Small-scale fishing families and their daily multiple-stressor on climate change and COVID-19: Preliminary findings

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Abstract. The COVID-19 pandemic situation is still ongoing in many countries in the world, including Indonesia. The positive case continues to increase every day and impacts our life, including the fisheries' family. The fishery is a vulnerable sector to climate change, and this day worsened by a pandemic situation. This paper aims to understand the resources attached to fishing families facing various pressures and risks, forms of response, and adaptation within the fishing families. During COVID-19 pandemic situation, we have to carried out an online ethnographic approach by online-focused group discussion (FGD) to fisherman group and fisherman wives. Purworejo village was selected as a research site because it is the one with the largest number of small-scale fishing families in Java's northern coastal area. The results show that various pressures and risks faced by fishery families, not only related to climate change and COVID-19 such as fishing season, limited resources, capital, and access, but also a risk on their internal family. In the context of fishery family resilience, each family member has a role in dealing with stressors, especially economic stressors. Fathers look for fish in the sea almost eight hours a day; children also go to sea when economic conditions continue to deteriorate; even a fisherman's wife has the same responsibilities as her husband.

1. Introduction
COVID-19 was announced as a global pandemic by the World Health Organization in early March 2020. The spread of this virus has yet to be well controlled, especially in Indonesia. As of September 2020, 210,940 confirmed positive cases of COVID-19, and a total of 8,544 people died [1]. This pandemic has had a significant impact on almost every aspect of life. As with other sectors, the COVID-19 also affects the fisheries sector [2–5].

Families with a strong resistance to being able to deal with various stressors, both internal (within the family) and those from outside (the environment and regulations) are needed especially during a pandemic situation [6,7]. Families need resources to adapt well from the stressors they are facing and return to their previous conditions (bounce back) or even return to a better state (build back better) so that their livelihoods are secure [6,8]. Families' ability to survive and bounce back from all the challenges and difficulties in life, becoming more robust and more creative in utilizing existing resources, is called family resilience [9,10].

Family resilience studies have been carried out in the general explanation. However, they have not discussed the aspect of livelihood and the reciprocal relationship between family and livelihoods. A family is categorized as vulnerable or resilient to stresses such as climate change and the COVID-19 pandemic. The important livelihood to understand in the context of family resilience is the fishery sector. The concept of resilience in an ecological context is defined as disturbances but accompanied by reorganizing itself to recover to its original state [11,12]. The family is a system in dealing with
changes that transpire by making various adjustments or adaptations to recover from the function, structure and identity as a family [13–15].

Meanwhile, family resilience is based on three domains: belief system, organizational processes and communication [9,10]. Each field has three fundamental processes. The key processes involved in a belief system include interpreting pressure, expectations, and spirituality. The organizational process consists of the following vital functions: flexibility to adapt, connectedness and mutual support, as well as relatives, and social and economic resources. Furthermore, the communication process includes the critical processes of clear information, sharing emotionally, and proactive and collaborative problem-solving. The concept in this study, family resilience is the strength that is owned as long as the family is under pressure as a response to long-term crises and difficulties [9]. Another study states there are four essential elements, namely stressors or challenges and difficulties faced by a family, family protection facilitates the family’s ability to restore the balance between desire, the ability after facing risks, and protecting against future threats [16]. The family vulnerability that increases the potential or increases risk and momentary adjustments and long-term adaptations. The four components can see the level of family resilience at various levels, for example: overall family system, sub-system, or individual family member level, family-ecosystem fit, by understanding the risk, protection, vulnerability and adaptation of the family itself.

Fisheries are quite different from other livelihoods such as plantations, agriculture and industry. Fishing is a job with high uncertainty, risk and is also dangerous [17,18]. The fisherman Uncertainty related to the existence of fugitive fish resources, are in constant motion coupled with the depletion of fish resources due to overfishing, environmental degradation and climate change will undoubtedly affect the livelihood of fishers and their families. The consequences of climate change such as sea level rises, high waves, coastal flood, ocean acidification, changing seasonal pattern, and marine heat waves [19] and disrupt the fisherman family resilience both directly and indirectly. In addition to facing the severe impacts of climate change, fishing families are also coupled with the COVID-19 pandemic which has shaken their lives, especially from the socio-economic aspects.

The fishing family from Demak regency especially in Purworejo village is one with largest numbers for small scale fishing family in Java's northern coastal area. Therefore, it is important know how the small scale fishing family cope with such multiple stressors. Pressure can come from the environment and climate change impacts, social and economic conditions, and pandemic situations. Resilience can be analyzed from the kind of stressor in the fisher’s family, then linked between individuals. Furthermore, we can also study the forms of adaptation carried out by each individual. Stressors and conditions of adaptation will vary between individuals but will relate to one another, can strengthen or weaken the resilience of the family [8,20,21]. This paper will explore the initial problem, the family vulnerability and capacity (protective factor), responses, and their strategy (coping and adaptation) to overcome the multiple stressors.

2. Methods
2.1. Research location
The research carried out at Puworejo Village, Bonang district, Demak regency, Central Java Province, Indonesia. Puworejo village area is 7.4 square kilometer and the largest village in Bonang district. The village is located at Java’s northern coastal area. Number of population in Purworejo is 7,009 people, and distributed equally in gender, estimated about 50 percent for woman and man population [22]. This village experiencing the coastal flood and the event is getting severe every year as a consequences of climate change.

2.2. Data collection and analysis
Data collected using qualitative approach. Because data collected in COVID-19 pandemic situation, we are using the digital approach called online ethnographic. This approach needs the engagement between researcher and the community include document collection, online observation, online group discussion and online interviews [23]. After building rapport with the resource person in Purworejo Village, we started two online focus group discussion (FGD). The FGD’s aim is to identified the risk
and stressor, vulnerability and protective factors and coping and adaptation strategies of fishing family in Purworejo’s village. We consider this is as a preliminary finding because we only carried out two FGDs. These findings as a basis for further data collection through in-depth interview and survey using questionnaire. First online FGD carried out in July, 24 2020 with fisherman and the second online FGD with fisherman wives/ fisherwoman in August, 18 2020. In COVID-19 pandemic situation we courage the participant to apply the physical distancing and hygiene protocol. We used media platforms such as zoom meetings and WhatsApp to support collect data in real-time.

Number of participants the first online FGD was 4 fishermen with various fishing gears namely crab trap, tidal trap, seine net, and lift net. The second FGD with 4 fisherman wives they are having a different characteristic. The first participant does not have any job except as a housewife. The second participant, beside as a fisherman’s wife, she also a fisherwoman. The activity of the third participant is a housewife. The last participant is a fish seller and crab catcher. We record the online FGD and also transcript the discussion between researcher and the participant. The transcript data analyzed by identifying the stressor, capacity (protective factor), response and strategy (coping and adaptation processes) of small scale fishing family in facing the COVID-19 pandemic and climate change.

3. Results and Discussion

3.1. The Fishing Family Resilience in Purworejo
Small scale fishing family in Purworejo village deals with many risk and stressor. Their daily lives alone facing many risk and stressor both from internal family and those related to their job as a fisherman. In 2020, the existing stressors even more magnify because of the COVID-19 pandemic. Family resilience as a concept from the family unit system intersects with the coping and adaptation processes in the family as a functional unit. This approach observes the adaptation process overtime, from continuous interactions to the course of the family life cycle and multigenerational influences [10]. The Purworejo’s fishing family resilience processes identified from the family resilience component such as risk and stressor, vulnerability & protective factor, and coping and adaptation strategies facing the multiple-stressor include climate change impact and COVID-19 pandemic. The preliminary finding from two FGD’s shows in figure 1.

![Figure 1. Preliminary Findings Fishing Family Resilience in Purwerojo Village, Demak.](image-url)

The stressor of one fishing family is relative different from other fishing family. However, they share worry of some risk and stressor (figure 1). The risk and stressor fishing families especially fisherman’s wife worry the most are regarding the drug abuse, promiscuity, and strong wind and wave when their husband going fishing. The wives worry regarding drug abuse for their children because the coastal areas in Indonesia are often the entrance of drug trafficking[24]. They also fear that
promiscuity will affect their children future. They even worry when they husband at the sea and big wave and strong wind happened. Fisheries is a job with high uncertainty and risk and is also a dangerous job [18]. Uncertainty related to the existence of fish resources, which are fugitive resources, which are in constant motion coupled with the depletion of fish resources due to overfishing and environmental degradation, will undoubtedly affect the livelihoods of fishers and their families [25]. The Indonesian Statistic data shows that fishers are the lowest group of people [26]. This condition can be seen in their daily life, which relies on the catch to meet his daily needs. Most of the poor fishing fishers rely on the sea, without having any other source of livelihood. In their fishing activities, small fishers also have limited fishing gear, lack of capital, and technology. The results obtained from the sea, other than for family consumption, are usually sell directly without processing which adds to the selling value. Also, more than 70 per cent of fishers have low education [26], making it difficult for them to absorb modern technology. All these limitations ultimately affect the income and welfare of the fishermen's family.

The other stressor that attached to fishing family is the limited time they spend with the family. Working hours of fisherman is quite different with other job such as farmer. They have to start fishing on the wee hour when most of the family still sleep and landing at noon. While family time is one of element to strengthening family resilience [16,27], fisherman family do not have that. Therefore they are depend on the existence of extended family to help in looking after and educated the children when the parents is absence. They also send their children to the ‘pesantren’-the Islamic boarding school that the level education equivalent to junior high and high school. It is also to prevent their children from drugs abuse and promiscuity. The results of the FGD show that fishers give considerable attention to their children. Purworejo fishers have a work passion for keeping their children in school; so they can leave poverty and do not become fishermen. From the experience of fishermen as parents, fishers analogized as people who still find it difficult to access education and health so that their standard of living is low [18].

Unpredictable incomes and seasons cause problems in fishing family life. The demand for the necessities of life continues to increase, while uncertain income is a problem that is often faced by fishing families. The fishing family strategy to cope with such problem are finding alternative job when low season in fishing for example the wives become temporary housemaid or borrow money from relative or neighbors.

Data from FGD showed for most of the fishermen in Purworejo village; togetherness is a factor that fishers want in maintaining the resilience of their families. In the context of family togetherness, positive communication between families is something that is very much needed. Communication becomes something that is a basic human need in interacting socially with fellow humans. Tubbs stated that one of the four primary human needs is the facilitation of social needs to gain a sense of security through a sense of belonging and belonging, association, feeling accepted, giving and receiving friendship [28]. Therefore, the need for communication as an aspect of exchanging message information between fishing families is given. The element of communication is very decisive for humans as social beings, so the study of humans itself is an indispensable part. The important of understanding family communication is to understand the concept of socialization needs between family members; it cannot be separate from the communication itself. Differences in communication and opportunities for participation in the decision-making process are influenced by personal resources contributed by each husband and wife to the place of marriage and the gender role norms prevailing in the area where they live. The time spent doing each activity according to the household members varies, depending on the type of activity carried out by each member of the fishing household.

3.2. COVID-19 pandemic and Climate Change Impact on Purworejo’s Fishing Families

The COVID-19 pandemic has shaken all elements, including the fisheries sector. Small fishers are the most suffering category in the fisheries sector [29]. Data from the Ministry of Marine Affairs and Fisheries shows the number of small fishers in Indonesia is reflected in the number of small-scale fishing fleets (<5 GT) which reaches 90 per cent of the total existing fleets. The impact of the COVID-19 pandemic for small fishers as summarized [30,31] includes the fall in fish commodity prices by
around 20-30 per cent due to the demand for fresh fish from hotels, restaurants and homes. The fall of fish prices experienced by Purworejo’s fisherman. Fish prices feel by up to 70 percent and not cover the fishing cost. Even though, the pandemic situation has disrupted the fisherman’s economy, they are still going fishing every day. This is because they have no other alternative livelihood and high-season on fishing is occurred.

Unlike from the impact of the COVID019 pandemic which suddenly occurred. The impact of climate change such as coastal flood, stronger wind and high ocean waves which although getting severe every year. They are already having a adaptation strategies. To deal with coastal flood that has inundated their homes, for example, they are raised floor and the roof. Similar to the coastal flood, they are not going fishing when stronger wind and high ocean waves occurred. The preliminary findings showed that the fishing family in Purworejo are suffering more because of COVID-19 than the impact of climate change. Facing the multiple-stressor is not simple. Learn from the experience of James Stockdale [32], the 51st Squadron Commander who survived his time as a prisoner of war in Vietnam in 1965. In several historical kinds of literature, this resilience stems from his way of thinking and acting. In essence, the story about James Stockdale has one thing to say: optimism followed by objective effort. In the context of the case of small fishers, referring to what Stockdale was doing, the way that can be done to survive is to activate adaptive capacity [33]. Adaptive capacity is precisely the ability of an individual, household or community to face the various changes that occur, as well as to reduce risks and impacts. However, this needs to be supported by adaptive government policies so that small fishermen's fishing activities can continue to follow the changes that occur.

As with other sectors, the COVID-19 pandemic also affects the fisheries sector. In a pandemic situation, fishermen families are faced with a decrease in the price of fishing products due to limited transportation due to restrictions on movement. This condition, of course, makes it even more difficult for fishing families to fulfil their daily life. The difficulties experienced by fishers, mostly poor small-scale fisher, should become the government's attention. The state must be present because fishers families are the most vulnerable group to COVID-19. Until the end of May 2020, there are poor fishers affected by the pandemic who have not received social assistance from the government. The data shows that 3.8 million poor farmers and fishers have not been recorded in the Integrated Social Welfare Data. The government should allocate a Special protection fund for fisheries families whose livelihoods are disrupted due to the spread of COVID-19.

4. Conclusions

Purworejo is a fishery village that experiences complex problems for a long time and is commonly faced by other fishing communities. Fishery communities are related to marginalized factors, poor communities, and exploited. This stereotype is inseparable from their precarious economic condition. The economic welfare of coastal communities is very dependent on fishery resources, both marine capture fisheries and aquaculture, which until now have access to open access, so that the environmental conditions of coastal and marine areas determine the sustainability of their socio-economic conditions. With these problematic economic stressors, the fishing family's resilience is an aspect that is the responsibility of every family member. Each family member has a role in dealing with stressors, especially economic stressors. The father looks for fish in the sea; the child also goes to sea when the financial condition deteriorates. Even a fisherman's wife has the same responsibilities as a husband. The wife of a fisherman is a woman who is part of a multitasker family unit.

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