# Disaster Microinsurance

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Disaster microinsurance can play an important role for low-income households, particularly in enhancing their resilience toward natural hazards. This insurance is a specific type of microinsurance that can be defined as an insurance for low-income people, to help them to manage risks and vulnerability toward local natural shocks. In other words, disaster microinsurance is a type of risk transfer mechanism specifically designed for low-income people who live in disaster-prone areas. The product of this microinsurance may cover financial losses caused by a large natural hazard event in terms of income, house, livestock, or other crops. This microinsurance is also known as a component of integrated disaster risk management frameworks that involve risk reduction, disaster preparedness, and risk transfer.

resilience disaster risk perception volcanic eruptions microinsurance

## 1. Introduction

Disaster microinsurance can play an important role for low-income households, particularly in enhancing their resilience toward natural hazards. This insurance is a specific type of microinsurance that can be defined as an insurance for low-income people, to help them to manage risks and vulnerability toward local natural shocks [1][2][3][4]. In other words, disaster microinsurance is a type of risk transfer mechanism specifically designed for low-income people who live in disaster-prone areas. The product of this microinsurance may cover financial losses caused by a large natural hazard event in terms of income, house, livestock, or other crops. This microinsurance is also known as a component of integrated disaster risk management frameworks that involve risk reduction, disaster preparedness, and risk transfer [5].

Large natural hazard events in recent years, such as the Aceh tsunami in 2004, have triggered discussions on the possibility to introduce disaster microinsurance in Indonesia, but this is still a hardly explored field [2][6][7]. People in Indonesia are yet to be exposed to different types of disaster microinsurance that they could buy, although disasters have been an important risk that can affect household welfare [8][9]. For the limited insurance options available, the uptake has been poor [2]. Other studies also indicate that the rate of participation in microinsurance in developing countries is low [4][10][11][12].

Promoting disaster microinsurance requires a better understanding of what the main determinants for participating in this insurance are. One possible determinant is people's perception of disaster risks relative to their living location [13][14]. This risk perception is important, since it could indicate households' willingness to invest beyond their usual patterns [15]. However, although large populations in Indonesia face disasters in their daily life, the link

between perception of risk and disaster microinsurance is still rarely studied. One of the few conducted is by Viverita et al. [8], assessing whether natural hazards are the most common risk faced by individuals or households. This study also does not focus on a specific disaster, although it has been argued that each natural hazard might bring a specific risk.

# 2. Factors Influence Disaster Microinsurance

## 2.1. Perception of Risks

Scientists define risk as 'hazard times exposure equals consequence, while the average person defines risk as 'the probability of something bad happening' [16]. This implies that the difference between these two risks is also important, as it can sometimes create further risks. In the context of natural hazard events, some studies present interesting results. Comparing the perceived risks and frequency of disasters from the survey results and the historical records of disasters, Wang et al. [17] argue that Chinese people, in general, have a correct perception of the hazards in the areas in which they live in. This indicates that there is no substantial gap between experts and lay people in assessing disaster risk. On the basis of their study of a flood-prone area in Slovenia, Brilly and Polic [18] show that the experience of floods influences the perceived threat and concern related to them. They also find that people are aware of the importance of insurance against floods, which results in an increase in the rate of insurance participation. Siegrist and Gutscher [19] confirm that lay people's risk perceptions and experts' risk assessment of flooding risks in Switzerland are correlated, but the strength of this relationship differs across regions.

The perception of risk, according to Slovic [20] and Renn [21][22], is basically known as the subjective judgement that people make about the characteristics and severity of a risk. Therefore, on average, intuitive risk judgments are important for people in evaluating hazards [20]. This highly personal process of decision making is based on, among many other factors, an individual's frame of reference developed over a lifetime [16]. Some studies underline the role of locational factors, as well as the experience of past shocks, on people's perception of exposure to risk in disasters related to natural hazard events [19][23][24] that could in turn affect households' decisions, such as that of participating in, for example, microinsurance [4]. This means that, when the disaster shocks change people's perception of risk, then their risk-taking behavior will also be affected depending on the impact of the shocks on income and wealth. As is commonly known, wealth is negatively associated with risk aversion. When a disaster negatively changes the wealth of a household, then this household will possibly be more risk-averse, whereby insurance may play a role to avoid risk-related disasters.

Based on this framework, we can expect that people who face natural hazard risks may be aware of important strategies in which disaster microinsurance is a promising option with several benefits: reducing vulnerability; being in a better position to cope with risk; protecting living standards; and complementing any social security system [2]. As noted by Kelman and Mather [25], one of the options for dealing with environmental hazards is to live with the hazards and risks, implying that livelihoods are intertwined with environmental threats and opportunities.

Empirical work, however, could not yet confirm the relationship between perception of risk and willingness to take up any disaster microinsurance. Xu et al. [13], in the case of the 2008 Wenchuan earthquake, observe that households' risk perceptions and livelihood capital are the most important factors affecting their willingness to purchase earthquake disaster insurance. Royal and Walls [14], in a survey among Maryland floodplain residents, show that stated risk perceptions predict voluntary flood insurance take-up. Fier and Carson [26] find a statistically significant relationship between natural hazard events and the demand for life insurance across states in the US, confirming that natural hazards affect not only property insurance but also life insurance. In a case study on the risk of flooding and cyclones in Bangladesh, Akter et al. [27] find that the return period of natural hazards and the distance at which people live from the river significantly explain the household decision to participate in insurance.

Naoi et al. [28], on the other hand, find that many households in Japan do not buy earthquake insurance, since it is too expensive, and this insurance does not reflect regional differences in earthquake risks. Longwell [29] suggests that the lack of equity and a certain bias in the perceived earthquake risk among Californians tend to lower the participation rate in earthquake insurance. Wang et al. [17], however, emphasize that disaster insurance participation is not directly influenced by this perceived risk of hazards when people expect the government to provide support.

## 2.2. Other Determinants

In an ideal situation (for instance, a perfect insurance market), one may assume that the questions about the need for insurance and the interest in participating in disaster microinsurance can be directed to respondents who have a perfect knowledge of insurance. However, it is difficult to expect that respondents would have such a perfect knowledge, even in developed countries. For instance, McCormack et al. [30] find that a sizable proportion of Medicare beneficiaries in Kansas City are unaware of some basic and critical aspects related to cost, coverage, and supplemental insurance options, although they are already informed about some elements of the Medicare program. In a recent study on health insurance, Paez et al. [31] state that one factor that may determine whether consumers select a suitable health plan and use health insurance to their best advantage is health insurance literacy. This also leads to the assessment of the influence of insurance literacy on the household decision to participate in disaster microinsurance [17].

As regards household risk factors, we note the influence of having children [32] on the probability of buying disaster microinsurance. Households with children are usually assumed to be more vulnerable to risks, and therefore they may have more interest in participating in disaster microinsurance. We can also include smoking behavior as a proxy for health status. A poor health (higher health risk) may have a negative effect on household expenditure by increasing the health costs of illness and reducing the household's capacity to earn income when the head of the household, as the main income earner, has health problems. This is in line with the available literature on health insurance, i.e., a correlation between health risk and health insurance demand [33]. Therefore, a higher smoking indicator index indicates a higher health risk, which might positively influence household participation in disaster microinsurance.

Social networks can also play a role as a channel to other disaster-coping mechanisms, and can therefore influence the participation in insurance. Having a close relationship with relatives will provide an opportunity to get informal support that, in turn, may reduce the household's probability of participating in disaster insurance. It is interesting that, in his study on reconstruction funds in Fiji, Takasaki [34] finds that traditional kin elites who have power, such as the chief's clans, receive benefits sooner than others in recipient villages. Therefore, it is possible to expect that people who have relatives who are known as village elites (like members of the village government) will have better access to this relief and will negatively respond to disaster microinsurance. In addition, membership of local associations may also reduce the likelihood of a household participating in disaster insurance [35]. Some types of local associations certainly depend on location: for instance, local associations related to agricultural activities are important for villagers in rural areas.

Disaster relief is also a coping alternative, so that access to ex-post disaster relief [17][27][29] can be expected to have a negative influence on the participation in disaster microinsurance. Meanwhile, liquid assets may play a role as a self-insurance. Therefore, for households with liquid assets, participating in disaster insurance is less urgent. Finally, households' ability to pay their monthly premium for disaster microinsurance may affect participation in disaster microinsurance (for instance, [27]). Yet it is also possible that higher income negatively affects participation in this insurance when higher income reflects the capacity to self-insure in the same way as liquid assets.

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