


Article

Assessing Community Disaster Resilience in Flood-Prone Areas of Bangladesh: From a Gender Lens

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Abstract: The main purpose of this study was to assess the level of community flood resilience with a special focus on gender. A gender perspective ensures the representation of diversified voices in the study. From concept development to data representation, all the steps were completed ensuring gender-based inclusion. Both quantitative and qualitative approaches were used to conduct the study. A total of 402 responses were analyzed as the sample. A linear structured questionnaire was developed by using a five-point Likert scale to collect quantitative data. As part of the qualitative tool, in-depth observation was used in the study. The study found that female members of the community lag in terms of disaster resilience comparing to their male counterparts. The scores in different components of resilience assessment framework indicate that there are gaps in terms of level of resilience from the gender perspective. The same disaster can create a disproportionate level of impact on women and men due to an unequal level of resilience. The study indicates that assessing community disaster resilience and introducing resilience enhancement interventions should focus on a gender-based approach.

Keywords: community resilience; gender; resilience assessment; flood



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1. Introduction

The frequency, extent, severity, and magnitude of disasters are increasing due to extreme climate variability. Millions of people around the world are facing more natural, biological, and anthropogenic disasters than ever before. Due to extreme climate variability and other causes, there are changes in the pattern and impact of disasters [1]. Intergovernmental Panel on Climate Change (IPCC) assessment reports indicate that due to climate change, alteration is taking place in terms of frequency, duration, and intensity of extreme events like cyclones, droughts, heavy precipitation, heat waves, etc. [1]. In the year 2019, a total of 308 natural hazards affected 97.6 million people around the world, among which 24,396 people were killed [2]. One of the significant findings of the World Disasters Report 2020 was that 97 percent of the disaster-affected people in 2019 were affected by climate- and weather-related disasters [2]. Due to significant climate change, scientists are predicting that climatic hazards such as floods, cyclones, heat waves, and droughts will intensify and increase in the coming years [2]. According to EM-DAT, a total of 46 percent of the disasters from 2010 to 2019 were floods [2].

Bangladesh is one of the developing countries which has been experiencing major catastrophic hazards. According to INFORM Global Risk Index 2020, Bangladesh is in the second highest position to be at risk of being affected by natural hazards [3]. Disasters like river flooding, monsoon flooding, waterlogging, and cyclones will be very frequent in the coming years, with the probability of severe impacts [4]. In another study, Bangladesh ranked 13th in terms of being at risk of facing most disasters [5]. In 2020, Bangladesh

experienced extreme monsoon floods in 21 districts, exclusively in the north and north-eastern regions. The COVID-19 pandemic increased the complexity of the condition. More than 700,000 households in 654 unions were devastated by severe floods [6].

There are a large number of definitions of disaster resilience coined by different studies and reports. These definitions have some commonalities and differences which enabled the scholars to analyze disaster resilience from different perspectives. Disaster resilience can be addressed as the capacity of any system or community to absorb impacts of any stress or shock and bounce forward to continue regular activities by reconstructing itself [7,8]. Asian Development Bank (ADB) defined resilience as “the ability of countries, communities, business, and individual households to resist, absorb, recover from and reorganize in response to natural hazard events, without jeopardizing their sustained socio-economic advancement and development” [9,10]. The Department for International Development (DFID), currently known as FCDO, also defined disaster resilience related to the ability of communities and households to face and shocks without compromising future development. But one thing in DFID’s definition that was new was that resilience will be achieved through “maintaining and transforming living standards” [10,11]. Twigg added a new term in the definition of disaster resilience which is “bounce back”. Like previous definitions, Twigg also agreed that disaster resilience refers to the capacity of any community to absorb impacts of disastrous events and maintain primary activities, and he also added that a resilient community would not only maintain regular functions during disasters but also will recover and bounce back after the event [10,12].

While increasing the level of disaster resilience, it is also important to make it inclusive. Ensuring actions to address the needs and capacities of marginalized groups like women, children, persons with disabilities, and elderly people will ensure strengthening of overall resilience [13]. Previous studies found that disasters create impacts on men and women differently, with a possibility of bringing long-term negative consequences for women due to the roles women have to play during emergencies [14,15]. As women differ due to causes like lack of economic opportunity, inequity in resource distribution, and limited decision-making power, etc., women face the impacts of disasters differently [15,16]. Assessing the level of community resilience from a gender perspective will help to review the inequity and differences faced by gender-based marginalized groups both inside the household and in the society [17].

All these background studies support that it is important to learn the condition of community resilience from a gendered perspective so that the importance of ensuring inclusive resilience can be established. The objective of this study was to assess the level of community resilience with a special focus on gender.

2. Literature Review

Disaster resilience has seen increasing attention over the past two decades due to the growing number of serious disasters affecting communities across the world and the understanding that community resilience is a key determinant for effectively reducing risks before disaster strikes and building back better once the disaster happens [18]. Disaster resilience refers to the ability of any community or system to face any negative phenomenon and to sustain efficiently with social, economic, environmental, and physical resources [19]. In the context of the community perspective, disaster resilience is the ability of a system to recover from a shock and disaster, which includes the capacities of the community people to absorb and cope with the event [19]. Disaster resilience refers to the capacity of the communities, which is the most common thing in all the definitions. Community resilience is seen as the capacity of any community to cope with adverse effects of hazards in an efficient way so that the food security and well-being of the community will not be disturbed [10,20]. The ability to cope with, recover from, and adapt to hazards is known as community resilience [21]. Community resilience can be alluded to as the capacity of a local area to use its accessible assets in the administration of unfriendly circumstances and was one of the first concerns of the Sendai Framework for Disaster Risk Reduction

(2015–2030). This term has acquired broad acknowledgment in disaster management [22]. The Zurich Flood Resilience Alliance defined resilience as “the ability of a community to pursue its development and growth objectives while managing its flood risk over time in a mutually reinforcing way” [10,23]. The contribution of local community people is essential and a vital aspect for setting up a feasible and useful early warning framework to improve the limit concerning community resilience [24]. In this manner, until now, while numerous speculations and structures about resilience exist, most of them are hard to operationalize or potentially only apply to explicit cases. Moreover, estimating the size of the local area level, where inert strength is generally required, represents its troubles [12]. To make proper decisions and ensure advocacy at all levels, it is important to measure the level of resilience at the community level. Community-level resilience measurement will ensure the inclusion of all the threats faced by the community [25].

There have been different studies to find proper frameworks to assess community resilience. In one study by [18], different frameworks for assessing community resilience are summarized. The list includes but is not limited to, Community Disaster Resilience Index (CDRI), Community Disaster Resilience Framework for Iran, Community Resilience Score Card, Conjoint Community Resiliency Assessment Measure (CCRAM), Communities Advancing Resilience Toolkit (CART), Community Disaster Resilience Indicators (CDRI), etc. [18]. As communities in different areas face various levels of hazards and their capacities are also different, identifying one standard framework for assessing resilience will raise complexity [24]. For a long time, community resilience mainly focused on interactions between elements like social, physical, economic, and infrastructural entities [22].

In resilience assessment frameworks like [26], gender is seen as part of human resources. Gender integration is considered a basic segment for upgrading the family unit and community resilience. Underpinning gender integration are three key aspects: expanded admittance to and control of the capital for changing inconsistent connections and frameworks; strengthening of excluded and vulnerable groups through the commitment of gatekeepers; and consideration as an essential social measurement for family and community resilience [27]. Gender-focused resilience analysis investigation affirms that shocks and stresses are seen diversely by men, women, boys, and girls. Previous studies have pieces of evidence that disaster creates impacts on women differently; for example, being the primary caregiver, women had to take responsibility of the children and elderly in the families during evacuation in the face of a disaster which creates barriers on the mobility of the women. Cultural practices like clothing create an impact on the survival ability of women. Studies also found that roles defined based on gender increase the mortality rates of women during a disaster [15,16,28,29]. Studies also observed that due to gender-based inequality, norms, and marginalization, women are more vulnerable to face the impacts of disasters. The same study also indicated that as a result of disasters, girls drop out from educational institutions more than boys [30]. Studies also found that these vulnerable groups like women are not only victims of disasters but also resources to increase the level of resilience. Inclusive interventions to increase communities’ resilience will ensure meeting the needs of vulnerable groups and also empowering them to contribute to the resilience of their communities [13]. To effectively reduce disaster risk, it is important to understand the gendered manner of risks and address the complexities and inequalities faced by women, girls, boys, and men [31]. Previous studies showed resilience building as a transformational change process where identifying the underlying and root causes of risk and challenging the current governance process, power structures, ideologies, views, and practices will ensure proper risk management and achievement of resilience. Empowering the marginalized groups, including gender-based vulnerable groups, will reduce the underlying drivers of risk and introduce a transformational change process to build resilience [32].

3. Theoretical Framework

This study used the Analysis of Resilience of Communities to Disasters (ARC-D) toolkit developed by GOAL to assess community resilience to flood [33]. The ARC-D toolkit is developed on the basis of Twigg's framework of the disaster resilience community. In the book titled *Characteristics of a Disaster-resilient Community*, J Twigg discussed the areas that should be focused on to assess the level of community resilience [12].

The toolkit assesses data in a way that also helps to use the results for future development (Table 1). The toolkit assesses community resilience in a more applicable, feasible, and useful way [33]. The sub-components of the ARC-D toolkit are also aligned with four priorities of the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030. The study used specific questions under each of the sub-components to measure the level of resilience [33,34].

Table 1. ARC-D toolkit resilience components, questions, and measurement scores [33].

Sl. No.	Components	Questions	SFDRR Priority Areas
1	Participatory risk assessment	Has the community carried out a participatory risk assessment?	Priority 1: Understanding disaster risk
2	Scientific risk assessment	Does the community combine local knowledge and perceptions of risk with scientific knowledge, data, and assessment methods?	
3	Dissemination of Disaster Risk Reduction (DRR) information	Have community members been exposed to/have participated in DRR specific awareness events?	
4	Education of children on DRR	Are DRR and recovery knowledge and capacities being passed on to children formally?	
5	DRR in development planning	Does the community see DRR as an integral part of plans and actions?	
6	DRR in land use planning	Does the community decision-making regarding land use and management take disaster risk into account?	Priority 2: Strengthening disaster risk governance to manage disaster risk
7	Community decision-making	Is the community leadership committed, effective, and accountable?	
8	Inclusion of vulnerable groups	Are the vulnerable groups in the community included and represented in community decision making?	
9	Participation of women	Do women participate in community decision making and management of DRR and recovery?	
10	Rights awareness and advocacy	Is the community aware of its rights, relevant legal mechanisms and responsible actors?	
11	Partnerships for DRR and recovery	Are there clear, agreed and stable partnerships between the community and other actors?	Priority 3: Investing in disaster risk reduction for resilience
12	Sustainable environmental management	Does the community adopt sustainable environmental management practices?	
13	Water security and management	Does the community have access to sufficient quantity and quality of water for domestic needs during disasters?	
14	Health access and awareness	Do community members maintain good health in normal times through appropriate awareness and practices?	
15	Secure and sufficient food supply	Does the community have a secure and sufficient food supply during disasters?	
16	Hazard-resistant livelihoods practices	Does the community employ hazard-resistant livelihoods practices for food and income security?	
17	Access to market	Are the local market links for products, labor and services protected against shocks?	
18	Access to financial services	Are there affordable and flexible financial services?	
19	Income and asset protection	Are household asset bases sufficiently large and diverse and protected?	
20	Social protection	Does the community have access to informal and formal social protection schemes?	
21	Social cohesion and conflict prevention	Is there a sense of peace, security, and effective conflict prevention and mitigation mechanisms?	
22	Critical infrastructure	Are the community's critical infrastructure and basic services resilient to disaster?	
23	Housing	Is the community's housing resilient to disaster?	

Table 1. Cont.

Sl. No.	Components	Questions	SFDRR Priority Areas		
24	Contingency and recovery planning	Does the community use communally developed contingency and recovery plans?	Priority 4: Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction		
25	Early Warning System	Is there an operational early warning system in the community?			
26	Capacity in preparedness, response and early recovery	Does the community have a trained and operating organization in disaster preparedness, response, and early recovery?			
27	Health services in emergencies	Does the community have access to health care facilities during emergencies?			
28	Education services in emergencies	Do education services have the capacity to continue operating in emergencies?			
29	Emergency infrastructure	Are emergency shelters accessible to the community and have adequate facilities?			
30	Leadership and volunteerism in response and recovery	Does the community play a leading role in coordinating preparedness, response and recovery?			
Measurement Score					
Score	1	2	3	4	5
Description	Minimum resilience	Low resilience	Medium resilience	Approaching resilience	Resilience

Every component has special characteristics that define whether the community is resilient or not. This study developed a special questionnaire using the questions of the framework. The questions were asked keeping the gender at focus. For example, while asking the question about the social protection, which is “Does the community have access to informal and formal social protection schemes that support disaster risk reduction and recovery?” the study also ensured to focus on gender and asked a sequential question, such as “Do the women of the community have access to informal and formal social protection schemes that support disaster risk reduction and recovery”?

4. Methodology of the Study

4.1. Research Approach and Instrument

The study followed a linear quantitative research path. In the linear research path, simple step-by-step predefined structure flows help to narrow down the results and reach a conclusion [35]. With a quantitative research approach, the study focuses on the simple research question(s) and use systematically created data collection tools and analysis method to show final results [35]. The study used a quantitative method to assess the level of community resilience in terms of a flood. The quantitative method justified the level of resilience with data-based evidence. Previous studies like [33,36,37] identified the ARC-D toolkit as a major tool to assess community resilience, whereas Mercy Corps developed a resilience assessment tool to address gender specifically in the assessment process based on the ARC-D toolkit [38]. The research question of this study focused on “Does gender have any relationship and/or impact on the level of community disaster resilience?”

To develop the questionnaire, this study focused on the components of the resilient framework. Each question was aligned with the characteristics of the disaster-resilient community (Table 1). Five-point Likert scale measurement approach was used in the questionnaire which helped to collect data and analyze it through different statistical models. The questionnaire was translated into the local language, which is Bengali. A group of data enumerators collected responses from the respondents.

4.2. Study Area and Sampling

The northeast part of Bangladesh was heavily affected by the flood of 2020 [6]. Highly impacted areas included the Sirajganj, Kurigram, Gaibandha, Jamalpur, etc., districts [6]. The geographical condition of these districts refers to all of the districts connected to the Jamuna River. The study selected Kajipur Upazila of Sirajganj as the study area. More than 51 percent of the area of Sirajganj district was inundated during the last flood. The

impact brought the district into the second position of the list of affected districts. A total of 251,494 women were directly affected by the flood in the Sirajganj district. Another most important rationale to select this area was the higher number of women-headed households (about 8605 households) [6]. This area experienced major impacts of the 2020 flood. A total of three of the unions were covered during the survey (Figure 1).

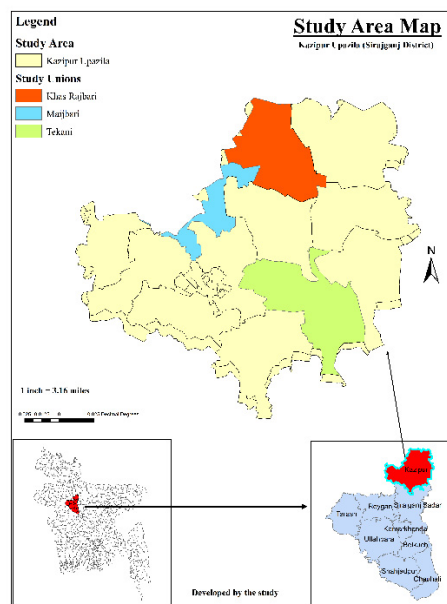


Figure 1. Study area map.

The study also followed a simple random sampling technique to select the sample size. The random sampling technique helps to get accurate information and it is regularly used in quantitative research [35].

The study used Slovin's 1960 [39,40] formula to determine the sample size (Equation (1)). Equation (1): Slovin's formula

$$n = N / (1 + N \times e^2) \quad (1)$$

where n = sample size, N = total population (Sirajganj district population 3,097,000 [41]), and e = margin of error. The study determined the sample size at 95% confidence level and the margin of error is 5%.

$$n = 3097000 / (1 + 3097000 \times (5\%)^2), n = 399.9483 \quad (2)$$

A total of 450 people were surveyed under the study. With a response rate of 94.44 percent, a total of 425 responses were recorded as full participation. After data cleaning and primary level processing, the study used data of 402 samples for final analysis. Among these 402 samples, 50 percent were male respondents and 50 percent were female respondents. As the main focus of the study was assessing resilience from a gender perspective, an equal number of participants from both genders ensured purposively. The study also tried to cover other genders from the LGBTQI+ community but in the study area the possibility of finding appropriate samples was very low. Due to cultural and religious complications, people do not prefer to disclose their other gender identities openly. Thus, the study focused on male and female members to cover the gender perspective.

4.3. Data Analysis

The main focus of the study was to observe differences in the level of community disaster resilience from a gender perspective. A gender perspective ensures the representa-

tion of diversified voices in the study. From concept development to data representation, every step is completed ensuring gender-based inclusion. In this regard, all of the analyses were performed with a specific focus on gender responses. IBM SPSS version 25 was used for coding data and analysis [42]. The ARC-D toolkit was followed to complete the analysis. Descriptive analyses like frequency and percentage analysis, mean, median, and standard deviation analysis, etc., were performed. With the accumulated mean score of all components, the level of resilience was calculated. Resilience level for male and female respondents was calculated separately to show the gender-based difference of resilience. Table 2 was used to describe community resilience. To understand correlation and association between variables, Pearson's Chi-square test was also performed. As the Chi-square test is robust, easy to calculate, and flexible to use, the study used this non-parametric test.

Table 2. Community resilience levels [33].

Resilience Level	Score	Description
Very low resilience	30–45	Very limited awareness and knowledge of the problem(s). No action taken.
Low resilience	46–75	A certain awareness of the problem(s), willingness to act, some actions taken, but actions are fragmented, and solutions are only short term.
Medium resilience	76–105	Awareness of the problems and long-term actions taken, but not related to a long-term strategy and/or addressing all aspects of the problem(s).
Close to resilience	106–135	Long-term actions are taken in accordance with a predefined strategy, addressing the main aspects of the problem(s), but are inhibited by persistent shortcomings in their implementation.
Resilience	136–150	Long-term actions are undertaken in accordance with a pre-defined strategy assessing all aspects of the problem(s); they are sustainable and supported by the community.

4.4. Ethical Approval

The study proposal, tools, and procedures were ethically approved by the Institutional Ethical Review Committee of the Institute of Disaster Management and Vulnerability Studies, University of Dhaka. The ethical review process included both internal and external reviewers. The study fully complied with the ethical guidelines to conduct research developed by the committee.

5. Findings

5.1. Socio-Demographic Information

The study population consisted of 50 percent male respondents and 50 percent female respondents. More than 20 percent of the respondents were above 57 years old. The study only included respondents who were 18 years old or above. More than 70 percent of the respondents did not have any formal education. The majority of the respondents were related to agricultural activities. Only 30.1 percent of the respondents were homemakers, who were mainly female respondents. Though homemaker is not a formal occupation, most of the female respondents who were homemakers also were engaged in different formal and informal income sectors, including day laborers, homestead farming, rearing livestock for business purposes, sewing, etc. Thus, the study identified homemaker as an occupation for the female members who also financially support the households through home-based activities. Table 3 shows the descriptive statistics of the socio-demographic condition of the respondents.

Table 3. Socio-demographic condition of the respondents.

Socio-Demographic Characteristics		Female	Male	Chi-Square Test	
		<i>n</i> = 201	<i>n</i> = 201	<i>x</i> ²	<i>p</i> -Value
Age	18–22	2.0	2.0	12.431	0.133
	23–27	3.7	3.0		
	28–32	4.5	2.0		
	33–37	5.5	5.7		
	38–42	5.0	4.2		
	43–47	8.2	8.5		
	48–52	8.5	5.5		
	53–57	4.2	7.0		
	Above 57	16.9	24.4		
Education	No formal education	39.1	31.3	22.815	0.000 ***
	Passed primary level	9.5	14.2		
	Passed SSC level	0	3.5		
	Passed HSC level	1.2	0.5		
	Studying undergraduate level	0.2	0.5		
Occupation	Farmer	13.7	44.8	194.148	0.000 ***
	Homemaker	30.1	0		
	Owner of a small and medium enterprise	0.2	0.5		
	Educationist	0	0.2		
	Student	0.2	0.7		
	Unemployed	0.5	0.7		
	Retired	0	0.2		
	Others	5.2	2.7		
Marital status	Married	49.5	48.8	1.308	0.253
	Single	0.5	1.2		
Monthly Household Expenditure (BDT)	Below 5000	12.2	9.7	9.458	0.092 *
	5001 to 10,000	14.2	18.7		
	10,001 to 15,000	15.2	10.4		
	15,001 to 20,000	3.2	3.2		
	20,001 to 25,000	3.7	6.0		
	More than 25,000	1.5	2.0		
Monthly Household Income (BDT)	Below 5000	18.9	16.4	8.769	0.119
	5001 to 10,000	14.7	19.2		
	10,001 to 15,000	8.2	6.7		
	15,001 to 20,000	3.7	2.0		
	20,001 to 25,000	2.7	4.7		
	More than 25,000	1.7	1.0		
Number of family members	1–5	34.8	29.8	11.133	0.025 **
	6–10	13.2	19.2		
	11–15	1.0	1.0		
	16–20	1.0	0		

* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01.

5.2. Level of Community Resilience

In this section, the results of the community resilience assessment are discussed from a gender perspective. The process of analyzing the data was already discussed in the methodology section. The results are discussed, aligning with four priority areas of SFDRR. Based on SFDRR priorities, the differences in the level of resilience between male and female respondents are visualized through the relevant figure. Table 4 shows the differences between male and female respondents' level of resilience in each component.

Table 4. Community resilience level scores.

Sl. No.	Component	\bar{x}		p-Value
		Female	Male	
1	Participatory risk assessment	1.28	2.76	0.000 ****
2	Scientific risk assessment	1.58	2.74	0.000 ****
3	Dissemination of DRR information	1.30	1.38	0.051 *
4	Education of children on DRR	1.38	1.66	0.000 ****
5	DRR in development planning	1.06	1.13	0.202
6	DRR in land use planning	1.58	2.74	0.000 ****
7	Community decision-making	1.07	2.86	0.000 ****
8	Inclusion of vulnerable groups	1.23	1.24	0.288
9	Participation of women	1.34	1.86	0.000 ****
10	Rights awareness and advocacy	1.58	2.74	0.000 ****
11	Partnerships for DRR and recovery	1.32	1.33	0.831
12	Sustainable environmental management	1.28	2.76	0.000 ****
13	Water security and management	1.37	2.86	0.000 ****
14	Health access and awareness	1.30	1.38	0.051 *
15	Secure and sufficient food supply	1.38	1.22	0.001 ***
16	Hazard-resistant livelihoods practices	1.32	1.33	0.831
17	Access to market	1.44	1.30	0.003 ***
18	Access to financial services	1.26	2.22	0.000 ****
19	Income and asset protection	1.42	1.44	0.045 **
20	Social protection	1.37	2.86	0.000 ****
21	Social cohesion and conflict prevention	1.30	1.38	0.051 *
22	Critical infrastructure	1.30	1.38	0.051 *
23	Housing	1.30	1.38	0.051 *
24	Contingency and recovery planning	1.30	3.37	0.035 **
25	Early Warning System	1.34	1.39	0.351
26	Capacity in preparedness, response, and early recovery	4.16	4.13	0.216
27	Health services in emergencies	1.30	1.38	0.051 *
28	Education services in emergencies	1.33	1.39	0.177
29	Emergency infrastructure	1.30	1.27	0.509
30	Leadership and volunteerism in response and recovery	1.38	1.22	0.001 ***
Total Score		42.93	58.08	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$.

Table 4 explains the level of resilience based on different indicators from both male and female perspectives. From understanding risks to recovering from disasters, the indicators include all the areas through which level of resilience can be explored. Through use of the measurement score of the Table 1 the study collected responses. The mean value mainly indicates the levels. The greater the value, the higher the level of resilience. Finally, all the mean values are added to finalize the score. The final scores represent the level of community resilience according to Table 2.

In both participatory risk assessment and scientific risk assessment, female respondents indicated a very low level of resilience compared to male respondents. But in the dissemination of DRR information and education of children on DRR, both male and female respondents scored closely (Table 4). These results indicated that female members of the community are lagging in participating in risk assessment activities. The results of risk assessment activities will not give a full picture of the available disaster risks in the communities if women do not get the opportunity to share their perceptions. Pearson's Chi-square test indicated a significant relationship between gender and participatory risk assessment ($p < 0.001$), scientific risk assessment ($p < 0.001$), dissemination of DRR information ($p < 0.1$), and education of children on DRR ($p < 0.001$). These significant relationships prove that gender affects increasing or decreasing level of community resilience related to DRR centered knowledge. Based on Table 1, in priority one, which is understanding disaster risk, the level of resilience of male respondents was 8.54 and female respondents was 5.54 (Figure 2).

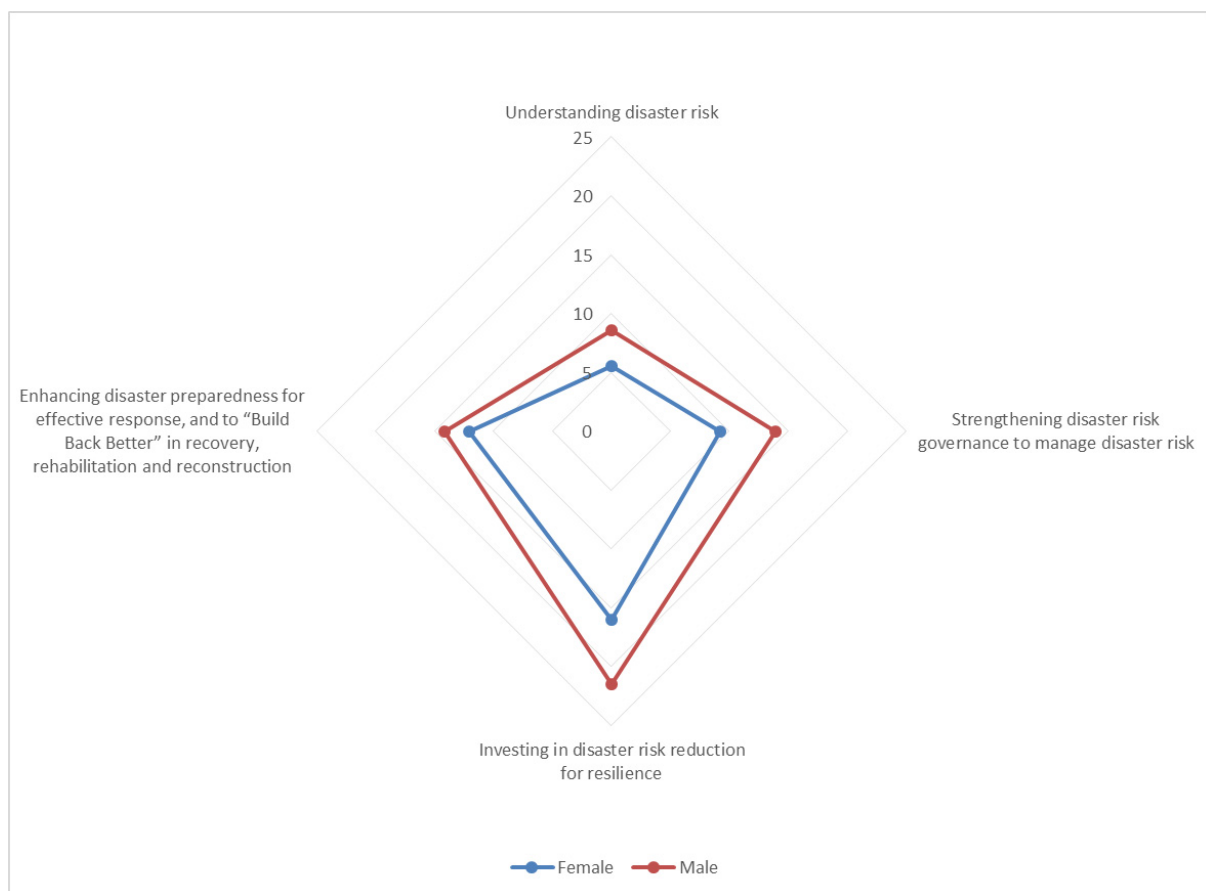


Figure 2. Community level of resilience (Based on priorities of SFDRR).

In the next components, which are DRR in development planning, the inclusion of vulnerable groups, participation of women, and partnership for DRR and recovery, both male and female respondents indicated a close level of resilience. On the other hand,

in components like DRR in land use planning, community decision-making, and rights awareness and advocacy, male respondents showed a comparatively higher level of resilience than female respondents (Table 4). Components like DRR in land use planning, community decision-making, participation of women, and rights awareness and advocacy are significantly related to gender ($p < 0.001$). The relationship proved that based on gender, community members could participate in decision-making processes and programs related to raising awareness. Female members of the community in the study areas did not get the opportunity to increase their level of resilience by participating in disaster governance-related activities. Thus, male members were more resilient in disaster governance components. SFDRR priority two is strengthening disaster risk governance to manage disaster risk. The score of male respondents was 13.9 and female respondents was 9.18 (Figure 2).

Both male and female respondents indicated a very close level of resilience in the following components. In very few components like sustainable environmental management, water security and management, access to financial services, and social protection, male respondents showed a better level of resilience comparing to female respondents (Table 4). But in other components, both male and female respondents scored closely. These components are related to increasing investment for strengthening DRR capacity. Due to lack of resources and limited access to decision-making platforms, both male and female members of the community were lagging in strengthening their disaster risk reduction capacity. Moreover, gender-based practices made women more vulnerable compared to men in the communities and reduced their level of resilience. For example, majority of the male respondents do not think it is important to ensure participation of female members in DRR training. There is also negligence among leaders of the community regarding investment for women to increase their coping capacity. The majority of the components are significantly related to gender (Table 4). This relation made it visible that gender plays a major role in structuring the level of resilience. In the third priority area of SFDRR, which is investing in disaster risk reduction for resilience, male respondents scored 21.51 and female respondents scored 16.04 (Figure 2).

In components related to preparedness, response, and recovery, male respondents showed a comparatively higher level of resilience in one component, which is contingency and recovery planning. In other components, both male and female respondents showed a close level of resilience (Table 4). Due to lack of early warning system, limited access to health care services and educational services during emergencies, the absence of emergency infrastructures like formal flood shelter centers, and deficiency in voluntarism culture reduced the level of resilience of the communities in the study areas. Components like contingency and recovery planning, health services in emergencies, and leadership and volunteerism in response and recovery have a significant relationship with gender (Table 4). This relationship indicated that based on gender, community members' capacity-related preparedness, response, and recovery fluctuate. The male respondents scored 14.15 and the female respondents scored 12.11 in the fourth priority area of SFDRR which is enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation, and reconstruction (Figure 2).

Altogether, male respondents scored 58.08 and female respondents scored 42.93 (Table 4). According to Table 2, male respondents had a low level of resilience. In the study area, male respondents had a certain level of awareness about the risks in their community and had taken some actions to reduce those risks, but the actions were short term. These actions included participating in different awareness-raising programs and training, sharing their needs in decision-making platforms, getting membership in different DRR committees at local government level, etc. On the other hand, female respondents had a very low level of resilience. Social and cultural barriers reduced their opportunities to participate in risk reduction programs and made them more vulnerable to hazards. Causes like gender-based discrimination, limited education, cultural beliefs and practices, and lack of access to resources prevent the female community members from achieving resilience.

6. Discussion

The results of the study indicated that there are differences in the level of community disaster resilience from the gender perspective. Women and men scored differently in the components of the resilience assessment framework. In most of the components, women scored less.

Understanding disaster risk is one of the priority areas to measure the level of resilience. In a previous study, understanding disaster risk is seen as an integral part of achieving resilience [43]. Ensuring proper development depends on identifying the risks and introducing interventions to reduce them [44]. Studies also identified that assessing the risks will help to identify the vulnerabilities and reduce them to achieve resilience [45]. In this study, the male respondents were more aware of the disaster risks in their communities than the female respondents. Male members of the communities had the opportunity to participate in simple and scientific risk assessment activities, whereas the participation of female members was very low. There was also a disparity in getting education related to disasters at institutions. Altogether, the female members were lagging in terms of understanding the risks. If a certain community does not know about the potential hazards they might face, the risk reduction mechanism will not work for that particular community. Thus, the male members of the communities had an understanding of the risks which made them more resilient than their female counterparts.

Community resilience is highly related to disaster governance. Due to strengthened disaster governance, different governmental and non-governmental institutions intervene in the communities effectively and increase community resilience [46]. Previous studies also indicated that effective disaster governance ensures activities of formal and informal organizations in the community, encourages participation of people in the decision-making process, prioritizes the need of most vulnerable groups, and includes people in long-term planning. These activities ultimately increase community resilience [47,48]. This study indicated that male respondents were more resilient in terms of disaster governance than female respondents. The main reason behind higher level of resilience among male members of the study area was getting the opportunity to participate in different platforms. This participation included areas like the decision-making process, selecting areas for resource allocation, relief and emergency services distribution, organizing and participating in training, etc. At the same time, women in the study area did not have the opportunity to be included in these activities. Absence of inclusive disaster governance reduced women's level of resilience.

Investing in disaster risk reduction to increase resilience is seen as a top priority. Studies agree that investing in different structural and non-structural measures to reduce disaster risk and developing instruments to protect social, economic, health, and culture-related assets will escalate resilience [49]. Investing in achieving resilience includes protecting livelihoods, making the environment sustainable, reducing social vulnerabilities, preventing economic loss, increasing capacity for managing crises, etc. [50]. The study results showed that male respondents were more resilient than female respondents in this priority area. Increased knowledge on environmental sustainability, access to financial services, and better support from social safety net programs made male members more resilient in the study area.

After a disaster, a community can become more resilient through the idea of build back better (BBB). While recovering from a disaster and reconstructing communities, BBB can strengthen human capacities and increase the sustaining capacity of infrastructures, ultimately increasing community resilience [51]. Both male and female respondents of the study lagged in terms of enhancing preparedness for future disasters. There was a lack of early warning systems, contingency plans, emergency services and infrastructures, and voluntary attitude among communities, which reduced community resilience in the study area.

7. Conclusions

Community disaster resilience depends on different indicators and factors. It will not be possible to ensure the incorporation of a large number of indicators in a small-scale study. However, this study was not only focused on assessing the level of disaster resilience of the specific communities but also emphasized a gender-based perspective. The study indicated that special importance should be provided on the gender component, as women represent one of the vulnerable groups [52]. Assessing community resilience will help in every phase of disaster management. At the same time, a noteworthy role is played by gender in every stage of disaster management [53]. Gender perspective showed the importance in studies like understanding risk perception and indicated that gender has a major role in risk perception [54]. Similarly, this study indicated that the level of resilience differs when assessed from a gender perspective. This study recommends that focusing only on gender or individual characteristics like children, disability, aging, minority, etc. will not be enough to get a proper view of community resilience. We need resilience assessment tools and methods that ensure the inclusion of diverse groups and also differentiate by the various drivers of vulnerabilities. Future studies have to provide more emphasis on intersectionality. As this study already showed that women are lagging in the level of resilience, what will be the scenario if a woman is disabled and old? This study, therefore, proposes a more advanced question focusing on the intersectional characteristics of the community.

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