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Changing Gender Stereotypes

Exploring Women's Roles in Disaster Risk
Management – A Systematic Literature
Review

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Abstract

Natural disasters affect women disproportionately. With the current literature bias of focusing on women's vulnerabilities towards natural disasters, this paper aims to investigate *how women contribute to the mitigation, preparedness, response and recovery of natural disasters*, viz. the disaster management cycle (DMC). Through a systematic literature review with exploratory aspects, this paper analysed 11 peer-reviewed articles to identify key activities carried out by women and respective facilitating factors. The systematic review highlighted crucial literature gaps in certain geographical regions, in women's activities in the mitigation and preparedness stages, and facilitating factors for women's activities in preparedness and response. The review found that overall, women were active contributors throughout the DMC, where eight categories emerged: caring, economic, household chores, leadership, learning, planning and organising, social work, and physical labour. The facilitating factors for women's activities were the inclusion of women in disaster risk management (DRM) programmes, training women in and increasing their knowledge on natural disasters, increasing women's formal and informal spaces, and changing gender norms. This research then concludes that women are key contributors to DRM throughout the stages of the DMC, and that there is a need for implementing facilitating conditions into policies and frameworks. Furthermore, the research stresses the need for more research on women's roles in the DMC in various fields. The findings can be applied to DRM policies and programmes together with future research in the field, taking an important step towards decreasing the gendered effects of natural disasters.

Key words: *natural disasters; women's roles; disaster risk management; disaster management cycle; facilitating factors; systematic literature review*

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Table of Content

| | |
|--|-----|
| Abstract..... | i |
| Acknowledgement | ii |
| Table of Content | iii |
| Index of Figures | iv |
| Index of Tables | iv |
| List of Abbreviations/Acronyms | iv |
| 1 Introduction..... | 1 |
| 1.1 Aim and research question | 2 |
| 1.2 Thesis outline | 3 |
| 2 Background..... | 3 |
| 2.1 “Natural” disasters..... | 3 |
| 2.2 Women and disasters..... | 4 |
| 2.3 Gender and development studies..... | 6 |
| 2.4 Disaster Risk Management..... | 7 |
| 3 Conceptual framework..... | 9 |
| 3.1 Disaster Management Cycle..... | 9 |
| 4 Methods and data..... | 12 |
| 4.1 Data Collection..... | 13 |
| 4.2 Data Analysis | 14 |
| 4.3 Limitations of research design | 15 |
| 5 Results..... | 16 |
| 5.1 Systematic Review/General overview of the sample | 16 |
| 5.2 Mitigation | 19 |
| 5.3 Preparedness..... | 21 |
| 5.4 Response..... | 23 |
| 5.5 Recovery..... | 26 |
| 6 Discussion..... | 29 |
| 6.1 Systematic review | 29 |
| 6.2 Activities | 30 |
| 6.3 Facilitating factors..... | 32 |
| 7 Limitations and future research | 34 |
| 8 Conclusions..... | 35 |
| 9 Bibliography | 37 |
| Appendix A..... | 44 |
| Appendix B..... | 46 |
| Appendix C..... | 47 |

Index of Figures

| | |
|--|----|
| Figure 1. PRISMA 2020 Flow Diagram..... | 14 |
| Figure 2. Number of papers per DMC stage and activity category | 18 |
| Figure 3. Mind map of the codes in each activity category together with their relationship to each other. | 46 |

Index of Tables

| | |
|---|----|
| Table 1. Search string in SCOPUS, EBSCO, and Web of Science | 13 |
| Table 2. Detailed description of the articles used as data for the systematic literature review. | 44 |
| Table 3. Activity categories across disaster management cycle stages, connecting specific activities with facilitating factors. | 47 |

List of Abbreviations/Acronyms

DMC – Disaster Management Cycle

DRM – Disaster Risk Management

SFDRR – Sendai Framework for Disaster Risk Reduction

UNDRR – United Nations Office for Disaster Risk Reduction

1 Introduction

Natural disasters affect communities and social groups differently. This is because they are the outcome of the interaction between natural hazards and socioeconomic conditions (Chmutina and von Meding, 2019). Therefore, an individual's or community's social, cultural and economic conditions affect how they are impacted by natural disasters. One group affected differently is women – a growing topic amongst scholars within disaster research (Fothergill, 1996; Enarson and Morrow, 1998; Fordham, 1998, 1999; Bradshaw, 2004; Bradshaw and Fordham, 2015; Enarson, Fothergill and Peek, 2018; Kreutzer, Millerd and Timbs, 2023). Women, as a group, hold specific socioeconomic factors due to gender inequalities that exist in society, including gender roles and expectations. Vulnerabilities arising from these factors disproportionately affect their experiences of natural disasters.

Current literature seems to contain a general bias towards focusing on women's vulnerabilities in disasters. Following a similar trend, the largest extent of literature reviews also look into the vulnerabilities of women (e.g., Bell and Folkerth, 2016; Fatemi et al., 2017; Koyama, 2021; Thurston, Stöckl and Ranganathan, 2021; Murphy et al., 2023). Some suggest that this bias victimises women and places them at the centre of a discourse of incapability (Zaidi and Fordham, 2021). While it may be true that women, just like persons of other genders, show vulnerabilities in the event of a disaster, the bias also creates a missed opportunity within disaster research to better understand how women actively contribute to disaster risk management (DRM), i.e., policies and strategies that reduce the risk and effects of disasters (Enarson, Fothergill and Peek, 2018; Yumarni and Amaratunga, 2018; Sikandar and Khan, 2019; Fatouros and Capetola, 2021). Thus, we also lack a holistic picture of the conditions that can facilitate women's participation in activities related to mitigation, preparedness, response and recovery, a.k.a. the disaster management cycle (DMC).

Previous research has attempted to synthesise such data on women's roles. Hemachandra, Amaratunga and Haigh (2018) and Pérez-Gañán et al. (2023) respectively explored the literature on the role of women in disaster risk governance and disaster emergency response, missing the broader picture of DRM and the DMC. Other literature reviews were conducted on women's roles in DRM as country specific case studies. These include Fiji (Charan, Kaur and Singh, 2016), Indonesia (Karistie et al., 2023) and Nigeria (Echendu, 2021), missing a holistic understanding of women's participation in the DMC.

This thesis intends to contribute to a more balanced view of the role of women in DRM within the various stages of the DMC and to fill the literature gap. In doing so, it aims to improve our understanding of the types of activities that women perform across the DMC, and the conditions that facilitate these activities. Following the PRISMA approach, the thesis systematically reviews and explores 11 peer-reviewed articles that focus on the active role of women in DRM through an explorative template and content analysis. While the literature review exhibits both systematic and exploratory aspects, the review is said to be “systematic with exploratory aspects” for clarification and will be called a systematic literature review hereinafter. The analysis of the articles focused on types of activities and facilitating conditions and how those activities and conditions relate to the different stages of the DMC. As the results demonstrate, the approach enables us to get a holistic view of women’s contributions to DRM. In a world where the point of view in research and management is predominantly male, understanding the experiences of women within natural disasters is imperative for sustainable and inclusive policies, programmes and frameworks (Ginige, Amaratunga and Haigh, 2009; Howard, 2023).

1.1 Aim and research question

The purpose of this thesis is to investigate how women contribute to DRM. The thesis will identify key gaps in the literature and identify activities that women undertake within the different stages of the DMC, viz. mitigation, preparedness, response and recovery processes of natural disasters. The thesis will also identify conditions that facilitate the activities. To that end, the following research question and its sub-questions guide the research:

How do women contribute to the mitigation, preparedness, response and recovery of natural disasters?

What are the activities of women in each stage of the disaster management cycle?

Which conditions facilitate these activities?

In order to address the research questions, the thesis reviews empirical studies on women’s active role in DRM. From the articles, the thesis identifies several types of activities carried out by women and conditions, and how they relate to the different stages of the DMC. This allows a broad understanding of how women contribute to DRM initiatives around the world and synthesise the available research and knowledge on women’s activities and facilitating factors for DRM policies and further research. Thus, the thesis also aims at uncovering knowledge gaps within the literature.

1.2 Thesis outline

The chapter above has presented the problem and significance of the research, through identifying a research gap. It has also outlined the aims and research questions of the thesis. The second chapter aims at giving a background to the issue while highlighting the academic knowledge in the matter. It introduces concepts of “natural” disasters and women’s vulnerability in natural disasters and situates the problem within the gender and development agenda. It then also describes other key concepts that are crucial for the thesis analysis. This includes the current inclusion of gender in DRM. Chapter 3 focuses on the conceptual framework used for the analysis – an adapted DMC and how it sets an outline for the analysis. Chapter 4 describes the methods including data collection, analysis and method limitations, while chapter 5 presents the systematic review, and women’s activities and facilitating factors. Following, chapter 6 and 7 respectively present the discussion, and the limitations of the study together with future research areas. Lastly, chapter 8 includes concluding remarks.

2 Background

2.1 “Natural” disasters

Natural hazards, including hydrometeorological and geophysical hazards, such as floods, tropical storms, earthquakes, volcanic eruptions, wildfires, tsunamis etc. have for a long-time affected populations around the world (UNDRR, no date b). Such effects include loss of life, loss of livelihoods, infrastructure damages, economic productivity reduction and so on (ibid). With the increased intensity and frequency of natural hazards, it is crucial to understand how these will affect different communities around the world (Schipper et al., 2016). The effects of natural hazards are typically referred to as “natural” disasters. However, some argue that the term natural disasters is misleading (e.g., Chmutina and von Meding, 2019). This happens when the socioeconomic causes of the disaster are omitted. Several social science scholars have highlighted that the causes of these effects are the embedded social inequalities that undermine specific groups to efficiently mitigate, prepare, respond and/or recover from natural disasters (Cannon, 1994; Smith, 2006; Kelman et al., 2016; Chmutina and von Meding, 2019). The UNDRR makes this interaction a central component in its definition of disasters as the organisation suggests that they are “a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of *exposure*, *vulnerability* and *capacity*, leading to one or more of the following: human, material, economic and environmental losses and impacts.” (UNDRR, 2024a, author's emphasis).

Correspondingly, a natural disaster is a disaster that was first introduced by a natural hazard, but the conditions of exposure, vulnerability and capacity coincide with the socioeconomical factors of a community. The UNDRR describes DRM as the policies, plans and strategies that help prevent and reduce the risk of disasters, but also those contributing to resilience and the reduction of disaster losses (UNDRR, 2007). It builds on the ideas of disaster management that highlights preparedness, response and recovery by adding aspects of mitigation and risk reduction (ibid).

2.2 Women and disasters

Gender relations is an obscure social system that affects women in their day to day life including during natural disasters (Enarson and Morrow, 1998; Fatouros and Capetola, 2021; Kreutzer, Millerd and Timbs, 2023). Gender relations affect one's capacities and vulnerabilities to natural disasters due to social expectations and roles. Gender also intersects with a multitude of other social structures such as caste, class, race, ethnicity, age and physical ability, giving women different "vulnerability bundles" that affect their experiences towards natural disasters (Enarson and Morrow, 1998; Rodriguez, 2010; Mishra and Rath, 2023).

A majority of the research in gender and natural disasters focus on the disproportionate effects of natural disasters. Often accredited impacts include violence against women and girls (Sohrabizadeh, 2016a; Yoshihama et al., 2019; Thurston, Stöckl and Ranganathan, 2021; Masson, 2022), psychological deterioration (Parida, 2015; McKinzie and Clay-Warner, 2021; Sari Handayani and Nurdin, 2021), declined economic opportunities (Bradshaw, 2004; Enarson, 2015), deterioration of sexual and reproductive health (Bradshaw, 2004; Sohrabizadeh, Tourani and Khankeh, 2016), and increased reproductive work (Paolisso, Ritchie and Ramirez, 2002; Fajarwati et al., 2016). Quantitative research on the effects of natural disasters has also similarly found effects from natural disasters to disproportionately affect women (Neumayer and Plümper, 2007; Murillo and Tan, 2017; Llorente-Marrón et al., 2020).

Vulnerability

Vulnerability towards natural disasters depends on socioeconomic factors (Cannon, 2014). Ginige, Amaratunga and Haigh (2009) argue that vulnerabilities can be categorised in four dimensions: physical, social, economic, and environmental. Physical vulnerability describes the level of exposure to the natural hazard, i.e. proximity to hazard-prone areas, and type of infrastructure. Social vulnerability includes the capacities and capabilities of individuals or

communities to mitigate, prepare, respond and recover from natural disasters. It includes social factors like beliefs and traditions, education, health, access to resources, socioeconomic status etc. Economic vulnerability refers to the economic dimension of DRM with factors such as income levels, employment, economic diversification, poverty, economic inequalities, and dependency. Last, environmental vulnerability includes the intensity of the hazard but also how the environment (e.g., biodiversity) reacts to its impacts.

Indeed, women's vulnerabilities, both physical and social, have long been linked to the gendered effects of disasters (Fothergill, 1996; Enarson and Morrow, 1998; Bradshaw and Fordham, 2015; Sikandar and Khan, 2019; UNDRR, no date a). As disasters expose already existing inequalities, women find themselves more vulnerable to the effects of natural hazards due to multiple reasons.

First, there are biological factors that may affect female vulnerability, such as strength, weight, pregnancies, etc. (Rodriguez, 2010). However, it is not these attributes that scholars have so often highlighted, but rather the socially embedded and gendered inequalities that create social vulnerabilities. For example, the role of women in reproductive labour can often make them more vulnerable for various reasons such as holding responsibility for household and taking care of dependent family members like children and elderly people (Bradshaw, 2009; Reid, 2012; Fatouros and Capetola, 2021). It also includes being unable to obtain valuable disaster knowledge (e.g., taking part in programmes or information on incoming disasters) due to time spent on household chores (Enarson, 2015; Floro and Poyatzis, 2018) and the lack of time to contribute to "productive" work (Enarson and Chakrabarti, 2009; Kreutzer, Millerd and Timbs, 2023).

Furthermore, social norms, including religious and cultural beliefs, also affect women's social and physical vulnerabilities. In some communities in Latin America and Asia, swimming and climbing trees are examples of activities that are not "feminine", leaving women often with a knowledge gap of coping mechanisms during disasters, incapable of saving their own lives (Aguilar, 2006; Rodriguez, 2010). Even when women do know how to swim, Mehta (2007) and Hyndman (2008) state that women's clothes can hinder swimming. In some communities, it is also not accepted for women to leave their home without being accompanied by a male household member (Bradshaw, 2009). In case of a disaster, this may mean that they do not dare to leave, increasing their exposure to natural hazards (Fatouros and Capetola, 2021). Additionally, women tend to also lack access to health services, education, and information on disasters in general (Enarson and Chakrabarti, 2009; Sikandar and Khan, 2019).

This literature trend has created a victimised view of women. Thus, women and the aspect of gender relations have often been neglected in DRM initiatives (Enarson, Fothergill and Peek, 2018; Rushton et al., 2020). Overemphasising women's vulnerabilities teaches children at a young age that girls and women cannot do what boys and men can (Rodriguez, 2010). Gender-based prejudices towards women and girls encourages a perception of them being "physically and emotionally weak, inferior in comparison to men and boys, dependent, subordinate and a burden to family" (Ariyabandu, 2009, p. 6). This for example further affects girls due to a "son preference" when it comes to saving lives (Dahlback, 2023). It also further affects women's perceptions of themselves and their own capabilities (Bradshaw, 2013).

2.3 Gender and development studies

The term gender attempts to capture the social construction of what it is to be a woman and a man, ideas of masculinity and femininity and its interpretations, and the notions of gender roles and relations (Bradshaw, 2013, p. 42). Thus, gender studies is the study of political, social and cultural dimensions of gender identity, relations and roles. It does not seek to study women only, but instead focuses on the unequal relationships between women and men and what it means to be a "man" or "woman" and on ideas of "masculinity" and "femininity" (Bradshaw, 2013). Parallely, the development studies field researches political, social, economic, cultural, and environmental changes in societies, especially in "developing" countries. The field encompasses a contested notion with a vast range of definitions and theories of what development broadly "is" and "isn't" (Sen, 1988; Allen and Thomas, 2000; Potter, Binns and Elliott, 2008). However, definitions typically refer to in one way or another that development processes involve increasing the quality of life of all people economically, socially and environmentally (UN, 2007). A "developing" country in these terms thus includes a wide variety of countries that undergo the developing process yet is mostly reserved to describe non-western countries.

One way of increasing the quality of life of people is to decrease inequalities, for example gender inequalities. As Enarson (2000) states, "gender relations as well as natural disasters are socially constructed under different geographic, cultural, political-economic and social conditions and have complex social consequences for women and men", connecting gender and disasters well with development (p. 5).

Disasters do not only affect communities by destroying schools, infrastructure and housing but also through the alteration of jobs and livelihoods – overall affecting and delaying development processes towards equality (Cannon, 2014). The effects of natural disasters can be significant

in “developing” countries due to their social, physical, environmental and economical vulnerability. However, so called “developed” countries may also be subjects of devastating effects due to inequalities which affect social vulnerability. For example, Hurricane Katrina that struck New Orleans in the United States in 2005 had the greatest impact on communities where inequalities related to race, gender and poverty were high (Smith, 2006; Cannon, 2014).

One of the first mentions of gender in development studies occurred with Boserup (1970) who highlighted the harmful impacts of economic development processes on women and their role within development. She argued that as countries modernise and shift towards more intensive agricultural practices, women experience increased workload but also reinforced gender inequalities and norms. The latter was said to be caused by a result of women’s participation in agriculture decreasing (due to machinery), thus reducing their role as active agricultural producers. Therefore, development processes can lead to the marginalisation of women’s roles.

Accordingly, Bradshaw (2013) mentions that policies have gendered aspects to them, regardless of intentions, “since they are based on assumptions about the world that may ignore gender differences or gendered realities and also because they seek to change the behaviour of people” (p. 47). For example, economic policies that may “only” affect productive labour may overspill on women’s reproductive work at home by increasing their responsibilities if men work longer and cannot contribute as much to the reproductive work. This can limit their contribution to productive or community work, while the same may not be true for men (ibid). This is also true in DRM, where policies, plans and strategies can have a side effect on women (Rushton et al., 2020).

2.4 Disaster Risk Management

There has been a lack of gender inclusiveness within the research field of natural disasters and DRM, which can be linked to the lack of knowledge of women’s experience of natural disasters (Thurairajah and Baldry, 2010; Ramalho, 2019; Rushton et al., 2020; Thapa, 2020). However, we can also see how increased research attention into women’s vulnerabilities to natural disasters has increased the knowledge of gendered impacts in the research field of DRM (Enarson, Fothergill and Peek, 2018; Fatouros and Capetola, 2021).

In response to a demand for more inclusive and gender sensitive frameworks for DRM, the UNDRR implemented the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) the main goal of which is to “prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health,

cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience” (UNDRR, 2015, pp. 12, 36).

The importance of women in DRM is emphasised in the Sendai goals in three main sections: (i) engagement from all of society; (ii) disaster preparedness, response, recovery, rehabilitation and reconstruction; and (iii) stakeholder engagement (UNDRR, 2015). The framework stresses the need to integrate a gender, disability, age and cultural perspectives as well as the need for adequate capacity building for empowering women. Furthermore, it acknowledges that “women and their participation are critical to effectively managing disaster risk and designing” (UNDRR, 2015, p. 23). Since the framework’s implementation, there has been a positive increase in the number of national DRM plans that include gender. Similarly, gender-segregated data collection has also increased (Obi-Aso, Ewurum and Ifeanacho, 2021; Zaidi and Fordham, 2021).

Women’s roles

Women exhibit many natural roles that can be key assets within DRM. Women around the world have been reported to be great community-based organising leaders (Enarson, Fothergill and Peek, 2018). Women can play a key role in rebuilding communities and caring for others due to their own social networks which allows them to identify other high-risk groups (Bradshaw and Fordham, 2015). For example, one such role that has been understudied is the unpaid labour of women, including their reproductive work (Floro and Poyatzis, 2018; Kreutzer, Millerd and Timbs, 2023). The latter is a phenomenon that is sometimes overlooked, due to the “invisibility” of the nature of the work and as it cannot be quantified (compared to productive) (Floro and Poyatzis, 2018; Kreutzer, Millerd and Timbs, 2023).

On the other hand, this view of women’s capabilities has also been argued as being negative if scholars are not sensitive. Bradshaw analyses the engendering of disasters and the existence of the “feminisation of responsibility” (2009). She argues that as women are being mainstreamed in early development and disaster programmes, women’s social roles have been used as an exploitative measure for development gains. Therefore, when researching and disclosing women’s roles within DRM, challenging the stereotypical roles within it is also crucial ((Bradshaw, 2009; Bradshaw and Fordham, 2015).

3 Conceptual framework

This thesis uses the disaster management cycle (DMC) as a conceptual framework to guide the analysis. This framework outlines four stages that help structure the analysis of women's roles by dividing DRM. Thus, the use of the DMC helps to carry out a systematic literature review while at the same time organising the results to make it clearer for the reader. Furthermore, as this study aims to understand women's contributions broadly and thoroughly, this framework allows the data to be holistically analysed while paying attention to the processes of disaster mitigation, preparedness, response and recovery. Lastly, the DMC is here adapted and expanded to the topic of women's activities in each stage, building on the concepts aforementioned in the background.

3.1 Disaster Management Cycle

Of the many frameworks within DRM literature, the most common is the DMC (Sawalha, 2020). This framework comprises four components: mitigation, preparedness, response and recovery (Alexander, 2002, p. 6; Bradshaw, 2013, p. x; FEMA, 2016). Each stage has various action plans and procedures associated with it depending on organisation, disaster agencies or literature (Sawalha, 2020). Furthermore, while often described as distinct, the stages all interconnect with phases of before, during and after the disaster. Sawalha (2020) offers insights on how to revisit the DMC and include new contemporary management knowledge within it. Additionally, Bradshaw (2013) takes a gender perspective on DRM which aids understanding of the DMC from a gender lens on the disaster level.

Following the traditional DMC, the proposed improvement by the above mentioned authors and concepts described in the background, a contemporary and gendered aspect to the four stages and what type of activities may fit in each will hereunder be defined and described. It should also be understood that these stages are fluid and overlap with one another and therefore cannot be pinned to one specific time of the disaster. Due to its fluidity and overlap, some activities and facilitating factors may repeat themselves in different DMC stages.

Mitigation

First, mitigation, also called prevention and risk reduction, broadly involves minimising or eliminating the likelihood or effects of natural disasters (Coppola, 2015, p. 12). This may include structural measures, such as resilient architectural planning, and non-structural planning such as land-use planning or evacuation planning (Alexander, 2002, p. 5). Mitigation overall strives for long-term changes in natural disasters' impacts, making it a key component

of development projects (Coppola, 2015, p. 267). It holds four main activities: risk likelihood reduction, risk consequences reduction, risk avoidance, and risk acceptance (Coppola, 2015, pp. 225–229). Acts of mitigation that need to be integrated in the contemporary DMC include leadership roles, and entrepreneurial and innovative actions (Sawalha, 2020). Some other important aspects to consider in disaster mitigation include capacity, sociocultural issues and risk perceptions (Coppola, 2006, p. 261).

These can all be linked to understandings of gender relations and women's participation and role within society and DRM (Bradshaw, 2013). In order to have mitigation measures that are socially sustainable we need to include the perspectives and experiences of women (Bradshaw, 2013; Yumarni and Amaratunga, 2018). Therefore, mitigation needs to include activities that try to eliminate women's vulnerabilities to natural disasters (Bradshaw, 2013, p. 175).

Scholars have emphasised that we lack knowledge on mitigation activities carried out by women (Enarson, Fothergill and Peek, 2018; Hemachandra, Amaratunga and Haigh, 2018; Zaidi and Fordham, 2021; Kreutzer, Millerd and Timbs, 2023; Pérez-Gañán et al., 2023). Here, the mitigation category will include all four mitigation activities listed above. It will also include the knowledge that women may have (capacity) of mitigation processes.

Preparedness

Preparedness similarly takes place before the occurrence of a natural hazard; however it consists of actions taken to ensure adequate response to natural disasters after the warning (Alexander, 2002, p. 5; Coppola, 2015, p. 275). Bradshaw (2013, p. 157) also expands that preparing for being notified of a disaster should be included in our understanding of preparedness. Preparedness can therefore be categorised by having and using the right tools and knowledge to act towards natural hazards (Coppola, 2015, p. 275). Sawalha's (2020) framework similarly stresses the importance of learning from past and current disasters as a key general process in disaster preparedness. She also includes situation awareness as a key component of that cycle, which is dependent on being informed of the natural hazard. Preparedness activities may be facilitated by government actions or organisational actions (Coppola, 2015, pp. 275-317). Activities at the household and community level can however also be undertaken, where women may possess a crucial role due to their gender roles (Bradshaw, 2013).

Similarly to mitigation activities, the activities carried out by women in the preparedness stage are understudied (Enarson, Fothergill and Peek, 2018; Hemachandra, Amaratunga and Haigh,

2018; Zaidi and Fordham, 2021; Kreutzer, Millerd and Timbs, 2023; Pérez-Gañán et al., 2023). Therefore, attention will be paid to emerging activities that haven't been discussed in the past throughout the analysis. Furthermore, following an understanding of women's invisible work, I will also pay attention to women's reproductive work that comprises preparation towards disasters (Floro and Poyatzis, 2018).

Response

The response stage is connected to the emergency aspect of a natural disaster and comes before, during and right after the natural hazard has hit. While overlapping with the preparedness stage, pre-hazard response activities include warning and evacuation, pre-positioning of resources and supplies, and last-minute mitigation and preparedness measures (Coppola, 2015, pp. 323–325). Direct and post disaster responses include first aid and medical help, search and rescue, evacuation, resource provision (food, water, shelter), social services, donations and volunteer management, as well as disaster assessment (Coppola, 2015, pp. 328–369). While it may not be reported by media, the real first responders of disasters are the “victims” (Bradshaw, 2013, p. 63).

The response stage of the DMC is one of the most reported, perhaps as it often comprises the most “visible” activities over a short timespan (Bradshaw, 2013; Coppola, 2015). Due to its abundance of “visible” activities it affects women in two ways: (i) “visible” activities are also the most “physical” ones which is often connotated with masculinity (Bradshaw, 2013), and (ii) women's invisible work is left unseen as a response activity (Floro and Poyatzis, 2018; Kreutzer, Millerd and Timbs, 2023). The capability of responding to the event may also vary depending on socioeconomic and cultural factors or “vulnerability bundles” (Enarson and Morrow, 1998; Rodriguez, 2010). The response abilities of an individual also depend on their situation awareness discussed in the preparedness stage (Sawalha, 2020). Response can also incorporate ideas of resilience, which is the ability of a system, community or society to overcome a disaster and their capacity to maintain desirable levels of functioning (UNDRR, 2007; Sawalha, 2020). Therefore, activities that maintain a level of normality or work towards going back to that normality can be identified as response activities. Other responses may include community and social networks responses especially including helping each other with different response activities written above (Bradshaw, 2013, pp. 74–75).

Here, the response activities will concentrate on all activities carried out by women, especially to highlight women's invisible work and the “masculine” activities. Bradshaw (2013) states

that women's response activities are often reported as "helping" (a man) instead of rescuing (p. 66).

Recovery

Lastly, the recovery stage includes the activities that allow individuals and communities to return back to their initial lives (or improved) (Coppola, 2015, pp. 12, 405). In a contemporary and comprehensive DMC, recovery activities may take place at any time as it also includes the planning of recovery actions and may last weeks, months or years, as one enacts planned or unplanned recovery actions (Coppola, 2015, p. 405). Certain types of recovery include government/public sector, infrastructure, debris management, environment, housing, economic, livelihoods, individual, family, and social (Coppola, 2015, pp. 426–445).

Similar to response activities, these may have a "masculine" bias. For example, reconstruction measures may be seen as a man's job (Bradshaw, 2013; Enarson and Pease, 2016). Men also tend to be the economic head of households, possibly affecting how one negatively perceives women in economic aspects for recovery measures (Enarson, 2015). On the other hand, some recovery activities may be expected of women for example household and psychological activities due to gendered roles and expectations (Enarson and Chakrabarti, 2009; Bradshaw, 2013, p. 64).

Bradshaw (2013, p. 101) also brings up the notion of disparities between what recovery means to different groups. The main discourse for survivors is "returning to normal" while academics, NGOs and governments are about "building better". She states that while disasters may open a window for improvement due to the highlighted inequalities, this may not always happen. Work done towards the embedded inequalities, including societal roles, is harder in practice. Therefore, long-term activities that increase the well-being of a community can also overlap each other in the recovery and mitigation stages. This also means that such activities could be seen as facilitating factors for women's participation in the DMC (Ramalho, 2019).

4 Methods and data

The aim of the study was to identify the role and contributions of women in DRM activities, as well as exploring the facilitating factors that influence their involvement and contribution in such endeavours. A review of the literature on the subject was conducted using the systematic literature review method according to the Preferred Reported Items for Systematic Reviews

and Meta-Analyses (PRISMA 2020) protocol, with exploratory aspects to it¹ (Page, McKenzie, et al., 2021; Page, Moher, et al., 2021). The methodology allows for a transparent report of how the review was conducted. After being originally published in 2009, the review was revised, modified and extended in 2020 to create a more extensive checklist for researchers to use in order to have a more transparent, complete and accurate account of the review.

The search was conducted on 4/4/2024 using SCOPUS, EBSCO and Web of Science (WoS). Articles in English and French were searched for against the selection criteria. These criteria were based on the research questions/aims of the research. Thus, the analysis includes articles that empirically analysed the role of women in any DMC stage and included contextualised conditions. In total, eleven papers were selected for analysis. The analysis method used coding methods from template analysis and inductive content analysis (King, 2012). Three different sets of codes were applied to the analysis: (i) “activity” and “facilitating factor/condition”, (ii) the DMC stages, and (iii) emerged categories based on initial coding.

4.1 Data Collection

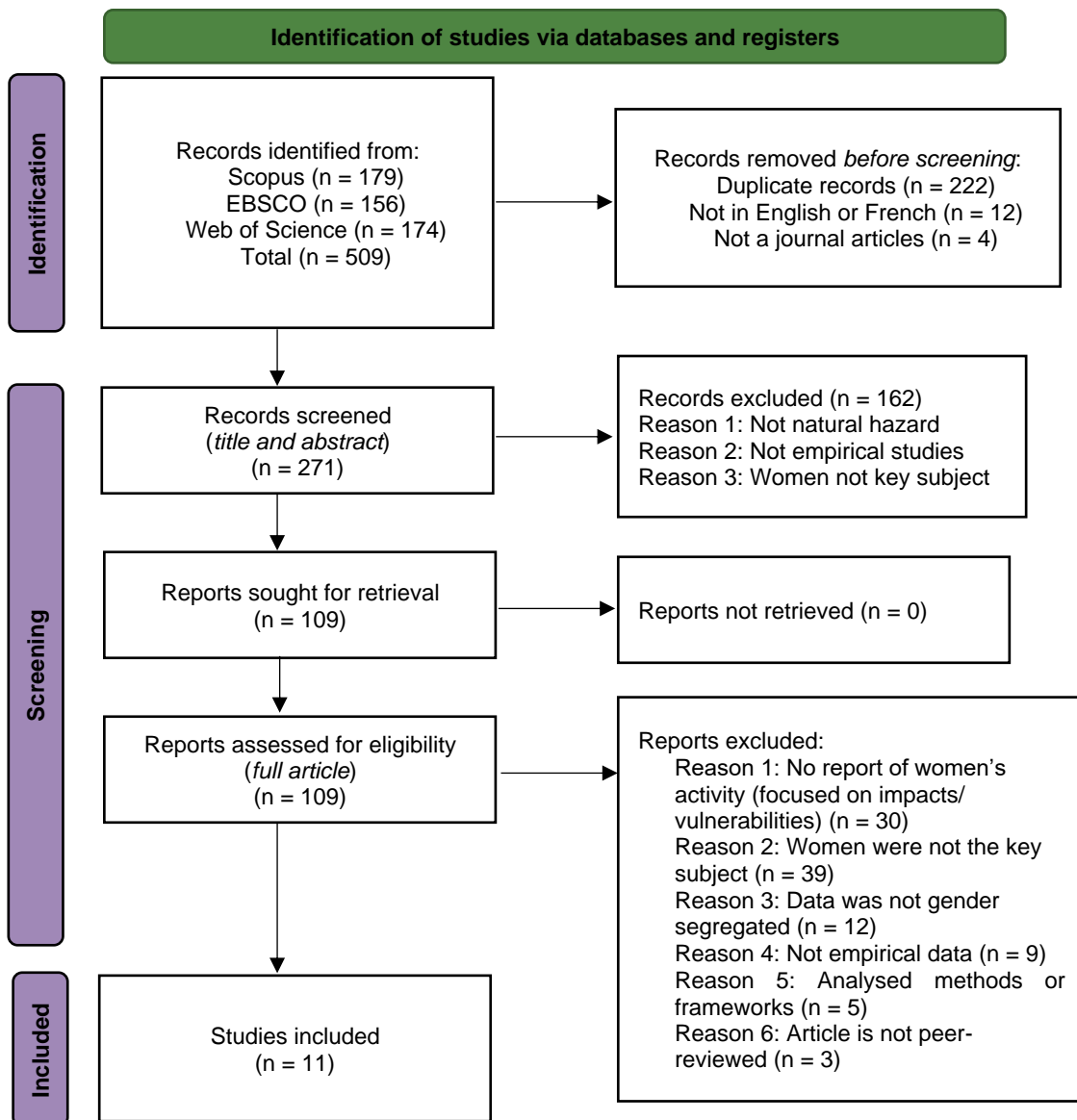
A search string, as can be seen in *Table 1*, was applied to three databases: SCOPUS, EBSCO and WoS. This yielded a total of 271 results after duplicates (n = 222), non-English or French articles (n = 12) and non-journal articles (n = 3) were removed. The search string was first based on the DMC stages and synonyms for these. Then the terms woman/women and participation or role or capabilities/capacities or contribution were used in order to yield results fitting the aim of the research. Finally, terms related to the Covid-19 pandemic were excluded to reject topics on the pandemic as a disaster. Zotero was used for reference management.

4.1.1 *Table 1. Search string in SCOPUS, EBSCO, and Web of Science*

| Database | Search string |
|---|---|
| SCOPUS | TITLE-ABS-KEY(("disaster* manage*" OR "disaster* prevention" OR "disaster* mitigate*" OR "disaster* preparedness" OR "disaster* response*" OR "disaster* recover*") AND ("wom*") AND (participat* OR role OR capa* OR contribut*)) AND NOT ALL(covid OR pandemic) AND (LIMIT-TO (DOCTYPE,"ar")) |
| EBSCO (limited to peer-reviewed, journal article) | AB (("disaster* manage*" OR "disaster* prevention" OR "disaster* mitigate*" OR "disaster* preparedness" OR "disaster* response*" OR "disaster* recover*") AND "wom*" AND ("participat*" OR "role" OR "capa*" OR "contribut*")) NOT covid* NOT pandemic |
| Web of Science (limited to journal article) | TS=("disaster* manage*" OR "disaster* prevention" OR "disaster* mitigate*" OR "disaster* preparedness" OR "disaster* response*" OR "disaster* recover*") AND TS=("wom*") AND TS=(participat* OR role OR capa* OR contribut*) NOT TS=(covid OR pandemic) |

¹ The method for the thesis can be said to be a systematic literature review with exploratory aspects to it as it uses a systematic data collection and content analysis method. The exploratory aspect holds true due to the study exploring the topic of interest by finding emerging patterns through a template analysis and due to the novelty of the research. Contrarily, a scoping review method was not used because of the detailed analysis and the low extent of literature on the topic.

Two stages of screening were conducted: (i) screening titles and abstracts, (ii) the full text. Studies were excluded if they (a) did not address natural disasters; (b) were not empirical studies; (c) did not have women as a key subject of the research; (d) did not report activities carried out by women; (e) did not have gender segregated data; (f) analysed methods or framework; and (g) were not peer reviewed. The process of the screening and eligibility assessment has been illustrated in the PRISMA 2020 Flow Diagram (*Figure 1*) here below.



4.1.2 Figure 1. PRISMA 2020 Flow Diagram

4.2 Data Analysis

After the data collection, the data sources were read for familiarisation of the data. Then, data from the sources were described based on the title, authors, year, locations, natural hazard, main DMC stage(s), aim and methodology. The coding was performed using NVivo 14. A

template analysis was used to code the activities and facilitating factors/conditions and then also categorising them into the four DMC stages (mitigation, preparedness, response, recovery) and into their own activity categories. Parallel coding was used in order to classify the same text segments into the different codes.

Following the main procedural steps in a template analysis, after becoming familiar with the sources, any textual data that was relevant and potentially contributed to the research question's understanding was highlighted (King, 2012). This included activities carried out by women together with any facilitating factors. As the facilitating factors were not always explicitly presented, any condition that had a positive outcome on women's participation in DRM activities were recorded. Conditions that were represented as "would" benefit women's participation either by the participants or author's observations were also recorded. Lastly, some explicit hindering factors were also coded into facilitating factors as minimising the hindering factor is assumed to be a facilitating factor. Parallely, each activity and condition were coded into one or more of the DMC stages. Both activities and facilitating factors were multi-dimensional in how they fit into the stages, i.e. some were coded in more than one stage due to their fluid nature (Sawalha, 2020).

Similar to thematic approaches, template analysis also distinguishes/welcomes an explorative coding method in its procedural steps. Therefore, following the steps, all activities were first coded into emerging themes simultaneously to the first coding. Then, after reviewing and grouping the codes, a coding template was defined. The activity and facilitating factors were then recoded within one of the following themes: caring, economic, household chores, leadership, learning, planning/organising, social work, and physical labour.

Lastly, the data was analysed through a content analysis with the use of NVivo 14. After the parallel coding was completed, the matrix query in the programme was used to cross-analyse the activities and facilitating factors to the DMC stages. This data was first manually collected with their corresponding sources, then synthesised across the different main activities and facilitating factors within each DMC stage.

4.3 Limitations of research design

The research methodology has some of its own limitations. First, as systematic literature reviews are made to be thorough and remove as many biases as possible, this type of research is difficult to carry out alone (King, 2012). A similar factor is true in qualitative content analysis (ibid). To mitigate possible errors the data collection and analysis were done especially

thoroughly. The data collection was done twice, where the excluded literature was revisited once at a later stage in case of incorrect exclusion. Furthermore, template analysis helped carry out a thorough analysis following steps. The data was analysed multiple times for the different codes, which allowed for subsequent changes if codes were initially set wrong. The analysis was also carried out at different stages throughout the thesis in order to leave a clear mind and minimise errors.

Additionally, the use of secondary data can make the research dependent on the quality of the data (Robson and McCartan, 2016). Therefore, to minimise this limitation, the data collection only included peer-reviewed articles. Furthermore, the interpretation of the secondary data does depend on the secondary data's first interpretations, which could include an additional interpretation bias (ibid). Transparent reporting of the findings and acknowledging possible bias is therefore carried out throughout the thesis.

During the analysis, pre-disposed knowledge may introduce bias when researching emerging activities, conditions and themes. I started the study with preconceptions of women's roles where I expected women to have pre-disposed gender roles including invisible work and reproductive work that would be left unnoticed. I also wanted to challenge the notion of victimised women and of them being less capable especially of "typically male" work. The systematic nature and thoroughness of the analysis helps minimise this bias, yet does not remove it.

5 Results

5.1 Systematic Review/General overview of the sample

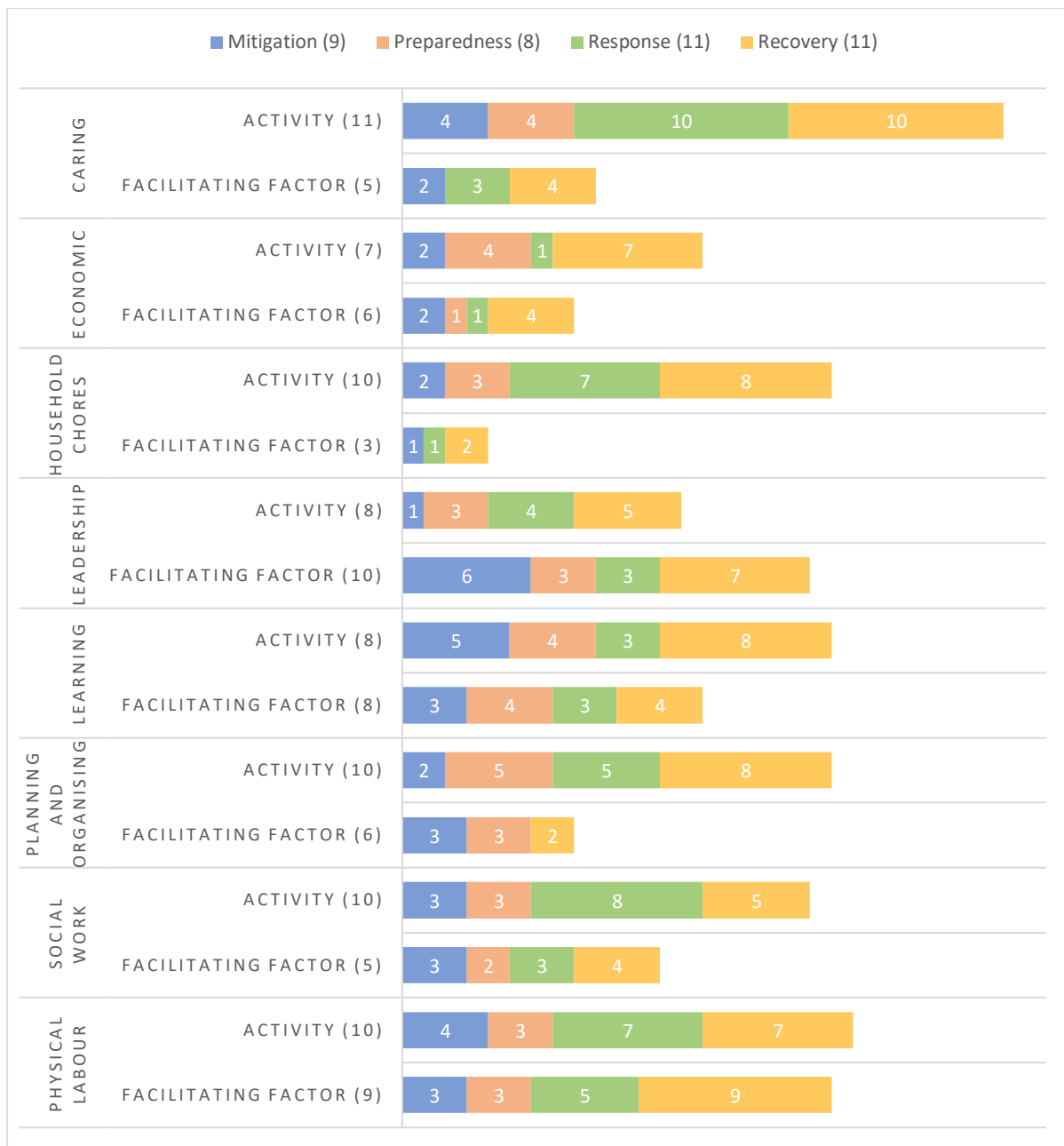
The systematic literature review data collection resulted in eleven peer-reviewed articles that ranged between 2013-2023 in publication year. The location of the research included Bangladesh, Iran, Nepal, New Zealand, Pakistan, Sweden, Thailand, USA, and Vanuatu. The natural hazards recorded included floods (5), earthquakes (4), cyclones (2), tornado (1), drought (1), storm surge (1), and forest fire (1). The DMC stages cited varied between what the research aimed at reporting and what was coded due to the fluidity of the cycle. One (1) article aimed at reporting mitigation activities while nine (9) articles were coded in mitigation by the end. Similarly, three (3) articles mentioned preparedness while eight (8) were coded, eight (8) mentioned response while eleven (11) were coded, and nine (9) mentioned recovery while eleven (11) were coded. The methodology varied between qualitative (8) and mixed methods (3). Lastly, various methods of data collection were carried out including surveys,

focus group discussion, interviews, informal dialogues, and field observations. More detailed information on the sources analysed with the locations, aims and other information are described in *Table 2* in appendix A

Women's activities and facilitating factors

The research showed that women are active participants of DRM activities in several ways. The number of articles referring to an activity and facilitating factor in each DMC stage, organised in categories, is presented in Figure 2. Recovery was the most referred DMC stage in both activities and facilitating factors.

Response was the second most mentioned within activities, followed by preparedness and then mitigation. Within facilitating factors, mitigation was the second most mentioned followed by preparedness and response equally. Women's active role as caring figures was the most referred to both as an activity (11) and within preparedness, response and recovery. Economic activities were mentioned by the least articles (8). Conditions facilitating women's participation within household chores followed by social work and caring activities were the least referred to. On the other hand, the most mentioned facilitating conditions were regarding leadership and then physical labour, and learning.



5.1.1 Figure 2. Number of papers per DMC stage and activity category

The different categories represent the different types of activities that emerged grouped together. Some are connected to each other, for example “home repairs/construction” is categorised as a house chore yet is also connected to physical labour. Farming is seen both as an economic activity but also as a house chore as farming was also at times described as subsidiary, thus two codes were created for those. Leadership, learning, and planning and organising are all activities that were highly connected with each other and other categories. The full relationship diagram and coding synthesis matrix can be found in appendix B, *Figure 3* while the results described below have been synthesised in *Table 3* in appendix C.

5.2 Mitigation

Activities

There were numerous mitigation activities carried out by women that are mentioned by the sources. Firstly, women care for their family, community members, other women and vulnerable groups. Coupled with their leadership and learning skills, women in Thailand and Vanuatu have created fundraising and financial risk-sharing initiatives respectively (Clissold, Westoby and McNamara, 2020; Puwajarernpong et al., 2023). These initiatives were directed to underprivileged or vulnerable groups in the community to mitigate possible economic and infrastructure losses, and to increase knowledge.

Women also used their knowledge, social network and organisational skills to teach and expose each other to different income streams in order to mitigate possible future dependency on the environment and stabilise their income source (Clissold, Westoby and McNamara, 2020). Additionally, women have been observed to take an active role in preserving economic resources (Alam and Rahman, 2014; Sohrabizadeh, 2016b; Rakib et al., 2017).

In Iran, women were reported as paying more attention to changes in the environment and new issues, a local knowledge considerable for preventive measures (Sohrabizadeh, 2016b). This could also be seen in Bangladesh and Vanuatu where women also cared for their property (Rakib et al., 2017; Clissold, Westoby and McNamara, 2020). They planted trees and cultivated different crops that were known to help mitigate against possible losses. For example, in Vanuatu, women innovatively planted more little gardens everywhere within the land in order to mitigate material and economic losses (Clissold, Westoby and McNamara, 2020). They also created seed banks together to act as reserve seeds if crops were washed away which could immediately mitigate material and economic losses after disasters.

Women were also found to care for each other and act as leaders by speaking up about organisations that excluded women from DRM practices in Vanuatu (Clissold, Westoby and McNamara, 2020). One woman stated “I just went there to force that they take some ladies there... That’s when I find out that we empower women so that we will never face another disaster... We know where we can use our women... [...] We can do it.” (ibid, p. 106). This demonstrates women’s solidarity and support for one another, while also recognising and valuing their capacities and contributions to DRM.

Women in New Zealand knew that their social network, i.e. working together to plan and organise, was their best option for “efficient effective progress” within DRM (Gordon, 2013, p. 421). This is something that is mirrored in the research in Thailand that states that “women

leaders use informal social mechanisms to access resources for communities and vulnerable groups because there is no decision-making power for them in the policymaking process.” (Puwajarernpong et al., 2023, p. 72).

Lastly, in Vanuatu, Thailand and Pakistan, women showed great interest in learning more about various sectors in DRM, for example in attending training courses to care for the sick and elderly or learning about different agricultural systems or about different income streams (Clissold, Westoby and McNamara, 2020; Gul and McGee, 2022; Puwajarernpong et al., 2023).

Facilitating factors

Different actions and factors can facilitate women’s role in mitigation efforts. First and foremost, the integration of women within DRM practices was highlighted. A woman in Iran stated that at least one woman needs to be in charge of DRM to recognise their needs (Sohrabizadeh, 2016b). Clissold, Westoby and McNamara similarly emphasise that “integrating women’s voice to drive conversations, projects and initiatives” is imperative (2020, p. 106). A woman-led organisation in New Zealand called Cancers strengthens this point as it “plays an important role in empowering them [suffering families]”, proving that integrating women in DRM activities will inevitably empower themselves and other women (Gordon, 2013, p. 422).

There is, however, a lack of formal channels where women can participate in DRM planning and programs (Thapa and Pathranarakul, 2019). In Thailand, municipalities and other agencies created a DRM plan that increased women’s participation in community committees or as community leaders (Puwajarernpong et al., 2023). This new municipality structure allowed for female community leaders to be heard and for them to represent their community during meetings. Furthermore, an increase in spaces promoting social networks has also been demonstrated to facilitate women’s innovative mitigation initiatives and participation within DRM (Clissold, Westoby and McNamara, 2020).

NGOs were also seen to include women in participating in teachings and others (Alam and Rahman, 2014; Clissold, Westoby and McNamara, 2020; Puwajarernpong et al., 2023). This official structure and knowledge can lead women to take on important roles with DRM, allowing them to express their caring of vulnerable groups and women to empower them and minimise possible disasters (Puwajarernpong et al., 2023).

The view of women participating in DRM seemed at times to be negative. In Iran men believed that women were incapable of carrying out such tasks (Sohrabizadeh, 2016b). In Pakistan women believed that their interference only delayed the men's work in DRM (Memon, 2023).

This negative view of women has also led to an underrepresentation of women within the working field. This has led to less women participating in planning and implementation due to a "scarcity of women representations in the community who could assume decisive roles" (Thapa and Pathranarakul, 2019, p. 217). It has also been reported to lower women's self-worth and limits learning opportunities.(Memon, 2023).

Changing the stereotypical views of women to enable women's participation in DRM activities was highlighted in several sources (Gordon, 2013; Alam and Rahman, 2014; Sohrabizadeh, 2016b; Thapa and Pathranarakul, 2019; Clissold, Westoby and McNamara, 2020; Memon, 2023; Puwajareernpong et al., 2023). An example of a method was highlighted by Clissold, Westoby and McNamara (2020) where women's increasing roles as primary income earners led to a "business-woman" identity, in turn increasing women's self-esteem and changing household roles and responsibilities. Furthermore, Memon (2023) and Thapa and Pathranarakul (2019) stressed that there was a dependency on male power and a traditional patriarchal culture, and that, similarly to Clissold, Westoby and McNamara (2020), a change in the social division of labour and responsibilities and empowering women is needed.

5.3 Preparedness

Activities

Women undertook several activities to prepare for natural disasters. Women were directly involved in taking care of their family, whether that was as a mental burden (Villarreal and Meyer, 2020; Puwajareernpong et al., 2023) or physically helping them (Alam and Rahman, 2014; Rakib et al., 2017; Puwajareernpong et al., 2023). Women took on household management tasks when preparing for disasters. They performed adaptive activities including new infant carrying methods, financial and property savings such as protecting valuables, food saving and storage, alternate cooking methods preparations, agricultural and property adaptations, securing resources, implementing safe action plans and monitoring incoming disasters (Alam and Rahman, 2014; Sohrabizadeh, 2016b; Rakib et al., 2017; Clissold, Westoby and McNamara, 2020; Villarreal and Meyer, 2020; Puwajareernpong et al., 2023).

Similarly to the mitigation stage, women cared for their own families but also for other vulnerable groups and families within the community (Alam and Rahman, 2014; Villarreal and Meyer, 2020; Puwajareernpong et al., 2023). Additionally, women actively worked together

with their community to share information about incoming disasters and ways for preparing for such (Alam and Rahman, 2014; Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023).

Furthermore, women showed that they wanted to and had actively learned from past disasters (Alam and Rahman, 2014; Puwajareernpong et al., 2023). For example, in Bangladesh, when a new disaster was said to be incoming, women changed their appearance (clothes and hair) in order to better cope with the disaster to come (Alam and Rahman, 2014). This was done due to learned behaviour that then allowed them to be better prepared.

Facilitating factors

In order to facilitate women's preparation towards disasters, an increase in knowledge is a reoccurring theme. Women specifically stated that they lack knowledge on incoming disasters, its impacts and escape routes (Rakib et al., 2017; Thapa and Pathranarakul, 2019; Memon, 2023). Alam and Rahman (2014) report a positive outcome where women's preparations techniques changed considerably after disaster preparedness trainings from NGOs. Accordingly, increasing opportunities for teaching can increase women's knowledge, and thus increasing their capacities in preparing for natural disasters. Women also lacked platforms to learn about preparedness tools, something that was facilitated in Thailand by empowering women and giving them the opportunity to attend training activities to enhance key knowledge and skills (Thapa and Pathranarakul, 2019; Puwajareernpong et al., 2023).

Access to knowledge and resources may however not always be sufficient for women to be informed about incoming natural disasters. This is not due to a lack of proximity to information sources, but because their husband would rather prioritise other activities such as listening to music or engage in other recreational activities on phones or radios (Rakib et al., 2017; Alam and Rahman, 2019). Women are also not welcomed in common community spaces where communication about incoming disasters take place and men usually did not communicate with them about such topics (Memon, 2023). Additionally, in Bangladesh, Iran and the USA, women were undermined by their family and not trusted in regard to their perception of incoming disasters and adaptive skills (Sohrabizadeh, 2016a; Rakib et al., 2017; Villarreal and Meyer, 2020). Therefore, in order to facilitate women's preparedness towards disasters there is a need for changing the view of women as incapable and the gender stereotypes and roles (Sohrabizadeh, 2016b; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Villarreal and Meyer, 2020; Memon, 2023).

Lastly, in order to facilitate women's economic preparedness activities, fundraising activities to help them save up before a disaster is crucial (Puwajareernpong et al., 2023). NGOs have helped women in such activity by involving female beneficiaries within economic and agricultural aid (Alam and Rahman, 2014). Similarly, the risk sharing economic scheme carried out by women in Vanuatu also helped women to save economically (Clissold, Westoby and McNamara, 2020).

5.4 Response

Activities

In terms of response activity, women were said to show “caring instincts” coupled with a great sense of organisation, physical strength and social skills while still taking on their gendered reproductive tasks. During a disaster, women were seen to care for their family, especially including children, the elderly, sick people, adolescent girls and pregnant people (Gordon, 2013; Alam and Rahman, 2014; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Villarreal and Meyer, 2020; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Memon, 2023; Puwajareernpong et al., 2023). As Gordon remarks in New Zealand: “The family co-ordination role seemed to fall naturally onto women, perhaps as an extension of the role they played prior to the earthquakes” (2013, p. 418). Women also cared for neighbours and others in their community, often saving others caught in the midst of the natural hazard (Gordon, 2013; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Memon, 2023; Puwajareernpong et al., 2023). For example, in Pakistan after an earthquake, women were seen helping in rescue activities despite their own families being affected by the hazard (Gul and McGee, 2022).

Women did not only care for the physical health but also the mental well-being of children, family members and community members (Gordon, 2013; Sohrabizadeh, 2016b; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Puwajareernpong et al., 2023). On top of being mentally strong for others, they also held a great deal of mental load towards the disasters. They were constantly alert to any physical and social impacts from the disaster and how to respond to those (Gordon, 2013; Sohrabizadeh, 2016b; Rakib et al., 2017; Villarreal and Meyer, 2020; Gul and McGee, 2022; Memon, 2023).

Women also took leading roles in household management and organising, often taking on the man's duties at home in order to let them carry out disaster response activities (Rakib et al., 2017; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Puwajareernpong et al., 2023). Women took care of their damaged property and were intuitively aware of possible damages

to it and their livestock (Sohrabizadeh, 2016b; Rakib et al., 2017; Danielsson and Eriksson, 2022). This was also a response to possible economic loss and mitigating such.

When it came to aid/relief material delivery, women knew who was in most need of assistance (Gordon, 2013; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Gul and McGee, 2022). For example, many women were seen creating and advocating for communities after an earthquake in New Zealand (Gordon, 2013). One woman set up an organisation in order to advocate for the more vulnerable where she stated that “the loud squawky people would get what they needed and the people that were quietly waiting, and often they were elderly, saying ‘Oh there are far worse people than me’ would fall through the gaps” (ibid, p. 421). In Sweden, women were organizing transports and donations (Danielsson and Eriksson, 2022).

Women have also been seen managing the community and volunteers in response to a disaster (Gordon, 2013; Clissold, Westoby and McNamara, 2020; Danielsson and Eriksson, 2022; Puwajarenping et al., 2023). They were aware of the importance of a community and working together, as a New Zealander said: “We have these amazing opportunities to do things well, collaboratively, co-ordinated, innovative, stop thinking in silos. Bring things together so that we make communities stronger, families stronger” (Gordon, 2013, p. 421). Similarly in Vanuatu, the authors stressed that social capital was one of women’s unique resources in DRM processes for themselves, their household and the community (Clissold, Westoby and McNamara, 2020).

This social capital can be seen in other places where women tended to cook for their family and the community together, especially for the people in need (Gordon, 2013; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Puwajarenping et al., 2023). In Pakistan, women went as far as taking wood from their broken houses to burn for cooking (Gul and McGee, 2022). They also made sure to cook and clean collectively for each other when resources were found (Gul and McGee, 2022). One respondent in Pakistan stated: “if someone found a cooking pot we used to cook collectively in it for all the people and we used to put it in one dish and eat it together” and “a few women took all the clothes of people and washed them with great difficulty” (Gul and McGee, 2022, p. 1019).

Women were seen to help the community with various physical tasks such as taking part in search and rescue activities, clearing the rubbles, stood guard, helped minimise impacts, fetching resources such as water, collecting firewood, and shovel liquefaction (Gordon, 2013;

Rakib et al., 2017; Danielsson and Eriksson, 2022; Gul and McGee, 2022). They were also seen surveying damages, maintaining communication about disasters within community, cooperate with neighbours and helping and asking for help (Alam and Rahman, 2014; Rakib et al., 2017; Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023).

Facilitating factors

Similarly to the above-mentioned facilitating factors, an increase in women's representation, self-esteem, and image can help women in carrying response activities. The integration of women within DRM practices was emphasised (Sohrabizadeh, 2016b; Clissold, Westoby and McNamara, 2020). Additionally to its mitigative effects which would help in response actions, increasing women's experience in tackling disasters helps them to do so in the future (Gordon, 2013).

However, the low representation of women in DRM has caused a low self-esteem within women, which in turn reduces their involvement in such activities (Rakib et al., 2017; Thapa and Pathranarakul, 2019). Women's undereducation or low knowledge is another factor affecting their self-esteem. This knowledge gap affects their survival skills, often causing deep frustrations as they feel incapable of saving their loved ones (Thapa and Pathranarakul, 2019; Memon, 2023). To counteract this phenomenon, education and training can be helpful. In Thailand and Bangladesh, NGOs and other agencies carried out survival training that included women, which helped in their response skills (Alam and Rahman, 2014; Puwajareernpong et al., 2023).

Here again changing the stereotypical views of women was recorded as imperative to increase their recognition in response activities, especially in "typically male" activities (Rakib et al., 2017; Thapa and Pathranarakul, 2019; Villarreal and Meyer, 2020; Danielsson and Eriksson, 2022; Memon, 2023). A woman in Bangladesh stated that "we do not get proper appreciation (dam), and sometimes we are misjudged (obicar) and neglected by our family and society" (Rakib et al., 2017, p. 37). Similarly, in Sweden, one respondent said that women were not allowed to participate in some response activities because of the "macho culture" (Danielsson and Eriksson, 2022, p. 156). While in the USA, women's concerns were not always "heeded" by the men in the household (Villarreal and Meyer, 2020).

Working on dismantling the rigidity of gendered social norms has also been highlighted by some sources (Thapa and Pathranarakul, 2019; Memon, 2023). Memon (2023) states that gendered social norms have affected how women even survive during floods in Pakistan. A

woman said “we cannot swim; it is not acceptable. So, we find it difficult to evacuate during floods” while another stated “during flooding, I could not leave the house as my brother was not back. It is not considered good to leave unchaperoned by a male family member” (ibid, p. 70). Women also reported that they lacked strength due to malnutrition and that sexual violence when getting resources was often recurrent (Rakib et al., 2017).

Lastly, increasing communal spaces that enable social network and communication can facilitate women’s response to disasters and ease their mental burden. In the USA, women expressed a desire to be with a community, especially among other women, during a disaster (Villarreal and Meyer, 2020). This also true in Nepal, where women were said to come together and be great consolers (Thapa and Pathranarakul, 2019). The benefit of these communal spaces is enhanced by the example in Vanuatu where informal networks were said to help women with access to resources and to meet urgent needs during response (Clissold, Westoby and McNamara, 2020).

5.5 Recovery

Activities

Women carried out many activities to advance recovery processes after disasters, including physical labour that may be seen as “typically male”, reproductive and productive work, and many “invisible” actions. First, women took part in typical recovery aid such as household and public infrastructure repairing and reconstruction, collecting resources such as water and firewood, and taking care of farm animals and land (Gordon, 2013; Alam and Rahman, 2014; Sohrabizadeh, 2016b; Rakib et al., 2017; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Memon, 2023; Puwajarernpong et al., 2023). All this effort is not without difficulty as a woman from Pakistan states “we have made these houses with so much difficulty” Gul p. 1016. Such work was said to be key to “rapid restoration of communities to normal status” (Sohrabizadeh, 2016b, p. 475).

Women in every source were shown to take care of their family and/or community especially including vulnerable and badly affected people (Gordon, 2013; Alam and Rahman, 2014; Sohrabizadeh, 2016b; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Memon, 2023; Puwajarernpong et al., 2023). Women took on a great mental load of the health of their family members and impacts of disasters (Sohrabizadeh, 2016b; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Memon, 2023). They also worked together as mental supporters for their family’s and community’s mental well-being (Sohrabizadeh, 2016b; Thapa and Pathranarakul, 2019;

Danielsson and Eriksson, 2022; Puwajareernpong et al., 2023). For example, in Iran women were said to be indispensable when it came to mental support (Sohrabizadeh, 2016b).

Women took care of household budget and contributed to the household economy by selling or exchanging their goods and taking on new employment (Alam and Rahman, 2014; Sohrabizadeh, 2016b; Rakib et al., 2017; Clissold, Westoby and McNamara, 2020; Gul and McGee, 2022; Memon, 2023; Puwajareernpong et al., 2023). Women were also seen to take active economic responsibilities such as taking loans for agriculture and farming purposes (Rakib et al., 2017; Alam and Rahman, 2019). These economic responsibilities did not stop at the household level; women also took economic initiatives to help people in need (Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). In Thailand and Vanuatu, women raised money to help vulnerable groups, especially women, with economic burdens and material loss (Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). Women in Vanuatu also shared knowledge on different income streams, which helped with speedier recovery (Clissold, Westoby and McNamara, 2020).

Women have also been advocates for underprivileged groups in their communities (Gordon, 2013; Thapa and Pathranarakul, 2019; Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). They were very successful in distributing aid to the most vulnerable (Thapa and Pathranarakul, 2019). In Thailand and Vanuatu, negotiating and leader skills have helped increase access to government resources (Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). In New Zealand, women often took initiatives to secure food and water for people in need and made sure the community had a voice in disaster recovery plans (Gordon, 2013).

Women also took on “typical” DRM jobs such as surveying disasters and their impacts, managing volunteers, household and city planning, supervising reconstructions, aid collection and distribution (Gordon, 2013; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Memon, 2023; Puwajareernpong et al., 2023). Furthermore, in Iran and Bangladesh, women were reported as having considerable local environmental knowledge such as adaptive agriculture knowledge for speedier recovery (Alam and Rahman, 2014; Sohrabizadeh, 2016b). They also attended agricultural training that men wouldn’t or couldn’t attend, giving them specific knowledge in their local environment (Rakib et al., 2017; Gul and McGee, 2022).

Facilitating factors

In order to facilitate women's activities and roles in disaster recovery, an increase in women's appreciation, representation, and self-esteem but also increase of knowledge and communal space can be resourceful. First, according to Sohrabizadeh (2016b) and Rakib et al. (2017), women's contributions to recovery efforts are often undermined by familial criticism and negative portrayals in the media. Some men in Iran believed that integrating women in recovery efforts would hinder goals (Sohrabizadeh, 2016b). Yet, women's encouragement and self-satisfaction need the respect and appreciation of their family (Sohrabizadeh, 2016b; Rakib et al., 2017). Furthermore, Gul and McGee (2022) note that women's participation in reconstruction activities changed men's perceptions of women's capacities to recovery contributions. Therefore, integrating women and their perspectives in DRM, especially within recovery activities, is necessary to recognize women's needs (Clissold, Westoby and McNamara, 2020). The integration of women and their knowledge of other vulnerable groups, including other women, would therefore in turn further facilitate women's participation in disaster recovery (Puwajarenping et al., 2023).

In order to facilitate women's representation and perception, a change in gender norms that leads to encouragement is also necessary (Sohrabizadeh, 2016b; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Villarreal and Meyer, 2020; Danielsson and Eriksson, 2022). Work against traditional patriarchal culture and dependency on men can further facilitate their participation in recovery efforts (Gordon, 2013; Thapa and Pathranarakul, 2019). Memon states that "this erroneous belief in the gender based social division of work and responsibilities has led women to accept that inherently they lack knowledge" (2023, p. 70). Therefore, empowering women will facilitate their participation in disaster recovery (Gordon, 2013; Rakib et al., 2017; Thapa and Pathranarakul, 2019; Clissold, Westoby and McNamara, 2020; Danielsson and Eriksson, 2022; Gul and McGee, 2022; Memon, 2023).

Women's participation in disaster recovery can be facilitated both through formal and informal channels. First, NGOs and other agencies have the chance to educate women and integrate them within programs (Alam and Rahman, 2014; Gul and McGee, 2022; Memon, 2023; Puwajarenping et al., 2023). Women in Nepal could not participate in recovery activities as they were not exposed to such opportunity and lacked education on the matter (Thapa and Pathranarakul, 2019). Aid and the distribution of critical resources also needs to be done with women in mind (Clissold, Westoby and McNamara, 2020; Memon, 2023). This can be done

through integrating women in leadership position (Gordon, 2013; Clissold, Westoby and McNamara, 2020; Danielsson and Eriksson, 2022).

Women were benefiting from the social support they received in community recovery processes (Clissold, Westoby and McNamara, 2020; Villarreal and Meyer, 2020; Puwajareernpong et al., 2023). Therefore, increasing communal informal channels can also be helpful in order to increase collaboration (Gordon, 2013). Informal social networks help support inclusive financial recovery, increases social capital, and resource sharing (Clissold, Westoby and McNamara, 2020). Furthermore, these networks can also help women support each other (Gordon, 2013). Women in the USA and Nepal reported that they appreciated being with the community and other women for their mental load (Thapa and Pathranarakul, 2019; Villarreal and Meyer, 2020). Therefore, increasing these communal spaces can help them in carrying other tasks.

Increasing women's participation through the abovementioned channels and increasing women's leadership will also further facilitate women's economic activities. As empowered women in Thailand and Vanuatu created economic schemes to facilitate women's recovery, an increase in such would further help (Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). Moreover, NGOS can integrate women as beneficiaries of monetary aid and train them in such which could facilitate economic independency (Alam and Rahman, 2014; Puwajareernpong et al., 2023). Lastly, employment was seen to be prioritised towards men, something that if a shift were to be seen, more women would be able to participate in the economic recovery process (Sohrabizadeh, 2016b; Gul and McGee, 2022). This in turn can help the depiction of women from victims to working business women (Clissold, Westoby and McNamara, 2020).

6 Discussion

6.1 Systematic review

The systematic literature review resulted in 11 peer-reviewed articles that reported women's roles before, during and after a wide variety of natural disasters. The data covered in total 5 regions: North America, Northern Europe, the Middle East, South Asia and Oceania. Overall, the systematic literature review identified a gap in the literature about women's roles in DRM in other areas that also suffer from reoccurring natural hazards. This especially includes Central and South America, all of the African continent, Southern and Eastern Europe, and Eastern and Central Asia.

There is also a literature gap in the activities that women perform, especially in the mitigation and preparedness stages of the DMC. This gap is supported by other research which has also highlighted similar research gaps in these stages (Enarson, Fothergill and Peek, 2018). Preparedness is also a short-term stage which may be difficult to research and, like mitigation, is a stage that is hard to notice before being informed a natural hazard will occur (Sawalha, 2020). This analysis emphasises the need to continue collecting data on women's contributions before natural disasters may occur, especially in areas where they are frequent, for the mitigation and preparedness stages.

Additionally, data on facilitating factors during the preparedness and response stage was lacking compared to other stages. This could be due to the short-term and emergency nature of the stages which makes it difficult to find long-term facilitating factors and to challenges of collecting data during a state of emergency (Sawalha, 2020). This shows that researchers need to concentrate on how to support women in these stages especially. Lastly, reporting of facilitating factors for women's household chores was especially low. Therefore, this systematic literature review points to a research gap within this topic.

6.2 Activities

The review found that women took a variety of roles and activities throughout the DMC. There were 8 categories of activities carried out by women that emerged: caring, economic, household chores, leadership, learning, planning and organising, social work and physical labour. These activities varied at the household but also community level. Overall, women were not passive but actively contributing to DRM activities.

Women were seen to be caring actors that supported mentally and physically their families and community, especially vulnerable people (e.g., Sohrabizadeh, 2016; Thapa and Pathranarakul, 2019). They were also seen to take on the mental load and burden of mitigating, preparing for, responding to and recovering from natural disasters (e.g., Villarreal and Meyer, 2020; Memon, 2023). Women were also often recorded doing household chores, especially in the response and recovery stages (e.g., Rakib et al., 2017; Gul and McGee, 2022). The documented chores pointed mostly to the physical aspects of household chores, such as property caring, or typical household chores that were done for the community, such as communal cooking or laundry.

Furthermore, it was mostly these abovementioned chores that were recognised by the wider community and family, while household chores for the home were generally described as "housekeeping" instead of describing the activities or were just altogether overlooked. This

could be due to the perception that women's contributions to household chores and caregiving for the community are viewed as "extra" work, whereas their reproductive labour within the home is considered a given and, consequently, rendered "invisible". This supports Floro and Poyatzis (2018) and Kreutzer, Millerd and Timbs, (2023) work that highlighted women's reproductive work being under recognised. Therefore, further research highlighting women's reproductive and invisible work is crucial to increase their recognition in DRM activities. This is similarly a necessity for integrative policies and frameworks.

Women also seemed to naturally take on leadership, planning and organising roles in all four stages of the DMC. They were seen to advocate for the vulnerable groups and people in need, e.g., other women, the elderly, children and disabled people (e.g., Gordon, 2013; Thapa and Pathranarakul, 2019). They gathered people using their social skills and networks to help the community, increasing communication and collaboration (e.g., Alam and Rahman, 2014; Rakib et al., 2017). They organised the community to facilitate mitigation, response and recovery efforts, and additionally organised fundraising and saving schemes for the community (Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). They also exercised leadership skills by standing up for women's needs and integration in local and national DRM programmes (e.g., Gordon, 2013; Puwajareernpong et al., 2023). Overall, women helped to decrease social and economic vulnerability for other women and groups that were deemed "vulnerable", a great asset in DRM policies and frameworks. These findings also support reports of women being great community-based organising leaders that use social networks to advocate for vulnerable groups Enarson, Fothergill and Peek, 2018).

Women were seen taking a multitude of economic initiatives. They sold goods, took care of their farms and started new employments in order to bring income to the household for faster and smoother recovery (e.g., Alam and Rahman, 2014; Gul and McGee, 2022). Furthermore, they took saving and budgeting initiatives at home and with the community by sharing and exchanging, helping with the recovery stage but also future mitigation efforts (e.g., Clissold, Westoby and McNamara, 2020). They actively attended trainings to increase efficiency in farming and saving schemes, especially when men couldn't, and took on men's job at home in order to let men take on more labour (e.g., Danielsson and Eriksson, 2022; Gul and McGee, 2022). Therefore, women were contributors to men's productive work.

Yet, women also participated in the "typically male" physical labour connotated with DRM activities such as aid collection, monitoring disaster, reconstructions and collecting resources (e.g., Rakib et al., 2017; Danielsson and Eriksson, 2022). They used their knowledge of

community networks and vulnerable groups to effectively manage these activities. Indeed, they were often providing essential healthcare support to those in need, such as the elderly, sick, disable, children and other women (e.g., Sohrabizadeh, 2016). Furthermore, these “typically male” activities were often described by participants as “helping” the men, supporting Bradshaw’s (2013) point (p. 66).

This new knowledge on the various activities carried out by women demonstrates the active role of women throughout the DMC. Women take on several activities that contributes to DRM, whether hindered by their vulnerabilities or not. The need to recognise women’s roles, especially in the “invisible” and “typically male” activities, is thus clear.

Additionally, instead of adding to women’s plate, DRM policies and programmes need to take into consideration women’s already existing roles. This can mitigate the possible “feminisation of responsibility” mentioned by Bradshaw (2009) and instead create a sustainable approach that recognises women’s contributions and improves community resilience.

6.3 Facilitating factors

Four main facilitating conditions emerged repeatedly from the systematic literature review, showing their significance in promoting women’s participation in DRM. These conditions included integrating women in DRM programmes and activities, training women and increasing their knowledge regarding natural disasters, increasing formal and informal spaces for women, and changing gender norms, all leading to an overarching theme of needing to “empower” women. Connecting to the mitigation stage of the DMC, all conditions are mitigation risk consequences reduction activities (Coppola, 2015, p. 226).

First, the inclusion of women in DRM programmes and leadership roles aided women’s contribution due to an increase in recognition and representation throughout the DMC (e.g., Sohrabizadeh, 2016; Thapa and Pathranarakul, 2019). This inclusion can help women contribute to traditionally male-dominated activities such as planning and organising, leadership, physical labour, and economic, but also allows them to participate in training and teaching.

Furthermore, as women leaders care for others, they minimise social and economic vulnerabilities which increasingly facilitates other women’s participation in DRM activities such as household chores, social work and caring (e.g., Clissold, Westoby and McNamara, 2020; Puwajareernpong et al., 2023). Moreover, by challenging prevailing conceptions of women as passive victims when including women in DRM and various programmes, it

increases women's self-esteem and capacity together with the community's perceptions of women (e.g., Rakib et al., 2017; Danielsson and Eriksson, 2022). Therefore, including women in DRM initiatives throughout the DMC not only facilitates their role but can also decrease social and economic vulnerabilities of women and other at-risk groups.

Informal spaces, categorised as a space that enables idea and knowledge sharing, collaboration, emotional support networks, social connections and community resources, also facilitate various activities for women (e.g., Clissold, Westoby and McNamara, 2020). These spaces create places for women to work together, facilitating their social work during response and recovery efforts. Furthermore, it creates a space that enables economic and learning activities during the recovery stage but also helps mitigate for further disasters (e.g., Clissold, Westoby and McNamara, 2020). It also supports women by creating a space where they can share their mental and physical workload within caregiving and household chores during the preparedness, response and recovery stages of the DMC (Thapa and Pathranarakul, 2019; Villarreal and Meyer, 2020).

Correspondingly, formal spaces predominantly facilitate learning and skill development, economic initiatives and scheming, leadership roles, planning, and physical labour during preparedness, response and recovery efforts (e.g., Puwajareernpong et al., 2023). Such formal spaces are for example NGO and governmental trainings and programmes that are tailored to women. This includes trainings in disaster mitigation, preparedness and monitoring, including them in response and recovery efforts and monetary aid programmes.

Both informal and formal spaces help women's participation in DRM activities. Consequently, the increased visibility of women in leadership roles or formal positions, and the increased skills and knowledge from training can all contribute to changing societal perceptions of women. As women become more visible and recognised for their capabilities, norms work towards changing gender norms through the above-mentioned conditions. Additionally, the shift in gender roles will then further facilitate women's contribution both through increased self-esteem and community perceptions, but also by equalising the gendered division of labour (Memon, 2023).

These facilitating conditions not only empower women but also promote a more inclusive narrative surrounding women's roles in DRM, furthering gender equality and resilience within disaster-prone communities. Furthermore, as women often demonstrate empathy, particularly in leadership roles (e.g., Clissold, Westoby and McNamara, 2020; Puwajareernpong et al.,

2023), it emphasises how women are powerful contributors to DRM efforts. Engaging men in efforts to dismantle societal norms is essential, as emphasized by Charan, Kaur and Singh (2016). It's imperative to shift the narrative away from portraying women solely as vulnerable and recognising that they are often made vulnerable by systemic factors.

It is however crucial not to follow the same pattern as when women were included to development initiatives and not recreate a “feminisation of responsibility” (Boserup, 1970; Bradshaw, 2009). Therefore, as these conditions are adapted into policies and programmes, one needs to be careful in understanding women’s perspectives and experiences in a specific region in order to properly tailor these policies.

7 Limitations and future research

There are a few limitations to this research in addition to the methodological ones, some of which pave the way for further research. Firstly, as mentioned in the discussion, certain geographical regions are not represented, potentially hindering the generalisability of the research. However, the consistent results across the various regions in this review suggests that the findings still hold general validity. It is also important to note that analysis is based on the available data which was thoroughly and systematically collected. Therefore, there is no inherent bias in the selection of the regions studied. Consequently, this leads to a very important gap in the literature and shows the need for further research in other regions which can be supported by this research.

This paper only analysed women’s roles and facilitating factors in regard to gender. On the other hand, while gender is often used synonymously to ‘women’, some research has argued that men also find themselves to be affected by disasters in unique ways (Enarson and Pease, 2016). Therefore, future research understanding how gender roles also affect men and other genders can give a more thorough understanding of the gender and natural disaster paradigm. Others have also argued that equating women to gender stems from the need for women’s empowerment in gender equality. Thus, the inclusion of women within DRM will unequivocally decrease the effects of disasters on men (Yumarni and Amaratunga, 2018).

Additionally other intersecting factors such as race, ethnicity, age, disability, sexual orientations, class, and socioeconomic status, may affect how women and other genders participate in DRM activities (Fatouros and Capetola, 2021). This therefore calls for future

research that builds upon this one by investigating how these factors may intersect to affect one's participation in DRM.

Furthermore, this research only highlights the possible facilitating factors. Future research exploring these conditions and their effects could be beneficial. For example, one could analyse DRM policies and frameworks against women's participation, while contextualising it within one region. This is especially important as my western perspective could have created cultural bias that may have affected the analysis and recommendations. Therefore, future research that contextualises women's activities and facilitating factors can further help policy makers.

Lastly, due to limited time and the paper selection criteria, this paper only included peer-reviewed material. By excluding papers that were not peer-reviewed, it is possible that useful data was not included in this paper. Future research could further analyse women's activities and possible facilitating conditions utilising non-peer-reviewed and grey literature together with DRM reports from NGOs and/or governments.

8 Conclusions

In light of a dominant view of women as victims in DRM, this systematic literature review aimed at improving knowledge of women's contribution to mitigation, preparedness, response and recovery activities, and factors that facilitate such activities. In doing so, the thesis systematically reviewed 11 peer-reviewed articles through a template and content analysis. The thesis then aimed at answering the following question: how do women contribute to the mitigation, preparedness, response and recovery of natural disasters? And these supporting questions: What are the activities of women in each stage of the disaster management cycle? Which conditions facilitate these activities?

The systematic literature analysis highlighted several gaps in the literature on women's roles throughout the DMC. First, articles were not found in certain geographical regions, shedding light on the need for such research in Central and South America, all of the African continent, Southern and Eastern Europe, and Eastern and Central Asia. Next, mitigation and preparedness were the least represented stages within activities, while facilitating factors were least found in the preparedness and response stages. Therefore, supporting past scholars, this analysis calls for future research on these topics (Enarson, Fothergill and Peek, 2018; Pérez-Gañán et al., 2023).

Furthermore, women were found to have active roles in all four stages of the DMC. The analysis brought up eight categories of activities women partook in: caring, economic, household chores, leadership, learning, planning and organising, social work, and physical labour. Facilitating factors for such activities were the inclusion of women in DRM programmes and activities, training women in and increasing their knowledge of natural disasters, increasing formal and informal spaces for women, and changing gender norms.

This new knowledge can be applied to DRM policies and programmes in the future. With this broad overview of women's roles throughout the DMC and how to facilitate them, DRM practitioners can build upon this to create inclusive policies and programmes. These can then be tailored to women's already existing contributions and facilitating them instead of overburdening them with new roles. It is also crucial to contextualise the programmes and policies to the women in specific regions. Yet, more research on intersecting factors and other genders is necessary for further understanding of women's contributions (Enarson and Pease, 2016; Bradshaw, Linneker and Overton, 2022).

Overall, it is clear that women contribute in many ways to the mitigation, preparedness, response and recovery of natural disasters supporting similar research (Charan, Kaur and Singh, 2016; Hemachandra, Amaratunga and Haigh, 2018; Echendu, 2021; Karistie et al., 2023; Pérez-Gañán et al., 2023). The findings can be applied to DRM policies and programmes together with future research in the field. This can then be a step towards gender equal effects of natural disasters.

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Appendix A

Table 2. Detailed description of the articles used as data for the systematic literature review.

| Title | Citation | Location | Disaster | Disaster Stage | Aim | Methodology |
|--|---------------------------------|--|--|----------------------------------|--|---------------|
| Flood vulnerability, local perception and gender role judgment using multivariate analysis: A problem-based “participatory action to Future Skill Management” to cope with flood impacts | (Rakib et al., 2017) | “Baladoba Char”, Buraburi Union, Kurigram district, Bangladesh | Flood | Preparedness, response, recovery | “Investigate the consequences of floods and the traditional social concepts of the char-land communities”; “the gender roles and resource accessibility in regards to flood hazard risk reduction”; “how efficient they are to cope with the flood hazards”; and “what would be the best approach to empower the char-land community.” (p. 30) | Mixed methods |
| Women in natural disasters: A case study from southern coastal region of Bangladesh | (Alam and Rahman, 2014) | Patharghata Upazila Sub-District, southwestern Bangladesh | Flood, cyclone, drought, storm surge, etc. | Preparedness, response, recovery | “Explore women's preparedness, risk and loss, cultural and conditional behaviour, adaptability and recovery capacity from the natural disasters.” (p. 68) | Mixed methods |
| The Neglect of Women’s Capacities in Disaster Management Systems in Iran: A Qualitative Study | (Sohrabizadeh, 2016) | East Azerbaijan, Bushehr and Mazandaran | Earthquake and flood | Recovery, (possible mitigation) | “Explore women’s capacity to cope in the recent natural disasters of Iran.” (p. 467) | Qualitative |
| Gender inclusiveness in disaster risk governance for sustainable recovery of 2015 Gorkha Earthquake, Nepal | (Thapa and Pathranarakul, 2019) | Kathmandu City and Sankhu Town, Nepal | Earthquake | Response | “Understand the roles of women in post-disaster recovery”, “explore the gaps in gender inclusive disaster recovery and disaster risk governance”, and “highlight the current needs of improvement for sustainable recovery of the 2015 Gorkha Earthquake.” (p. 109) | Mixed methods |
| Preserving family and community: women’s voices from the Christchurch earthquakes | (Gordon, 2013) | Christchurch, New Zealand | Earthquake | Response, recovery | “Highlight and report on women’s work during and after the Christchurch earthquakes.” (p. 415) | Qualitative |
| Women’s Disaster Management Capacities: A Qualitative Study of Flood-Affected Areas in Sindh, Pakistan | (Memon, 2023) | Sindh Province, Pakistan | Flood | Response, recovery | “Critically reflect on the barriers women in Pakistan face during disaster management, their roles and the assistance they need to improve their coping capacity.” (p. 62) | Qualitative |

| | | | | | | |
|---|--|--|---------------------|----------------------------------|--|-------------|
| Women's participation in disaster recovery after the 2005 Kashmir, Pakistan earthquake | (Gul and McGee, 2022) | Azad Jammu and Kashmir, Pakistan | Earthquake | Recovery | Fill the gap in knowledge of women's roles in recovery of Kashmir earthquakes. | Qualitative |
| Women's invisible work in disaster contexts: gender norms in speech on women's work after a forest fire in Sweden | (Danielsson and Eriksson, 2022) | Västmanland, Sweden | Forest fire | Response | “Investigate what women do in disaster situations and how both men and women perceive and discuss the work of women.” (p. 141) | Qualitative |
| Gender and Disaster Management: A Case Study of Prik Tai Community, Songkhla Province, Thailand | (Puwajarenping et al, 2023) | Sadao District, Songkhla Province, Southern Thailand | Flood | Preparedness, response, recovery | Study “community-based disaster (flood) management processes” and “gender roles in disaster management.” (p. 61) | Qualitative |
| Women's experiences across disasters: a study of two towns in Texas, United States | (Villarreal and Meyer, 2020) | Granbury, Texas, USA | Tornado | Response, recovery | “Examine women’s experiences of two disasters in small towns in the United States.” (p. 285) | Qualitative |
| Women as recovery enablers in the face of disasters in Vanuatu | (Clissold, Westoby and McNamara, 2020) | Efate Island, Vanuatu | Cyclone and drought | Mitigation, recovery | Provide insights on women's critical roles in natural hazards with their response and recovery strategies. | Qualitative |

Appendix B

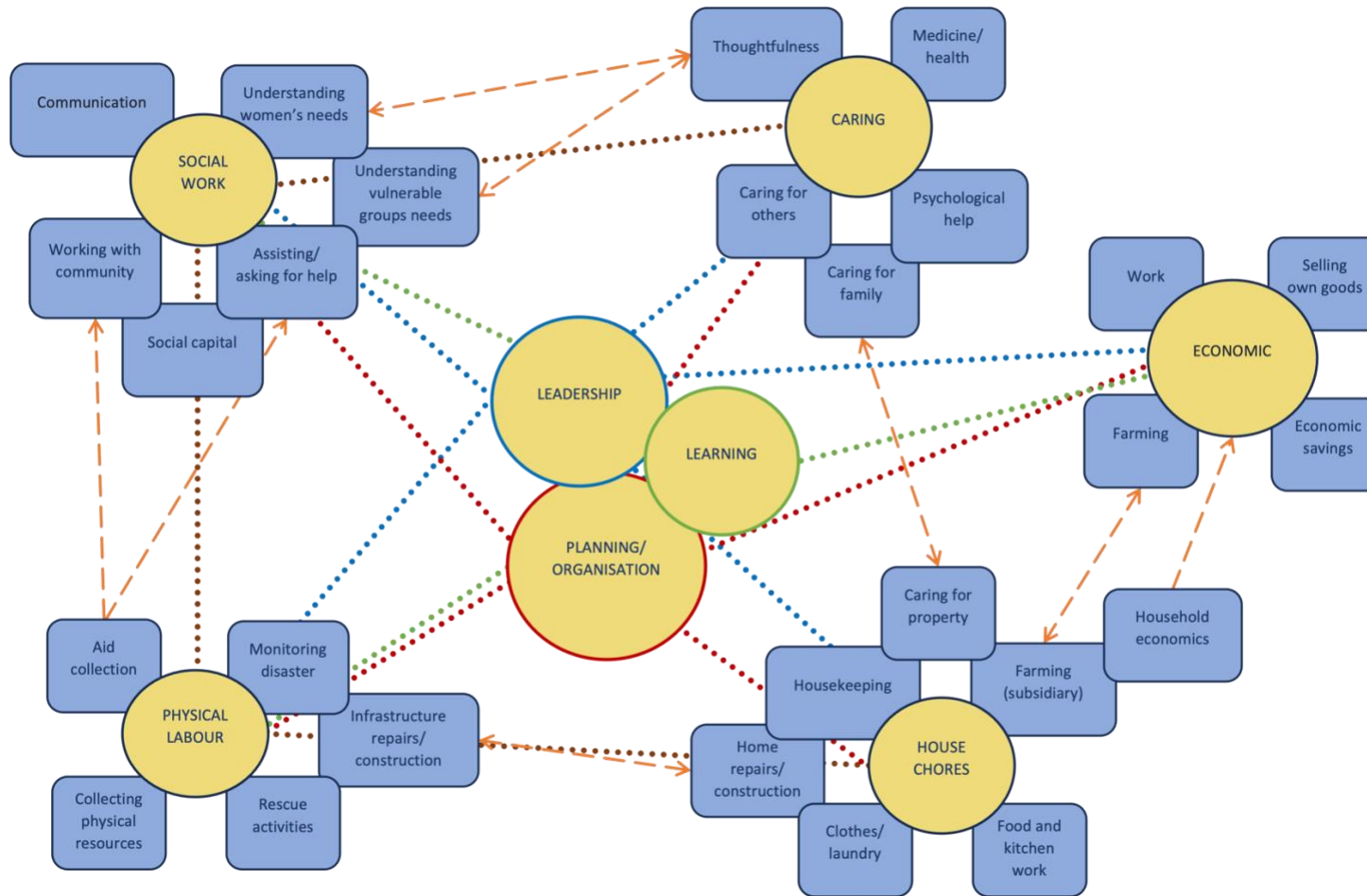


Figure 3. Mind map of the codes in each activity category together with their relationship to each other.

Here we see how certain codes are connected together (e.g., caring for family and for property or economic and subsidiary farming) while others connect in one way with other codes (e.g., aid collection to working with community) or category (household economics to economics). Lastly, we can see that categories in general connect with each other as can be seen through the (brown) dotted line. Since leadership, planning/organising and learning all connected with multiple categories, colour coding was done to simplify the readers understanding.

Appendix C

Table 3. Activity categories across disaster management cycle stages, connecting specific activities with facilitating factors.

| Category | | Mitigation | Preparedness | Response | Recovery |
|-------------------------|---------------------|--|--|---|---|
| Caring | Activity | Caring for family, community members, vulnerable groups and environment | Taking care of at-risk group, preparing medicine | Caring for family, community members, vulnerable groups, and household, healthcare, moral support to family and community | Caring for family, community members, vulnerable groups, household and environment, healthcare, moral support to family and community |
| | Facilitating factor | Inclusion of women in disaster management, empower women, communal/informal structure, formal infrastructure/institutions | N/A | Inclusion of women in disaster management, empower women, communal/informal infrastructure, teaching | Inclusion of women in disaster management, empower women, communal/informal structure, formal infrastructure/institutions |
| Economic | Activity | Introduce financial insurance schemes (for most vulnerable), expand income streams, financial and property savings | Financial and property savings, protect valuable possessions | Economic farming | Economic farming, collect financial aid, selling possessions, new/extra employment, selling crafts, financial and property savings and budgeting), expand income streams |
| | Facilitating factor | Monetary aid programmes for women, empower women, training in monetary aid, use adaptive farming methods | Monetary aid programmes for women, give women access to finances | Give women access to finances | Employ women, monetary aid programmes for women, training in monetary aid, inclusion of women in disaster management, distribution of critical resources, communal/informal structure, formal infrastructure/institutions |
| Household chores | Activity | Food/kitchen work, caring for grounds, adaptative farming methods | Emergency preparing for: Food/kitchen, medicine, clothing, farming, belongings | Food arrangements for home and community, farming, household caring, washing for home and community | Food arrangements for home and community, housekeeping, kitchen quick-repairs, gardening, farming |
| | Facilitating factor | Women as primary income earners, change in gender roles | N/A | Communal/informal structure | Inclusion of women in disaster management, communal/informal structure |
| Leadership | Activity | Community leader, economic manager, vulnerable groups and inequality advocator, representation for women, start groups/schemes for resilience and risk reduction | Economic manager, community leader, resource securing | Household manager, disaster response manager/ leader, community leader | Economic, community, household, disaster response manager/ leader, start groups/ schemes for resilience and risk reduction, vulnerable groups and inequality advocator, representation for women, teach women, work with local government |

| | | | | | |
|----------------------------------|---------------------|--|---|---|---|
| | Facilitating factor | Inclusion of women in programmes and disaster management, empower women, increase women representation, training, improve perception of women's capacity, formal infrastructure/institutions | Inclusion of women in programmes and disaster management, empower women, increase women representation, improve perception of women's capacity, | Inclusion of women in programmes and disaster management, training, improve perception of women's capacity, inclusion of women perspectives | Inclusion of women in programmes and disaster management, empower women, training, improve perception of women's capacity, inclusion of women perspectives, increase women representation |
| Learning | Activity | Knowledge of local environment, agriculture, women and vulnerable people, economics, learn and teach, communal idea sharing | Knowledge of resource access, household preparedness, adaptive measures | Knowledge of disaster response management, community and vulnerable groups, collaborative initiatives | Knowledge of needs of recovery, planning and repairs, economics, agriculture, environment, women and vulnerable people, communal spaces and idea sharing, learn and teach |
| | Facilitating factor | Inclusion of women in programmes and disaster management, empower women, training, inclusion of women perspectives, improve perception of women's capacity and role, communal/informal structure, formal infrastructure/institutions | Inclusion of women in programmes and disaster management, empower women, training and access to it, communal/informal structure, formal infrastructure/institutions | Training, teaching, communal/informal structure, formal infrastructure/institutions | Inclusion of women in programmes and disaster management, empower women, training communal/informal structure, formal infrastructure/institutions, improve perception of women's capacity and role |
| Planning & Organising | Activity | Organise economic initiatives and sharing systems for women and vulnerable groups | Planning access to resources and cooking, organising community members | Organise family, community, volunteers, healthcare, household, help | Organise/planning farming, household, family, community, economics, teaching, reconstruction processes, initiatives for vulnerable groups and women |
| | Facilitating factor | Inclusion of women in programmes and disaster management, empower women, improve perception of women's capacity and role | Prevention awareness tools, improve perception of women's capacity and role | N/A | Inclusion of women in programmes and disaster management, empower women, increase women representation |
| Social Work | Activity | Create social and economic initiatives to mitigate disaster effects on vulnerable groups, community and women, ask and | Ask and provide help for other women, inform neighbours about incoming disaster | Ask and provide help for other women, communicate with community, work together as moral support for others, cooperate with community members | Communicate, cooperate with and help community, work together as moral support for others, create social and economic initiatives to lessen disaster effects on vulnerable groups, share knowledge with |

| | | | | | |
|---|---------------------|---|---|---|---|
| | | provide help for other women, share knowledge with community | | | community, gather to lobby against inequality, use of informal social spaces for resource access for vulnerable community |
| | Facilitating factor | Inclusion of women in programmes and disaster management, empower women, increase women representation, communal/informal structure, formal infrastructure/institutions | Inclusion of women in programmes and disaster management, empower women, increase women representation, communal/informal structure | Improve perception of women's capacity and role, communal/informal structure | Inclusion of women in programmes and disaster management, empower women, increase women representation, improve perception of women's capacity and role, communal/informal structure |
| Visible/ Typical Physical Labour | Activity | Rebuilding infrastructure for resilience, allocate resources to vulnerable groups, knowledge of local environment | Monitoring disaster, adapt infrastructure for resilience, resource securing | Monitoring disaster, aid and resource collection and distribution, physical labour, search and rescue activities | Infrastructure, economic tools, community and environmental repairs and reconstructions, aid and resource collection and distribution, knowledge of local environment, active learning |
| | Facilitating factor | Inclusion of women in programmes and disaster management, empower women, increase women representation, training, improve perception of women's capacity and role | Inclusion of women in programmes and disaster management, empower women, increase women representation, training, improve perception of women's capacity and role | Inclusion of women in programmes and disaster management, empower women, increase women representation, training, improve perception of women's capacity and role, protection of women (violence, malnutrition) | Inclusion of women in programmes, institutional aid, recovery initiatives and disaster management, empower women, increase women representation, training, improve perception of women's capacity and role, communal/informal structure, formal infrastructure/institutions, protection of women (violence, malnutrition) |

