. Hence, the findings cannot be generalised to the broader community from this study alone. The study is restricted to households in Norway and Sweden, and the preparedness activities discussed are influenced by the political, social, and geographical climate in these countries. Furthermore, the study only consists of rural households. It is likely that urban households differ in their preparedness activities, and there is a need for further research to explore a larger variety of informal preparedness activities.

Even though this article paid attention to informal preparedness activities, we do not suggest abolishing formal preparedness actions. We would strongly argue for knowledge transfer between practitioners, policy-makers, and researchers within the crisis management and preparedness field, as well as lay people to grasp the complexity of preparedness. There is a need to incorporate households as competent actors in managing blackouts through their everyday practices, and not merely address them as recipients of information and support. This entails recognising lay knowledge as important in policy development at all levels, rejecting the distinction between objective and subjective knowledge, for example through deliberative processes (Klinke & Renn, 2002). Likewise, guidance, education, and information from authorities and professionals are needed to advance household preparedness, not least for safety issues. It is, however, imperative that these actions are rooted in the embedded preparedness activities already at hand in households, and this study makes an important contribution to acknowledging the complexity of household preparedness as a dynamic process implicit in everyday life.

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Article 3

Embodied competences

Embodied competences in preparedness for blackouts: Mixed methods insights from rural and urban Norwegian households

Corresponding author:
Nina Heidenstrøm
Email: ninah@oslomet.no
Telephone: 0047 67 23 56 29

Affiliation 1: Consumption Research Norway (SIFO), OsloMet - Oslo Metropolitan University. Stensberggata 26, 0130 Oslo, Norway.

Affiliation 2: University of Oslo, Department of Sociology and Human Geography. Moltke Moes vei 31, 0851 Oslo, Norway.

Co-author:
Anders Rhiger Hansen
Email: arh@sbi.aau.dk
Telephone: 0045 6167 2860

Affiliation: Danish Building Research Institute, Aalborg University. A.C. Meyers Vænge 15A, 2450 Copenhagen, Denmark.

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Abstract

As part of governmental risk management policies, households are advised to be aware of local preparedness plans, make a family emergency plan and kit, and stock supplies to increase their level of preparedness. But the sole focus on this 'formal preparedness competence' fails to consider the 'embodied preparedness competence' that comes into play during a blackout. Drawing on 25 in-depth interviews in Norwegian households and a representative web survey (N=1,005), this article considers how an embodied competence shape household preparedness for extensive electricity and ICT infrastructure breakdowns. Informed by social practice theory, we define embodied competences as practical knowledge of how to act, and demonstrate the importance of three constituents: (i) previous experience with blackouts or having lived with restricted access to electricity or ICT; (ii) local geographical knowledge of climate and weather conditions and the built environment; and, (iii) mobilising social networks. The analysis shows that the formal preparedness competence was low, while the three constituents of the embodied competence were found to be significant preparedness resources. However, these varied between and within households, and most notably rural households had more experience with blackouts, more extensive social networks and were more engaged in their geographical surroundings than urban households. Our analysis provides important insights for policy in demonstrating that households should be recognized as resourceful through their everyday practices rather than by the level of implementation of formal preparedness resources.

Keywords: Blackouts, critical infrastructure, social practice theory, mixed methods, embodied competences

1. Introduction

In modern society, everyday life is increasingly sustained by complex systems of infrastructures stretched across large geographical areas. Electricity powers a range of technologies in our homes that give us heat and cold, light, enables us to use our TVs, computers, mobile phones,

and connects us to the internet. These interconnected infrastructures exist at the backdrop of our lives and we seldom reflect on them, even though they are imperative for modern society to function [1-3]. According to the IPCC [4], the frequency of extensive infrastructure breakdowns will increase in the future as a result of more extreme weather conditions caused by climate change. In 2018, IPCC warned about the consequences of a rising temperature, which included a higher occurrence of storms, floods and fires that can damage critical infrastructure. Moreover, an increasingly complex and interwoven infrastructure system is more vulnerable to long-term breakdowns [6-8].

In most OECD-countries, citizens are now expected to be part of the preparedness for such breakdowns, echoed in the growing popularity of concepts such as 'societal resilience' and 'community resilience' in global, national, and local risk management policies [9-11]. Within this discourse, preparedness 'provides a way of understanding and intervening in an uncertain, potentially catastrophic future [12]. According to the Federal Emergency Management Agency (FEMA), this intervention consists of 'a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action to ensure effective coordination during incident response'. In Norway, a 'total defence' concept aims to include citizens in such strategies, and in 2018 all households received the brochure 'You are part of Norway's emergency preparedness' [13]. Despite the increased use of a discourse that positions citizens as active participants to increase societal resilience, little is known about what social, cultural, and material resources they have and can mobilise during blackouts. This is particularly the case for the Nordic countries, as most existing studies examine coping strategies in developing countries, and high-risk areas [14-16].

There has generally been a lack of in-depth studies of individual and household preparedness, most likely as a result of how the concept has been conceptualised and operationalised in empirical studies. Literature reviews have indicated that there is no uniform definition of household preparedness [eg. 17, 18-20], and according to Kirschenbaum [21] and

Staupe-Delgado and Kruke [22], preparedness lacks a theoretically informed conceptualisation. Currently, preparedness is used interchangeably with other phrases such as readiness, contingency management and planning. The concept of preparedness has a political origin and is used to organise the plans and exercises set in place to manage potentially catastrophic events that cannot be predicted [12]. It gives policy a way to be ready for the unknown by building a framework of readiness. Many empirical studies of preparedness use a definition produced in policy documents either by national authorities such as FEMA or global organisations such as the Red Cross and examine to which extent preparedness is present within a population and what hinders this preparedness. According to Kirschenbaum [21], this is a form of bureaucratic pragmatism. Household preparedness is understood as 'an active state of readiness' by having implemented many of the same measures that are suggested for authorities, organisations, or companies. Such an operationalisation has to a large degree excluded the social, cultural, and material resources that are not directly linked to planning activities [this argument has also been explored by e.g. 23, 24-26].

We have labelled this paradigm 'formal preparedness'. In contrast, the article aims to empirically explore 'informal preparedness', which is inspired by theories of social practice [27, 28], and entails the ability to mobilise competences and materials from everyday practices as preparedness resources. While there is a large body of research devoted to how practice theory can be used to identify more or less sustainable energy consumption patterns [e.g. 29, 30-34], only a few studies have investigated how households in developed countries perform energy-dependent practices without energy [14, 35-39]. We use blackouts to explore how the embodied competences of practitioners, acquired throughout a life course and formed by material surroundings and social relations, influence preparedness.

The social practice perspective centres everyday practices as a pivotal context where people engage with infrastructure. Many of these practices take place within the household, here defined as a socio-material unit of interlinked practices. Consequently, the household is

an interlinkage between people and houses, and differences in family composition and the material characteristics of the house affect how everyday practices are performed [40]. We are interested in understanding what resources household members draw on to deal with blackouts within this context. Trentmann [41] calls it the elasticity of practices; how much can we adapt a practice before it breaks? Small details of everyday life like how to cook a meal without electricity, recognize the wind direction that might lead to tree falls and damage the power lines, or knowing from whom you can borrow a power generator, matter enormously to understand preparedness. Given the recent turn towards active citizen participation in societal resilience, a stronger focus on how everyday life is organised and performed is needed to fully understand household preparedness. The article therefore asks the following research questions: (i) in what ways are embodied competences part of household preparedness? and, (ii) how do these competences differ between and within households?

We explore preparedness through a mixed methods study of Norwegian rural and urban households' preparedness for and coping strategies during extensive blackouts, which involved in-depth interviews with 25 households followed by a representative web survey (N=1005). The next section elaborates on the categorisation of formal and informal preparedness before the results section demonstrates how three constituents of an informal competence: previous experience, local geographical knowledge, and social networks affect household preparedness.

2. A social practice perspective on household preparedness

In most studies, household preparedness is conceptualised based on existing policy definitions, as stated above. A majority of studies use a quite simple operationalisation of preparedness, such as the presence of emergency supplies at home, a family evacuation plan and rehearsals, and degree of awareness of national and local emergency preparedness plans, what Kirschenbaum [21] frame as an 'attribute-based' approach to preparedness. When constructed into measures, studies report on

how the level of this preparedness is affected by sociodemographic variables such as race, gender, education, income and age, and behaviours such as previous experience with crises [eg. 42, 43]. Households are seen to be underprepared if these resources are not in place [24]. Preparedness studies are almost exclusively quantitative and follow a behaviouristic model where individual risk perceptions are correlated with preparedness behaviours [26]. Consequently, these studies suggest that informing citizens about proper preparedness measures will increase awareness and thus readiness. Such individualistic behaviour models fail to fully consider the everyday social and material resources that are mobilised in the context of crises. Our interest in this article is, therefore, to take a bottom-up perspective and start with the socially and culturally shared everyday practices of households that are not predefined preparedness measures, seldom reflected on, and not explicitly defined as capacities to be more resilient. Rather, they are routines that are already there.

In this regard, we have developed the concept of 'informal household preparedness' [38, 44] that is based in theories of social practice [45, 46]. In recent advances, these theories have been summarized as an analytical toolkit to bring attention to how the social world is continuously produced and reproduced by collective activities [e.g. 27, 46, 47], suggesting that fundamental aspects of human life including knowledge, meaning, language and institutions must be understood as produced in practices and their interconnections [48]. Rather than studying individual behaviours, theories of social practice make arrangements of actions – practices – their analytical focus. The social practice perspective on preparedness is inspired by how practice theory has been used to avoid simplistic attitude-behaviour models to explain and change consumption patterns [e.g. 49, 50].

Schatzki [46] distinguishes between practices-as-entities and the performance of these practices. Practices-as-entities are organised by interconnected elements that include materialities, meanings and motivations, and competences in the form of skills and embodied knowledge [27]. The entity is an outline of these elements, which is reproduced as well as reconfigured through the performance of a

practice. Thus, a practice is more than individual perceptions, it points to the interconnectedness of our perceptions, the practical knowledge of knowing how to perform a task without reflection, and the artefacts that take part in all aspects of human life [48, 51].

Practical knowledge further refers to the embodied skills and experiences the individual practitioner has acquired through previously performed practices, as well as the embodiment of knowing how to act in relation to specific material surroundings and ongoing (unconscious) negotiations with social relations [52]. Although we in this article highlight how such competences affect household preparedness, competences are produced, re-produced and changed according to the other elements of materialities, and meanings such as norms, values, and beliefs. Our focus on competences is also a critique of existing preparedness studies, where behaviourism is the dominant paradigm [26]. Here, knowledge is often positioned as expert knowledge of how to best prepare, while experiential knowledge is downplayed [53]. Such a view reinforces individualisation of responsibilities, as well as having a disproportionate focus on agency rather than structures. Shifting from understanding the low level of preparedness as a knowledge deficiency of the individual to recognizing that embodied competences might, in fact, increase the level of preparedness, is a step towards expanding also the target for intervention programmes to enhance preparedness.

Most empirical studies of practices have focussed on integrative practices as sets of elements (competences, meanings and materials), their connections and how they are performed [51]. However, preparedness is not an integrative but a dispersed practice. Dispersed practices circulate through many of these integrative practices [28]. Preparedness is in this sense not performed in itself but follows the structures of the integrative practice of which it is part. A preparedness competence is composed of competences from other practices, within their logic, and without reference to preparedness. Using the account of practice theory presented by Gram-Hanssen [31], which distinguishes between explicit rules and practical understandings as elements of practices, the embodied competences are ways in which bodies are socialised into certain know-hows and routines. In contrast, a formal

preparedness competence is generally defined as the extent to which practitioners draw on institutionalised knowledge and rules. Although almost non-existing in households, a formal preparedness competence also bears resources to cope with crises. For example, owning supply stocks of food and equipment are important to the level of preparedness. However, we argue that a broader view on use and maintenance competences to mobilise these materials is essential to grasp preparedness.

Table 1 summarizes the main features of the formal and informal approach to preparedness as we see them, both in terms of their disciplinary approach and the knowledge they tend to produce.

Table 1: The characteristics of formal and informal household preparedness

Characteristics	Formal household preparedness	Informal household preparedness
Approach	▪ Stems from a policy discourse of response and recovery strategies ▪ A top-down approach that is predefined and adapted to a specific case	▪ Stems from social theories of everyday life ▪ A bottom-up approach that explores social, cultural and material resources of everyday practices
Definition	▪ Readiness to anticipate, manage and recover from crises	▪ Households' ability to sustain everyday practices in case of crises
Study method	▪ Quantitative mapping of predefined readiness measures	▪ An in-depth qualitative exploration of everyday practices and quantitative measuring of resources and barriers found to matter for preparedness
Unit of analysis	▪ Individual preparedness behaviours	▪ Socially shared practices
Focal points in empirical studies		
Engagement by households	▪ Active state, readiness	▪ Passive state, built into everyday practices
Knowledge	▪ Awareness of written information such as regulations, laws, national and local emergency plans ▪ A family evacuation plan ▪ Norms, values, beliefs	▪ Embodied competences generated through performing practices, such as previous experiences, local geographical knowledge and social networks
Material preparedness	▪ Individual ownership of preparedness resources	▪ Knowledge of how to acquire, use and maintain material resources within and between households

In the following, we present a mixed methods design to explore the informal expressions of household preparedness understood as an integrative part of household practices.

3. Mixed methods research

To understand the significance of competences in household preparedness, we employed a mixed methods approach that consisted of in-depth interviews and a survey. The in-depth interviews were explorative to the forms of preparedness resources and constraints that were used to deal with blackouts. The survey used these findings to create measures of preparedness resources that indicate differences between households and between social groups. As such, our approach is novel compared to most previous research within the preparedness research field, where resources are predefined.

3.1 In-depth interviews

In Norway, the geography, climate and weather conditions vary considerably between different parts of the country, which in turn affects the frequency of blackouts. Therefore, the sample consists of data from two case studies in three locations. Case Study I consists of nine visits to households in Lærdal, a small rural village in western Norway that in 2011 was hit by a hurricane. Later known as Dagmar, the hurricane caused a long-lasting electricity and ICT breakdown in the whole region. Over 570.000 households were affected, and 35.000 lost their electricity supply for more than 24 hours [54]. Three years later, Lærdal also experienced an extensive fire that resulted in the evacuation of half the village, over forty buildings burnt down and critical infrastructure was disrupted [55]. This case gave us information about how blackouts affected families during a major crisis, what resources became important for them, how they were used, and whether these experiences produced any changes in their current preparedness resources. The households were recruited by a key informant, and the visits took place in 2015.

Case Study II was designed to explore how different types of households prepare for future outages. It consists of six visits to households in Grue,

a rural municipality in eastern Norway that lies in a forest area with low population density, and a relatively stable climate with low temperatures. This case contrasts Lærdal in its geography, weather conditions and distance to the nearest city. Some of the interviewed families in Grue had experienced the outage caused by hurricane Dagmar. Finally, Case Study II also include visits to 10 households in the capital Oslo in eastern Norway, which in comparison to the former two locations has a warmer climate and stable weather conditions, is an urban area with high population density, where households have access to a large range of services and where none of the interviewed households had experienced extensive outages. Whereas houses in Lærdal and Grue are mainly detached with access to non-electric heating, Oslo has a large share of small apartments without alternative heating. In Case Study II, 13 households were recruited by a recruitment agency, three were recruited using social networks, and the visits took place in 2017.

The total sample includes 42 participants (22 women and 20 men), with an average age of 47 (17-84 years), houses with and without alternative heating, as well as different family compositions and differences in experience with blackouts. The interviews had an average length of 94 minutes (50-170 min.) and have been fully recorded and transcribed.[12] As a consequence of different recruitment methods, Case Study I has a smaller variation of family and house characteristics than the strategically selected households in Case Study II. Also, households in Case Study I were all part of the same local community, had similar family compositions and socioeconomic status. Using a recruitment agency in Case Study II ensured a greater variation.

The methodology used in this article is made up of three techniques to produce data about how preparedness is integrated in everyday practices. First, the interviews were unstructured and consisted of 'performative questions' [56, 57]. These included the scenario 'what would you do if the infrastructure broke down right now?' Second, walk-

[12] The Norwegian Centre for Research Data (NSD) has approved the project, and all participants signed a written consent form after the interview.

along tours of the home were carried out to identify and demonstrate preparedness resources at home [58, 59], as well as to play out the scenario. Third, the placement of preparedness resources was photo documented. By anchoring the interviews to the material surroundings of the home during the walk-alongs, and to specific material resources during photographing, stories of how preparedness was performed was given prominence rather than individual perceptions of preparedness. The interconnectedness of the three techniques produced data about performances of everyday practices. A detailed account of the applied methodology can be found in [44].

A three-step process was used to analyse the data, seeking to explore the constituents of a preparedness competence. The first step was a detailed review of all transcripts to seek words or phrases used in the stories about how preparedness was performed. For example, nearby locations, tunnels, roads, streets, and the eastern wind were used to explain and predict blackouts and seek alternative infrastructures that might still be connected. These were in the second step turned into codes such as 'local knowledge', 'wind', 'geographical locations', and the full transcripts were coded using the software HyperResearch. The third step involved the construction of overreaching analytical concepts, in this example 'local geographical competence'. The photographs were catalogued according to the type of resources or constraints such as 'alternative heating source', 'food storage', and 'supplies'. The photographing session produced stories about the acquisition, maintenance, and use of material resources and that these differed between household members, which is explored in the analysis.

The in-depth interviews indicated three important constituents of an embodied preparedness competence: (i) previous experience with blackouts and living with restricted access to infrastructure; (ii) local geographical knowledge of weather and climate conditions and the built environment; and, (iii) mobilisation of social networks of family and friends, neighbourhood and community. Together with a formal competence of awareness of preparedness, knowledge of governmental information, emergency plans, and stocking of supplies, the three constituents make up the basis for the quantitative survey where they

are operationalised, and their prevalence was tested in the overall population.

3.2 Survey

A web survey was conducted among a representative sample (N=1,005) of Norwegians in September 2016. In the survey, a household is identified as one or more people living in the same house, and the survey respondent is the household member with full or partial responsibility for the overall household economy. Based on two question-batteries from the survey, we used the Cronbach's alpha test and factor analysis to construct one measure indicating a formal competence, and three measures indicating the constituents of an embodied competence. Multiple regression analysis was used to investigate differences in preparedness competences across social groups. Due to non-responses and removal of 'Do not know' answers, several observations were excluded, leaving a sample of 779 respondents in the regression model on formal competences and 911 respondents in the models on the constituents of an embodied competence.

3.3 Factor analysis: Measures indicating formal and embodied preparedness competences

The questionnaire included six questions referring to formal competences. To make the variables useful as items on a scale, we removed the category 'Do not know' and recoded into binary variables with value 1 = *Yes* or 0 = *No*. A Cronbach's alpha test showed a coefficient of reliability at 0.701, which is normally considered acceptable to form a scale [60], and the lowest displayed 'item-test correlation' was 0.633 (see appendix 1). Therefore, we considered the items suitable for the construction of a summative measurement scale indicating formal competence. The summative scale was afterwards standardised.

The questionnaire also included 12 questions related to what we have defined as constituents of an embodied competence. When 'Do not know' responses were removed, the questions had five response categories ranging from 'Strongly disagree' to 'Strongly agree'. Four of the 12

question items were removed based on considerations around interpretable factors and correlation with the factors. A factor analysis with oblique rotation on the remaining eight items showed three interpretable factors of an embodied competence that were constructed into variables using the Bartlett method [61]. Because the promax rotation method was used, the three factors were allowed to correlate. Based on the factor loadings after rotation, we interpreted the first factor to indicate previous experience of blackouts or living conditions with restricted access to infrastructure, and the two items correlate almost equally with the factor. The items that correlated strongly with the second factor refer to knowledge about the local geography such as weather conditions, local terrain and potentially dangerous places. Social networks were defined as referring to relations to friends and people in the neighbourhood. The item on receiving help from neighbours had the strongest correlation with the factor, whereas the item on knowing friends near-by had the weakest correlation with the factor, which illustrated that the factor reflects local social networks rather than social networks in general. The pattern matrix is presented in Appendix 2.

The regression analysis is presented in Appendix 3 and consists of four models: (1) formal competence; (2) previous experience; (3) local geographical knowledge; and, (4) social networks. In the result sections, the models are referred to by numbers 1-4. The analysis showed large differences across the models, indicating that the two forms of competences and their constituents relate to different types of households. In the following, we analyse the results from the regression analysis together with the qualitative material starting with a brief outline of the formal competence, followed by the three constituents of an embodied competence: previous experience; local geographical knowledge; and, social networks.

4. Preparedness competences

4.1 Formal competence

Formal and informal competences are employed as contrasting concepts to study household preparedness. Whereas a high level of formal preparedness would entail an aware, informed and active household that has obtained explicit knowledge about preparedness measures and implemented them at home, the informal competence is not attributed to preparedness as such but is nevertheless mobilised through embodied skills when blackouts occur. The interviews showed that very few had ever talked about what they would do in case of a blackout, which confirmed by the survey where only 16 per cent stated that they had talked about preparedness for blackouts [62]. Moreover, the concept of preparedness was perceived to belong to a policy discourse and not an everyday language, and very few of the interviewed families were aware of or used governmental preparedness information (such as websites, documents, plans etc.). Instead, other actors such as local and national authorities, grid companies, and even other households were expected to take responsibility in the case of blackouts [63]. Furthermore, 78 per cent of the survey respondent perceived blackouts to be of low risk. In accordance with previous research, we also found that few perceived blackouts to be dangerous, some even considered them cosy [14, 36]. Yet, the cosiness of blackouts is a frame used only when it was perceived to be controllable with one's existing resources and when information from authorities about the duration of the blackout, as well as digital communication with family and friends, was in place [38].

While the interviews did not indicate any variation in formal competence across social groups, model 1 in the regression analysis shows that people aged 60 to 69 scored higher on formal competence compared to the reference group of people aged 20 to 29, and also the group aged 50 to 59 is significantly different from the younger reference group at a 90 % significance level. This indicates that older people have a stronger formal competence, which might relate to experience with crises where formal information played a different role and was more relevant, for example before the introduction of ICT services. Model 1 also shows that those living in smaller cities tended to have a stronger formal competence compared to those living in larger cities, but there is no significant difference to those living in villages or rural areas.

Although formal competence was low, the interviews also indicated that rural households more often knew about local meeting places in case of emergencies than urban households. This is probably related to previous experiences with emergencies that required evacuation in the rural areas we visited, as well as to extensive local geographical knowledge and social relations also with municipality employees and local rescue services. Thus, the formal competence seems to be strengthened through experiential knowledge and social networks.

Overall, our findings indicate quite clearly that there is no expressed motivation to be prepared for blackouts across households, and actions are not taken with preparedness in mind. If we are to look for preparedness not as an integrative practice, we must seek its constituents as dispersed amongst other practices. In the following sections, we turn focus to the competences that are generated from previous experiences, used to manage local geographical conditions, and used to mobilise social networks where knowledge and materials flow, and how these matter to preparedness.

4.2 Previous experience

When the significance of previous experience for future preparedness is studied, the concept is usually defined as experience with previous emergencies, crises or disasters [64-68]. Here, we expand the concept to also consider how living with limited infrastructure produces differently performed practices that in turn might increase preparedness. Previous experience understood as part of an embodied preparedness competence includes knowing of and the ability to mobilise know-hows and material resources required to sustain infrastructure dependent practices during blackouts. The older participants who had experienced blackouts in their childhood, or a daily life with limited electricity and no ICT infrastructure, claimed to be prepared for a future blackout like this participant expressed:

> *People were not dependent on electricity before, so if the electricity was gone for two weeks it did not matter to us (…) what we used electricity for was primarily lighting and cooking. We had no devices, or a water pump, that was electric. If the electricity*

disappeared then we were all set, we had kerosene lamps and woodstoves and everything (Man, 84, Lærdal).

The older participants were not worried about blackouts because they had already experienced many, and in addition to knowing what to do, they had kept the objects that were considered necessary for future blackouts. Even though some of the practices, like lighting a room with an oil lamp, were abandoned, the competences and materials from these practices remained and could serve as preparedness resources. Remnants from previous practices thus seemed to survive even with access to infrastructure.

Older participants in the rural areas had more experience than those of the same age in the urban area, which is in line with the regression analysis in model 2, showing that people in rural areas score higher on previous experience compared to those from the city, and people from smaller cities score higher, although the significance level is lower at 95 %. This might indicate that older households should not merely be considered vulnerable in case of blackouts [26], older rural households in particular do have important know-how and materials of how to live 'off-grid' that might not be integrated in younger households' practices.

The participants also drew on previous experience of cabin life and hiking. These are quite common leisure activities in Norway, and most of the participants engaged in these practices. Statistics Norway finds that 78% of Norwegians had been on short hiking trips in 2019 and that almost half the population have access to cabins [69, 70]. Heidenstrøm and Kvarnlöf [38], have previously argued that the changes made in daily practices such as lighting, heating, cooking and cleaning in non-electric cabins are built-in preparedness resources to cope with blackouts. This has shown to be the case regardless of the residential area, age and gender. Although preparedness is not the goal or meaning of leisure-related practices, preparedness becomes an intrinsic competence needed to accomplish these practices, meaning that preparedness is less salient than the concept of formal preparedness indicates.

Finally, competences produced as a result of previous experience with blackouts were important for future preparedness, as exemplified with a household that talked about hurricane Dagmar:

> Woman: *I don't know, but maybe after hurricane Dagmar, we might have become more aware of electricity breakdowns, but…*
> Man: *At least it was like that during Christmas when it was windy. (…) Then, I remember that we filled bottles with water, and took out matches and candles*
> Woman: *Yes, experiences after Dagmar, or is it?*
> Man: *It could be*
> Woman: *Yes, even though we do not think about it like that*
> Man: *At least we were prepared*
> Woman: *Not entirely reflexive, but yes Dagmar might have contributed to it* (Woman, 40, Man, 39, Grue).

Hurricane Dagmar had revealed to this family that the water infrastructure could potentially be disrupted during a blackout. Hence, they knew that when a similar wind occurred, a preventive action would be to fill bottles of water and to secure lighting with candles and matches. However, a similar study by Rinkinen [35] found that even though blackouts were reflexive moments, and handled by adjusting daily practices, these adjustments were not sustained and gave no further reflection on energy consumption levels. Importantly, although Dagmar caused a higher level of reflexivity and awareness, the participants did not frame these skills as preparedness, which might indicate that further explicit preparedness measures will not be taken.

Urban households had a lower level of experience with blackouts, and even though they owned material resources like candles and matches, they did not have the same level of know-how to predict the consequences of weather events. From the regression analysis, model 2 further indicates that single households have less experience with blackouts, which might be a result of a high concentration of single households in urban areas. Interestingly, model 2 also indicates differences within the households, stating that men tended to have a stronger preparedness competence than women based on previous

blackout experience, although the estimate is only significant at a 95 % significance level. In the interviews, however, individual experience with blackouts was considered as belonging to the whole household.

4.3 Local geographical knowledge

Local geographical knowledge has to the authors' knowledge not been paid attention to in preparedness studies. We define it here as know-how of how the immediate landscape, weather conditions, and climate affect the stability of the infrastructure. Also, it includes practices where the locally built environment such as base stations, power lines, tunnels, roads and key locations (e.g. evacuation sites and emergency meeting places) are significant. In his work on the interconnectedness of nature and society, Ingold [71], Ingold [72] shows that people gain skills from living in a particular environment, creating a dynamic and ever-changing relationship between what surrounds us and our actions.

Nature has a central role in Lærdal, it affects daily practices as well as being at the core of the community identity. In Lærdal, the valley formation produces a strong wind the villagers have learned to live with, and that caused the 2014 fire to spread extensively. One of the participants explained the characteristics of this wind:

> *During the fire, it was the eastern wind. It is at its worst down here in the village. It travels through the valley, swipes through the valley, so it was worst down here. During the hurricane Dagmar, it was the south east wind and that usually gets right in here* [in the valley], *but when it travels through a south-eastern valley, then it strikes right here and then bounces back again. There is this narrow path that gets the worst conditions, that is right where my sister and I grew up, and that area has been destroyed many times* (Woman, 55, Lærdal).

A precise vocabulary using cardinal directions to explain how the wind travels, and how the wind's path is determined by the valley formations was a skill that the inhabitants in Lærdal had acquired through experience, and that was incorporated into their everyday practices, expressed by another participant:

> Interviewer: *When the wind blows, did you avoid using the wood stove for example, or did you do anything differently, do you remember?*
> Man: *No, I do not think so. We were so used to the eastern wind, to put it simply; we took it for granted. We were used to the east wind, but we could not always use the woodstove because the wind was too strong. Here, outside, I always keep it tidy and make sure there are no loose objects.*
> Interviewer: *Do you do that because of the wind?*
> Man: *Yes, because of the wind. Like now, the past few days it has been windy, and I have tidied the yard (…) These are the kinds of things that the villagers from Lærdal have learned to do because of the wind* (Man, 72, Lærdal)

The materiality of nature, and in particular weather and climate conditions, shaped practices in the rural areas and these ways of adjusting to local conditions produced a higher level of preparedness. Moreover, knowing how the electricity infrastructure was organised, knowing the location of the power lines and how the climatic conditions and weather potentially affected the distribution of electricity in the area, was another form of preparedness related geographical local knowledge that ran through several practices, such as adjusting use of mobile phones to locations with mobile coverage, and choosing a subscription with the company that offered the best mobile coverage. In Lærdal, such knowledge was mobilised in the days after the fire when people drove to near-by tunnels and base stations to gain access to mobile coverage [73]. How local climate conditions and infrastructure entangle the everyday practices of these families shows the close interplay of the social and material world within a specific place and suggests that preparedness should be studied as localised practices [74].

Model 3 in the regression analysis clearly shows that people living in rural areas score higher on local geographical knowledge compared to people from the city. The same goes for people from smaller cities, although the estimate is weaker, and for people from villages, although the estimate is less significant. This corresponds with the interviews, where the urban households did not express the same local geographical

knowledge compared to the rural households. This is related to the fact that the local geography, the climatic conditions and topography have significantly less impact on daily life in the city. Urban households also talked less about the locally built environment, including the electricity infrastructure. Their lack of engagement in the local geographical surroundings might also be explained by the urban households' understanding of the distribution of responsibility for preparedness between themselves as private citizens and public authorities. The urban households expected authorities to deal with blackouts much quicker than the rural households. Thus, the differences in expectations of the formal preparedness system are also significant for the household preparedness level.

Moreover, model 3 in the regression analysis clearly shows differences in local geographical knowledge between men and women, where men scored higher. In the interviews, we found that men had more engagement and competences about practices that involved surrounding infrastructures such as power lines and base stations, fuel-based products such as cars, tractors, generators, ovens, flashlights and tools. Women had a higher level of engagement in domestic practices that involved acquiring, cooking and storing food, alternative lighting and heating, laundry and use of clothing, which is consistent with research on gender and housework [75]. These differences in knowledge type between men and women might indicate that the level of preparedness is dependent on family composition. Interestingly, the gender differences were not as clear regarding weather and climate where women and men living in the same rural area had similar knowledge. The knowledge of how to deal with the local climate and weather conditions seemed to be created through experience with these conditions.

4.4 Social networks

Social networks are defined here as the extent of connections between the households and others such as the extended family, friends and neighbours. These connections can be strong (close relationships) or weak (acquaintances, secondary connections) [76]. Previous research

has identified social networks and social capital, drawing on Putnam [77], as important resources to prepare for and manage crises [e.g. 78, 79-86]. Furthermore, research has shown that citizens come together in 'emergent groups' to deal with disasters within the community [87, 88]. Communities with a high level of social capital are generally found to be more able to cope with crises. However, Cheshire [10] points out that existing norms of a neighbour relation will come into play in a crisis. These norms are based on already existing latent patterns, rather than active work to be resilient within the community. This leads us to the important point that a community is constantly shaped by social and cultural norms and values, and that we must look at how these norms and values shape practices to grasp community resilience.

In the small village of Lærdal, existing social networks had played a significant role during the fire, as this participant talked about:

> *(…) we know these people, they are part of the community, right. Of course, after the fire, the local doctor called and asked whether we were ok, a follow-up of everyone that was involved. I think they called absolutely everyone; they called me several times (…). There were obviously a lot of resources, and they worked around the clock in the days after. But I know these people, one of them is a parent at the school, he called. You know everybody, right. It's very special. You know everybody, including the mayor, all the volunteers* (Woman, 48, Lærdal).

The expression 'everybody knows everybody' was typical in the Lærdal interviews, which as a value, affected how social networks were performed in this context. Four aspects of social networks seemed to be of importance to preparedness: (i) individuals who had formal roles (the local doctor, the mayor) were known to the community and knew the community, including individuals with fewer preparedness resources; (ii) there was some form of contact between all community members; (iii) formal and informal roles and responsibilities were mixed; and, (iv) other community members were frequently referred to as knowledgeable about the local infrastructure, weather conditions, or

they had access to information and knew how to act in a crisis. The participants also provided this knowledge to others.

Extensive local social networks were not found in urban households. In accordance with previous studies such as Sampson [89], the main tendency in the material is that urbanisation is negatively associated with local social relationships and a sense of community. The regression analysis proved the occurrence of strong social networks in rural areas. Model 4 shows that people living outside cities score higher with increasing strength further from the city. This indicates quite clearly that people in less densely populated places have stronger social networks.

However, we also found that smaller neighbourhoods such as a street or an apartment building in the urban area in some cases brought forth social networks that resembled the relations in the rural areas. A couple living in an apartment building talked about this:

> Interviewer: *Have the same people lived here for a long time?*
> Man: *Yes, and we know the neighbours in this apartment block quite well*
> Woman: *We have lived next door to three of them for fourteen years*
> Interviewer: *You have socialized a bit with them, then?*
> Woman: *Yes, it's a bit like a mini-collective here* (Woman, 50, man 45, Oslo).

Neighbourhoods and apartment buildings in urban areas might share some of the characteristics of villages in rural areas that matter to preparedness, most importantly a sense of community. This also underpins the argument made by Morgan [90] that we must look at the complexities within loose social networks [see also 91].

The regression analysis indicates that age and family composition matter to the extent of social networks. Model 4 shows that the youngest age group (20 to 29 years) score significantly lower than the older age groups on social networks. The younger interview participants were still heavily dependent on their parents' preparedness resources, which

might indicate that younger households are less prepared than older households. Model 4 further shows that people living in households with one or more children also score higher on social networks, which might indicate that having children integrate household members in practices where such networks are part, for example through institutions such as kindergartens and schools, and that same-age children have similar daily rhythms that foster social relations. Interestingly, the model also shows that women have stronger social networks than men do. We do not find a similar difference in the interviews, which might again be related to the participants' understanding of a competence as belonging to a household, and not an individual. This indicates that men could rely on the social networks of the women in the household, much in the same manner as women might with men's technological competences and their competences from previous experiences with blackouts.

So far, we have concentrated on the social aspects of networks. However, we also find that there are material resources within existing social networks that can be mobilised in case of blackouts. From a social practice perspective, these materials are not external factors or mere instruments but are active elements that co-constitute practices [27, 92]. A purpose or meaning of social networks was a flow of materialities, some of which are preparedness resources. The interviews show that material resources that belonged to other individuals in a social network were seen as accessible, explained by this participant: '*I use my friends and know that they would have the equipment that I need. Or I use other people to help me if something was to happen. You have to be a bit ahead'* (Man, 45, Lærdal). Here, preparedness is found within a continuous reproduction of friendship by exchanging things and services. Another participant was asked whether he owned a power generator and replied that: '*No, I do not own a generator, but I have access to a generator, even though I do not own it. (…) my brother has one. I think we have two; there is one at my father's place as well. It is. So, I have access to those'* (Man, 40, Grue). Access to resources did not necessarily mean that the individual household owned them; rather, expensive products were shared across these relationships and moved between the members of a social network. As Kirschenbaum [21] also points to, this finding

indicates that preparedness must be understood beyond individual attributes.

5. Discussion and conclusion

In this article, we have argued that an embodied preparedness competence composed of previous experience, local geographical knowledge, and social networks is significant for the level of household preparedness for infrastructure breakdowns, and that this competence varies between and within households. Applying a mixed methods design, we sought to integrate a qualitative exploration of preparedness resources, with a quantitative analysis of how the identified resources varied across social groups. We are aware that the mixed methods design in this article also pose potential limitations. First, we are not going in-depth with the statistical modelling of differences in household preparedness. For example, it would be interesting to look at interaction effects with gender. Second, we only focus on households, leaving out interconnections with other actors such as local and national authorities. Third, we have not observed how the household members acted during blackouts. The findings are re-enactments of previous events and enactments of scenarios, meaning that we gain data of talk about performances.

However, the social practice perspective has foregrounded interconnected resources that have been given little attention so far, but that matter to preparedness. Figure 1 summarizes the preparedness competences, emphasizing that households are prepared through the embodied competence even if the formal competence is low.

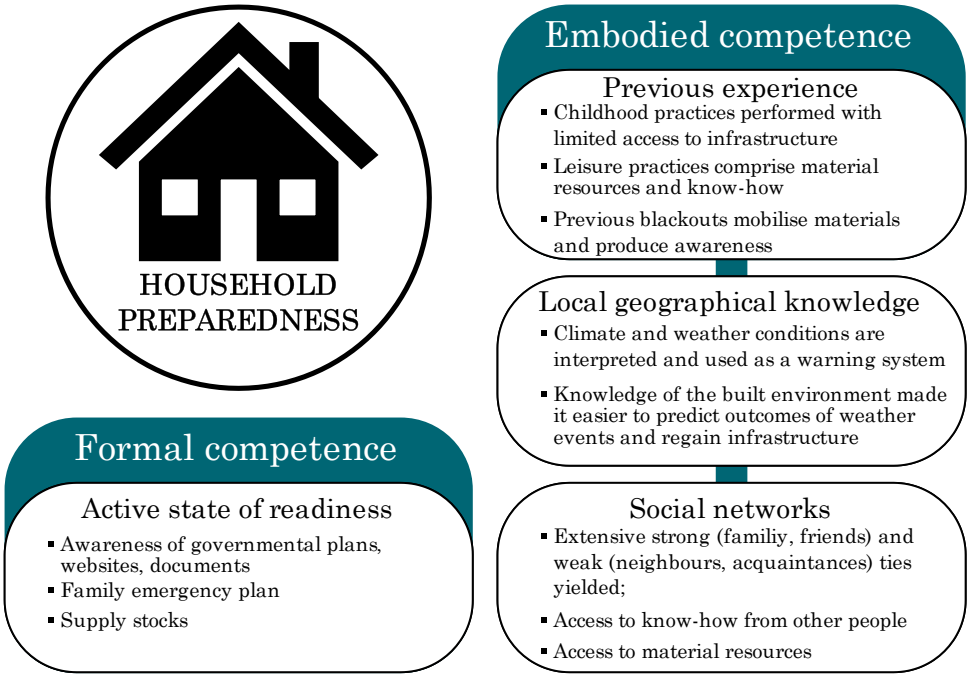

Figure 1: Preparedness competences

The analysis has demonstrated that resources to cope with blackouts are mobilised from many existing practices, indicating that preparedness should not be understood as one integrative practice. Rather, preparedness is dispersed, following the logic of other integrative practices such as wood heating, leisure activities and cabin life [28, 93]. Also, preparedness consists of competences found in other dispersed practices such as weather knowledge, local knowledge and social networks.

Furthermore, a higher competence amongst rural households suggests that preparedness should be understood as situated practices that vary across geographical areas also within the same cultural context. Differences between practitioners, such as those between generations and genders, emphasise the embodiment of competences. However, household members understood preparedness at a household rather than an individual level, indicating that an embodied competence could be shared between members. This, in turn, might suggest that single households possess fewer resources. Overall, the analysis indicates that

young and urban single households have the lowest competence to cope with extensive infrastructure breakdowns.

More broadly, this article has demonstrated that there is a huge difference between the preparedness discourse that exists in policy, which is used as a baseline for empirical studies, and the preparedness resources that have proven to be significant for households dealing with blackouts. The social practice perspective acknowledges the interdependency of social, cultural, and material elements that together form bundles of everyday practices, and the analysis has demonstrated how competences from these practices increase preparedness even with a low level of reflexivity about preparedness. Furthermore, a recent review of responses by the public to major power outages by Rubin and Rogers [94], stated that studies of blackouts tend to focus on the technical impact on the existing system of infrastructures, but seldom reflect on the consequences for citizens [see also 95, 96]. The present study offers an approach to understand how infrastructure shapes and is shaped by the social practices of which it is part.

It is critical to note that we do not suggest that households should rely solely on these competences when faced with blackouts. Society needs to have formal contingency plans and to be responsible for national crisis management. But, as the analysis indicates, without taking the embodied preparedness competence into account in future preparedness policies as well as in future studies of household preparedness, the scope of what preparedness should be defined as remains rather narrow. Policies aimed to strengthen preparedness would probably be more successful if they build on the forms of resources that already exist. Instead of informing the public about preparedness as a separate task to perform, a greater understanding of how infrastructure embeds our lives, grounding policy measures in infrastructure-dependent practices, might lead to heightened awareness [97]. The practice perspective also suggests that strengthening important preparedness resources, such as knowledge about first aid, should focus on establishing competence rather than provide information. Concretely, local participatory processes led by citizens themselves could contribute to going beyond the dominant preparedness paradigm (aware and ready is a common

goal that is achieved through information) that tends to be reproduced in top-down deliberations [98], and produce more relevant plans which are written by and actively used within a community, also bearing in mind that preparedness is not an individual task.

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Appendix 1: Cronbach's Alpha test

Formal preparedness competence (Yes=1)	Item-test correlation
Do you have a preparedness plan in case of accidents or crises?	0.674
Are you aware of a local meeting place organized by local authorities in case of crises?	0.633
Do you know where to find information from the government in case of a crisis?	0.651
Are you familiar with the local preparedness plan in your area?	0.652
Are you familiar with information from the government about how to plan your own preparedness in case of an emergency or crisis?	0.655
Do you know how to contact governmental emergency services in case of an emergency?	0.709
A Cronbach's alpha test scale	**0.701**
Homerisk survey (N=779)	

Appendix 2: Factor loadings after oblique promax rotation

	Pattern matrix		
Informal preparedness competences	Social networks	Local geographical knowledge	Previous experience
I/we have experienced living without electricity for a longer period of time (eg. a week)	0.023	0.024	**0.698**
I/we have experienced living without internet and telephone connection over a longer period of time (eg. a week)	-0.019	0.008	**0.701**
I/we have knowledge about the local terrain and weather conditions	-0.013	**0.685**	0.055
I/we know the safe and dangerous places in the local area	0.055	**0.699**	-0.005
I/we know a lot of people in our neighbourhood	**0.658**	0.090	-0.021
I/we have friends who live near-by (cycling distance)	**0.555**	0.062	-0.031
I/we are important resources where we live and are happy to help neighbours if they need help	**0.666**	-0.025	0.076
I/we can receive help from neighbours if we need help	**0.748**	-0.038	-0.018
Proportion of variance accounted for after rotation	*0.702*	*0.594*	*0.446*
Homerisk survey (N=911)			

Appendix 3. Regression model of four forms of household preparedness competences

	(1) Formal	(2) Previous experience	(3) Local geographical knowledge	(4) Social network
City size (Ref. 'City')	Ref.	Ref.	Ref.	Ref.
Smaller city	0.367***	0.251**	0.379***	0.274***
	(0.138)	(0.111)	(0.109)	(0.095)
Village	0.158	0.114	0.248**	0.419***
	(0.142)	(0.115)	(0.113)	(0.099)
Rural area	0.174	0.394***	0.685***	0.879***
	(0.153)	(0.122)	(0.120)	(0.105)
Household income (Ref. 'Less than 200,000 NOK')	Ref.	Ref.	Ref.	Ref.
400,000 to 599,999 NOK	0.001	-0.093	0.134	0.292**
	(0.199)	(0.163)	(0.160)	(0.140)
600,000 to 799,999 NOK	0.274	-0.454**	0.110	0.283*
	(0.219)	(0.179)	(0.175)	(0.153)
800,000 to 999,999 NOK	0.352	-0.244	0.138	0.244
	(0.234)	(0.189)	(0.185)	(0.162)
1,000,000 NOK or more	0.594***	-0.240	0.217	0.501***
	(0.230)	(0.186)	(0.182)	(0.160)
Do not wish to answer	-0.126	-0.362**	0.056	0.105
	(0.215)	(0.172)	(0.168)	(0.147)
Education (Ref. 'Primary school')	Ref.	Ref.	Ref.	Ref.
High school	-0.459*	0.254	0.162	0.116
	(0.278)	(0.211)	(0.207)	(0.181)
Vocational education	-0.483	0.369	0.227	0.042
	(0.303)	(0.229)	(0.224)	(0.196)
University degree	-0.345	0.377*	0.194	0.071
	(0.268)	(0.201)	(0.197)	(0.172)
Out of workforce or other (incl. unemployed, students and stay-at-home) (Yes=1)	0.074	-0.054	-0.047	0.167
	(0.163)	(0.130)	(0.127)	(0.111)
Pensioner (Yes=1)	-0.145	-0.287	0.223	-0.002
	(0.266)	(0.209)	(0.204)	(0.179)
Male (Yes=1)	-0.031	0.188**	0.300***	-0.200***
	(0.105)	(0.086)	(0.084)	(0.074)
Age (ref. 20-29)	Ref.	Ref.	Ref.	Ref.

30-39	-0.013	-0.074	0.273*	0.362***
	(0.194)	(0.161)	(0.157)	(0.138)
40-49	0.242	0.200	0.327**	0.498***
	(0.181)	(0.146)	(0.143)	(0.125)
50-59	0.335*	0.137	0.221	0.535***
	(0.181)	(0.146)	(0.143)	(0.125)
60-69	0.629***	0.375**	0.212	0.713***
	(0.222)	(0.174)	(0.170)	(0.149)
70-80	0.539	0.352	-0.051	0.525**
	(0.332)	(0.263)	(0.257)	(0.225)
Child in household (Yes=1)	-0.166	-0.157	0.039	0.259***
	(0.146)	(0.117)	(0.114)	(0.100)
Single household (Yes=1)	0.016	-0.343***	-0.179	-0.207*
	(0.153)	(0.125)	(0.122)	(0.107)
Constant	1.070***	-0.328	-0.906***	-1.054***
	(0.327)	(0.262)	(0.256)	(0.224)
Observations	779	911	911	911
R-squared	0.067	0.049	0.085	0.167

Standard errors in parentheses, *** p<0.01, ** p<0.05, p<0.1

Article 4

Engagement

“Someone will take care of it”. Households’ understanding of their responsibility to prepare for and cope with electricity and ICT infrastructure breakdowns

Corresponding author: Nina Heidenstrøm [1, 2]
Email: ninah@oslomet.no
Telephone: 0047 67 23 56 29

Co-author: Harald Throne-Holst [1]
Email: harth@oslomet.no
Telephone: 0047 67 23 56 36

[1]Consumption Research Norway (SIFO), OsloMet – Oslo Metropolitan University, Stensberggata 26, 0130 Oslo, Norway

[2] Department of Sociology and Human Geography, University of Oslo, Moltke Moes vei 31, 0851 Oslo, Norway

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Abstract
Extensive infrastructure breakdowns are likely to become more frequent in the future as a result of continually complex and interconnected infrastructures vulnerable to weather and climate changes as well as indented attacks. By means of ethnographic interviews with households in Norway, this article examines their engagement in preparing for and coping with such breakdowns. It focusses on the division of responsibility between households, the authorities, and industry actors, and demonstrates that households do not believe they are responsible for preparedness, saw little advantage in contacting the authorities or industry actors, and chose to wait until someone handled the outage. However seemingly unprepared, households mobilised their social networks, used skills from previous experiences, local knowledge on infrastructure and weather, and material resources. Despite low engagement in the preparedness measures suggested by the authorities, we propose households to be considered key actors in societal preparedness by calling for greater attention to the socially shared practices households engage in that are not explicit preparedness actions, and for crisis management policies in the energy sector to provide the vehicles to mobilise household resources.

Keywords: household preparedness, power outages, social practices, responsibility

1. Introduction

When hurricane Dagmar hit the coast of Norway in December 2011, it caused massive tree falls over the power lines and 35.000 households lost their electricity supply for more than 24 hours. Telecommunications were also down due to limited battery capacity and lack of power generators at the base stations, leaving over 30.000 subscribers without a landline and with unstable mobile coverage (Norwegian Communications Authority, 2012). In January 2014, an unexceptional house fire started in a house in Lærdal in western Norway, but strong winds in the middle of a dry winter season led the fire to rapidly spread across the village. Base stations for electricity and telecommunication

burnt down, causing a major outage that affected the municipality and surrounding areas (Norwegian Directorate for Civil Protection, 2014).

Both events were related to strong winter winds, and although they cannot be directly linked to climate change, researchers agree that we must expect more extreme weather events like these in the future (IPCC, 2012, 2018). Moreover, as the interconnectedness of infrastructure systems are becoming ever-more complex, breakdowns might cause cascading effects, meaning that interdependent systems such as electricity and ICT might produce non-linear consequences leading to the failure of other systems relying on this infrastructure (Graham, 2010; Matthewman & Byrd, 2014; Pescaroli & Alexander, 2018). Recently, Pescaroli, Nones, Galbusera, and Alexander (2018, p. 162) have called for further research on household level preparedness for such cascading risks, emphasising the need for knowledge about the type of measures needed, as well as when and how they should be implemented. With the transition to a renewable energy system, which might imply a higher frequency of breakdowns, it is crucial to gain knowledge about the consequences for households. The article takes this call as its starting point and argue that valuable knowledge about household level preparedness to cope with infrastructure breakdowns, can be gained by studying everyday practices.

Our everyday lives are dependent on electricity and Information and Communication Technologies (ICT). We need infrastructure to buy and store food, cook, heat and light our homes, do laundry, to communicate and work, for transportation, use credit cards and so on. Although to a varying degree across populations, extensive outages affect the way people carry out these daily practices (Ghanem, Mander, & Gough, 2016; Silvast, 2017; Trentmann, 2009). By means of in-depth interviews with rural households about their experience with hurricane Dagmar and the Lærdal fire, and with rural and urban households on preparedness for future outages, this article explores how households themselves understand their role in society's preparedness, and the resources they possess to cope with infrastructure breakdowns.

The article continues with a brief overview of the energy regime in Norway, before outlining the concept of preparedness in section 3. In section 4, social practice theory is suggested as an analytical tool to understand preparedness as embedded in everyday life. Section 5 presents the methodology and data material. In section 6, we present the results, while the final section discusses policy implications for future risk management policies.

2. Norway's energy regime

For households in Norway, we can broadly distinguish between two types of energy use; home and transport (Poortinga, Steg, & Vlek, 2004). Whereas transport is still mainly dependent on fossil fuels, domestic energy use is covered by electricity. Hydropower completely dominates the Norwegian electricity production, and the domestic production matches quite closely the domestic demand. However, there is a scheme for transition of electricity between the Nordic countries, by both physical interconnectors, and by financial market integration[13]. This increases the reliability of electricity production, as Norway also has the possibility to be a net importer in years when there is lower hydropower production, for instance in seasons where rain-, and snowfall do not match demand (White Paper no.25 (2015-2016)). Usually, a high share of renewables in the energy mix is considered to require storage capacity in the form of batteries. This is often stressed by scholars studying transitions to variable renewable energy (VRE) (e.g. Australian Energy Market Commission, 2018; Sepulveda, Jenkins, de Sisternes, & Lester, 2018). However, a hydropower-based system has an inherent capacity for storing energy through high-capacity reservoirs. This may even have the potential to store electricity produced by other energy sources, as options exists for using electricity to pump water back up into the reservoirs. Frequently referred to as a 'green battery', Norway is often suggested to serve as a backup for larger regions as the country holds approximately 50 per cent of Europe's reservoir storage capacity, with a total capacity of 87 TWh (Gullberg, 2013). [14] It should be noted that

[13] The Nordic market is also integrated, in both physical and financial terms, with power markets in the rest of Europe.
[14] https://energifaktanorge.no/en/

reservoir hydropower are constrained to specific favourable geographies, and that there is significant (local) environmental impacts of hydro reservoirs (Sepulveda et al., 2018).

The dominance of a variable renewable energy source makes Norway a special case, at least in the European context. This feature is interesting for at least two reasons. Firstly, as to learn how the system and actors have adopted to variable renewable energy. For other countries, there will be a transition period when phasing in variable renewable energy sources. To what extent such transition of variable renewable energy source makes the electricity system more vulnerable, is a matter of some contention. It is common to distinguish between the reliability and the security of a power system, where reliability means that there is an adequate capacity (of both generation and demand response) to meet consumer demand. There has been concerns about the reliability with the transition from 'traditional' electricity generation to variable renewable generation. This matter has been examined in several countries. Both Australian and German reports suggest that reliability-related supply interruptions have only accounted for a very small fraction of supply interruptions to households over the past ten years, while the share of renewable electricity production has increased (Australian Energy Market Commission, 2018; Clean Energy Wire, 2019). However, this at least partly depends on how the transition to renewable energy sources is done. Finally, technological diversity is considered beneficial for the supply quality and reliability of a renewable energy supply (Camargo & Stoeglehner, 2018). Further, there is internal complexity and significant levels of interdependence between ICT and energy systems. Internet and telecommunications, for example, require an external power supply (Petermann, Bradke, Lüllmann, Poetzsch, & Riehm, 2014). At the same time, the power system itself depends on ICT, which constitutes central parts of the remote control, supervision and protection systems that assist in increasing the reliability, stability and security of the power system (Torres, 2013).

The reliability and stability of the Norwegian electricity production is good. One indicator for this is the energy not supplied relative to the

energy supplied to end users. For 2018, this amounted to just 0,12 ‰ (per thousand) (excluding notified interruptions) (Flataker & Nielsen, 2019). This may contribute to the dominating perception in Norwegian households that the risk of interruptions is low, and as such adding to the low level of engagement in preparedness for outages.

3. Household preparedness

Lakoff (2007) defines preparedness as a modern risk management strategy, based on the ethos that society must be ready to deal with any potential catastrophic event when it occurs. Governing through preparedness thus means that whether society needs to prepare is not questioned, but rather what measures a society should design and implement to minimise the consequences of an event (Collier, 2008; Collier & Lakoff, 2008). As the occurrence and consequences of catastrophic events are impossible to control, preparedness entails that we must be in a 'continuous state of readiness'. How we imagine future events to be, shapes our readiness for them (Anderson, 2010).

Disaster studies has provided valuable knowledge about the social determinants of individual and household preparedness (e.g. Becker, Paton, Johnston, & Ronan, 2012; Becker, Paton, Johnston, Ronan, & McClure, 2017; Bourque, Mileti, Kano, & Wood, 2012; Bourque et al., 2013; Eiser et al., 2012; Murphy, Cody, Frank, Glik, & Ang, 2009; Paton & McClure, 2013; Paton, McClure, & Bürgelt, 2006). These studies report that people do not prepare although they are aware of a risk. Preparedness is viewed as too time consuming compared to the perceived risk level. The motivation of households to prepare is dependent on factors that determine individual risk perception. These include the nature of the threat (whether it is close and visible, has long-lasting effects), previous experience with disasters, information and knowledge about the threat, and homeownership and family structure (Donahue, Eckel, & Wilson, 2014; Hawkes, Houghton, & Rowe, 2009; Helsloot & Ruitenberg, 2004; Wachinger, Renn, Begg, & Kuhlicke, 2013). An important finding is that previous experience with a specific event have a high probability of leading to future preparedness for

similar events (Becker, Paton, Johnston, & Ronan, 2013; Wachinger et al., 2013).

A large body of research studies community resources during disasters. It has been long recognised, for example, that community-based emergent groups can be mobilised during disasters (Drabek & McEntire, 2003; Quarantelli, 1984; Stallings & Quarantelli, 1985). Moreover, improvisatory techniques where existing capabilities are used in new ways are found to be important resources (Kendra & Wachtendorf, 2003, 2007). Social resources within a community, including 'a sense of community' and a high level of social capital or networks, are all contributors to a higher level of preparedness (e.g. Cutter et al., 2008; Dynes, 2006; Johansson & Linnell, 2012; Kapucu, 2008; Kim & Kang, 2010; McEntire & Myers, 2004; Paton, 2007). Other forms of capital such as human, physical, and financial are also found to be significant for community disaster response (Rademacher, 2013).

Nevertheless, there is reason to discuss how the concept of preparedness has been used in research and in policy to date. Together with similar concepts such as disaster risk reduction (DRR) and disaster risk management (DRM), as well as the more overarching concept of resilience (see Tierney, 2015), preparedness is clearly a current issue, highlighted in recent international policy documents such as the Hyogo framework for action (ISDR, 2007) and the UN's disaster resilience scorecard for cities (UNDRR, 2017). However, according to recent research on the conceptualisation of preparedness, there is a lack of consensus about what preparedness entails among scholars. Staupe-Delgado and Kruke (2018) argue that a strong applied focus within disaster studies has led to little theorising of concepts such as preparedness (see also Sutton & Tierney, 2006; Tierney, 2007, 2015). Kirschenbaum (2002) points to the political origin of preparedness, which he argues reflects the language used in preparedness studies. This view is supported by Baker (2013, 2014) and Baker and Grant Ludwig (2018) who claim that a 'traditional preparedness' view is dominant within the field. Traditional preparedness is conceptualised as planning activities, training, drills and exercises, preparedness kits and supplies, defined as an 'attribute-based' view by (Kirschenbaum,

2002). Baker (2013) further argues that traditional preparedness has a top-down approach to preparedness, where relevant preparedness activities are defined by the authorities or organisations. In an extensive review of the concept of preparedness, Nojang (2015) argues that preparedness is most often measured as a state of readiness – to complete an action in relation to preparedness – and when measured as such, the level of preparedness tends to be low.

According to Tuohy, Stephens, and Johnston (2014), disaster research on household preparedness has to date been conducted within a socio-psychological perspective, which is largely based on the correlation between individual perceptions and attitudes and preparedness behaviours. This implies that if individuals are correctly informed, aware of, and knowledgeable about preparedness, they will behave accordingly (Lupton, 2013). However, the individualised cognitive perspective rarely includes the wider social context (Lindell & Perry, 2000). Also, most preparedness studies are based on quantitative surveys where respondents report on predefined measurements of preparedness. However, it is unclear whether they are in fact the most relevant preparedness indicators (Diekman, Kearney, O'Neil, & Mack, 2007; Uscher-Pines, Chandra, Acosta, & Kellermann, 2012).

Our aim in this article, is to provide knowledge on why households seem to have a low engagement in preparedness. This we do by looking at the social context through the lens of social practices. We make two arguments: (i) that preparedness is low only when conceptualised as an active state of readiness, and (ii) that policies aimed at increasing awareness does not necessarily increase the level of preparedness. The article brings forth a social practice perspective that studies how household preparedness is interwoven in an array of everyday practices. Preparedness understood as part of social practices, we argue, is a built-in and taken for granted capacity to cope with outages within a given social and cultural context (Heidenstrøm, 2019; Heidenstrøm & Kvarnlöf, 2017; Heidenstrøm & Rhiger Hansen, in-press). Such an argument also has important implications for risk management policy. Rather than increasing awareness in the general population through information campaigns that promote active citizen participation in

preparedness, we suggest that such policy should recognise that household preparedness includes a variety of practices that are seemingly unrelated to preparedness. We believe that a social practice perspective on preparedness for infrastructure breakdowns is beneficial to policy because it provides an understanding of why citizens are unengaged in preparedness, as well as it emphasises social, cultural and material resources of households that are currently understudied.

4. A social practice perspective on household preparedness for infrastructure breakdowns

A number of studies have been devoted to understanding how households use energy and ICT from a social practice perspective (e.g. Gram-Hanssen, Heidenstrøm, Vittersø, Madsen, & Jacobsen, 2016; Hansen, 2018; Hargreaves, Nye, & Burgess, 2010; Pink & Mackley, 2012; Røpke, Christensen, & Jensen, 2010; Shove & Walker, 2014; Strengers, 2012; Wilhite, Nakagami, Masuda, Yamaga, & Haneda, 1996). Such studies argue that we should produce a different type of knowledge about energy consumption by looking at socially shared practices instead of individual behaviour (Labanca & Bertoldi, 2018; Shove, 2010; Southerton, 2013). Contrary to behaviourism, the social practice perspective recognises that most of what we do is not a result of reflexive decisions, but that we rather do and redo socially and culturally shared practices. Moreover, an individualist focus downplays the importance of the social and political contexts that produce specific preparedness discourses (Blake, Marlowe, & Johnston, 2017). Our aim in this study is thus to move away from behaviourism, and rather look at how preparedness is intertwined in the socially situated everyday lives of Norwegian households.

Although practice theory is not one unified theory, a sensibility to practice has been present in the social sciences dating back to scholars such as Giddens (1984) and Bourdieu (1977). In this article, we make use of a practice perspective outlined by Schatzki (1996), suggesting that the social world is entirely made up of practices. Practices can be studied as entities consisting of elements that together form a practice. Shove, Pantzar, and Watson (2012) propose these elements to be grouped as

competences (all forms of explicit and embodied knowledge and skills), *meanings* (the social significance of participating in a practice, the norms, values and emotions associated with a practice), and *materials* (things, technologies, infrastructures and physical surroundings). When studying the performance of practices, we look at how these elements come into play when a practitioner does a task such as light a fire or cook a meal, and how practices are interconnected. Some practices can be studied as units. However, we argue that preparedness is not something that is done in itself. Preparedness is the result of households' performance of several practices, and can be defined as the ability to sustain infrastructure dependent practices without access to infrastructure (Trentmann, 2009). During outages, infrastructure-dependent practices lose one of their material elements and need to be reconfigured to persist. To do so requires alternative materials and associated competences. From a practice perspective, these resources do not belong to the individual, but to the practices individuals perform.

Over the past few years, some studies have engaged with how infrastructure breakdowns affect household practices. A case in point, which shows the interdependence of ICT and energy systems, is the loss of power in Lancaster due to flooding (Kemp, 2016). The subsequent blackout affected a number of other services that the public take for granted, and that greatly affects their everyday practices: mobile phone coverage was lost within the hour, internet was lost, electronic payment systems and ATMs did not work, digital radio services (DAB) were affected, no traffic lights or petrol or diesel as the fuel pumps are driven by electricity. Ghanem et al. (2016) looked at how British households coped with such outages, and found strategies of tweaking household practices for cooking, heating and communicating to maintain an acceptable level of comfort. Moreover, the local community distributed their available resources amongst each other. Wethal (2020) and Heidenstrøm and Kvarnlöf (2017) similarly find that rural Norwegian households are able to mobilise coping strategies during blackouts, and that these strategies are already part of their household practices. Both studies emphasise that infrastructure breakdowns are considered low risk, and can even be framed as cosy (see also Guldåker, 2009; Helsloot

& Beerens, 2009; Silvast, 2017). Helsloot and Beerens (2009) also report that Dutch citizens considered outages low risk, and were also able to continue their everyday lives during the outage, mobilising existing resources. Wethal (2020) argues that living in a rural location invoked an identity of being able to cope without help from the authorities. Heidenstrøm and Rhiger Hansen (in-press) find that rural households had a higher level of competence to cope with infrastructure breakdowns than urban households did due to their previous experience, local knowledge and extensive social networks.

Taken together, these studies have demonstrated that household preparedness is influenced by other factors than those directly linked to preparedness for outages (Ghanem et al., 2016). These factors include local knowledge of weather, climate, place and people, the flow of social and material resources in various kinds of social networks, the division of labour between men and women in the household, energy consumption habits, mobile phone use and so on. In the present article, we aim to show the differences between understanding preparedness as readiness, and understanding preparedness as embedded in social practices. The following section presents our case in more detail.

5. Methods and data material

There is a need to extend the research methodologies used to study the constituents of household preparedness (Tuohy et al., 2014). The ethnographic interview approach of this study, aimed to produce in-depth data about how households themselves understand preparedness within the context of everyday life, giving primacy to social and cultural knowledge. Our position prior to entering the field, was that most households did not actively engage in preparedness. This was confirmed by a representative survey (N=1005) that the project conducted in 2016, a year into the qualitative data collection. The survey results show that about 15 per cent of Norwegian respondents had an emergency plan and knew of local meeting places, only seven per cent knew of local preparedness plans, while 30 per cent knew where they could get information from the authorities during a disaster (Storm-Mathisen & Lavik, 2016).

Our research interest has thus been to explore preparedness through the social, cultural, and material resources that could be mobilised during infrastructure breakdowns. To identify these resources, we constructed a methodological design that emphasised the performance of social practices. First, we used a 'performance-based interview style' (Hitchings, 2012), focussing on how infrastructure-dependent practices (e.g. cooking, heating, cleaning, lighting) could be performed without access to infrastructure, and on future scenarios ('what would you do if the infrastructure broke down right now?'). Other key themes in the interviews were previous experiences with limited access to infrastructure, use of material resources that are part of household practices, communication and social networks, knowledge about governmental and industry preparedness plans and actors. Second, we conducted 'walk-along tours' (Carpiano, 2009; Kusenbach, 2003; Pink, 2007) in the homes of the participants, focussing on use of material resources and demonstrating different practices without infrastructure. Third, these tours were photographed, producing inventories of resources as well as usage during the tour. For a detailed account of the methodology, see Heidenstrøm (2019).

The design was implemented in at-home visits to 25 Norwegian households, organised in two case studies.[15] Case Study I consists of visits to households in Lærdal who experienced hurricane Dagmar as well as the fire. A municipality employee came to be a key informant that contributed to recruiting nine households and six governmental actors (the latter not included in the present analysis). The main recruitment criterium was households who lost their electricity and ICT supply during and in the aftermath of the events. Secondly, we aimed to cover different age groups (16-25, 25-40, 40-55, 55-70, 70-85 yrs.), we pursued even gender distribution, as well as differences in family structures (couples and single households with and without children). Case Study II examined how rural and urban households with and without previous experience prepared for future infrastructure

[15] The Norwegian Centre for Research Data (NSD) has approved the project, and all participants signed a written consent right after the visit containing a separate section for consenting to the use of photos in dissemination activities.

breakdowns. We recruited six households in Grue, a rural municipality and ten households in Norway's capital Oslo by means of Norstat recruitment agency, using the same recruitment criteria as above. All interviews were conducted between 2015-2017 and were fully recorded and transcribed. The total sample includes 42 participants (22 women and 20 men), with an average age of 47 (17-84 years), as well as different dwelling and household types. Appendix 1 provides a detailed overview of the data material.

The data analysis was conducted using the classic inductive strategy suggested by Glaser and Strauss (1967). A first step included an inductive reading where we identified words and phrases used by the participants. These were in a second step organised into codes that represented similar words, phrases, and narratives. The codes were added to the HyperResearch software, and all interviews were coded. In a third step, codes were connected. Importantly, the case study analysis is an 'embedded analysis' of one specific aspect of the case, the infrastructure breakdown (Creswell, 2007; Flyvbjerg, 2006).

Although hard to define, saturation of the sample was considered using two strategies. First, towards the end of the interview, all participants were asked whether they had anything else to add to the topic of interest to ensure that we had covered as many aspects of the topic as possible. Second, analytical saturation was reached when no new narratives about the topics of interests were found in the material, and no new codes were generated (Guest, Bunce, & Johnson, 2006). Trustworthiness of the data was ensured through methodological triangulation within the qualitative design using the three techniques described above to gather data, as well as by participation of multiple researchers in the data collection, including discussions after each interview, and analysis including generating codes, reading transcripts, and producing analytical categories (Denzin, 2012; Golafshani, 2003).

Methodological limitations to be considered include the post-event research design, meaning that we did not observe the actual performances of the participants during infrastructure breakdowns. Moreover, the sample in Case Study I consists of families with similar

socio-economic status, dwelling type, and family structure, and is more homogenous than the sample in Case Study II, where greater variation was achieved. Different recruitment strategies might also have influenced the selection of participants. The study was conducted within the cultural, social and political context of Norway. Research from other developed countries have yielded similar results as those presented here (see section 4), but research on infrastructure breakdowns in developing countries where the infrastructure system is less stable and where the political system is different, other coping strategies are found to be of importance (Ghanem, 2018; Graham, 2010).

6. Results

The results section explores the level of engagement in preparedness among the households. We do this firstly by looking at acquisition of material preparedness resources, the immediate response strategies of households, and how households understand the division of responsibility for preparedness between themselves and other actors. Secondly, we argue that the lack of engagement in preparedness is not the same as being unprepared. We identify coping strategies that are found to be important during infrastructure breakdowns, because they fall outside the conceptualisation of preparedness as an active state of readiness. These, we have labelled informal preparedness measures.

6.1 Engagement in preparedness

In line with Baker (2013) who found little or no engagement in explicit preparedness practices among her interviewees, and Helsloot and Beerens (2009) who report that over half of respondents did not know in advance what to do during a power outage, the participating households in our study had not thought much about preparedness or implemented any measures they themselves defined as preparedness. None of them had drafted a family emergency plan or were stocking supplies for the purpose of preparedness. For most of them, it was not something they had engaged in at all, which was commonly expressed, in particular in the urban households: '*No, we don't think about that on an everyday basis*' (Man, 51, Oslo), *'I don't really think much about preparing for*

blackouts, I don't really' (Woman, 29, Oslo), *'We obviously don't give a damn about preparedness, but it is smart to think about it'* (Woman, 50, Oslo), *'We take electricity for granted in 2017, right. Especially when you have grown up with it and have never experienced not having it'* (Woman, 31, Oslo).

The lack of explicit preparedness actions is also evident from the type of material resources present in households. In the interviews, the families were presented with a list of supplies provided by the Norwegian Directorate for Civil Protection (DSB) to advise households about preparedness.[16] We asked whether the families had heard about the list or owned and maintained supplies. Further, we asked them to show us the resources they had at home. None had heard about the list, but many already owned several resources such as batteries, candles, flashlights, battery radios, gas burners, and canned food, and in the rural households also firewood. However, these were not given meaning as preparedness resources.

What is particularly interesting here are the resources that were not present in the households. For example, only one family had stored bottled water to cover three days demand. Bottled water was not used in any existing household practices. Thus, this was a resource to be acquired and maintained specifically for preparedness. Outages may have a knock-on effect on water provision, as this is dependent on both ICT-based systems to function properly, and electricity for water pumps. One of the participants talked about storing water:

> *No, I have not stored any water, I just take it from the tap, so… I guess I don't have that. (…) The first thing I would do would have to empty a soda bottle and filled it with water instead. I would have to fill water in bottles I already have, eh...* (Woman, 29, Oslo).

[16] In 2015-2017, the list included bottled water, dried foods, a battery-operated radio, flashlights, candles, matches, firewood, a first aid kit, and a primus. The list was updated in 2018, and now include more detailed recommendations regarding of water and food, medicines and other health related supplies, cash, fuel and iodine tablets. The full list can be viewed here: https://www.sikkerhverdag.no/en/being-prepared/incidents-and-crises/advice-on-self-preparedness-for-emergencies/

Permanent storage of water was believed to be unnecessary because the families relied on getting information about upcoming infrastructure breakdowns or anticipating it themselves. Such knowledge gave the participants time to fill up bottles, buckets or their bathtub, as this participant said: '*Like at Christmas we got a weather forecast about heavy winds. Then we wanted to be precautionary and stored water'* (Man, 40, Grue). Some considered it unnecessary in any situation, as this participant argues: *'No, we have not stored water. You drink like two litres each, so we had to have enormous amounts of water for it to be of any help'* (Man, 45, Oslo). Others believed they would get access to drinking water in wells, creeks, or use the water in their boiler, particularly in the rural households:

> *Here we have rivers and creeks in the mountains from which you can get drinking water. So, having drinking water for three days, you are supposed to keep it cool even. Then you would have to have a tank. No, these are city preparedness. Even though the directorate should cover the whole nation, they have not gotten further than thinking about cities. It should have said 'only for cities' on that list* (Man, 72, Lærdal).

The above quote also shows differences between rural and urban households. While rural households argued they could cope with their existing resources, urban households expected other actors to fix the problem rapidly. This is further discussed below.

A second resource considered unnecessary was to write down important phone numbers in case mobile phones were to run out of battery. Most participants did not have this, and some even reacted with surprise, like this family:

> Interviewer: *You have a landline, so do you have an address book or a list of phone numbers, or is everything stored in your mobile phones?*
> Woman: *Oh, no, we have… no!*
> Man: *(laughs)*
> Woman: *I think that's crazy* (Woman, 68, Man, 70, Grue)

Unlike stored water that has never belonged to any household practice in Norway, address books were common to have prior to storing phone numbers digitally. With the technological convergence of the mobile phones, address books no longer serve any purpose beyond preparedness. The participants relied on functioning internet connection either by 4G or Wi-Fi during infrastructure breakdowns to get information and access to phone numbers, as talked about in this interview:

> Interviewer: *You do not have a landline, and if the electricity was to disappear, you would call the energy company. Is that a phone number you remember, or how would you do that?*
> Man: *No, I would have to search the internet*
> Interviewer: *But you would not have Wi-Fi?*
> Man: *No, that's true. I would have to use 3G or 4G* (Man, 40, Oslo).

Such a line of argument was quite common in the interviews. Severe and long-lasting infrastructure breakdowns were not seen as particularly dangerous, and the participants believed that some infrastructure would be available within a short amount of time (Baker, 2014; Wethal, 2020). Thus, they presented alternative infrastructure dependent strategies that they believed would work, which is also found in other studies of disrupted ICT infrastructure (Al-Akkad et al., 2013). Their dependency on and trust in a functioning infrastructure is also reflected in not having cash available, which is another preparedness resource listed by the authorities. Some had cash at the time of our visit, but it was by chance, like this participant said: *'(laughs) it was just pure luck that we had cash back then [after the Lærdal fire], I would not had that today, I just happened to have it at the time'* (Woman, 55, Lærdal).

Low implementation of recommended preparedness measures might be seen as a consequence of the social and political context of the Nordic welfare regime. According to Cornia, Dressel, and Pfeil (2014), the Nordic countries belong to a 'state-oriented risk culture' where citizens expect the government to take responsibility in case of crises. According to Aune, Ryghaug, and Godbolt (2011), the energy culture in Norway is similarly state-oriented. Norwegians expect a stable electricity supply

across seasons, at a low cost. Several studies have also shown that citizens who believe that being prepared is in part their own responsibility have a higher level of individual preparedness compared to those who believed that the responsibility lied with other actors, such as the authorities (Basolo et al., 2008; Lindell & Perry, 2000; Paton et al., 2006; Terpstra & Lindell, 2013).

6.2 Waiting as a response strategy

Although Norway has experienced several extreme weather events over the past ten years, the participants did not consider them to be dangerous or frequent enough to actively engage in preparedness. In a Swedish context, Palm (2009) found that households did not consider themselves responsible for preparing for outages, and during an outage they expected the grid company to fix the problem and municipalities to take care of citizens (see also Palm, 2008). This lack of engagement was a result of how households understood a division of responsibilities and seeing themselves as capable to handle an outage with existing resources. Moreover, about a third of the respondents contacted the grid company to obtain information about the duration of the outage and expected someone else to call without knowing who that would be.

One of the participants summed up the overall attitude we found in our study: *I don't think I would be very worried nowadays either* (laughs), *I just think that I would trust it to be fixed, and just waited it out'* (Woman, 37, Oslo). Many also expressed that they did not want to be of nuisance to the responsible actors during an outage:

> Woman: *I don't feel that we were very active in finding out when the electricity would return either*
> Man: *No, but we had what we needed*
> Woman: *Yes, and we might not be the first ones to call and nag*
> Man: *We do not worry, and we do not nag* (Woman 39, Man, 40, Grue)

However, urban households expected the outage to be fixed within a shorter amount of time than the rural households did. One of the participants from Grue talks about this:

> *The nearby village got the electricity back a lot sooner than us out here. They prioritize areas that are populated, you know. As I said, we are at the end of the power line, I think, and there are always problems with the generator up here* (Man, 69, Grue).

In rural areas, households believed that they should and was expected to manage for an extensive period without infrastructure, as one participant talked about: *'Are there any limitations? We would have dirty clothes eventually, but we would manage. We have what we need (…). We could manage for a long time'* (Man, 40, Grue).

Rural households also appeared to be more active in contacting authorities and companies during an outage. This participant compares his activities living in an area with few people to his present residence in a more populated area:

> Interviewer: *Would you call the electricity company or something like that during an extensive blackout?*
> Man: *I have not done that, because someone would alert them immediately*
> Interviewer: *You think that it will be taken care of?*
> Man: *Yes (…) but back when I lived in a different village I had to call immediately, there were so few people there, where I come from, so then I had to call. Here, there are loads of people that would call, you know* (Man, 69, Grue).

Statements like this where 'someone' was supposed to manage the infrastructure breakdown are explored further in the following section.

6.3 'Someone' will manage infrastructure breakdowns

The word 'preparedness' was perceived to be part of a policy vocabulary that the participants did not relate to. When they talked about preparedness it was most often about governmental preparedness. The actors in these stories were not themselves, but rather national and local authorities, emergency personnel (police, ambulance, and fire dep.), and industry actors such as the grid operators or telecom companies. Most often, the responsibility for infrastructure breakdowns was given to 'someone' that at some point would provide alternative services or

correct the problem, as this participant expressed; *'The most important reason is that I have thought that, I trust that someone has already discovered the error. That an alarm goes off somewhere, something happens'* (Man, 45, Oslo). 'Someone' appeared to entail a range of actors, their responsibilities as well as how the households themselves related to them. In figure 1, we have categorized our empirical data in three interconnected categories of actors that the households found to be responsible for managing and preparing for infrastructure breakdowns.

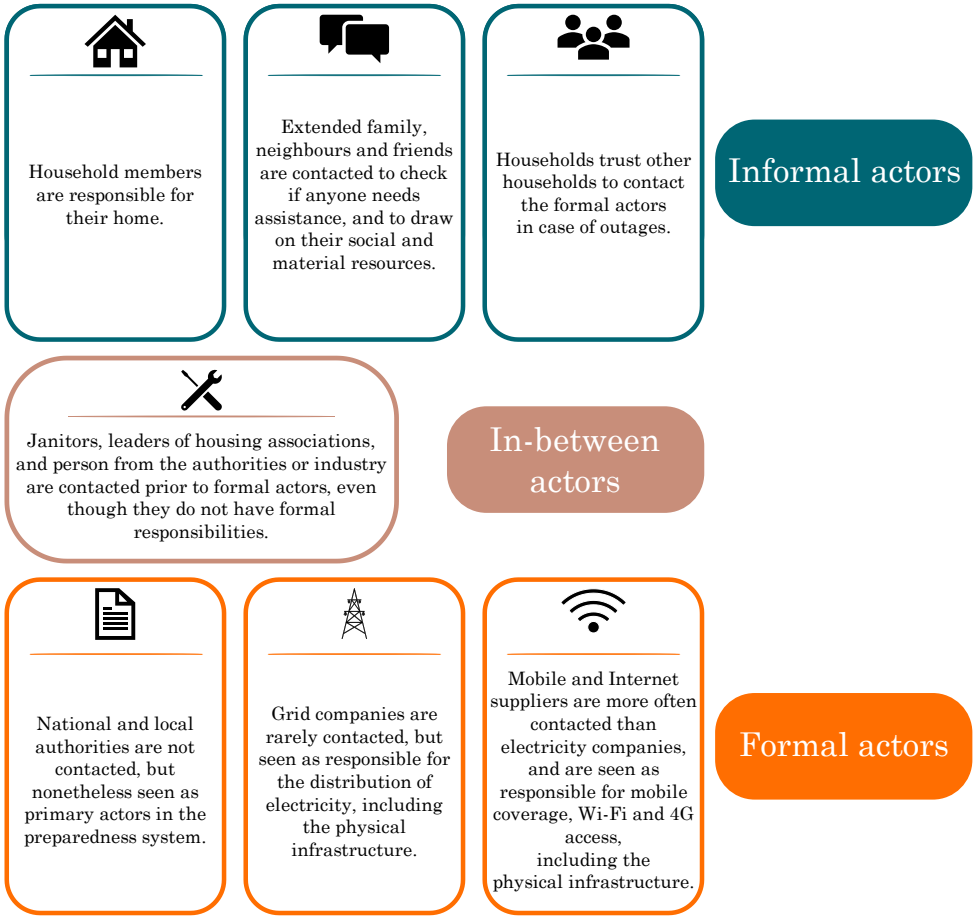

Figure 1: Households' perceived distribution of responsibility for infrastructure breakdowns

Informal actors are defined as individuals within the household, from their own social networks, and other citizens in general. They are informal because they do not have any assigned responsibilities to manage outages. In case of an extensive outage, the households saw

themselves as responsible for their own home for a certain amount of time, and would provide or seek help from neighbours, family and friends, as stated by one participant: *'Maybe I would have called someone that lives around here. I could have contacted my neighbour to check whether they had lost their electricity supply as well. Then I would check the online newspapers'* (Woman, 31, Oslo). The responsibility of households during extensive outages was seen to be limited to their own home as a material unit, and not the infrastructure beyond this. The services coming into their homes such as energy and water supply, internet and mobile coverage were seen to be the responsibility of authorities and grid companies. The resources of households are further explored in section 6.4.

In-between actors are defined as individuals the participants knew in person and could contact directly. For example, one participant talked about their housing association: *'I don't think I would have contacted anyone (…) the chairman [of the housing association] would have taken the responsibility'* (Woman, 50, Oslo). In-between actors could also be people in the participants' extended social networks that worked as engineers, in the military, the fire department, or that had contact with the authorities. These individuals might be contacted for aid or information during breakdowns.

Some members of the rural households we interviewed saw themselves as such in-between actors. One participant said that: *'A friend called me [during the Lærdal fire] because he knew that I was a former fire fighter, and that he would get information from me* (Man, 69, Lærdal). Some participants also wanted to take an active part in ensuring that the infrastructure was functioning, but were not always allowed to, like this farmer talks about:

> *A friend and I offered to clean up after hurricane Dagmar, in a forest area right up here. (…) several trees were leaning over the power lines, but it is the company's responsibility. My friend called them and said that the trees were in danger of falling over the lines at any time and asked whether they could send someone to cut them down. We did not want to do it ourselves, because if*

> *anything should happen, we are responsible. If the company could just send someone to cut down the trees, then we could remove them. But no, we were not allowed to* (Man, 45, Lærdal).

Stories like this also included events where the participants had broken regulations and tried to secure the power lines anyway. This can be seen as a 'moral economy' of preparedness. The farmers who wanted to cut down the trees had the equipment and the skills to do so and do the community good, but it would cost them money if anything went wrong because they have no formalised responsibility for preparedness.

Finally, formal actors are defined as national and local authorities, grid operators and tele companies that were perceived to be the active part in risk management. These actors have legal responsibilities to ensure a secure infrastructure, and when the participants referred to 'someone' it was most often the formal actors, even though they were unsure about the distribution of responsibility between these actors. The participants took on different roles when talking about electricity supply and ICT services. For electricity, they took on the role as citizens, expecting energy supply to be provided by the authorities and companies, and very few had ever called the grid company and would not do so in case of an outage. For ICT, they took on the role as consumers, purchasing Wi-Fi and mobile subscriptions, were more eager to contact companies, and expected them to restore the infrastructure quickly (Throne-Holst, Slettemås, Kvarnlöf, & Tomasson, 2015). We consider this a result of the Norwegian energy culture where electricity has long been regarded as a common good for the whole population provided by the authorities, while ICT's are new technologies accessed in a market (Aune, 2007; Aune et al., 2011). Furthermore, mobile services provide infrastructure to practices that are much more conspicuous than electricity (Shove & Warde, 2002).

6.4 Preparedness as part of everyday practices

The results section so far has explored why Norwegian households are unengaged in preparedness. However, there is a discrepancy between preparedness conceptualised as readiness, and the actual coping

strategies of households. This discrepancy can be exemplified with a discussion with a couple from Lærdal:

> Interviewer: *Is there anything you do differently now after the fire, based on your experience?*
> Man: *No, we as private citizens do nothing. Your question should be asked to someone dealing with the preparedness plans.*
> Interviewer: *Yes, and we have done so. I was wondering, did you pick up lessons from your experiences?*
> Woman: *I never light a candle outside if it is windy*
> Man: *Oh, these are the things you ask about* (Woman, 66, Man, 69, Lærdal).

The couple continued to talk about precautions with using the wood stove during strong winds, where they kept their headlights and batteries in case of outages, and knowing how to regain mobile coverage from a near-by village (Heidenstrøm & Storm-Mathisen, 2017). These are materials and competences that are seldom given emphasis in preparedness studies. Nevertheless, they are part of the important resources of households in case of extensive infrastructure breakdowns.

The quote also points to a methodological point. When preparedness is conceptualised to consist of specific attributes, we are missing out on important knowledge about the tacit resources that might be important to the level of preparedness although it is not connected explicitly to preparedness (Kirschenbaum, 2002). In previous articles, we have given detailed accounts of these resources. Heidenstrøm and Kvarnlöf (2017) identified practices from hiking trips and cabin life, which consisted of important competences, such as lighting a fire and cooking with a primus, and owning and maintaining material resources, that would be crucial to manage without infrastructure. Heidenstrøm and Rhiger Hansen (in-press) have further considered the importance of 'embodied competences' for household preparedness. In a social practice perspective, competences are defined as the skills of knowing how to perform a practice (Schatzki, 1996). An embodied preparedness competence consisting of three constituents was found to be of importance to preparedness. Firstly, previous experience was found to

build competences to manage future outages. Whereas previous research has emphasised the impact of previous experience from disastrous events (see section 2), we found that previous experiences of living with limited access to electricity and ICT, for instance cabin life practices and older generations practices in a time where infrastructures were less developed, generated a competence to dealing with outages. Experiences with long-term outages represented a 'moment of reflexivity' where the participants became aware of their own preparedness resources that could be mobilised and barriers to be addressed (see also Rinkinen, 2013). Secondly, knowledge about the local climate and weather conditions, the built environment such as base stations, power lines and tunnels and roads enabled households to anticipate outages and implement measures. Thirdly, extensive social networks involved a flow of resources in the form of information and skills, and material preparedness resources that were shared between members of the network. The embodied competence was found to be higher in rural than in urban households.

In figure 2, we have summarised some materials and competences, and the interconnectedness between them, found to be of importance to cope with and prepare for infrastructure breakdowns.

Figure 2: Participants displaying material preparedness (photos taken by the authors).

In the two top left photographs, a participant showed us how to use camping gear that he believed would be an important resource during outages. In the top right photographs, another participant gave us a tour of her kitchen where we talked about the family's shopping and storage routines. During these tours, we were given insight into the moral economy of the household practices. There was a division of responsibility between women who were more often responsible for food acquisition, storage and cooking, and men who were more often responsible for supplies of firewood, tools, and car maintenance and fuelling (see also Heidenstrøm & Rhiger Hansen, in-press). Consequently, different household members we responsible for acquisition and maintenance of different preparedness resources. We also found that dwelling size and storage space affected the amount of

supplies. Detached dwellings had a lager stock of food, wood and fuel, as well as smaller items such as candles and batteries.

In the middle row, a scenario walk-along took place, and the participant showed us where the family kept their flashlight, and that he had a small amount of cash to be used in case bank terminals were not working[17]. The third photograph in this row shows tools that can be used in case of treefalls over the power lines.

In the bottom row, a woman showed us how to use their secondary heating source, a wood stove, which is present in over 60 per cent of Norwegian households (Statistics Norway, 2014). In the next photograph, a participant showed us his wood storage that he believed would last for several years. Another participant showed us their landline phone, which is present in only 15 per cent of Norwegian households (Norwegian Communications Authority, 2019). As the share of landlines are declining due to use of mobile phones, this is a preparedness resource that might disappear as a consequence of changed communication practices. However, resources such as the power bank for extra battery capacity on mobile phones shown in the next photograph, has over the past few years been integrated in our communication practices as a result of our dependence on these technologies even outside the home. The changes in this practice may also result in a higher level of preparedness.

These findings make the point that preparedness for infrastructure breakdowns exists embedded in many everyday practices, and when these practices are performed, important preparedness resources are established and maintained. Contrary to the active state of readiness that is argued to be the logic of preparedness (Lakoff, 2005, 2007), we frame these resources as 'informal household preparedness' (Heidenstrøm, 2019; Heidenstrøm & Kvarnlöf, 2017; Heidenstrøm & Rhiger Hansen, in-press). We use the term informal to emphasise that these resources are tacit forms of knowledge interconnected with

[17] In Norway, payment by credit card or mobile payment solutions by surpass cash payments. 80% of all purchases were done using cards or mobile solutions in 2018, according to the National Bank.

material resources that can be mobilised during infrastructure breakdowns. Preparedness was found to be less related to individual attributes and individual beliefs, and more to the materials, competences, and meanings of their everyday practices. As others, such as Ghanem et al. (2016), Wethal (2020), and Silvast (2017) have shown in different cultural contexts, the ability to adapt the elements used to perform a practice, to provide heat or light for example, is imperative to the level of preparedness. Thus, preparedness exists in households even when preparedness is not the intent of participating in these practices.

7. Conclusions and policy implications

This article has shown some of the dynamics of preparedness for extensive infrastructure breakdowns at a household level and why it matters to overall societal resilience. We have pointed to an important difference between a low level of engagement in preparedness defined as readiness, and preparedness as embedded in everyday household practices.

Norwegian households typically framed preparedness as part of the policy discourse, assigning public authorities, policy makers and industry actors' responsibility for dealing with overall preparedness. When the electricity disappeared, the most common strategy was to wait until it returned or until they received more information. This was a result of the households' expectations to other informal, in-between and formal actors to take responsibility. This expectation is at least partly based on the high level of trust in public authorities among Norwegian households.

However, households' informal preparedness resources contributed to upholding their everyday practices such as cooking and food storage, heating, lighting, communicating and so on, without infrastructure. We argue that low engagement in preparedness does not mean unprepared. The study contributes insights on the type of resources used by households during extensive infrastructure breakdowns. By applying a social practice perspective, the resources are framed as socially shared through the performance of everyday practices. This viewpoint can be

useful for policy makers in defining the community preparedness within a specific political and social context. It is particularly useful when dealing with the potential cascading effects of infrastructure breakdowns. Developed societies grow ever more dependent on infrastructures that are increasing both in complexity and connectedness with other parts of the infrastructure, like those between the ICT and electricity systems. Such issues may increase the likelihood of failures, as it becomes harder to have a complete overview of the total system. This further implies it will take more time to identify and fix potential failures. The social practice perspective emphasises the extent to which everyday life is disrupted and needs to be re-established during such breakdowns, as well as the extent to which households can re-establish practices without access to infrastructure.

A further implication of this study regards the authorities' risk communication to citizens. The study suggests that households do not see themselves as engaging in preparedness. They will probably not engage in increasing their own awareness about preparedness or actively search for information. At home, they do not see it as necessary to perform preparedness measures such as to stock certain supplies. Consequently, information campaigns about preparedness at a national level might not yield the desired results (Tulloch & Lupton, 2003; Tuohy et al., 2014). Future risk communication would probably benefit from avoiding policy language, as well as develop communication measures that go beyond mere written information.

The important role of communities has been recognised in recent risk management policies. However, scholars such as Benadusi (2014) argue that such policies tend to include a normative vision of culture, and reproduce a dichotomy between expert and experiential knowledge. We propose that local authorities develop community-based strategies that take their starting point in the infrastructure-dependent practices households engage in, and the competences and materials within these practices. Participatory processes designed to develop community preparedness plans that include the tacit competences of households entail active participation and empowerment of households. Households have expertise on their own everyday life that can be crucial input for

planners. By actively engaging with community members and stakeholders in the planning process, the planners both get vital input to their work while at the same time have an increased potential to achieve some degree of consensus among affected stakeholders and interests (Burby, 2003; Fiorino, 1990; Stirling, 2008). Including the local households in the development of preparedness plan would probably increase the likelihood that these plans will be read by household members (Scolobig, Prior, Schröter, Jörin, & Patt, 2015).

One concrete suggestion would be to develop 'citizen state contracts' where individuals are allowed to take responsibility for managing infrastructure breakdowns outside their home, and still be insured by the state. This would utilize the efforts of highly resourceful households without formally placing a responsibility with them, such as the farmers who wanted and had the skills and equipment to cut down trees to secure the power line. We are, however, aware that this points to a certain dilemma: At the one hand we suggest that households represent resources in the event of infrastructure breakdowns, however, we would hesitate to advice that any formal responsibility should be assigned to households.

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Appendix – Data material

Table 1: Case study I – Lærdal, Norway

Id.	Household members*	Dwelling characteristics	Interview context
1	**Woman (55)**, Man (55), two adult sons not living at home	Detached house with wood stove	At home interview including a walk along photo tour. 2 hrs, 15 min recording, 10 photos.
2	**Woman (48), Man (52), Daughter (17), Son (25)**	Detached house with wood stove	At home interview including a walk along photo tour. 1 hr, 41 min recording, 14 photos.
3	**Woman (52), Man (52)**, two teenage sons living at home	Detached house with wood stove.	At home interview including a walk along photo tour. 2 hrs, 48 min recording, 25 photos.
4	**Man (45), Woman (unknown age)**, son (10), new-born daughter	Farm with wood stove and generator	At home interview including a walk along photo tour. 2 hrs, 5 min recording, 76 photos
5	**Man (69), Woman (66)**, son (30)	Detached house with wood stove	At home interview including a walk along photo tour. 1 hr, 13 min recording, 14 photos
6	**Man (84)**, Woman (82)	Detached house with wood stove	At home interview including a walk along photo tour. 1 hr, 47min recording, 24 photos
7	**Man (72)**, Woman (73)	Detached house with wood stove	At home interview. 1 hr, 14 min recording
8	**Woman (17)** from household 2, and her friend **Woman (17)** were interviewed together	Detached house with wood stove and apartment without wood stove	Interview in the home of household 2. Second visit. 1 hr, 20 min recording
9	**Man (72)**, Woman (70)	Detached house with wood stove	At home interview including a walk along photo tour. 1 hr, 45 min recording, 23 photos

Table 2: Case study II – Grue, Norway

Id.	Household members	Dwelling characteristics	Interview context
10	**Man (63), Woman (59)**	Detached house with wood stove	At home interview including a walk along photo tour. 2 hr, 1 min recording, 20 photos

11	**Man (40), Woman (39)**, four young children living at home	Detached house with wood stove	At home interview including a walk along photo tour. 1 hr, 52 min recording, 25 photos
12	**Man (51)**, Woman (50), three teenage daughters living at home	Farm with wood stove	At home interview including a walk along photo tour. 1hr, 28min recording, 10 photos
13	**Man (69), Woman (unknown age)**	Detached house with wood stove	At home interview including a partial walk-along photo tour. 1 hr, 10min recording, 6 photos
14	**Woman (70), Man (68)**	Detached house with wood stove	At home interview including a walk-along photo tour. 1 hr, 47 min recording, 21 photos
15	**Man (42), Woman (unknown age)**, four children living at home	Detached house with wood stove	At home interview including a walk-along photo tour. 1 hr, 49 min recording, 32 photos

Table 3: Case study II – Oslo, Norway

Id.	Household members	Dwelling characteristics	Interview context
16	**Woman (22)**	Apartment without alternative heating	At home interview including a walk-along photo tour. 50min recording, 14 photos
17	**Man (51), Woman (unknown age)**	Apartment with gas heating	At home interview including a walk-along photo tour. 52 min recording, 21 photos
18	**Woman (29)**	Apartment without alternative heating	At home interview including a walk-along photo tour. 1hr, 46 min recording, 23 photos
19	**Woman (50), Man (45)**	Apartment with wood heating	At home interview including a walk-along photo tour. 1hr, 53 min recording, 21 photos
20	**Man (71), Woman (70)**	Apartment with wood heating	At home interview including a walk-along photo tour. 1hr, 5 min recording, 31 photos
21	**Man (73), woman (70)**	Apartment without alternative heating	At home interview including a walk-along photo tour. 1hr, 17 min recording, 83 photos
22	**Woman (48)**, Man (48) and one child (10) living at home	Detached house with wood heating	At home interview including a walk-along photo tour. 1hr, 16 min recording, 80 photos

23	**Woman (37), Man (33)**, two children (7, 3) living at home	Apartment without alternative heating	At home interview including a walk-along photo tour. 1hr, 27 min recording, 39 photos
24	**Man (31), Woman (31)**, two children (3, new-born) living at home	Apartment without alternative heating	At home interview including a walk-along photo tour. 1hr, 5 min recording, 45 photos
25	**Man (45)**, Woman (unknown age), three children living at home	Apartment without alternative heating	At home interview including a walk-along photo tour. 1hr, 20 min recording, 42 photos

***participants marked in bold**

Appendix 1: Interview guides for Case Study I & II

The interview guides are translated from Norwegian.

Case study I

1. Introduction

Information about the project

This project is called HOMERISK and is about how households cope with breakdowns in the electricity and ICT infrastructure, and how they prepare for extensive outages. The project started in the fall of 2014 and is financed by the Research Council of Norway. In the project, we work together with researchers from Sweden and Iceland. In one part of the project, we talk to households who have experienced a crisis where the electricity, mobile coverage and internet stopped working. In Norway, we are going to talk to households that were affected by the fire in Lærdal in 2014, and hurricane Dagmar in 2011. In addition, we will talk to households about their preparedness for future outages.

The participant should then be presented with information about the ethical guidelines of the project, including anonymity, data storage and storage of contact information, and written consent. Give specific information about use of audio recorder and camera.

Introductory questions

- Can you tell us about your household?
    - Who lives here? (age, gender, occupation)
    - Can you tell us about your dwelling? (heating sources, renovation measures, how long have you lived here, equipment, alarm, insurance)

Questions about the event

2. Before the event

- When did you find out about the event?
- How did you find about the event? (by whom, and in what way)
- How serious did you think the event was?
- Was there anything in your surroundings that indicated that this would be a serious event? (e.g. the weather, previous experiences with such events, information, communication with others, the media)
- Do you remember what you did right before the event?
- Did you implement any precautionary actions right before the event? In that case, which and when?

3. The narrative of the event

- Can you tell us about how you experienced the event? (Emotions, specific episodes, actions etc.)
    - Where you were when the event happened?
    - Who were you with?
    - What was the first thing you did?
    - Who did you contact?
    - Who contacted you?
    - Did you go anywhere in particular? Where?
- What material objects were important during the event?
    - Did you use any objects to accomplish what you did?
    - How were they used?
    - Did you secure any items?
    - Were there items that you thought you should have had access to?
- Who were important for you during the event?
    - Family, friends, neighbours
    - Crisis management team, fire-, and police department, the hospital, municipality employees
    - Others

4. Electricity breakdown

- Did the electricity disappear in your home during the event?
    - When did it disappear?
    - Where were you when it disappeared?
    - What did you do when it disappeared?
    - How long was it gone for?
    - What did the outage mean for your family during the event? (e.g. what stopped working, what were you not able to do)
    - Did you have any alternative heating sources?
    - Did you implement any measures? (e.g. food storage, lighting, heating)

5. ICT breakdown

- Did the mobile coverage disappear in your home during the event?
    - When did it disappear?
    - What did you do when it disappeared?
    - How long was it gone for?
    - What did the outage mean for your family during the event?
    - How did you communicate with others during the event?
    - Did anyone try to reach you? (e.g. family, friends, people from outside the affected area)
    - Do you have a landline, and did you use it?
- Did the internet connection disappear in your home during the event?
    - If yes: How did you receive information about the event?
    - If no: did you use the internet to get information about the event. In that case, where?

6. Immediate consequences of the event

- In what ways was your household affected by the event?
    - Direct or indirect involvement
    - Material damages

- Evacuation

7. Post-event changes

- How did the event affect your day-to-day lives?
  - Did you do anything differently?
  - Did anything happen to your house?
  - Did you purchase any new items, or replace items you used during the event?
- Did your preparedness change after the event?
  - Are you more prepared for similar events?
  - Are you more prepared for other types of events?
  - If something similar was to happen again, would you do anything differently?

Preparedness questions

8. Previous experiences with electricity and ICT infrastructure breakdowns

- Have you experienced extensive outages before?
  - Do you remember what you did when the electricity disappeared?
  - How long was the outage?
  - How did it affect your household? (e.g. what stopped working, what were you not able to do)
- Did the internet and mobile coverage also disappear?
  - How did it affect your household?
  - Who did you communicate with and why?
  - How did you communicate with them?
- What material objects were important during the outage?
- Did you receive any help from someone during the outage?

9. Preparedness

- Can you show us and tell *(include walk-along tour in this section).*

9a. Preparedness for electricity and ICT outages

- What will you do if the electricity/internet connection/telecommunication disappeared now?
    - What is the first thing you would check?
    - Who is the first person you would talk with?
- If the electricity supply is not back after your initial measures, what do you do then?
- Do you have any material objects that you use when the infrastructure disappears?
    - Why do you have these objects?
    - Are there other objects you think that you should have, but do not?
    - Do you have any experiences with outages that made you acquire certain objects?

9b. General preparedness

- Has your household implemented any preparedness measures for any type of event?
- Does your family have an emergency plan in case of an emergency, crisis or disaster?
- Are you familiar with the Norwegian Directorate for Civil Protection (DSB) and their website 'secure everyday life', where you can find a list of household preparedness items?[18]

- Do you have any of the items on the list? Can you show us?
- Can you think of any other things that you do regularly, that can be a type of preparedness?

10. Knowledge about preparedness plans and actors

- Are you familiar with the preparedness plans in your local area?
  - Who is responsible for these plans?
  - Where can you find information?
  - Who should you contact in case of an event?
- How do you see your own role in the case of preparedness?
  - What are you responsible for?
  - Who else has a responsibility for preparedness?
- What do you think should be done to maximize household preparedness in Norway?

[18] Note that the list from DSB is based on their information campaigns from 2013-2018. In 2018, a new version of the website was launched, and the brochure "You are part of Norway's emergency preparedness" was issued to all Norwegian households.

- Are there any questions or topics that we have not talked about and that you find important?

(Participants give their written consent after the interview.)

Case study II

1. Introduction

Information about the project

We work at Consumption Research Norway (SIFO) and have been granted money from the Research Council of Norway to study preparedness for infrastructure breakdowns in Norwegian households. The project is called HOMERISK and started in 2014. It is about how households in Norway, Sweden and Iceland handle and prepare for such breakdowns. In this part of the project, we aim to examine how Norwegian households prepare for electricity and ICT infrastructure breakdowns in rural and urban areas, and in households with and without previous experience with outages.

We are going to ask you some questions about what you do on a day-to-day basis, small things that might seem obvious to you, but we think that they are important in order to document everyday lives of Norwegians. We would also like to walk around your home with you later, to look at your preparedness.

The participant should then be presented with information about the ethical guidelines of the project, including anonymity, data storage and storage of contact information, and written consent. Give specific information about use of audio recorder and camera.

One of the things we would like to know more about is how the type of household you live in affect your preparedness, so we start off by asking you;

- Who lives in this household? (gender, age)
- What do you do for work? Where is the work located?

- What type of house do you live in? (Apartment, detached dwelling, farm etc.)
    - Heating sources (electric heating, wood stoves, gas, heat pumps etc.)
    - How old is the house? Have you done any renovation?
    - How long have you lived here?
    - Do you have alarm and insurance?
    - Do you have any pets or farm animals?

2. Previous experience with infrastructure breakdowns

Have you experienced any extensive outages in your home?

- When did this happen?
- How long was the electricity gone for?
- Where were you when the electricity disappeared?
- What was the first thing you did when the electricity disappeared? *Ask for detailed descriptions*
    - Checked the fuse box
    - Checked whether there was light in the homes of neighbours
    - Contacted anyone
    - Looked for information on the internet, radio, TV etc.
- How did the outage affect your household? (what stopped working, for how long)
    - Heating (seasonal)
    - Food storage
    - Cooking
    - Access to water
- Did the mobile coverage and internet also disappear?
    - If yes, how did it affect your household?
    - Who did you communicate with? (Family, friends, neighbours, the municipality, police, fire dep., health personnel, insurance companies, tele companies, energy companies etc.), and why?

    - How did you communicate?

- What types of material objects did you use during the outage?
    - Candles and matches, other forms of lighting (battery lights, gas lights, kerosene lights)
    - Gas cooker, primus
    - Wood stove, wood
    - Flashlights or headlamps
    - Battery driven radios
    - Generators
    - Power banks
    - Food

- Did you receive any help from outside the household? (by whom and for what?)

- Have you done any changes at home after your experience?
    - Material changes (bought new items, moved items)
    - Lists or plans (analogue phone list, emergency plans)
    - Maintenance and stocking (of material items such as batteries, matches, food, kerosene, gas and wood)

- Are there any material objects you thought that you needed, but did not have access to?

3. Secondary experiences with infrastructure breakdowns

Do you know of anyone that have experienced extensive outages at home?

- What happened and what kind of experience did they have?
- Did they implement any changes after the event?
- Have you learned anything for their experience?
- Have you implemented any changes in your home after their experience?

4. Scenario: infrastructure breakdown

We would like to walk around your home with you while you show us what you would do in case of an infrastructure breakdown. We would also like to take pictures of this tour.

- What is the first thing you would do if the electricity disappeared now?
    - Fuse box, light in surrounding houses
    - Contact someone

- How long would it take for you to do anything further?
    - Contact family, friends, neighbours, the municipality, energy and ICT companies?
    - Look for information? Where? (internet, TV, radio)
    - Precautionary measures (not open fridge and freezer, fill bathtub with water, locate preparedness items, light the wood stove, close off rooms etc.)

- What would stop working in your home?
    - Outside: garage, outdoor lighting, other equipment
    - Hallway: Lights, heat, alarm system
    - Living room: lighting, heat source (panel ovens, heat pump, radiator, kerosene and gas ovens), TV, radio, computer, ventilation, router
    - Kitchen: lighting, heat, fridge, freezer, stove, dish washer, water boiler, other appliances
    - Bathroom and laundry room: lighting, heat, washer, dryer, water access, appliances
    - Basement: water boiler, technical systems, other boilers, pipes

Given that the electricity is gone in the whole area, how would you solve the following tasks?

- Food acquisition, storing and cooking
    - Have you stored food that can be eaten without being heated?
    - How would you cook food without electricity?
    - How would you keep the food cold?

        - How long do you estimate that you will be able to survive on the food you have stored?

- Heating and lighting
    - Do you have any non-electricity dependent heating or lighting sources?
    - Would you close off any rooms?
    - Do you have warm clothes, blankets or sleeping bags to keep warm?

Given that the internet connection and mobile coverage is also gone

- Do you own a mobile phone and/or landline?
- Do you have an internet connection?
- What is the first thing you would do if the ICT connections disappeared now?
- Who would you contact and how?
- How long would it take for you to contact anyone?
- Has the household any items to prepare for ICT infrastructure breakdowns? (Power banks, mobile Wi-Fi connection etc.)

5. Material preparedness

- Has your household implemented any preparedness measures for any type of event?
- Does your family have an emergency plan in case of an emergency, crisis or disaster?
- Are you familiar with the Norwegian Directorate for Civil Protection (DSB) and their website 'secure everyday life', where you can find a list of household preparedness items?[19]
- Do you have any of the items on the list? Can you show us?
- Can you think of any other things that you do regularly, that can be a type of preparedness?
- Do any of the items have a fixed space in your home?
- Who is responsible for buying and maintaining these resources?

You should have the following items in your home

Water
Food with long shelf-life
Radio with batteries
Flashlight
Candles
Matches
Wood
First aid kit
Gas fuelled cooker

6. Time

- For how long would you have managed without electricity/ICT at home?
- How long would you wait before you implemented any measures to manage an infrastructure breakdown?

[19] Note that the list from DSB is based on their information campaigns from 2013-2018. In 2018, a new version of the website was launched, and the brochure "You are part of Norway's emergency preparedness" was issued to all Norwegian households.

7. Social networks

- Do you have any resources that you could have used to help others in the neighbourhood? If yes, which?
- Do you know anyone in your neighbourhood that would need help or that could help you?

8. Other actors and division of responsibility for preparedness

- Are there other actors that you would contact in case of extensive infrastructure breakdowns?
  - Authorities
  - Rescue personnel
  - Organisations
  - Industry actor
- Are you familiar with the preparedness plans in your local area?
  - Who is responsible for these plans?
  - Where can you find information?
  - Who should you contact in case of an event?
- How do you see your own role in the case of preparedness?
  - What are you responsible for?
  - Who else has a responsibility for preparedness?
- What do you think should be done to maximize household preparedness in Norway?
- Are there any questions or topics that we have not talked about and that you find important?

(Participants give their written consent after the interview)

Appendix 2: Overview of data material

Table 1: Case Study I – Lærdal, Norway.

Id.	Household members*	Dwelling characteristics	Experience with infrastructure breakdowns	Interview context
1	**Woman (55),** Man (55), two adult sons not living at home	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar	At home interview including a walk along photo tour. 2 hrs, 15 min recording, 10 photos
2	**Woman (48), Man (52), Daughter (17), Son (25)**	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar	At home interview including a walk along photo tour. 1 hr, 41 min recording, 14 photos
3	**Woman (52), Man (52),** two teenage sons living at home	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar	At home interview including a walk along photo tour. 2 hrs, 48 min recording, 25 photos
4	**Man (45), Woman (unknown age),** son (10), new-born daughter	Farm with wood stove and generator	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar	At home interview including a walk along photo tour. 2 hrs, 5 min recording, 76 photos
5	**Man (69), Woman (66),** son (30)	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar, childhood experiences with long-lasting breakdowns	At home interview including a walk along photo tour. 1 hr, 13 min recording, 14 photos
6	**Man (84),** Woman (82)	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar, childhood experiences with	At home interview including a walk along photo tour. 1 hr, 47min

			long-lasting breakdowns	recording, 24 photos
7	**Man (72),** Woman (73)	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar, childhood experiences with long-lasting breakdowns	At home interview. 1 hr, 14 min recording
8	**Woman (17)** from household 2, and her friend **Woman (17)** were interviewed together	Detached house with wood stove and apartment without wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar	Interview in the home of household 2. Second visit. 1 hr, 20 min recording
9	**Man (72),** Woman (70)	Detached house with wood stove	Experienced two major breakdowns caused by the Lærdal fire and hurricane Dagmar, childhood experiences with long-lasting breakdowns	At home interview including a walk along photo tour. 1 hr, 45 min recording, 23 photos

Table 2: Case Study I – Sweden.

Id	Household members	Dwelling characteristics	Experience with infrastructure breakdowns	Interview context
10	**Man (52), Woman (49)**, son (13)	Detached house with wood stove and generator	Recent experiences with frequent minor breakdowns	At home interview including a walk-along photo-tour. 1hr. 16 min recording, 5 photos
11	**Man (55), woman (54)**, daughter (20)	Detached house with wood stove and generator	Childhood experiences with long-lasting breakdowns	At home interview including a walk-along photo-tour. 45 min recording, 5 photos
12	**Man (49), Woman (35)**, teenage daughter and son	Detached house with wood stove	Recent experiences with frequent minor breakdowns	At home interview, 45min recording
13	**Man (55)**, woman (54)	Detached house with wood stove	Childhood experiences with long-lasting breakdowns	At home interview, 1hr 45min recording

14	**Woman (53)**	Detached house without wood stove	Recent experiences with frequent minor breakdowns	At home interview including a walk-along photo-tour. 1hr. 50 min recording, 7 photos

Table 3: Case Study II – Grue, Norway.

Id.	Household members	Dwelling characteristics	Experience with infrastructure breakdowns	Interview context
15	**Man (63), Woman (59)**	Detached house with wood stove	Several experiences with long-lasting breakdowns including hurricane Dagmar	At home interview including a walk along photo tour. 2 hr, 1 min recording, 20 photos
16	**Man (40), Woman (39)**, four young children living at home	Detached house with wood stove	Experienced one major breakdown caused by hurricane Dagmar and several minor breakdowns	At home interview including a walk along photo tour. 1 hr, 52 min recording, 25 photos
17	**Man (51)**, Woman (50), three teenage daughters living at home	Farm with wood stove	Experienced one major breakdown caused by hurricane Dagmar and several minor breakdowns	At home interview including a walk along photo tour. 1hr, 28min recording, 10 photos
18	**Man (69), Woman (unknown age)**	Detached house with wood stove	Experienced several major breakdowns, childhood experiences with long-lasting breakdowns	At home interview including a partial walk-along photo tour. 1 hr, 10min recording, 6 photos
19	**Woman (70), Man (68)**	Detached house with wood stove	Experienced one major breakdown caused by hurricane Dagmar, childhood experiences with long-lasting breakdowns	At home interview including a walk-along photo tour. 1 hr, 47 min recording, 21 photos
20	**Man (42), Woman**	Detached house with wood stove	Experienced one major breakdown	At home interview

	(unknown age), four children living at home		caused by hurricane Dagmar	including a walk-along photo tour. 1 hr, 49 min recording, 32 photos

Table 4: Case Study II – Oslo, Norway.

Id.	Household members	Dwelling characteristics	Experience with infrastructure breakdowns	Interview context
21	**Woman (22)**	Apartment without alternative heating	Not experienced any breakdowns	At home interview including a walk-along photo tour. 50min recording, 14 photos
22	**Man (51), Woman (unknown age)**	Apartment with gas heating	Not experienced any breakdowns, childhood experiences with minor breakdowns	At home interview including a walk-along photo tour. 52 min recording, 21 photos
23	**Woman (29)**	Apartment without alternative heating	Not experienced any breakdowns	At home interview including a walk-along photo tour. 1hr, 46 min recording, 23 photos
24	**Woman (50), Man (45)**	Apartment with wood heating	Not experienced any major breakdowns, childhood experiences with minor breakdowns	At home interview including a walk-along photo tour. 1hr, 53 min recording, 21 photos
25	**Man (71), Woman (70)**	Apartment with wood heating	Childhood experiences with minor breakdowns	At home interview including a walk-along photo tour. 1hr, 5 min recording, 31 photos
26	**Man (73), woman (70)**	Apartment without	Childhood experiences with	At home interview including a

		alternative heating	long-lasting breakdowns	walk-along photo tour. 1hr, 17 min recording, 83 photos
27	**Woman (48)**, Man (48) and one child (10) living at home	Detached house with wood heating	Recent experience with a minor breakdown, childhood experiences with minor breakdowns	At home interview including a walk-along photo tour. 1hr, 16 min recording, 80 photos
28	**Woman (37), Man (33)**, two children (7, 3) living at home	Apartment without alternative heating	Recent experience with a minor breakdown, childhood experiences with minor breakdowns	At home interview including a walk-along photo tour. 1hr, 27 min recording, 39 photos
29	**Man (31), Woman (31)**, two children (3, new-born) living at home	Apartment without alternative heating	Recent experiences with minor breakdowns	At home interview including a walk-along photo tour. 1hr, 5 min recording, 45 photos
30	**Man (45)**, Woman (unknown age), three children living at home	Apartment without alternative heating	Recent experience with minor breakdown, childhood experiences with minor breakdowns	At home interview including a walk-along photo tour. 1hr, 20 min recording, 42 photos

***participants marked in bold**

Appendix 3: Written consent form

The consent form is translated from Norwegian.

Participation in the research project

HOMERISK – Risk management strategies when households face collapsing electricity and digital infrastructure

Background and objectives

Consumption Research Norway (SIFO) leads a project about Nordic households' preparedness and crisis management for breakdowns in the electricity and/or ICT infrastructure called HOMERISK. The project runs from the fall of 2014 throughout 2017 and is financed by the Research Council of Norway. A PhD is part of the project, and the Mid-Sweden University, the University of Iceland and the Norwegian Museum of Science and Technology are partners in the project.

The main objective of the project is to contribute with new knowledge about the role of households in preparedness and crisis management, and sets out to examine the following:

1) How the role of households is defined in national and local preparedness plans, and perceived by key actors in the preparedness system. Here, we will conduct a document analysis and interviews with stakeholders.

2) The role of households and their experiences with previous extensive outages in Norway, Sweden and Iceland (including hurricane Dagmar in 2011 and the Lærdal fire in 2014). This part of the study involves a media analysis, fieldwork in affected areas, and household visits to affected families.

3) Household preparedness for breakdowns in the electricity and ICT infrastructure. This part of the study involves a representative survey of the population in the three partner

countries, and visits to families in Oslo and Grue that have or not have experienced extensive infrastructure breakdowns.

Participation

Your participation in this study consists of an interview in your home where two researchers will ask you to share your experiences with previous infrastructure breakdowns, what you would do in case of a new breakdown, and how you are prepared for breakdowns.

The researchers will ask permission to audio record the conversation and to photograph key objects and surroundings. It is voluntary to participate in the study, and you will be asked to give your active consent by signing the consent form. You are free to withdraw your consent at any time without giving a reason. If you wish to do so, all the information about you will be deleted.

What happens to the information about you?

Our study has been reported to the Norwegian Centre for Research Data (NSD). Personal information will be treated confidentially and only by the Norwegian research group. It will not be possible to identify you or any of your family members once the study results are published. Name and contact details about you will be stored separately from the interview data and will be deleted by the end of the project 31.12.2017, if you have not consented to extended storage. Data about you can only be used for the purpose of the project. Participants will be given access to the results upon request. The results will be published in the form of scientific articles, report, and used as background information in brochures and an exhibition at the Norwegian Museum of Science and Technology. You can follow the project on its website www.homerisk.no.

If you have any questions regarding the study, please contact:

Project manager Ardis Storm-Mathisen

Email: ardist@oslomet.no

or

Researcher Nina Heidenstrøm

Email: ninah@oslomet.no

With kind regards,

Consumption Research Norway (SIFO)

STORBYUNIVERSITETET
FORBRUKSFORSKNINGSINSTITUTTET SIFO

Written consent for participation in the HOMERISK study

I have received information about the HOMERISK study and is willing to participate:

_____

(Signed by project participant, date)

☐ I consent to participation in interview and home visit in part 2/3

☐ I consent to storage of contact information after the project period

☐ I consent to photographing in the interviews and that the photographs can be used:

- ☐ Internally in the project group
- ☐ Externally for dissemination