

Non-DRR NGOs coping strategies for livelihood development in the coastal communities of Bangladesh: a Case Study

Assraf Seddiky (✉ md.assraf.seddiky@uon.edu.au)

Newcastle University <https://orcid.org/0000-0002-0117-709X>

Assraf Seddiky

University of Newcastle

Helen Giggins

University of Newcastle

Thayaparan Gajendran

University of Newcastle

Research Article

Keywords: non-DRR NGOs', increasing poverty, exclusion, private organizations, agriculture, health, water, settlements, finance

Posted Date: July 24th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-655326/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at Natural Hazards on November 9th, 2021. See the published version at <https://doi.org/10.1007/s11069-021-05097-7>.

Abstract

This study aims to assess the effectiveness of non-DRR NGOs' programs focusing on their contribution to the uplift livelihood of the disaster-affected coastal communities. Researchers conducted a field study in Satkhira, the most disaster-prone coastal district of Bangladesh, and interviewed 45 respondents, including NGO officials, local government bodies, and community beneficiaries, applying purposive sampling. For analyzing data, Researchers used thematic analysis methods with NVivo software's assistance. Study findings reveal that NGOs' community-based awareness and advocacy, mobilization of local resources, and primary healthcare programs contributed to enhancing community livelihood by promoting their attitudes and capacities to cope with disasters. However, their microfinance and infrastructure-related programs reinforced community vulnerability and exposure to disaster by increasing poverty, exclusion, and disparities among them. In conclusion, the study signifies the value of integrating sustainable infrastructure, environmental impact assessment on health and agriculture for promoting effective livelihood strategies in coastal communities.

1. Introduction

Natural hazards in countries across the world are more frequent now than ever before, resulting in impacts on the social, economic, political, and environmental realities of the world's population (AmbrasonSeidler et al. 2018). In the last twenty years, there has been a tremendous increase in the number of disasters worldwide due to climatic changes (Djalante 2018). Disasters that occur due to natural hazards or socio-political and structural causes, such as cyclones, droughts, floods, earthquakes, fire, and landslides, are more common in developing countries compared to other parts of the world because of lack of access to food, clean water, healthcare, education, and infrastructure, which can help a country prepare for and possibly mitigate the impact of such disasters, as well as their inability to adapt (Hallegatte &Rentschler 2015). Ranked fifth most catastrophe-affected nation in the world (Mallick et al. 2017), Bangladesh has experienced disasters in several forms, including cyclonic storms and tidal surges, droughts, earthquakes, and fire, while flood is a yearly event (Sai et al. 2018). For the people of Bangladesh, the fear of disasters is an ever-present concern that threatens their livelihood, with communities located in river basins, urban centers, hilly regions, and the southwestern coastal regions of the country particularly vulnerable to disasters (Rahman et al. 2018).

Bangladesh is the biggest delta in the world, framed by the strong waterways of the Ganges, the Brahmaputra, and the Meghna rivers, rendering most of the population vulnerable to frequent disasters (Islam &Zhang 2018). Its geography reveals a lopsided distribution of access to infrastructure and economic benefits, with more than seventy percent of the aggregate populace living in rural settings and depending on agriculture, fishing, and small farming for sustenance (Chowdhury &Jenkins 2018). Riverbed siltation due to flooding and tidal waves leads to prolonged waterlogging, with salinity adversely affecting agriculture and water bodies, which in turn negatively affects the livelihoods of the coastal people who depend mainly on agriculture and fishing (Tareq et al. 2018). Saltwater intrusion affects

200,000 hectares of cropland, thirty percent of the total tillable land in Bangladesh, severely affecting coastal communities' livelihood (Awal 2014).

Moreover, flooding frequently contaminates this region's groundwater with arsenic, jeopardizing the drinking water supply of seventy-seven million people (Center for Excellence in Disaster Management and Humanitarian Assistance 2017).

Although the state is the leading actor in integrating disaster risk reduction (DRR) into policy strategies, the reformation of top-down governing modes and government incapability amplify the scope of non-governmental organizations' (NGOs) involvement in development (Jones et al. 2014). As of March 2018, there were more than 2,500 registered NGOs in Bangladesh, most operating at the community level, undertaking non-DRR activities (NGO Affairs Bureau of Bangladesh 2018). Non-DRR NGOs refer to those NGOs whose core business is not to reduce disaster risk but to promote the wellbeing of the community by providing healthcare, education, training and awareness, and poverty reduction. From the central level to the grassroots level of disaster management planning, the government relies on DRR efforts within government, NGOs, communities, and the private sector to ensure sustainable livelihoods. However, NGOs have no clear requirement to include DRR in their regular development policies and programs. This study assesses the effects of non-DRR NGOs' intervention programs focusing on their contribution to promote the livelihoods of disaster-affected coastal communities in Bangladesh.

2. Ngos, Disaster, And Livelihood Development: A Theoretical Overview

Prior to 2000, international development assistance was increasingly directed towards poverty reduction. Since then, the national government and development agencies, including NGOs, have generated a range of tools for designing development interventions, including sustainable livelihood approaches such as technical, financial, and rights-based programs (Brocklesby & Fisher 2003). Livelihood development theory has become a popular strategy for building community resilience (Singh & Hiremath 2010) and is based on the community's capacity to maintain and improve its income, assets, and social well-being to cope with shocks (Lindenberg 2002). Public and private organizations, including NGOs, can play a vital role in enhancing the livelihoods of the concerned community (Laverack 2006).

In many disaster-prone countries, NGOs provide communities with ways to cope with the challenges posed to agriculture, health, water, settlements, finance, and community identity (Amoatey & Sulaiman 2020, Rai et al. 2008). Research has found that in addition to the loss of life, the most damage caused by disasters is to crops, fish, livestock, and aquaculture (Sina et al. 2019).

Following natural hazards, people of the affected zones face real challenges regarding shelter, food production, pure drinking water, transportation, social forestry, jobs for daily income, and alternative income sources, which may lead them into poverty traps (Israel & Briones 2012). In this case, NGOs' community-level programs, such as effective livelihood programs, can shape the empowerment approach

of the community (Islam & Morgan 2011, Izumi & Shaw 2012). In Indonesia, India, and Africa, NGOs provide school-based health education and disseminate information regarding the health aspects of disasters, and aid in developing community resilience (Pascapurnama et al. 2018).

The conservation and promotion of agriculture through training, education, technology, and climate-sensitive seeds can improve livelihoods and protect the environment in many disaster-prone countries (Nkala et al. 2011). In Zimbabwe, NGO interventions to protect vulnerable livelihood programs have increased food production, created economic opportunities for thousands of beneficiaries, increased sustainable access to water supply for drinking and irrigation, increased support for HIV positive patients through quality community home-based care, and empowered communities to work on local development programs (Chitongo 2013). Basic infrastructural components, such as affordable transport, secure shelter, water supplies, and sanitation, are essential components of livelihood development (Twigg 2001). NGOs develop and implement well-thought-out pre-disaster plans that allow the community to mitigate hazards with practical solutions, such as aquifer storage, stream restoration, flood diversion, and green infrastructure processes (Seddiky et al. 2020).

Rural livelihoods in developing countries are likely to suffer more from shocks due to their fragile settlements, physical isolation from the mainstream economy, and exposure to the risks of disasters (Harvey et al. 2014). NGOs provide a certain degree of financial support to the poor so that they can generate income opportunities, build an asset base, and protect themselves from risks (Hammill et al. 2008). A sustainable livelihood requires legal support for the community to ensure balanced development (Daigle et al. 2020). As livelihood development is a holistic approach, it essentially entails human rights by improving equity and justice mechanisms for the people to secure an acceptable standard of livelihood (Moser et al. 2001). This can be shown through a framework, illustrated in Fig. 1.

However, NGOs' livelihood development activities have been criticized due to a lack of clear focus on the issue of citizens' rights, environment, and even poverty (Carney 2003). NGOs do not look for the root causes of poverty; rather, they ahistorically consider the current situation (O'Laughlin 2002). It has been shown that poverty is a multidimensional phenomenon that cannot be overcome by just reducing economic deprivation, as it is related to the social, political, gender, and power structures of society (Small 2007). There is a problem with the social relation of poverty, where the relationship of inequality and power maintain and reproduce poverty at the local level. NGOs also start their programs with some prescribed policies developed by the donors, outside agencies, or ministries of the government, which limits the scope of community participation in actual meaning.

3. Research Methodology

This study utilizes a qualitative approach based on the philosophy of social constructivism. The researchers conducted a field study in the Satkhira district, a South Western coastal zone of Bangladesh, which is very close to the Bay of Bengal (Fig. 2) and is the most disaster-prone region in Bangladesh (Dasgupta et al. 2018). Several national and local NGOs (mostly non-DRR in their core business) are

currently working in this area for the welfare of the community (NGO Affairs Bureau of Bangladesh 2018). During the last fifteen years, massive damage and loss of life and property were sustained due to different disasters in this region. This coastal belt of Bangladesh still deposits saltwater, which encroached during cyclones Sidr and Aila, salinating farmland, freshwater ponds, lakes, canals, and waterways (Mahmuduzzaman et al. 2014). The local communities are experiencing a shortage of safe drinking water, irrigation, agriculture, and employment due to increasing salinity and arsenic contamination in the water and soil (Alam et al. 2017). In Satkhira district, during the last thirteen years, 992,326 people have been affected, 1,541 people have been injured, and 82 people died in various disasters, with an economic loss of US\$150.65 million.

Researchers collected primary data from forty-six respondents including local NGO managers, program officers, and the beneficiaries of ten NGOs (Table 1) established before 2003 and have community-level programs in the research area. We applied purposive sampling. Purposive sampling is used in unique cases to select information-rich cases that can be aligned with the objectives of the study (Merriam & Tisdell 2015, Neuman 2014). One participant withdrew his name before data analysis (as stated in the consent form- any participant can withdraw his/her name from the project up to the point of publication without showing any cause). That is why this study's results have been discussed by analyzing the interview transcriptions of (45) forty-five participants.

Figure 2: Map of Satkhira District (Research area).

For this study, researchers also met local government bodies—the Deputy Commissioner, the Upazila Nirbahi Officer (a mid-level officer of the Bangladesh Civil Service), and locally elected representatives—as critical informants to obtain their experience and knowledge regarding NGOs’ community-level programs. Besides in-person (semi-structured) interviews, the researchers analyzed relevant documents, such as project proposals, program evaluation reports, progress reports, and annual reports of the selected NGOs, alongside the primary information. Studying the programs of any development organization requires existing document analysis to understand the program's context (Creswell & Creswell 2017).

Table 1
Distribution of interviews.

| Type of participants | Number |
|---------------------------------------|--------|
| Manager/ Executive Director of NGOs | 9 |
| Program Officer of NGOs | 14 |
| Local Government Bodies (DC, UNO, UP) | 5 |
| Beneficiaries of NGOs | 18 |
| Withdrawn before data analysis | 1 |
| Total number of interviews analyzed | 45 |

Source: Field interviews.

Besides primary data, this study focused on a comprehensive survey of literature around the livelihood challenges of the disaster-affected communities, alongside NGO strategies to promote their coping mechanisms. Using Google Scholar and Scopus as critical resources, this study carefully identified and reviewed articles, books, chapters, reports, and conference papers that addressed NGOs' community-level initiatives to promote livelihoods. To avoid duplication of references, EndNote reference manager was used in this study.

3.1 Ethical considerations

The researchers followed ethical standards and policy guidelines for this study as outlined by the University of Newcastle, Australia. The ethics application was approved by the Human Research Ethics Committee of this university on June 12, 2019. Accordingly, researchers maintained informed consent and observed data access and ownership protocols in this study. Contributions from potential participants were kept confidential and anonymous in this study through the quotation of individual de-identified responses.

3.2. Data analysis

For this study, the researchers used thematic analysis techniques for analyzing primary data using NVivo 12 software. Thematic analysis for qualitative research is flexible and is mostly used in case of a wide range of research objectives and the possibility of interpretation that quantitative analysis lacks (Castleberry & Nolen 2018). Furthermore, qualitative data analysis is mostly inductive, allowing themes to emerge from the data rather than from a hypothesis. For analyzing data in this research, the researcher followed six steps, guided by (Creswell & Creswell 2017), as outlined in Fig. 5.

The researchers used two-cycle coding (open and selective coding) to prepare and organize the themes. We used first cycle coding (open coding) to identify the distinct concepts for categorization, which facilitated the researcher's ability to advance the research process. We applied the second cycle (selective) coding to select and integrate categories of organized data (Table 2). This continued toward a higher level of abstraction to formulate the story of the case. Text search was also used to better understand contextual use and meaning across each participant interview.

Table 2
Process of open and selective coding regarding NGOs initiatives in Bangladesh.

| Approaches to NGO initiatives | Open codes | Selective codes |
|--|---------------------------------|--------------------------------|
| NGO strategies for livelihood development in the disaster-affected coastal communities | Eco-friendly agriculture | Awareness and training |
| | Developed preparedness skill | |
| | Understanding local issues | |
| | Enhanced collective efforts | |
| | Utilization of unused resources | Food security |
| | Multi-use of limited resources | |
| | Employment creation | |
| | Promotion of irrigation | |
| | Rain water harvesting | |
| | Agricultural diversion | |
| | Exclusion of the poor | Financial support |
| | Reinforcing poverty trap | |
| | Malpractices | |
| | Breaking social cohesion | |
| | Poor quality shelters | Settlements and infrastructure |
| | Increasing exposure | |
| Elite captured | | |
| Inadequate potable water supply | | |
| Improved maternal and child health | Health and sanitation | |
| Increased sanitation practice | | |

| Approaches to NGO initiatives | Open codes | Selective codes |
|-------------------------------|--------------------------------------|-----------------|
| | Increased environmental health risks | |

Source: Based on the field interview transcriptions.

4. Discussion

We focused on theoretical perspectives from the literature concerning organizational initiatives for sustainable livelihood development in the disaster-affected communities to interpret the primary data. The community-based disaster risk reduction strategies of NGOs mainly approach livelihood development through building community capacities such as community awareness, rights-based advocacy, food security, financial assistance, infrastructure, and healthcare. However, not all of their functions have positive impacts on the community's livelihoods; some initiatives reinforce the social, economic, physical, and environmental vulnerabilities of the community.

In Table 3, the extent and nature of the impacts of non-DRR NGOs' coping strategies on livelihood development and disaster risk reduction capacity of the coastal communities have been summarized. Sustainable livelihood strategies always consider disaster risk reduction (DRR) policies and actions because DRR approaches contribute to promote the livelihood of the disaster-affected communities by enhancing their skills and adaptive capacity and vice versa (Alexander et al. 2006, Jones et al. 2010).

Table 3: The nature of the impacts of non-DRR NGOs' coping strategies on livelihood development and disaster risk reduction capacities of the coastal communities.

Indication = Positive impact P Negative impact ç. Mixed impact Ω

| Livelihood risks of coastal communities | Non-DRR NGOs' coping strategies | Impacts on livelihood development | Impacts on DRR capacity | Lesson learnt critical point of view. |
|---|---------------------------------|-----------------------------------|-------------------------|---|
| Floods, surges, cyclones, food and agricultural loss, isolation, waterlogging, deaths, illness, water risks, socioeconomic and environmental risks. | Awareness and training | P | P | NGOs community-based associations contribute to increasing community knowledge and awareness for combating disasters for survival. |
| | Food security | Ω | Ω | NGOs' alternative sustenance strategies increase the communities' economic and environmental vulnerability due to their less focus on sustainable environment and development. |
| | Financial support | ς | ς | NGOs' financial support decreased the community's adaptive livelihood capacity by increasing disaster risks and vulnerability due to their high interest, forced installment collection, and inclusion error. |
| | Settlements and infrastructure | ς | ς | Poor technology, profit motive, and short-term project prolong the vulnerability rather than increase coastal communities' livelihood. |
| | Health and sanitation | Ω | Ω | NGOs' less focus on environmental impact assessment reinforces environmental health hazards and reduced livelihood capacity. |

Source: Author

The themes that emerged from the study covering the interpretative alignments based on the participants' reflective experiences regarding non-DRR NGOs' strategies to improve the livelihood in disaster-affected coastal communities of Bangladesh are discussed in the following sections in detail.

4.1 Awareness and training to survive in a hostile environment

NGOs have a number of community-level voluntary organizations (women's groups, youth groups, microcredit groups) that raise awareness in communities to enhance sustainable livelihoods. With a focus on health, daily life, sanitation, and managing disasters, they constitute essential learning and social engineering forum for facilitating community participation. These groups get together in weekly meetings in which individual and group-based discussions create an avenue for developing problem-solving skills and shaping the community's empowerment approach. In the same vein, Izumi & Shaw (2012) stated that community empowerment is an essential prerequisite for developing livelihood, especially in disaster-affected areas. NGOs' training programs help beneficiaries improve their livelihoods

by enhancing their skills. Similarly, Griffin (2014) explored that training programs organized by NGOs develop the knowledge, awareness, and potential of members of associations to perform their prescribed functions for the welfare of the affected communities. They also increase the knowledge and awareness among the beneficiary communities of the benefits and process of eco-friendly agriculture, which contributes to improving their livelihoods in a hostile environment. Their awareness and training programs enhance the level of rational practices among the communities towards nature. Similar findings from Haslinda & Mahyuddin (2009) found that programs also help to positively transform the functions and thoughts of the community, impacting their behavior and contribution to livelihood development. One of the participants stated:

The soil and water of this area are very saline, and in Satkhira district, disasters are very frequent, affecting our lives. The NGO gave us a handbook with clear pictures that make it easy to understand and a red marked calendar to hang at home so that we can follow the information from there and complete our farm work on time.

Sometimes NGOs, in collaboration with other organizations, organize mock drills or practical sessions centered around reducing disaster risk, where the members of associations participate either as the actors or audience. This practical experience helps the beneficiaries establish a safety culture in the society by mastering different ways of overcoming the dangers. As Mathbor (2007) stated that these type of practical participation increase their knowledge and awareness of tools and best practices for combatting disasters for survival. In the same line, Forino et al. (2015) found that members also compose and curate folk songs, local songs, drama, drawing competitions, simulations, and documentaries that serve as vital means of instruction for communities, which is an influential factor in adaptation to a disaster-prone environment. NGO programs contribute to raising awareness among beneficiary communities about identifying easy escape routes, preserving important documents, sharing information, moving livestock to a safe place, and helping others before and during disasters. One of the beneficiaries observed:

Last year, a foreign NGO, in collaboration with our local NGO, conducted training in the NGO's office on how to reduce the loss of life and property in the event of any disaster. There, we dramatized how to go to a safe place quickly with our emergency documents and cattle. We experience one or two disasters in our area every year, with very high damage, but now the damage is much less because we know better.

Mass rallies organized by NGOs to increase public awareness have had a positive impact at the community level, with placards, banners, pictures, festoons, and sound systems in these rallies helping the people of the community to easily understand the importance of the messages being communicated. Through the NGOs' efforts, people are now more aware of child marriage, sanitation, stockpiling emergency food supplies for floods and cyclones, using mosquito nets regularly, and making Orsaline to prevent outbreaks of dengue, malaria, and diarrhoea during floods. Similarly, Chan et al. (2020) stated that the awareness of health, food, and cleanness are closely related to hazards, exposure, and

vulnerability. The net result of all these various activities is a reduction in disaster risk with enhancing livelihood capacity.

4.2 Food security: Enhancing self-reliance or reinforcing dependency?

NGOs' rainwater harvesting, ponds diking, and household greening projects ensure the use of existing local resources to make the community self-dependent. These programs developed the beneficiary community's skills by providing training, awareness, and technical supports to reduce their vulnerability and help them adapt to the hostile environment. Similar study findings from Amelia et al. (2020) explored that strengthening community capacity is vital to reduce disaster risk and encapsulates activities undertaken by individuals and communities to mobilize local resources to reduce vulnerability to hazards and increase livelihoods. NGOs incorporate a large number of beneficiaries (especially women) to ensure the regular flow of their income through employment creation.

More than eighty percent of the people of this area live on agriculture and fishing, but no crops or native fish are cultivated here due to salinity and arsenic contamination. The NGO has set up model shallow machines for a small number of the beneficiaries, with which it is possible to quench arsenic and iron through filters. This NGO backed model has inspired other farmers in the area to install such irrigation machines. Some NGOs are marketing salt tolerance high yielding seeds, promoting food security for many disasters affected beneficiaries. By fostering these livelihood development strategies, NGOs in the subject area mitigate vulnerability and exposure to disaster-affected communities. Similar findings are shown in another study conducted by Khatun (2003) as disaster risk, and communities' vulnerabilities can be reduced by adopting appropriate and sustainable strategies that improve community members' livelihood with NGOs and government support., as explained by a participant:

After getting this irrigation machine from NGO, I am a hundred times better than before. In the past, I could hardly manage one meal a day. Now I have rice in my house all year round. I am getting the opportunity to take a lease of the land of others who do not have a machine for irrigation. This makes me self-dependent.

In Satkhira district, almost all water sources except rain are saline, and this water is neither potable for animals nor usable in agriculture. Keeping this problem in mind, NGOs' strategies of conserving rainwater in the small ponds in front of the house and water tanks have reduced the suffering of the affected areas' beneficiaries for clean water. These strategies adopted for water conservation reflect an understanding of the environmental challenges and the innovation required to solve them. Similarly, in his study, Shaw (2012) showed that NGOs in Kenya and Ethiopia's drought-prone areas helped community members build sand dams that served as artificial aquifers for water preservation to sustain community members throughout the dry season. One participant remarked:

On the advice of NGOs, we buy water tanks and store rainwater in the tanks by setting pipes on the roof of the house. We can use this water for drinking and household purpose. However, in a multi-member

family, this water does not last long. But, we can drink pure water for a few months and that is a big thing.

Figure 4: NGO-supported water tanks. Source: Field.

NGOs put efforts into developing the communities' alternative livelihood development strategies by introduced maize cultivation thinking the reduced harvesting time. However, this maize cultivation increased beneficiaries' socio-economic vulnerability and exposure to disaster due to their strategic flaws and profitable attitude. NGOs provide microcredit for small farmers to cultivate maize, and they also sell seeds to the beneficiaries at high prices. Similarly, Banerjee & Jackson (2017) revealed that NGOs do not consider the long-term environmental effects of implementing community-level agriculture. The beneficiaries are not allowed to take an NGO loan without buying seeds from them at high prices, which impacts beneficiaries' sustainability and long-term development by increasing their economic vulnerability to disasters, as Bendell (2017) stated that sustainability considers economic growth with human progress. One of the beneficiaries explained his bitter experience:

When maize is cultivated on land, the long root of maize absorbs all the natural nutrients from the depths of the soil, making it very difficult to grow any other crop on that land. Last time, I could not even recover the cost of the maize cultivation; the land's fertility was also ruined. This year, I have to apply a lot of chemical fertilizer on the land to cultivate paddy.

Drawing from the discussion, although NGOs' local resource mobilization and provision of irrigation to agriculture have a positive impact on the community's livelihood, their alternative sustenance strategies become failures due to their less focus on sustainable environment and development.

4.3 NGOs' financial support reinforcing poverty and vulnerability

Most of the NGO officials claimed that they offer microcredit to selected beneficiaries to improve their socio-economic conditions and livelihoods by helping them cope with the challenges posed by disasters. However, it was observed that the NGOs' objective-based initiatives brought about some unintended outcomes that weakened the community's ability to manage disaster risk, thus making them more vulnerable. NGOs' microcredit program increased the beneficiaries' exposure, physical and mental vulnerability, which hinders sustainable livelihoods. As Boyce (2000) stated, vulnerability to natural hazards results from poverty, exclusion, and inequality in material consumption. Besides, NGO officials generally do not consider the feelings, emotions, or problems of the beneficiaries collecting loan installments. Even after few days of any disaster, NGO officials visit the disaster-affected beneficiary community to collect the loan installments, which increases their emotional vulnerability to disasters. Hence, microcredit programs in the research area make beneficiaries financially vulnerable, trapped in a poverty cycle with growing stress and exposure to disasters. Many studies (Al Amin 2017, Nduwarugira & Woldemariam 2015, Siddiquee & Faroqi 2009) showed that NGOs' higher interest and repayment policy

built inflexible installment rule was also implemented without considering long-term sustainability, which left the beneficiaries trapped in a vicious cycle of poverty.

The microcredit program's inclusion and exclusion process increased the inequality and deprivation in society. The marginal poor, who are the most vulnerable to disasters, are deprived of this microcredit due to their inability to pay the loan installments. Similarly (Pfeiffer 2003, Rahman & Razzaque 2000) explored that the marginal poor or the most deserving groups have no participation in NGOs' microcredit programs, and this system of exclusion leads to greater inequality and vulnerability in the society. In the continuation of this statement, Abramson et al. (2015) found that social and economic discrimination increases vulnerability and reduces the resiliency of the individuals and community, which leads to a significant threat to their livelihood.

The beneficiaries stated that microcredit was the NGOs' business model. They also complained that the NGOs' interest rate was higher than other financial institutions, and their installment payment rule never considered sustainability. This, in turn, drew the beneficiaries into a vicious cycle of poverty rather than self-dependence (Nduwarugira & Woldemariam 2015). As stated by the participants, the inclusion and exclusion process of the microcredit program increased inequality and deprivation in society. The marginal poor, who are the most vulnerable to disasters, are deprived of this microcredit as they cannot pay the loan installments. The moderate poor who have received microcredit have lost their assets due to falling into the NGOs' loan cycle. One interview participant stated:

Before giving the loan, the NGO official came and looked at our house, cows and goats, land, gold, bank balance and asked about our financial condition. They also sought out information from neighbors and group members. The well-being and interest of the people are not a consideration for them, they are simply concerned about the borrower's ability to repay the loan.

NGOs' microcredit program has also increased social stress and tension as well as demoralized the solidarity of the community members. Women, as loan recipients, are more prone to harassment by family members and NGO officers. NGO officials insult women borrowers in front of other members of the association due to the failure of paying any installment. In his study findings, Al Amin (2017) noted that NGO officials undermine women beneficiaries' social status by insulting them in front of group members. If someone fails to pay the NGOs' installments, sometimes, NGO officials seize their household furniture. Some credit programs even disempowered women making them default debt collectors, increasing social tension and unrest. These outcomes increase socio-economic vulnerability and social disparities of the beneficiaries. As part of the patriarchal society, women take loans and hand them over to the family's head, the male member. Most men avoid the obligation of installment, as the NGO pressures the woman as the borrower to pay the installment. Thus, microcredit is degrading women socio-economically on the one hand and creating rifts in family relationships on the other, which makes them weak physically and mentally to deal with DRR. Sultana (2010) pinpointed that in a patriarchal social structure, microfinance has failed to strengthen intra-household gender relations or raise women's status in society. Various studies (Bradshaw & Fordham 2015, Mulyasari & Shaw 2013, Sultana 2010) showed that women are the

worst sufferer of the disasters due to the pre-existing social inequalities regarding the restricted access to resources, unequal power relations, and indirect participation in decision making.

NGOs selected women as beneficiaries to empower them, but the main objective is to ensure they are available at home during the installment days. One of the NGO officials said:

Men run away from home on the day of the collection of installments, so we feel comfortable providing loans to women so that we can collect the installments on time, as women are always available at home.

The regular surveillance of the members of the 'self-selected group' formed as a strategy to avoid NGO liability, created distance, mistrust among members of the association, and destroys social bonds, which are indispensable in reducing disaster risk. Besides economic vulnerability, NGOs' microcredit operation mechanisms increased the beneficiary community's social susceptibility to disaster. NGOs prefer to form self-selected groups who would be accountable to themselves. If someone of the group receives a loan from the NGO, all group members become liable to get back the borrower's loan. If the borrower defaults on the repayment plan, the installment is deducted from all members' shared purse due to their disadvantage. With keeping this in mind, all microfinance group members regularly visit the borrower's house and keep their eyes on her to get the installment in time.

Sometimes, group members abuse the borrower verbally and physically while missing the installment and paying the installment selling her household goods, destroying mutual trust and solidarity. Thus, they deny the collective efforts regarding warnings, recovery, and preparedness during and before disasters.

In summary, NGOs' microcredit programs negatively affect the community's livelihood capacity by increasing their poverty, socio-economic vulnerability, and exposure.

4.4 Infrastructure: How helpful is it for sustainable livelihood?

NGO's support related to infrastructure is not adequate due to the absence of strategic planning. The majority of their projects are short-term and focused on individual projects over wholesale development via several linked projects that addressed the beneficiary community's key challenges. These programs are project-based and last for only a few months. The impact of these temporary community-level programs did not contribute to ensure sustainable development, as NGOs were known to abandon such projects without carrying out detailed assessments to evaluate their degree of success and make data-backed reports for future projects.

Most of the NGO's community-level programs in the subject area are adhoc based and have little effect on long-term sustainability. In implementing community-level projects, NGOs mostly depend on donors' directives and interests rather than duly considering local demands and the beneficiary community's peculiar needs as they navigate the persistent challenge of disasters. Similar findings from Moroto et al. (2018) stated that NGO initiatives are sometimes criticized due to a lack of transparency and over-dependence on foreign donors. These sentiments have cast a cloud over their interventions in addressing

vulnerability, exposure, disaster risks, and resiliency in development projects, with a debate about the effectiveness of their role raging on. NGOs were maximizing profit in providing financial support to the beneficiaries for constructing and repairing homes. They usually did not consider the quality and sustainability of the shelters. They neglect to monitor the construction process or issue guidelines and provide expert support for quality control.

These houses are not built with the disaster in mind, so it is damaged by strong wind or storm. As a result, the borrowers cannot enjoy the benefits of the home. At the same time, they become financially weak, providing NGO's loans back with interests, which increased beneficiaries' physical and economic vulnerability to disasters. In this regard, in his study, Negh (2013) showed that the lack of experienced leadership, large-scale misappropriation, and the prevalence of widespread corruption limit NGOs' scope of activities in rural infrastructure development. In the same line, Islam & Walkerden (2014) explored that the houses and other infrastructure NGOs rebuild are not strong enough to protect the risk of vulnerability to hazards.

Criticizing an NGO's poor housing project, a beneficiary participant stated:

NGOs do not provide monitoring for construction activities or give guidelines for building standards. They provide a small amount of loans for people who want to build houses, but the amount is often only able to build houses of tin sheds. The walls and roofs of these houses are made of bamboo and tin, making them less durable.

Most community-based NGO support programs, including agriculture and IGA projects, increased social inequality and reinforced dominant power structures within the community, keeping the poor (the most vulnerable to disasters) out of their services. Similar study findings from Platteau (2004) explored that only the rich and elite who can pay for the services received the NGO services. NGOs curry favor of the elites by providing privileged services in return to guarantee that they would exert their influence to aid NGOs' local level interest. For instance, NGOs sometimes face challenges in collecting loan installments from the default beneficiaries and using this powerful elite to enforce collection. This type of service extends the scope of socio-economic exclusion and rejection of the vulnerable groups in society. One of the respondents noted:

We are a privileged middle class in this neighborhood, but we still have to cope with the non-availability of water that persists throughout the region. However, one of our influential neighbors had a good connection with this NGO official. And he was able to leverage this relationship to get access to clean water provided by the NGO.

NGOs have set up water treatment plants to get arsenic, saline, and iron-free water to promote community livelihoods. However, most of the plants were found to be inactive due to mechanical problems. At one plant, the beneficiaries paid 0.50 taka per litre of water, and most of the time they did not get service as it took a long time to fix the problem. This water treatment plant required electric power to continue service,

so the beneficiaries had to pay the electricity bill. However, a water crisis occurred due to a lack of electricity during a disaster.

NGOs did not consider the pre and post-disaster risk of installing the plants, so this service rarely contributed to sustainable community development or reduced the community's disaster risk. NGOs' poor technology and design, attitudes to profit, and short-term projects prolong beneficiaries' vulnerability rather than improve the livelihoods of the coastal communities.

4.5 Health and sanitation: How far do they consider a livelihood development approach?

Health is an important indicator for livelihood development. NGOs play an eye-catching role in promoting community health and hygiene behavior by raising awareness and providing financial support. NGOs' field workers (FW) also improve sanitation behavior, family planning, and lifestyle habits among the beneficiary communities through training and household counselling. Similar findings from Thapa et al. (2021) revealed that NGOs' supports for family planning, sanitation, nutrition, and water promoted integrated social and behavioral change within the community. In the research area, the beneficiaries learned from FW to alter long-held habits that put them at risk and protect themselves from outbreaks of diarrhoea, cholera, dengue, and other skin-related diseases that increase during and after disasters, increasing preventive measures in the community. As Pascapurnama et al. (2018) revealed, community awareness and knowledge of health risks reduce the occurrence of disaster-related infectious diseases, and the preventive measures of post-disaster conditions also contribute to mitigation and preparedness for future disasters. The rural people do not know much about the community clinics' services that the government has launched at the local level as part of the decentralization of health services and their rights there. NGOs' efforts to facilitate community access to healthcare have increased their physical and economic capability to face disaster challenges. Similar findings from Shoaf & Rottman (2000) showed that NGOs are also enhancing the community-level clinics' service delivery system and promoting the community's access to health services through constant training and information sharing, contributing to promoting the community's livelihood capacity and reducing vulnerability to disaster.

In addition to government health care providers, NGO's promotional activities have made significant contributions to maternal and child health. Participants from all walks of life praised the NGOs' role in reducing maternal and child mortality. Similarly, Mercer et al. (2004) showed that NGOs service promotes mother and child health and has proven crucial in reducing maternal fatality. In the same vein, Coates et al. (2013) revealed that NGOs' awareness-raising programs, campaigns, and joint listing of individuals eligible for vaccines with government officials had played a key role in treating primary diseases at the community level and maximizing immunization rates in Bangladesh. Perry & Chowdhury (2020) more clearly stated that in the mid-1980s, the immunization rate was around 2%, and in recent times, it has been increased to 70% through NGOs' social mobilization for immunization. A local government official observed:

NGOs are conducting maternal and child nutrition programs. The NGO pays them two thousand and two hundred (BDT-2,200) every month until the baby is six months old. This project starts in the first month of the pregnancy. As a result of this project, many low-income families can provide nutritious food and treatment for mothers and babies.

In addition, before the catastrophe, NGO workers' health and hygiene counseling has mitigated the community's health risks. NGOs' healthcare programs have raised community awareness and made them physically and mentally healthy, which enhanced their disaster resiliency and livelihood capacity. Similar study findings from Chandra et al. (2013) explored that health promotion increases the community's livelihood capacity because it helps communities get better preparation by strengthening the community's ability to withstand the next disasters. Because health is directly related to the livelihood and coping capacity of the community. In this regard (Basumatary & Basumatary 2020, Kim & Marcouiller 2020) stated that health impacted economic development by reducing production, and poor economic conditions lead to weaker preparedness and mitigation.

However, NGOs rarely consider existing environmental health hazards and do not carry out an environmental impact assessment before launching a community-level program. As a direct consequence, NGO programs sometimes reinforce environmental health hazards leading to disaster vulnerability. An NGO official participant acknowledged the weakness of this program as:

"Without long-term planning, poverty and disaster risks cannot be reduced by providing cows, goats, and poultry. During disasters, some cattle die due to lack of food and shelters, stench spreads in the air and causes environmental health problems".

Besides, widespread corruption among NGO officials has marred the distribution of health kits at the community level. They extort money from beneficiaries under various guises. In short, NGOs' health care services increase the community's income ability to carry out their livelihood by enhancing physical and mental strength. Let's consider every point (codes emerged under sub-themes). It will then help make an effective assessment of the impact of NGOs' coping strategies on communities' livelihoods and their capacity to deal with disasters, contributing to the future policy-making process in this regard. In Fig.5, the different indications used to show the outcomes are stated as:

5. Conclusions And Policy Implications

NGOs across the country have proved to be vital players, actively complementing government efforts and reaching out to underserved communities with local-level programs that target the grassroots. Study findings reveal that most non-DRR NGOs are working at the community level alongside the government to provide support services to make communities self-reliant. However, with a majority of these NGOs focused on post-disaster programs, the practicability of their continued actions has been called into question. Active community participation in every phase of community-level programs is known to be indispensable for identifying local issues, ensuring participatory vulnerability assessment, and enhancing joint decisions, which can play a significant role in advancing sustainable livelihoods for disaster-prone

communities. NGOs should select more vulnerable and marginalized communities without considering their location and loan repayment capacity. Microcredit can benefit these communities, and NGOs should adjust their interest rate as other financial institutions do, consider the socio-economic condition of the community, relax the complex loan payment system, and become flexible in installment collection. NGOs can make a significant contribution in infrastructural sectors by arranging training for the builders and owners about quality buildings, designing model houses, and providing technical support to the house loan seekers. Even if NGOs provide house loans to a small number of beneficiaries, if they make sure that the beneficiaries' housing is strong enough and disaster-resistant, they will enjoy the result of long-term development and will not fall into the debt trap. NGOs' consideration of environmental health hazards and ecology before implementing agriculture and health-related programs can lead to more sustainable outcomes for promoting communities' livelihood.

It is a matter of survival, sustainability, and progress for Bangladesh to ensure the availability of the infrastructure, technology, research, awareness, and expertise necessary to provide sustainable livelihoods for coastal communities and reduce their vulnerability. Disaster risk reduction as a process is participatory, and most vulnerable communities must work hand in hand with NGOs and other organizations to build local capacity, develop programs tailored to the communities' needs, and create resources for education and awareness that community members can easily understand. It is hoped that this study attracts the attention of development practitioners and policymakers looking to integrate NGOs effectively in development ventures.

References

1. Abramson DM et al (2015) The resilience activation framework: a conceptual model of how access to social resources promotes adaptation and rapid recovery in post-disaster settings. *J Behav Health Serv Res* 42(1):42–57
2. Al Amin M (2017) Development for Whom? Neoliberalism, Microcredit and Women in Bangladesh. University of Milan School of social and political studies Doctoral Dissertation
3. Alam MZ et al (2017) Effect of salinity intrusion on food crops, livestock, and fish species at Kalapara Coastal Belt in Bangladesh. *Journal of Food Quality*: 1–23
4. Alexander B et al (2006) Sustainable livelihood considerations for disaster risk management: implications for implementation of the Government of Indonesia tsunami recovery plan. *Disaster Prevention Management* 15(1):31–50
5. Amelia L et al. (Integrating Disaster Alert Kindergarten Watching into Preschool Education: Designing a Professional Disaster Mitigation Education Model to Early Children." *Proc, International Conference on Elementary Education*, 124–137
6. Amoatey P, Sulaiman H (2020) Assessing the climate change impacts of cocoa growing districts in Ghana: The livelihood vulnerability index analysis. *Environ Dev Sustain* 22(3):2247–2268

7. Awal M (2014) Water logging in South-Western coastal region of Bangladesh: local adaptation and policy options. *Science Postprint* 1(1):e00038
8. Banerjee SB, Jackson L (2017) Microfinance and the business of poverty reduction: Critical perspectives from rural Bangladesh. *Human relations* 70(1):63–91
9. Basumatary K, Basumatary S (2020) Health and economic development: A granger causality analysis. *PalArch's Journal of Archaeology of Egypt/Egyptology* 17(7):4015–4032
10. Bendell J (2017) *Terms for endearment: Business, NGOs and sustainable development*. Routledge
11. Boyce JK (2000) Let them eat risk? Wealth, rights and disaster vulnerability. *Disasters* 24(3):254–261
12. Bradshaw S, Fordham M (2015) Double disaster: Disaster through a gender lens. In: Shroder A et al (eds) *Hazards, risks and disasters in society*. Elsevier, pp 233–251
13. Brocklesby MA, Fisher E (2003) Community development in sustainable livelihoods approaches—an introduction. *Community development journal* 38(3):185–198
14. Carney D (2003) *Sustainable livelihoods approaches: progress and possibilities for change*. Department for International Development London
15. Castleberry A, Nolen A (2018) Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching Learning* 10(6):807–815
16. Center for Excellence in Disaster Management and Humanitarian Assistance (2017) 'Bangladesh: Disaster Management Reference Handbook'. Academic and Research Institution, United States of America. Retrieved from <https://reliefweb.int/report/bangladesh/disaster-management-reference-handbook-2017-bangladesh>. (Accessed: 14 July 2018)
17. Chan EYY et al. (2020) Health-EDRM in International Policy Agenda I: Sendai Framework for Disaster Risk Reduction 2015–2030. In: Chan, and Shaw (Eds.) *Public Health and Disasters*, Springer, 59–74
18. Chandra A et al (2013) Getting actionable about community resilience: The Los Angeles county community disaster resilience project. *American journal of public health* 103(7):1181–1189
19. Chitongo L (2013) The contribution of NGOs to rural development: the case of catholic relief services protecting vulnerable livelihoods programme in Zimbabwe. *Asian journal of management sciences education* 2(3):124–139
20. Chowdhury P, Jenkins A (2018) Feasibility of solar-biomass hybrid cold storage for unelectrified rural areas of Bangladesh. In: Selim S et al (eds) *The Environmental Sustainable Development Goals in Bangladesh*. Routledge, pp 73–84
21. Coates EA et al (2013) Successful polio eradication in Uttar Pradesh, India: the pivotal contribution of the Social Mobilization Network, an NGO/UNICEF collaboration. *Global Health: Science Practice* 1(1):68–83
22. Creswell JW, Creswell JD (2017) *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications
23. Daigle M et al (2020) *Moving forward on gender, livelihoods and financing*

24. Dasgupta S et al (2018) Climate Change, Salinization and High-Yield Rice Production in Coastal Bangladesh. *Agric Resour Econ Rev* 47(1):66–89
25. Djalante R (2018) A systematic literature review of research trends and authorships on natural hazards, disasters, risk reduction and climate change in Indonesia. *Nat Hazards Earth Syst Sci* 18(6):1785–1810
26. Forino G et al (2015) A conceptual governance framework for climate change adaptation and disaster risk reduction integration. *International Journal of Disaster Risk Science* 6(4):372–384
27. Griffin R (2014) Complete training evaluation: the comprehensive guide to measuring return on investment. Kogan Page Publishers, India
28. Hallegatte S, Rentschler J (2015) Risk management for development—Assessing obstacles and prioritizing action. *Risk Anal* 35(2):193–210
29. Hammill A et al (2008) Microfinance and climate change adaptation. *IDS Bull* 39(4):41–68
30. Harvey CA et al (2014) Extreme vulnerability of smallholder farmers to agricultural risks and climate change in Madagascar. *Philosophical Transactions of the Royal Society B: Biological Sciences* 369(1639):20130089
31. Haslinda A, Mahyuddin M (2009) The effectiveness of training in the public service. *American Journal of Scientific Research* 6(1):39–51
32. Islam MR, Morgan WJ (2011) Non-governmental organizations in Bangladesh: their contribution to social capital development and community empowerment. *Commun Dev J* 47(3):369–385
33. Islam MS, Zhang Y (2018) The potential of strategic environmental assessment to reduce disaster risks through climate change adaptation in the coastal zone of Bangladesh. *Int J Clim Change Strateg Manag* 11(1):137–153
34. Islam R, Walkerden G (2014) How bonding and bridging networks contribute to disaster resilience and recovery on the Bangladeshi coast. *International journal of disaster risk reduction* 10:281–291
35. Israel DC, Briones RM (2012) Impacts of natural disasters on agriculture, food security, and natural resources and environment in the Philippines. Series, Impacts of natural disasters on agriculture, food security, and natural resources and environment in the Philippines, PIDS discussion paper series
36. Izumi T, Shaw R (2012) Chap. 3 role of NGOs in community-based disaster risk reduction. In: Shaw (ed) *Community-Based Disaster Risk Reduction*. Emerald Group Publishing Limited, pp 35–54
37. Jones L et al. (2010) Responding to a changing climate: Exploring how disaster risk reduction, social protection and livelihoods approaches promote features of adaptive capacity. Overseas Development Institute, UK
38. Jones S et al (2014) Governance struggles and policy processes in disaster risk reduction: A case study from Nepal. *Geoforum* 57:78–90
39. Khatun H (2003) Livelihood strategies in disaster risk reduction in Bangladesh. In: Shahni, and Malalgoda (Eds.) *Disaster Risk Reduction in South Asia*, Parentice Hall of India Private Limited, New Delhi, 264–280

40. Kim H, Marcouiller DW (2020) Making sense of resilience planning and policy in the pursuit of sustainable development and disaster risk reduction. *Climate Dev* 12(3):228–240
41. Laverack G (2006) Improving health outcomes through community empowerment: a review of the literature. *Journal of Health Population Nutrition* 24(1):113–120
42. Lindenberg M (2002) Measuring household livelihood security at the family and community level in the developing world. *World development* 30(2):301–318
43. Mahmuduzzaman M et al (2014) Causes of salinity intrusion in coastal belt of Bangladesh. *International Journal of Plant Research* 4(4A):8–13
44. Mallick B et al (2017) Living with the risks of cyclone disasters in the south-western coastal region of Bangladesh. *Environments* 4(1):13
45. Mathbor GM (2007) Enhancement of community preparedness for natural disasters: The role of social work in building social capital for sustainable disaster relief and management. *International Social Work* 50(3):357–369
46. Mercer A et al (2004) Effectiveness of an NGO primary health care programme in rural Bangladesh: evidence from the management information system. *Health Policy Plann* 19(4):187–198
47. Merriam SB, Tisdell EJ (2015) *Qualitative research: A guide to design and implementation*. John Wiley & Sons
48. Moroto H et al (2018) Possible factors influencing NGOs' project locations for disaster management in Bangladesh. *International journal of disaster risk reduction* 27:248–264
49. Moser C et al (2001) *To claim our rights: livelihood security, human rights and sustainable development*. Overseas Development Institute London
50. Mulyasari F, Shaw R (2013) Role of women as risk communicators to enhance disaster resilience of Bandung, Indonesia. *Natural hazards* 69(3):2137–2160
51. Nduwarugira G, Woldemariam T (2015) *Microfinance a poverty trap or solution?: A study of the development strategies operational NGOs use to help entrepreneurs in developing countries escape the povetry trap*. University of Kristianstad School of Economics Bachelor thesis
52. Neuman WL (2014) *Social Research Methods: Qualitative and Quantitative Approaches: Pearson New International Edition*. Pearson Education Limited
53. NGO Affairs Bureau of Bangladesh (2018) *List of Non Government Organizations (NGO) in Bangladesh*. Social Welafre Department Retrieved from <http://www.ngoab.gov.bd/> (Last accessed on 18 July 2017)
54. Nkala P et al (2011) The conundrum of conservation agriculture and livelihoods in Southern Africa. *Afr J Agric Res* 6(24):5520–5528
55. O'Laughlin B (2002) Proletarianisation, agency and changing rural livelihoods: forced labour and resistance in colonial Mozambique. *Journal of Southern African Studies* 28(3):511–530
56. Pascapurnama DN et al (2018) Integrated health education in disaster risk reduction: Lesson learned from disease outbreak following natural disasters in Indonesia. *International Journal of Disaster Risk*

Reduction 29:94–102

57. Perry HB, Chowdhury AMR (2020) NGO Contributions to Community Health and Primary Health Care: Case Studies on BRAC (Bangladesh) and the Comprehensive Rural Health Project, Jamkhed (India). In: (Eds.) Oxford Research Encyclopedia of Global Public Health
58. Pfeiffer J (2003) International NGOs and primary health care in Mozambique: the need for a new model of collaboration. *Soc Sci Med* 56(4):725–738
59. Platteau JP (2004) Monitoring elite capture in community-driven development. *Development change* 35(2):223–246
60. Rahman A, Razzaque A (2000) On reaching the hardcore poor: some evidence on social exclusion in NGO programmes. *The Bangladesh development studies*: 1–35
61. Rahman S et al (2018) Climate change adaptation and disaster risk reduction (DRR) through coastal afforestation in South-Central Coast of Bangladesh. *Management of Environmental Quality: An International Journal* 30(3):498–517
62. Rai A et al (2008) Development of livelihood index for different agro-climatic zones of India. *Agricultural Economics Research Review* 21(2):173–182
63. Sai F et al (2018) Towards impact-based flood forecasting and warning in Bangladesh: a case study at the local level in Sirajganj district. *Nat. Hazards Earth Syst. Sci. Discuss*: 1–20
64. Seddiky MA et al (2020) International principles of disaster risk reduction informing NGOs strategies for community based DRR mainstreaming: The Bangladesh context. *International Journal of Disaster Risk Reduction* 48:101580
65. Seidler R et al (2018) Progress on integrating climate change adaptation and disaster risk reduction for sustainable development pathways in South Asia: Evidence from six research projects. *International Journal of Disaster Risk Reduction* 31:92–101
66. Shoaf KI, Rottman SJ (2000) The role of public health in disaster preparedness, mitigation, response, and recovery. *Prehospital Disaster Medicine* 15(4):18–20
67. Siddiquee NA, Faroqi MG (2009) Holding the giants to account? Constraints on NGO accountability in Bangladesh. *Asian Journal of Political Science* 17(3):243–264
68. Sina D et al (2019) What does the future hold for relocated communities post-disaster? Factors affecting livelihood resilience. *International journal of disaster risk reduction* 34:173–183
69. Singh PK, Hiremath B (2010) Sustainable livelihood security index in a developing country: A tool for development planning. *Ecol Ind* 10(2):442–451
70. Small L-A (2007) The sustainable rural livelihoods approach: a critical review. *Canadian Journal of Development Studies/Revue canadienne d'études du développement* 28(1):27–38
71. Sultana A (2010) Patriarchy and Women s Subordination: A Theoretical Analysis. *Arts Faculty Journal*: 1–18
72. Tareq SM et al (2018) Evaluation of climate-induced waterlogging hazards in the south-west coast of Bangladesh using Geoinformatics. *Environ Monit Assess* 190(4):230

73. Thapa B et al (2021) Integration of family planning in nutrition programming: experiences from the Suaahara II programme in Nepal. Field Exchange 64
74. Twigg J (2001) Sustainable livelihoods and vulnerability to disasters. Benfield Greig Hazard Research Centre Disaster Management Working Paper 2/2021

Figures

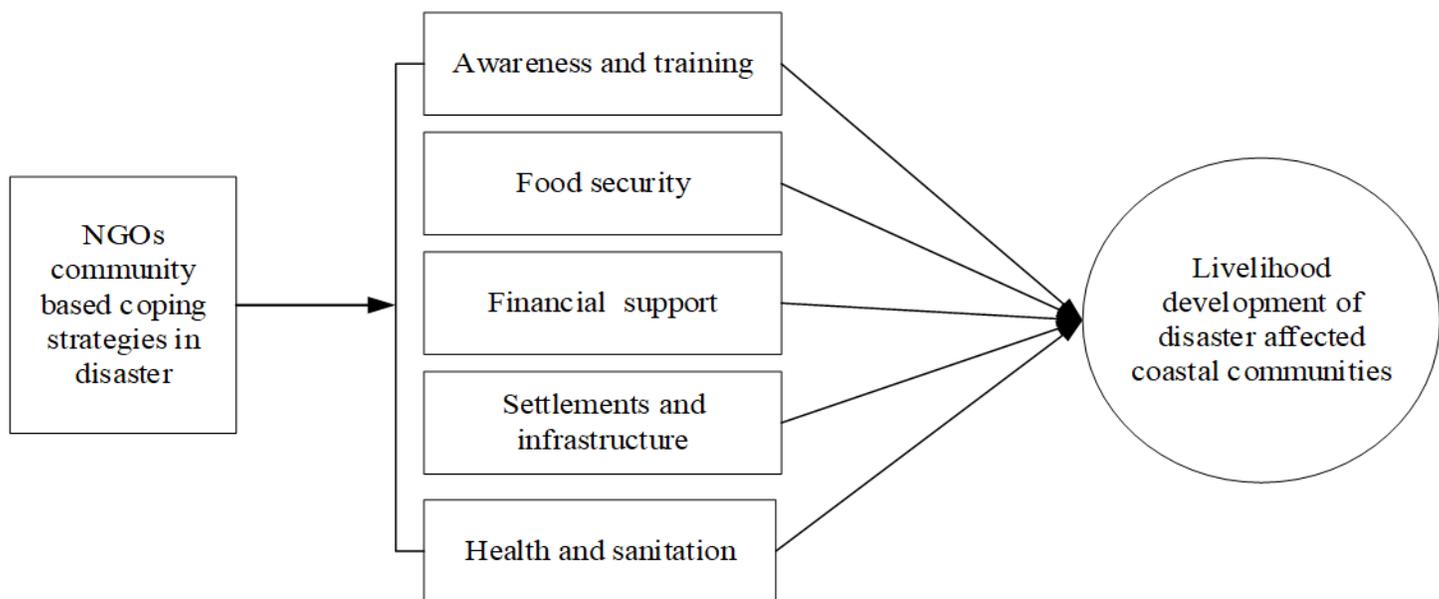


Figure 1

Theoretical framework

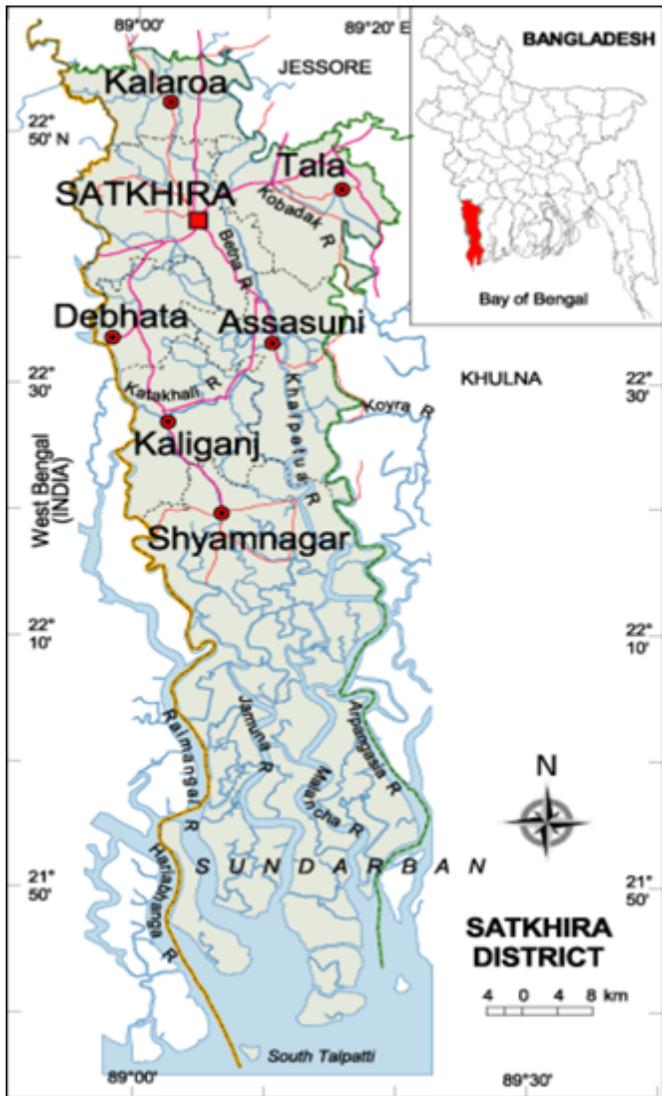


Figure 2

Map of Satkhira District (Research area).

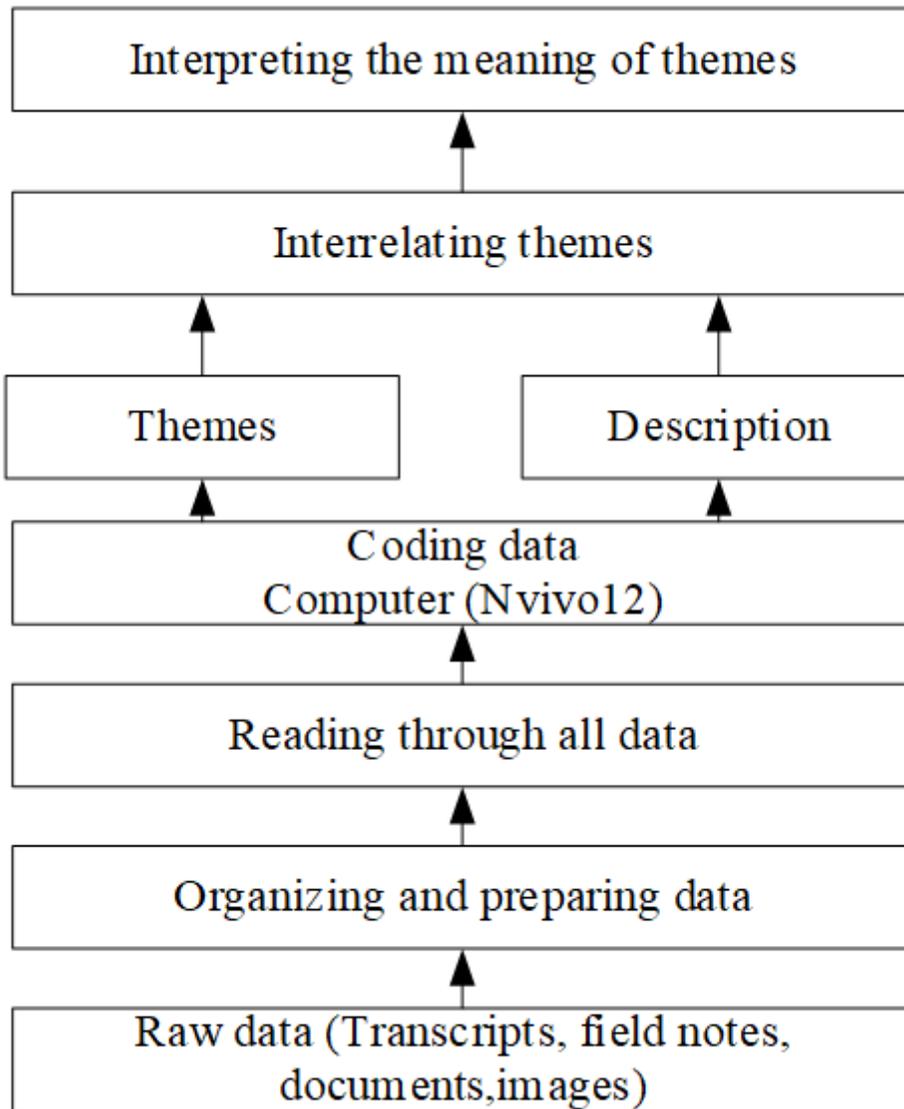


Figure 3

Steps in qualitative data analysis. Adapted from (Creswell & Creswell 2017).



Figure 4

NGO-supported water tanks. Source: Field.

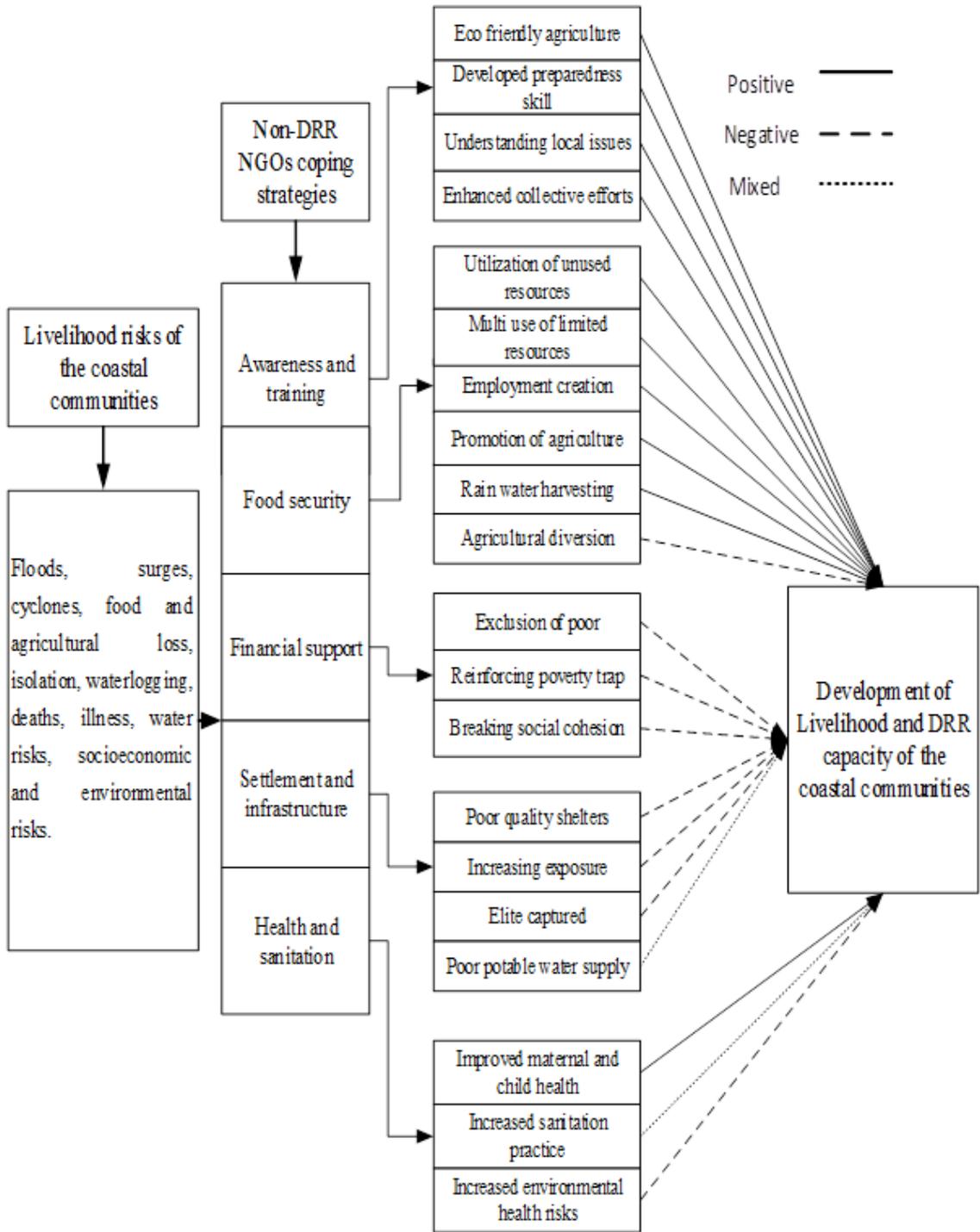


Figure 5

Positive and negative impact of NGOs explicit individual coping strategies on livelihood of coastal communities