Chapter 1
Introduction: Conceptualising the Demography of Disasters

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Abstract Understanding and documenting intersects between disasters and human demographic change is an emerging academic field. Both the study of disasters and demographic issues are broad constructs in their own rights. While it may seem obvious to link the two, as we have in this book, disasters can impact on populations and population change in multifarious, obtuse and complex ways. Our aim in this book is to extend the nascent work to improve disaster policy and planning processes through enhancing knowledge about the demography-disaster nexus. In this chapter, we overview contemporary debates and paradigm shifts within the field of disaster studies to provide conceptual links between these and the field of demography. To conclude, we outline the topics and case studies which form the basis for individual chapters in this book.

Keywords Disaster-demography nexus · Hazard · Vulnerability · Social embeddedness · Non-routine event

1.1 Introduction

Understanding and documenting intersects between disasters and human demographic change is an emerging scientific field. This demography-disaster nexus is growing in importance as efforts to build structured and cohesive planning to prevent and mitigate disasters grow in line with the anticipated and realised increases in extreme events (Coleman 2006; Eshghi and Larson 2008; Okuyama and Sahin 2009). According to Donner and Rodríguez (2008, p. 1090), the contemporary growth in

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population densities in vulnerable areas and regions, and especially mass urbanisation in developing nations, is the most important factor that has increased population-related hazard exposure. In addition to this, the increased frequency and intensity of extreme weather events due to climate change (Katz and Brown 1992; Easterling et al. 2000; Frich et al. 2002; Coumou and Rahmstorf 2012; Jakab et al. 2019) have already contributed and soon will more significantly contribute to increased population vulnerabilities. Furthermore, global entropy has increased through technological change (Ellul 1964) and as a result of complex and systemic issues where nuclear, chemical, biotech industries and artificial intelligence along with 'traditional' threats such as pandemic, violence, war and famine bear the potential to trigger catastrophic events (Quarantelli et al. 2007). Each of these factors have the potential to alter demographic profiles and negatively affect people's lives through disasters.

The demographic make-up of populations at the time of disaster determines who is impacted and the extent of impacts on residents and others. Improving technologies, improved warning systems, investments in disaster mitigating infrastructure and improving community preparedness and response in the face of disasters are examples of attempts to reduce disaster impacts. While a range of studies have looked at demographic impacts from individual disasters, these are generally short-term focused and concentrated on post-event analysis and evaluation. Our aim in this chapter and generally in the book is to extend the nascent work to improve disaster policy and planning process through the growing knowledge about the demography-disaster nexus.

Both the study of disasters and demographic issues themselves are broad constructs in their own rights. While it may seem obvious to link the two, as we have in this book, disasters can impact on populations and change populations in multifarious, obtuse and complex ways. Populations may be the root cause of a localised disaster or indeed be the main 'victims'. Disasters can speed up pre-existing demographic changes or create new population profiles through immediate impacts and human reactions to such events (as we learn in Chap. 2 by Karácsonyi et al., in Chap. 5 by Carson et al. and in Chap. 7 by Bird and Taylor). Their impacts on demographic change can occur on a complex time–space continuum which may involve feedback loops. Most obvious are deaths and injuries, out-migration and the temporary relocation of residents and others from affected areas which rapidly and noticeably alter the pre-existing demographic profile of a town or region. More vulnerable cohorts (like the elderly) are often disproportionately impacted. Disasters may also affect the gendered demography of places, as discussed in Chap. 9 by Barnes. Disasters may encourage populations not immediately affected by the disaster at hand to adjust their demographic behaviours, such as around fertility or migration. Such feedback loops may be complex, unknown and unpredictable, altering not only the population profile but the economies and social fabric of towns and regions well into the future (see for example, Chap. 5 by Carson et al., Chap. 6 by King and Gurtner, or Chap. 8 by Zander et al.).

This introductory chapter discusses paradigm shifts in the field of disaster studies. This provides important theoretical context to posit our examination of the disaster-demography nexus which is the core theoretical contribution of the book. In the latter part of this chapter, we outline the structure of the book to facilitate a digestible overview for the reader.

1.2 Disaster Studies: From 'Acts of God' to a Distinguishable Scientific Field

In the face of the conventional perception of disasters as 'acts of God' (Robinson 2003) that are chaotic and random situations with anarchy and panic (Quarantelli and Dynes 1972; Webb 2007), the majority of disaster experts now perceive disasters are never 'accidental' (Quarantelli et al. 2007; Lavell and Ginnetti 2013). Thus, there is a need for systematic research and analysis to enhance the potential for the prevention of disasters. Samuel Prince's doctoral thesis (Prince 1920) on the 1917 Halifax explosion[1] is recognised by many as the first systematic disaster study (Drabek and McEntire 2003; Perry 2007). However, the real flourishing in disaster studies started during the early Cold War era with studies on the impact of bombings on civilian's morale in World War II (see United States Strategic Bombing Survey 1947). Many of these studies attempted to address how American communities might react to a possible nuclear war. Consequently, they had strong strategic-military origins and aims along with consummate funding provided by the armed forces (Bolin 2007; Perry 2007; Rodríguez et al. 2007). A notable step forward in the institutionalisation of civilian disaster studies was the establishment of the Disaster Research Centre at Ohio State University, the first of such schools, in 1963. The School published several synthesising works on disaster studies and played a pioneering role in developing theoretical frameworks rooted in the field of social sciences (see for example, Dynes 1970; Mileti 1975; Quarantelli 1978; Oliver-Smith 1979; Drabek 1986). This nascent adjunction between disasters and social sciences more than half a century ago was arguably the beginnings of the field we recognise today.

Although early links were evident between disaster studies and social sciences, disaster studies are multifarious and are strongly multidisciplinary by nature (Quarantelli 2006). Because of this, disaster studies are not ontologically limited to a clearly defined field (see for example the debate summarised in Perry and Quarantelli 2005). Alexander (2005, p. 24) proposed, for example, that disaster studies encompass the fields of geography, anthropology, sociology, social psychology, development studies, health sciences, geophysical sciences and engineering. Consequently, members of risk, hazard and disaster study communities with various backgrounds have often taken very different approaches which Cutter (2005) proposed made it

[1] A cargo ship loaded with munition exploded during the World War killing approximately 2000 people.

difficult to develop a recognisable and distinctive academic field with a universally understood inner logic and framework.

As such, the field of disaster studies is constantly emerging and reshaping. This brings many benefits. Not least, the knowledge and understanding about the risks of and impacts from disasters can be sourced and considered from a wide range of disciplines; including those reflected on here. The theoretical and applied 'stock' of knowledge is, therefore, not constrained to ontological paradigms, and its evolving nature protects disaster studies from the dangers of received wisdom which may be pervasive in singular and more focused fields. Disaster studies are, therefore, plural in a conceptual, theoretical and applied sense. While the benefits are many, this also brings challenges, as we will now discuss in relation to the debate on defining precisely what constitutes a disaster and therefore disaster studies.

1.3 Disaster: A Non-routine Phenomenon or Embedded in Society?

To meaningfully consider the disaster-demography nexus, it is necessary to plot the debate and literal discussion on what constitutes a disaster. As an illustration, Dynes (1970), Rodríguez et al. (2007) and Webb (2007) stressed that disaster is understood by many as an agent for bad luck to be bought to bear on the physical environment, human system and society in general. However, disasters are now widely recognised as complex events with society and populations intricately linked to the causes and consequences of individual disasters, rather than simply as victims or passive actors.

Two seminal books have sought to address the definition of a disaster; *What is a disaster?* by Perry and Quarantelli (2005) and *At risk*, by Blaikie et al. 1994 (its newer edition is Wisner et al. 2004). In the former, most contributors emphasised that a disaster can oftentimes be understood as 'departure from normal', a 'non-routine event', as echoed by Kreps (1989) and Drabek (1989). In Wisner's work, authors understood disasters as being embedded in the 'normal' functioning of the society and in particular rooted in social inequalities. The main criticism on this 'non-routineness' position is that, if disaster occurs when society cannot function normally under severe environmental change, then members of society are usually able to cope with everyday problems and needs when there is no external hazard stress on them (Donner and Rodríguez 2008, p. 1092).

McEntire (2013) distinguished two main schools in disaster studies, the social vulnerability school (emphasising social, political and economic structures) and the holistic school (in which disasters are seen as non-routine events, related to non-routine social problems). In the holistic school, for example, disaster definitions can be related to the scale and speed of disasters. The scale is emphasised by Quarantelli (1998, 2006) who distinguished a catastrophe from disaster and by Bissel (2013) who distinguished an emergency, hazard, disaster and catastrophe from each other based on the size of the impacted area and population. A further element in the

definitional quandary is based on the different speeds of disaster impacts (Alexander 2001; Robinson 2003; Quarantelli 2006; Bissel 2013); those slowly emerging (such as sea level rise, industrial pollution, landscape degradation—see Kertész and Křeček 2019) and rapid onset disasters (e.g. hurricanes, earthquakes and floods).

Furthermore, in the holistic school (non-routineness perspective), the definitional debate has focused on the root causes of disasters including that they may be sudden, unexpected and unwanted events (Gencer 2013) and a result of natural or human made catastrophes (Robinson 2003). Alexander (2001) categorised disasters based on the geophysical agent, such as earthquake, volcanic eruption, desertification and soil erosion. Alexander (2001) and others, such as Kapuchu and Özerdem (2013), also stressed that natural and man-made disasters are usually very different. They highlighted that a disaster is a situation where people are confronted with a sudden and uncontrollable catastrophic change caused by natural phenomena or external human action. Hence, Kapuchu and Özerdem (2013, p. 12) pointed out that disasters induced by natural hazards can be predicted to some extent, but that it is impossible to prevent them.

In contrast to the stance on disasters by Alexander, Kapuchu and Özerdem, the majority of disaster experts (e.g. Quarantelli et al. 2007) agree that each disaster is influenced by humans and can therefore be prevented. This viewpoint stresses that human actions have the potential to reduce disaster impacts. Conversely, poor or wrong decisions can worsen the situation. In support of this, Perry (2007) bought to the fore definitional differences between the terms hazard and disaster. In his view, a disaster occurs when a hazard (an extreme physical event, such as extreme rainfall, heat wave or earthquake) intersects with the social system (vulnerable human population). In a practical sense, therefore, a landslide in a remote, uninhabited area is just a geological phenomenon if there is no injury, loss of life or property damage. It is important to emphasise that only a very small fraction of hazards lead to a disaster (Quarantelli et al. 2007) because usually there is no impact on human population (see Alexander 2001 on the 1964 Sherman debris avalanche in sparsely populated Alaska).

Robinson (2003), Wisner et al (2004) and Cutter (2005) argued that a disaster is an interplay between human–social root causes and hazard event and hence can lead to a combination of multiple events (e.g. conflict causing hunger, disease and displacement). Blaikie et al. (1994) and Wisner et al. (2004) used the 'pressure and release model' to show how disasters can occur when natural hazards affect vulnerable populations. In the model, vulnerability and natural hazards are seen as intersecting forces generating systemic pressure which are released in the form of a disaster. The pressure and release model suggests that, even if the triggering event is natural, the root causes are always society-based. This view helped shift attention to the vulnerability of human–social systems. As Cutter (2005, p. 39) stated, the question is not about a disaster but about vulnerability to environmental threats and extreme events. Cutter underlines that vulnerability is embedded in human, natural and technological systems, which are interconnected, and this interaction is of utmost importance in grasping vulnerability.

Alexander (2001) surmised that human vulnerability has often been a result of underestimating the limited degree to which technology and economic systems are able to mitigate *natural disasters*. In other words, natural hazard events have the power to exert a substantial and consistent influence on modern society (ibid. p. 3). Hence, in Alexander's perception, disasters induced by these events are in fact 'natural' disasters. Alexander's view is further supported by the recent cultural turn in disaster studies (see Webb 2007, Ekström and Kverndokk 2015). Consistent with that paradigm, there are some studies on how communities living in hazard-prone areas have been influenced through their continuous disaster experiences, including in Japan (Bajek et al. 2008; Kitagawa 2016) and the Philippines (Bankoff 2003). A cross-cultural study by Paton et al. (2010) comparing Japan and New Zealand (two disaster-prone nations) revealed some universal similarities on how hazard beliefs and social characteristics interact despite the fundamental cultural differences between the two countries.

In spite of the earth science-based criticisms by Alexander and the findings by recent cultural studies, Wisner's 'social embeddedness' view is widely accepted by disaster study experts with a sociology background. Hence, these scholars tend to avoid the use of the term 'natural disaster' (see O'Keefe et al. 1976; Cannon 1994; Cohen and Werker 2008). Despite this, the term 'natural disaster' is still common particularly in the economic, demographic and geographic literature (see for instance, UN General Assembly 1989; Cavallo and Noy 2011; Cavallo et al. 2013). Some authors have concluded that the 'natural disaster' events they studied have different impacts for developing nations (Kahn 2005; Toya and Skidmore 2007; Loayza et al. 2012; Chen et al. 2013), for women (Enarson 2000; Neumayer and Plümper 2007) or for low-income people (Masozera et al. 2007). These all emphasise that the severity of a disaster is related to social, rather than natural characteristics, in support of Wisner and his colleague's (2004) view that disasters are rooted in 'social' rather than in 'natural' causes.

Wisner et al. (2004, p. 92) went further to suggest a more 'radical' social embeddedness view, stating even nature itself can be considered as a part of the resources that are allocated by social processes, such that, under routine social functioning, people become more or less vulnerable to hazard impacts. Hence, vulnerability to natural hazards is a social construct (Lavell et al. 2012). According to Wisner, vulnerability describes a set of conditions that people derive from their historical, cultural, social, environmental, political and economic contexts, as well as socio-economic status. In Wisner's definition (ibid. p. 11), vulnerability is 'the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of natural hazard events'.

Wisner's assumption has been further elaborated on by Oliver-Smith (2009) who argued that "social systems generate the conditions that place people differentiated along axes of class, race, ethnic, gender or age, at different levels of risk from the same hazard and subject to different forms of suffering from the same event" (p. 120). Such perspectives were the first to mark direct links to population and their characteristics according to demographic traits such as age, race, gender and socio-economic status. Hence, vulnerable groups are not only at risk because they are exposed to

a hazard but as a result of their marginality, of everyday patterns of social interaction and organisation and their constrained access to resources (Cardona et al. 2012, p. 71). Further, Wisner et al. (2004) accentuated that levels of vulnerability change during the life-course (e.g. partner formation, child bearing and later years) such that vulnerability for individuals may be temporary or in flux based on a range of factors in their lives including changes in occupation, immigration status or residence and again, the links to the field of demography become evident.

Of course, in the academic discourse, disasters are not only approached through root causes and triggering events, but also in terms of consequences. While the 'social embeddedness' approach accentuates social conditions as both the root cause and consequence from disasters, the 'non-routineness' perspective has a strong social science emphasis regarding consequences, which are understood as 'non-routine' social conditions generated by the disaster. These consequences may include significant loss of resources and threats to life (Frankenberg et al. 2014, p. 3), causing severe physical injuries, emotional distress and substantial property damage (Flanagan et al. 2011). According to Robinson (2003) and Smith (2005, p. 233), disasters change social and human life and livelihood in a negative way for certain groups hit directly or indirectly by the event, leading to serious disturbances and disruptions to the functioning of a society. In addition, Lindell (2013) summarised disaster consequences into two main groups, physical impacts (e.g. casualties, damage) and social impacts (psychological, demographic, economic and political impacts).

In summary, analysing literature in which disasters are defined, debated and understood highlights some successive paradigm shifts in disaster science (Fig. 1.1), the move away from seeing disasters as non-routine cyclic events, meaning simply a departure from, then a return to 'normal'. Even the 'normal' is often a different, deteriorated or improved situation compared to the initial stage. Hence, the disaster life cycle, a fundamental framework for disaster studies (Coetzee and Niekerk 2012; Lavell et al. 2012), which was proposed by Mileti (1975), Baird et al. (1975) and Drabek (1986, 1999), was broadly used by key institutions such as UN Office for Disaster Risk Reduction (UNISDR 2009) and Federal Emergency Management Agency (FEMA) of the USA has been criticised as being overly simplistic (see Lewis 1999). Disasters are complex, multidimensional events where root causes and consequences are embedded in the functioning of society, and they are related to policy and political management failures, social injustice and exclusion. Ultimately, this conception of disasters focuses attention on the relevance of the disaster-demography nexus in understanding, managing and recovering from disasters.

1.4 Method and Structure of the Book

The book consists of eleven, mostly multiple-authored chapters which aim to compare jurisdictions and provide insights from different cases. The cases range from technological to natural hazard events and population vulnerabilities. It is important

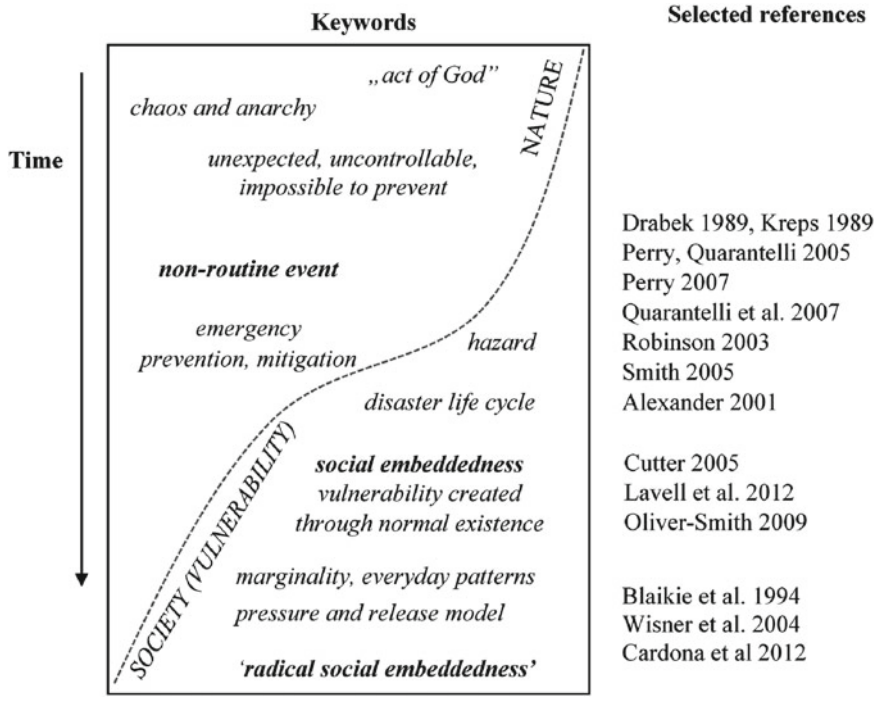

Fig. 1.1 Paradigm shifts in disaster studies

to highlight that several other shock events, other than natural hazards, technological accidents, infectious diseases or climate change could also unfold vulnerabilities and hence lead to disastrous demographic consequences for populations. Unrest, war and ethnic cleansing could be also understood as part of demography of disasters (see Drabek 1999; Wisner et al. 2004) along with pandemics or economic crises because they change the demographic profile of the impacted populations and lead to mass displacements. Global disasters (nuclear war, climate change) are part of the disaster literature dialect as well (see Giddings 1973), and hence, the concepts of 'risk society' or 'global risk society' have been introduced by Wisner et al. (2004) and Cutter (2005). In addition, Wisner et al. (2004) suggested disasters caused by natural hazards are not the greatest threat to humanity in comparison with violent conflicts or famines which interact with each other, making disaster impacts worse. Of course, the cases presented in this volume are limited in scope. That is why we summarised other ways of disaster-demography nexus in Chap. 13. Hence, the final chapter is not only summarising the learnings from the present volume but also serves as an extended literature review.

This volume contains significant spatial-geographical analysis, and this is the basis for its subtitle 'impacts for population and place'. For example, Chap. 2 has a strong emphasis on spatiality through permanent mass displacements. Chap. 3 and

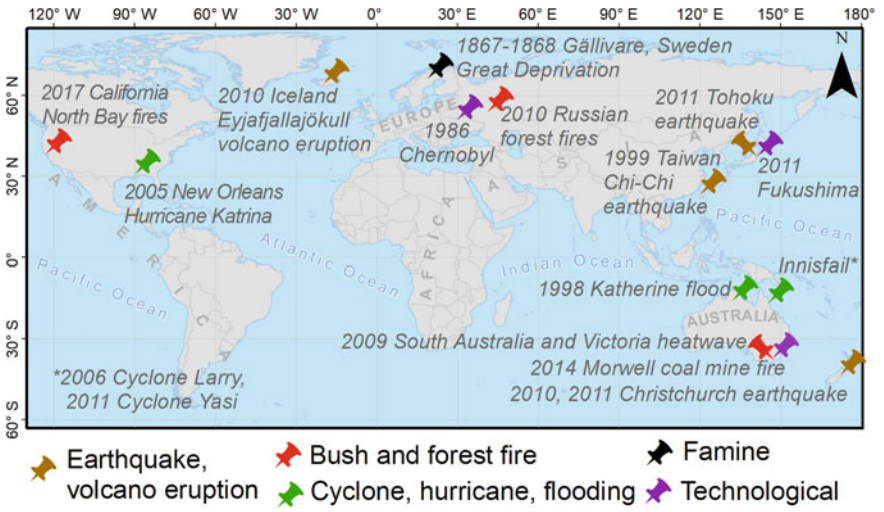

Fig. 1.2 Locations and triggering events of the disasters represented in this book

the comparative example in Chap. 4 draws attention to how bushfires impacted population migration in California while in Chap. 4 we learn of the contributing effects of a lack of forest maintenance to catastrophic forest fires in Russia. Geography is also represented by the spatial variation of case study areas in this book (Fig. 1.2) covering Europe, Asia, North America, Australia and New Zealand. Altogether 13 disaster cases are discussed in this volume with the majority occurring in the twenty-first century.

The following chapters aim to broaden links between demography and disasters. Chapters 2–8 focus on holistic population-disaster linkages where hazard events alter population trends (disaster-induced mass displacements, migration as heat adaptation strategy, long-term impact of disasters in sparsely populated areas) or population change generates disaster risks. Chapters 9–11 focus on issues related to demography more broadly, such as the disruption of lifeline networks as key infrastructure elements, gender aspects of resilient urban design and the role of communities in disaster recovery. Chapter 12 is about international collaboration in the field of disaster studies and highlights, through the author's personal experiences, how scientific ideas and approaches can be exchanged and new connections can be built through case studies across nations.

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