

National Symposium on Family Issues

Selena E. Ortiz
Susan M. McHale
Valarie King
Jennifer E. Glick
Editors



Environmental Impacts on Families

Change, Challenge, and Adaptation

 Springer

National Symposium on Family Issues

Volume 12

Series Editors

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Each year, the Population Research Institute and Social Science Research Institute at Penn State hold a two-day symposium that focuses on a key problem of relevance to family studies. The symposium, known as the *National Symposium on Family Issues*, brings together 200 or more scholars, practitioners, and policy experts to:

- Promote interdisciplinary dialogue to stimulate research on family issues.
- Advance scholarly excellence by inviting leaders in the field to present their work.
- Identify important issues that do not receive sufficient attention from researchers who study families.

The symposium organizers – Professors Susan McHale, Valarie King, and Jennifer E. Glick – work to connect family scholars from diverse fields, such as demography, sociology, human development, psychology, education, economics, anthropology, law, and history. The *National Symposium on Family Issues* is a landmark event in ongoing efforts to understand more thoroughly the challenges facing contemporary families.

At each annual symposium, nine or more leading scholars are convened to present and critique research on a focal topic and discuss implications for effective programs and policies for families. Books based on each symposium provide additional background and detail about current research and applications for evidence based policy and programs, allowing the research to reach a wider audience and impact the national conversation. Past volumes have received favorable reviews and are used as reference works by researchers, professors, students as well as clinicians and other professionals.

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The efforts of many went into planning the 2021 symposium and producing this volume. We thank our Internal Advisory Board, Professors Sarah Damaske, Greg Fosco, Alyssa Gamaldo, Yolanda Jackson, Nancy Luke, Mary Shenk, Doug Teti, Ashton Verdery, and Dawn Witherspoon for their continued help in developing the foci of our annual symposium. Professors Alexis Santos, Heather Randell, and Selena Ortiz served as moderators of the three sessions of the 2021 symposium. We also thank Kristie Auman-Bauer in SSRI for her help in publicizing the symposium. The virtual family symposium, necessitated by the COVID pandemic, was skillfully orchestrated by Mark Hixon and Russell Houtz from the SSRI/PRI IT Core. Finally, the symposium and book would not have been possible without Carolyn Scott's organizational skills, commitment, and attention to the many details that go into developing an engaging conference and producing a scholarly volume.

Selena E. Ortiz
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About the Book

Families are embedded in larger contexts that have implications for family relationships and well-being. A large body of research by family scholars has documented multiple dimensions of the broader social environment – including cultural, economic, and political contexts – in family functioning. Family scholars have paid less attention, however, to how dimensions of the physical environment may impact families, including factors that impede health and healthy behaviors, as well as factors that may protect families and promote their resilience in the face of change and challenge. Toward promoting equity, significant efforts must be directed at recognizing and addressing the physical conditions – and the structural and systemic factors that allow these physical conditions to persist – that undermine the health and well-being of children and families. To that end, this volume highlights discussion and emerging evidence that reinforces the call for significant and sustainable investments that improve the physical environment in ways that support families.

Toward stimulating novel interdisciplinary and translational research on families, the 2021 National Symposium on Family Issues showcased the work of teams of scholars focusing on the role of the physical environment in family relationships, behaviors, and well-being. The symposium focused on three critical dimensions: disasters, climate change, and the built environment.

The chapters in the first section address the social, demographic, and health impacts of disasters such as hurricanes and tsunamis, on communities, families, and children. Rich data sources and mixed-method techniques are utilized to produce in-depth appreciations of the multiple and complex ways in which disasters impact families, both in the immediate aftermath and over the long term. The results from these analyses underscore the importance of understanding the sustained impacts of disasters on the health and well-being of families, as well as emphasize the role of individual and community resilience in long-term recovery from disasters. The authors also suggest ways in which evidence-based prevention and treatment interventions and government programs and policies can assist families and family members to recover after a disaster. However, in light of the critical role of family

in post-disaster recovery, the authors acknowledge the dearth of family-focused programming and recommend providing substantial support for family-oriented intervention research and development.

The second section focuses on climate change and the intersection of environmental conditions, socioeconomic disparities, and community resilience that has shaped new realities and constraints for families. The chapters in this section advance understandings of how environmental change impacts maternal and child health, family functioning, and adaptation across diverse communities around the world. In their research, authors consider the numerous ways in which climate change has altered family life and opportunities, such as when and why families pursue migration, as well as issues of environmental justice. Recognizing the range of interconnected factors – demographic, social, economic, political, and environmental – that independently and collectively function to increase families' susceptibility to climate change-induced conditions, the authors argue that novel approaches to examining the processes that link these conditions to health and demographic outcomes are essential. Such innovative approaches require the development and application of new theory, data, and analytic tools, as well as the integration of fields of scholarship to maximize insights on how climate change impacts families.

The third section considers the ways in which dimensions of the built environment – from the proximal environment of homes to neighborhood and larger community environments – have effects on the health and well-being of children, adolescents, and their families. The chapters in this section examine the ways in which features of home environments, as well as extensions of home environments (e.g., afterschool settings, nearby play centers, etc.), *get under the skin* to affect family processes and youth physical and mental health; how food access and opportunities for physical activity in communities serve to promote youth and family health; and how neighborhood development can reduce burdens experienced by family caregivers who depend on and must navigate environmental characteristics. The authors consider the efficacy of adopting community-driven and systems thinking approaches to create and maintain opportunities for physical activity in low-resourced communities and to improve the urban conditions that families must negotiate to provide care for their loved ones. Future investigations focusing on how the built environment impacts children of color, as well as immigrant, refugee, unhoused, and otherwise displaced children, are also recommended.

The research presented in this volume, as discussed in its final chapter, incorporates diverse theoretical frameworks, engages interdisciplinary perspectives, and applies robust methodologies to investigate how the physical environment – disasters, climate change, and the built environment – can exact severe harms upon family functioning, health, and well-being. The 2021 National Symposium on Family Issues generated vital exchange on the significance of designing, implementing, and evaluating efforts that can protect against these harms. Taken together, the research described in this volume offers opportunities to reflect upon the breadth of the constraints and challenges families encounter in their physical environments – a first

step toward conducting novel research to serve as the foundation for developing and implementing policies and programs that build resiliency among families and, ultimately, achieve health equities.

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Part I
Environmental Disasters

Chapter 1

Impacts of Disaster-Induced Death and Destruction on Health and Mortality Over the Longer Term



Elizabeth Frankenberg, Nicholas Ingwersen, Rene Iwo, Cecep Sumantri, and Duncan Thomas

Climate change is increasing the frequency and intensifying the force of natural disasters at the same time that populations in vulnerable areas are growing in size. Projections that take the combination of these forces into account indicate that relative to their parents and grandparents, today's children and young adults will experience a four- to sevenfold increase in the number of extreme events they live through (Thiery et al., 2021). Understanding the sustained impacts of these events on health and well-being is critically important, but a key constraint is the paucity of high-quality longitudinal data that can advance the science.

In this chapter, we use data from an extremely rich population-representative longitudinal survey, the Study of the Tsunami Aftermath and Recovery (STAR), to explore how both longer-term survival and psychosocial health of individuals who experienced a natural disaster are affected by various types of exposure in the 15 years after the event, in comparison to individuals who were not directly exposed. We study the 2004 Indian Ocean earthquake and tsunami. The disaster, which killed

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an estimated quarter of a million people, is one of the most devastating natural disasters in recorded history. Nowhere was hit harder than coastal Aceh, Indonesia. The tsunami completely destroyed some communities but left other comparable communities untouched. STAR is uniquely well-suited for this research: the baseline was conducted 10 months before the tsunami as part of Statistics Indonesia's annual household survey program. We have followed survivors for 15 years post-tsunami. The tsunami was completely unanticipated, and the location of the communities that sustained damage is a complex function of the location of the precipitating earthquake and the topography of the sea floor and coastline. Leveraging the natural experiment of the tsunami, we provide evidence that credibly identifies the causal impact of the disaster on mortality and psychosocial health over the longer term.

Context of the Disaster

Early in the morning on Sunday, December 26, 2004, one of the most powerful earthquakes in recorded history occurred some 150 miles from the coast of the island of Sumatra, Indonesia. The earthquake displaced a trillion tons of water, which formed a series of tsunami waves that hit the northern coast of Sumatra about 15 min later and eventually reached across the entire Indian Ocean (Rubin et al., 2017). The tsunami was completely unexpected. Geological records indicate that the last tsunami to hit mainland Sumatra was over 600 years ago (Monecke et al., 2008).

Aceh, the northern most province on the island of Sumatra, was hardest hit. Along 800 km of the coast, communities experienced varying degrees of inundation, resulting in destruction of the built and natural environment and the deaths of more than 170,000 people (Lavigne et al., 2009).

Impacts varied considerably even between areas quite close to one another. The water's height and inland reach were a function of slope, water depth, and coastal topography (Ramakrishnan et al., 2005). Along parts of the west coast of Aceh, trees up to 13 m tall lost their bark (Borrero, 2005). At the beachfront in Banda Aceh, the province's capital and largest city, the water was as deep as 9 m, though rarely exceeded the height of a two-story building (Borrero, 2005). Low-lying communities within a few kilometers of the coast were largely destroyed, and many of their residents perished. River basins allowed the waves to move inland as much as 9 km in some areas, whereas in other locations they encroached only 3–4 km (Kohl et al., 2005; Umitsu et al., 2007). Areas sheltered by altitude, distance from the coast, or other topographical features sustained damage to structures and deposition of sediment and debris, but larger proportions of the population survived. For some communities the tsunami had few if any direct effects, although the earthquake was felt throughout Aceh and damaged property and infrastructure in some areas that the

water never reached. The tsunami affected the transportation network along the coast, and some communities were cut off from the main roads connecting major population centers. In some cases, residents of communities that were not directly impacted by the tsunami saw increased demand for their goods and services, particularly food and housing.

Data

The STAR baseline consists of respondents who participated in a large, population-representative socioeconomic survey (SUSENAS) conducted by Statistics Indonesia in February/March 2004, 10 months before the tsunami. SUSENAS is representative at the *kabupaten* (regency) level. We worked with Statistics Indonesia to select all 11 districts in the province of Aceh that had coastlines which were potentially vulnerable to inundation by a tsunami. Within each selected district, we included all SUSENAS enumeration areas, regardless of distance from the coast. All members of all households enumerated in these districts in the 2004 SUSENAS form the STAR baseline study population.

SUSENAS, a long-standing government survey that is well-known in Indonesia, achieves participation rates that exceed 97%. The survey, which most closely parallels a combination of the Consumer Expenditure Survey and Current Population Survey in the United States, collects information on demographic and socioeconomic characteristics of household members from a key household member. The first STAR follow-up survey took place between May 2005 and July 2006. Four annual follow-ups were conducted thereafter, with additional follow-ups roughly 10 and 15 years after the tsunami.

We triangulated across multiple sources of information to establish survival status for 99% of the baseline (pre-tsunami) respondents. Information came from interviews with household and family members (whose reports we consider most reliable), community leaders, and neighbors. Information from the latter two sources was critical for households in which no members could be located. In each follow-up, every household member was interviewed. Parents or caregivers provided information about children aged 11 years or younger; proxy respondents provided information for adults unable to answer for themselves. The first two follow-up surveys collected detailed information on experiences at the time of the tsunami from each respondent. All surveys included questions on physical health, psychosocial well-being, and behavioral responses to the event, including displacement and migration, as well as information about individual and household demographics and socioeconomic status.

Measuring Exposure to the Tsunami

We investigate links between multiple indicators of exposure to the tsunami and two post-tsunami measures of health—mortality for those who survived the tsunami and post-traumatic stress reactivity (PTSR). Frankenberg et al. (2011) describe mortality at the time of the tsunami, and Frankenberg et al. (2008) describe PTSR in the year after the tsunami. See, also, Ho et al. (2017) and Frankenberg et al. (2020) for studies of mortality. This research builds on those studies. Our data on mortality are derived from our household rosters which we update at each wave to track survival status and movement across locations (and of household members across households).

Following the literature, we summarize the impact of the stressors using an index of the incidence and severity of symptoms of PTSR, based on seven items from the PTSD Checklist Civilian Version (Weathers et al., 1993). For example, respondents were asked whether they have had “repeated, disturbing memories, thoughts, dreams or relived experiences of the tsunami” and “felt very upset when something reminded you of the tsunami.” If the respondent did experience the feelings, they were asked, for the period when the feelings were most severe, whether they felt them rarely (coded as 1), sometimes (coded as 2), or often (coded as 3). Respondents who did not experience the feelings are coded as 0. Summing the responses to each of the seven items creates a 21-point scale. Elevated PTSR, a score above 11, is represented by a 1; a 0 represents respondents who do not have elevated PTSR.

These questions were included in the first post-tsunami survey conducted 5 to 16 months after the tsunami, except for a small fraction of respondents (less than 3%) whose first post-tsunami interview took place during the second follow-up at 18 to 24 months after the tsunami.

Exposure to the tsunami was measured at both the community and individual level. At the community level, two classes of measures of exposure are operationalized. Our first measure is an indicator of exposure based on the geographic location of the community where each respondent resided at the time of the tsunami. This measure, in recognition that characteristics of the tsunami wave and coastline topography were key determinants of death and destruction at the time of the tsunami, combines information on that community’s elevation above sea level, proximity to the coastline, and tsunami wave height at the closest coastal point to the community. In the analyses this indicator allows us to distinguish respondents who were living in communities that were directly affected by the 2004 tsunami (“tsunami-affected”) from respondents who were living in communities at similar risk of exposure to a tsunami but were not directly affected by the 2004 tsunami (“other”). Our second measure of exposure at the community level is the percentage of baseline respondents in the community who died in the tsunami. It was designed to reflect intensity of exposure and varies from no deaths to a staggering three-quarters of the community residents perishing in the tsunami.

Turning to individual-level measures, we asked each surviving respondent about their own experiences of the tsunami. The first set of individual-specific measures reflects experiences that may generate a sense of helplessness or horror (which have been linked with symptoms of post-traumatic stress; Dalglish, 1999). Specifically, we asked whether the respondent was caught up in the water, was injured at the time of the tsunami, or watched friends or family struggle or disappear in the waves. Any affirmative answer is classified as direct exposure. We also constructed exposure measures that capture loss of family: whether the tsunami killed an individual's spouse, or whether it killed an individual's parent, sibling, or child (regardless of whether the family member was co-residential). These individual-specific indicators of exposure complement the community-level measure of damage, providing more fine-grained indicators of tsunami-related stresses experienced by the respondent. As with PTSD, the individual-specific questions were asked at the first post-tsunami follow-up except for those respondents whose first post-tsunami individual interview took place during the second follow-up.

Finally, to address post-tsunami displacement during the 24 months after the disaster, we developed an indicator identifying respondents who lived in temporary housing during this period: a tent, camp, or barracks. This measure draws on data collected in the first three annual post-tsunami follow-ups.

Our community-level and individual-level direct exposure measures are plausibly exogenous because they depend primarily on characteristics that were outside the control of the respondents at the time of the tsunami. While the exact locations of tsunami impact are reasonably treated as random, residential location is a choice, and it is possible that those who were living in areas that were inundated are different from those who were living elsewhere. To address this concern, we examined the effects of individual-level exposures, drawing contrasts between individuals who, at the time of the tsunami, were living in the same community so that the estimates are not contaminated by differences across communities in vulnerability, socioeconomic status, and the availability of resources.

We focus on mortality and psychosocial health in the 15 years after the tsunami among 5927 individuals from 334 baseline communities who were age 35 and older at the time of the tsunami and who survived to the first post-tsunami interview. Face-to-face interviews were completed with 97.8% of this group in the 15 years after the disaster (0.5% refused, 1.7% were not found). This re-interview rate is unprecedented for a large-scale population-representative follow-up 15 years after baseline and stands out given the extent of displacement and the complexity of conducting fieldwork in the aftermath of the tsunami. It reflects the combination of well-designed and extensively tested tracking protocols, high-quality fieldwork, and the commitment of respondents, enumerators, and team supervisors to the scientific goals of the project.