



Learn from the Past, Prepare for the Future: Impacts of Education and Experience on Disaster Preparedness in the Philippines and Thailand

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Summary. — This study aims at understanding the role of education in promoting disaster preparedness. Strengthening resilience to climate-related hazards is an urgent target of Goal 13 of the Sustainable Development Goals. Preparing for a disaster such as stockpiling of emergency supplies or having a family evacuation plan can substantially minimize loss and damages from natural hazards. However, the levels of household disaster preparedness are often low even in disaster-prone areas. Focusing on determinants of personal disaster preparedness, this paper investigates: (1) pathways through which education enhances preparedness; and (2) the interplay between education and experience in shaping preparedness actions. Data analysis is based on face-to-face surveys of adults aged ≥15 years in Thailand ($N = 1,310$) and the Philippines ($N = 889$, female only). Controlling for socio-demographic and contextual characteristics, we find that formal education raises the propensity to prepare against disasters. Using the KHB method to further decompose the education effects, we find that the effect of education on disaster preparedness is mainly mediated through social capital and disaster risk perception in Thailand whereas there is no evidence that education is mediated through observable channels in the Philippines. This suggests that the underlying mechanisms explaining the education effects are highly context-specific. Controlling for the interplay between education and disaster experience, we show that education raises disaster preparedness only for those households that have not been affected by a disaster in the past. Education improves abstract reasoning and anticipation skills such that the better educated undertake preventive measures without needing to first experience the harmful event and then learn later. In line with recent efforts of various UN agencies in promoting education for sustainable development, this study provides a solid empirical evidence showing positive externalities of education in disaster risk reduction.

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1. INTRODUCTION

In the past years the world has witnessed a significant global increase in the intensity and frequency of extreme weather events such as floods, droughts, and tropical storms, which are expected to increase even further in a future warmer climate (Field *et al.*, 2012). Since 1975, the number of reported disaster incidents has risen more than threefold: from 65 reported incidents in 1975 to 344 in 2014. In the year 2014 alone, disasters caused a worldwide damage of US\$ 98.43 billion with more than 140 million persons affected (Centre for Research on the Epidemiology of Disasters, 2015; EM-DAT, 2015). Heavily exposed low- and middle-income countries, in particular, carry a large share of the human and economic burden. Undoubtedly, disaster risk reduction is a fundamental component of social and economic development, especially in order to ensure sustainability of development in the future. Accordingly, one of the urgent targets of Goal 13 of the newly adopted Sustainable Development Goals (SDGs) is to strengthen resilience and adaptive capacity to climate-related hazards, which essentially include reducing disaster risks (UNISDR, 2015).

There has recently been improvements in national disaster risk reduction efforts especially after major disaster events such as the 2004 Indian Ocean Tsunami (Birkmann *et al.*, 2008) or the 2013 Typhoon Haiyan in the Philippines. Indeed,

governments' investments in structural mitigation for large buildings or infrastructure, implementation of early warning systems, planned evacuation routes and shelters are effective in preventing loss of life (Andrews & Quintana, 2015). Nevertheless, disaster risk reduction measures at the national level alone are not sufficient to protect households from the devastating impacts of a disaster. In fact, in time of emergencies—be natural disasters or terrorist attacks—experts recommend the “72 Hour Rule” in which individuals are required to be self-

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sufficient for at least three days following a disaster (Russell, Goltz, & Bourque, 1995). This is because it takes some time for local government and disaster-relief organizations to mobilize resources to an affected area. Therefore, individual preparedness measures such as stockpiling of food and water, having a first aid kit in the home, or having a family evacuation plan can ensure a proper response to natural hazards. Particularly in low- and middle-income countries where public disaster risk management is relatively underdeveloped, precautionary measures taken by households before a disaster occurs can reduce the risk of loss of life and injuries as well as minimize damage to the property (Shreve & Kelman, 2014; van der Keur *et al.*, 2016).

Despite the importance of individual preparedness, several studies report relatively low levels of disaster preparedness even in disaster prone areas (Adiyoso & Kanegae, 2014; Kohn, Eaton, Feroz, Bainbridge, Hoolachan, & Barnett, 2012). How people can be motivated to take precautionary actions when they have little prior disaster experience has been a fundamental question raised by scholars of risk analysis and risk communication (Harvatt, Petts, & Chilvers, 2011). Accordingly, in many disaster-prone areas local and national governments and NGOs have put efforts in providing disaster educational programs and emergency trainings in order to raise awareness, promote self-reliance and household preparedness actions. While such educational activities can boost disaster preparedness in some cases (Mishra & Suar, 2007; Wood, Mileti, Kano, Kelley, Regan, & Bourque, 2012), many studies have documented the failure of these campaigns in initiating protective actions (Baker, 1980; Paton & Johnston, 2001; Sims & Baumann, 1983; Sorensen, 1983). In order to promote household disaster resilience, it is thus crucial to understand underlying factors explaining the adoption of preparedness measures. There are nevertheless relatively few empirical studies on the determinants of disaster preparedness in developing countries (Muttarak & Pothisiri, 2013).

To this end, this study focuses on examining individual determinants of disaster preparedness in low- and middle-income countries in Southeast Asia, namely, the Philippines and Thailand, which have been affected by major disaster incidents in the past decade. According to the most recent Climate Risk Index, both countries ranked among the top ten of countries worldwide most affected by extreme weather conditions from 1995 to 2014 (Kreft, Eckstein, Dorsch, & Fischer, 2015). Such disaster experience may raise public awareness and preparedness accordingly. In this paper, we aim to: (1) analyze the role of formal education in shaping an individual's propensity to prepare against disasters and identify mediating channels through which education may influence disaster preparedness; and (2) investigate the importance of past disaster experience and its interplay with education. Theoretically, both factors may determine preparedness through similar mechanisms such as increasing risk perception or knowledge about the devastating consequences of a disaster. Formal education, as a channel through which individuals can "learn" about disaster risks and preventive strategies, may consequently replace disaster experience in promoting preparedness actions.

The remainder of the paper is structured as follows. Section 2 describes determinants of disaster preparedness, presents a conceptual framework for our empirical analysis and discusses the previous literature on education and preparedness behavior. Section 3 introduces the case studies and presents the data and measurement used including the estimation strategy. The descriptive and multivariate results are presented and discussed in Section 4. Section 5 concludes

with a summary of the findings and implications of our research.

2. CONCEPTUAL FRAMEWORK AND PREVIOUS LITERATURE

(a) Overview of determinants of individual disaster preparedness

The previous literature has identified various determinants of personal/household disaster preparedness. These can be broadly divided into socio-demographic characteristics, structural/geographical variables and psychosocial factors. In terms of demographic characteristics, generally being married (Reininger *et al.*, 2013; Russell *et al.*, 1995) in middle-age groups (Baker, 2011; Boscarino, Adams, Figley, Galea, & Foa, 2006; Sattler, Kaiser, & Hittner, 2000) and having children living in the home (Basolo, Steinberg, Burby, Levine, Cruz, & Huang, 2009; Eisenman, Zhou, Ong, Asch, Glik, & Long, 2009) are associated with higher preparedness actions. Likewise, having household members with a disability or health conditions that require special equipment also increase the likelihood of preparedness (Ablah, Konda, & Kelley, 2009; Eisenman *et al.*, 2009; Muttarak & Pothisiri, 2013).

While demographic characteristics determine necessities to prepare (e.g., having dependent members in the home), socioeconomic factors influence a household's capability to undertake preparedness actions, among other things. Some preparedness measures such as purchasing disaster insurance or the technical or structural building retrofitting require financial investment. Thus, higher income is associated with higher preparedness levels partly because it enables households to afford to take such actions (Mishra & Suar, 2007; Murphy, Cody, Frank, Glik, & Ang, 2009; Phillips, Metz, & Nieves, 2005). Also, homeowners are more likely to be prepared than renters (Burby, Steinberg, & Basolo, 2003; Siegel, Shoaf, Afifi, & Bourque, 2003; Spittal, McClure, Siegert, & Walkey, 2008). Having invested more time and money in constructing their homes and household goods, homeowners have stronger ties with the property and place of residence while those who rent are more mobile and less focused on the long-term horizon (Harvatt *et al.*, 2011). Socioeconomic constraints thus partially explain the adoption of preparedness actions.

Structural/geographical variables have also been identified to be crucial determinants of disaster preparedness. Longer residence in the community enhances local knowledge about the neighborhood, natural environment, and hazard risks. This in turn increases disaster awareness and promotes the undertaking of preparatory activities (Tanaka, 2005). Similarly, living in or close to the hazard area implies better knowledge about hazard risks and consequently increases preparedness actions (Baker, 2011; Lindell & Hwang, 2008).

Apart from demographic, socioeconomic and structural/geographical characteristics determining the need and capacity to be prepared, disaster preparedness has also been found to be associated with psychosocial factors including hazard awareness, risk perception, self-efficacy and knowledge. In order for preparedness actions to take place, first people need to be aware of the hazards and consequently perceive them as critical or salient issues within their community. Accordingly, some studies reported that higher levels of perceived risk are associated with increases in preparedness behavior (Martin, Martin, & Kent, 2009; McNeill, Dunlop, Heath, Skinner, & Morrison, 2013; Paul & Bhuiyan, 2010). On the other hand, lack of self-efficacy i.e. beliefs regarding personal capacity to

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