

THE VIENNA YEARBOOK OF POPULATION RESEARCH 2015¹⁾

Martina Miskolczi

The Vienna Yearbook of Population Research by the Vienna Institute of Demography for the year 2015, titled '**Demographic Differential Vulnerability to Climate-related Disasters**', focuses on the link between demography and other social science disciplines to pay higher attention to demographic differential vulnerability. This yearbook contains a selection of 15 papers that were presented at the IUSP conference, 'Demographic Differential Vulnerability to Natural Disasters in the Context of Climate Change Adaptation', which was co-organised by the Vienna Institute of Demography of the Austrian Academy of Sciences and held in Thailand in April 2014.

The empirical analysis of the vulnerability of people to recent natural disasters is probably the best way to get an analytical handle on estimating the levels of human vulnerability that could result from the intensifying consequences of climate change in the future. This empirical approach is based on the underlying assumption that vulnerability to past climate-related disasters, such as flooding, storms, and droughts, is isomorphic in relation to the likely future vulnerability to climate change. While the risks and the exposure levels of human populations to extreme weather events may change across regions as climate systems shift, it is also evident that not all people who are living in the same region that is affected by a natural disaster are equally vulnerable to disaster-related mortality or injury. As is the case for other mortality risks, **people tend to be differentially vulnerable according to their age, gender, level of education, occupation, and other social and economic variables.**

THE DEMOGRAPHIC DEBATE SECTION

This section comprises six articles by distinguished demographers from different continents. The study of environmental change has yet to become popular among demographers. Here demographers therefore address the following question: Why are so few demographers working on population and climate change? The reasons are:

- The complexity of climate science and the limitations of data and methods for integrating the environmental and climate context into the microdata commonly used by demographers. With a focus on empirical science, it takes a longer time for demographers to address new research questions such as climate change if the appropriate data are not available (authors: *Hayes; Hunter and Menken*).
- The lack of interdisciplinary collaboration, despite the interconnectedness of the issues of population and climate change. This results in climate models being inadequate for accounting for social and demographic components (authors: *Gage; Hayes; Hunter and Menken; Peng and Zhu*).
- The discomfort with addressing population and environmental issues given the historical involvement of demographers in the controversial debates during the late 1960s and 1970s on the limits to population growth, which were triggered by concerns about the limits of natural resources. As these debates raised complex and sensitive policy questions, demographers have become reluctant to engage with climate change and environmental issues (authors: *Gage; McDonald; Peng and Zhu*).
- The research topics surrounding climate change, such as production and consumption and disaster vulnerability, are more directly related to other social

1) Crespo Cuaresma, J. – Lutz, W. (ed.). 2016. *Vienna Yearbook of Population Research 2015*. Volume 13. Vienna: Vienna Institute of Demography, Austrian Academy of Science. Available at: <<https://www.oeaw.ac.at/vid/publications/serial-publications/vienna-yearbook-of-population-research/vienna-yearbook-of-population-research-2015-vol-13/>>. ISBN-13: 978-3-7001-8007-4 ISBN-13 Online: 978-3-7001-8041-8.

science disciplines (e.g. economics, political science, geography) than demography. As anthropogenic climate change is a 'social problem' inherently related to human values, demographers are required to go beyond merely emphasising empirical relationships between population and climate systems when investigating this issue (authors: *Hayes; Peng and Zhu*).

- Limitations in funding, especially because funders of climate change research tend to value natural science approaches more than social science approaches (authors: *Peng and Zhu*).

The following nine original research articles presented in this special issue highlight how scholars of population studies and other relevant disciplines can contribute to the understanding of population and climate change interactions. These articles address the issue of demographic differential vulnerability from different perspectives on vulnerability, drawing upon case studies from across the globe based on unique data and innovative methodologies. This collection of research articles offers both empirical studies and forecasts of future vulnerability based on national- and global-level evidence.

THE SECTION ON DIFFERENTIAL MORTALITY FROM EXTREME CLIMATE EVENTS

Zagheni et al. and *Zhao et al.* explicitly investigated mortality risks from climate extremes, such as hydrological hazards (flood and storm) and extreme temperatures, which are likely to be further aggravated by climate change. The findings on age-sex differentials in mortality risks from different types of natural disasters have important implications for designing appropriate policy responses to address the differential vulnerability of different demographic subgroups. Focusing on mortality from extreme temperatures in Taiwan in the 1970s, *Zhao et al.*, in their article '**Daily Mortality Changes in Taiwan in the 1970s: An Examination of the Relationship between Temperature and Mortality**', showed that both unusually cold temperatures in winter and unusually hot temperatures in summer were associated with higher mortality. However, the mortality patterns differed by age group and cause of death, with older people

being more likely to die from cardiovascular disease during extreme cold episodes, and children and young adults being more likely to die from drowning during hot spells. These mortality patterns have changed in recent decades due to socioeconomic developments in Taiwan, which brought about improvements in health care, living environments, safety management, and disease prevention practices. Similarly, the analysis of cause-of-death data for 63 countries in the years 1995–2011 by *Zagheni et al.* in '**Differential Mortality Patterns from Hydro-meteorological Disasters: Evidence from Cause-of-death Data by Age and Sex**' found that mortality from hydro-meteorological disasters declined over this period as a result of improvements in human development. Contradicting the common belief that women are more vulnerable to natural disasters than men, *Zagheni et al.* found that in the case of mortality risks from floods and storms, men, and especially young adult men, had much higher mortality levels than women.

THE SECTION ON SPATIAL PATTERNS OF SOCIAL VULNERABILITY TO WEATHER AND CLIMATE EXTREMES

The articles in the next section contribute spatial perspectives to the analysis of differential vulnerability. The two articles address the important question of whether the subgroups of the population who are socioeconomically disadvantaged – for example, people who have low incomes, low levels of education, or high unemployment rates, or people who are members of ethnic minority groups – are also more likely to live in areas with higher levels of exposure to natural hazards. In geography, this question is often approached by developing an index of social vulnerability or a composite measure of various demographic and socioeconomic characteristics of a geographical unit.

De Sherbinin and Bardy, in their article titled '**Social Vulnerability to Floods in Two Coastal Megacities: New York City and Mumbai**', employed census data to develop social vulnerability indices of New York City and Mumbai, which are considered to be among the top 10 port cities most exposed to coastal flooding. Exploiting the events of Hurricane Sandy in 2012 for NYC and of the Maharashtra floods in 2005 for Mumbai, the article investigated whether the areas

with higher social vulnerability scores were also more likely to be inundated. This was found to be the case for Mumbai, but not for New York City. While these findings may be attributable in part to data limitations and the different spatial resolutions used, the two cities may also differ in terms of settlement preferences, with, for instance, wealthy households in New York preferring to live along the coastline.

The findings from the case study of tropical storm Washi flood in the southern Philippines in 2011 by *Ignacio et al.* in their article **'Assessing the Effectiveness of a Social Vulnerability Index in Predicting Heterogeneity in the Impacts of Natural Hazards: Case study of the Tropical Storm Washi Flood in the Philippines'** suggest that the areas along the riverbanks most prone to severe flooding were predominantly inhabited by the middle class. In addition, authors broke down the vulnerability indices in order to determine which demographic and socioeconomic factors contributed to disaster vulnerability. They found that physical characteristics that determine exposure to flooding, such as elevation from the coast and slope, explained the losses and the damages better than the sociodemographic characteristics of the areas. Given the extreme nature of the flood event, exposure was an important determinant of vulnerability.

THE SECTION ON DIFFERENTIAL RISK PERCEPTIONS AND CLIMATE ACTIONS

Risk perceptions, attitudes toward climate change, and climate-related behaviours vary considerably by demographic and socioeconomic characteristics. Understanding public attitudes and perceptions is essential not only for formulating education and communication strategies, but for successfully implementing risk reduction or adaptation strategies.

The article by *Meijer-Irons* titled **'Who Perceives What? A Demographic Analysis of Subjective Perception in Rural Thailand'** offers a unique analysis of panel surveys from rural Thailand that compared subjective assessments of environmental risks with objective measures of environmental and climate conditions, such as the vegetation health index. In particular, the author showed that subjective perceptions of environmental risks depend on household characteristics and economic activities.

Households that, relative to the average, were large, had a high level of involvement in agriculture, and had a large number of members were more likely to report that their income losses were due to environmental shocks. This finding implies that policies aiming to address the impacts of environmental change should take into account the issues that are most crucial to different subgroups of people who are vulnerable to environmental shocks.

The article by *Muttarak and Chankrajang*, **'Who Is Concerned about and Takes Action on Climate Change? Gender and Education Divides among Thais'**, investigated the relationships between climate change perceptions and climate-relevant behaviours, i.e. the actions individuals take to minimise the problem of global warming (mitigation actions) in Thailand. Their results showed that while concerns about global warming were associated with climate-relevant behaviours, this association applied to actions that involved making technical and behavioural changes (e.g. using energy-efficient electrical devices, using a cloth bag instead of a plastic bag, and planting trees), but not to actions that involved saving electricity and water (e.g. turning off unused lights and turning off the tap while brushing teeth). Similarly, educational differences were found for the former set of behaviours, but not for the latter. The findings further showed that achieving technical and behavioural changes generally involved making consistent efforts to change behaviour, knowing what actions to take; whereas saving electricity and water was undertaken for economic reasons. Educational differentials in climate actions thus depend on the motivations for carrying out the action.

THE SECTION ON FORECASTING FUTURE SOCIETIES' VULNERABILITY AND ADAPTIVE CAPACITY THROUGH THE LENS OF HUMAN CAPITAL

The final three articles in the special issue offer a forecast of the future vulnerability and adaptive capacities of societies through the lens of human capital based on a multi-dimensional population projection exercise and the application of the newly developed Shared Socioeconomic Pathways (SSPs), following the five scenarios as defined by the SSPs. The SSP narratives

described alternative socioeconomic development pathways that influence population dynamics and human capital formation for different world regions.

Based on the estimation of disaster mortality for the years 1970–2010 covering 174 countries, *Striessnig* and *Loichinger*, in their article titled ‘**Future Differential Vulnerability to Natural Disasters by Level of Education**’, confirmed that countries with a higher proportion of women with at least secondary education experienced far fewer deaths due to climate-related extreme natural events. The results were then translated into the predicted number of deaths, and the future fatalities were projected according to changes in the educational composition of population derived from the five SSPs scenarios. They found that future disaster deaths vary considerably in the SSP scenarios, especially for Latin America and the Caribbean, Asia, and Africa, where room for educational expansion is greater than it is in other regions.

Similarly, *Crespo Cuaresma* and *Lutz* further extended our understanding of future societies’ adaptive capacity in the article ‘**The Demography of Human Development and Climate Change Vulnerability: A Projection exercise**’ by projecting how the Human Development Index (HDI) varies under different SSP scenarios. Previous studies have shown that each of the three components of HDI (income, educational attainment, and life expectancy) is a key determinant of vulnerability to natural disasters (*Striessnig et al.*, 2013; *Patt et al.*, 2010). Indeed, the article by *Zagheni et al.* in this issue demonstrated that disaster-related mortality steadily declines as a country’s HDI level increases. Exploiting the new life expectancy and educational attainment projections by the Wittgenstein Centre for Demography and Global Human Capital (*Lutz et al.*, 2014), projections of income per capita growth by *Crespo Cuaresma* (2015) under the five SSP scenarios, the authors were able to produce HDI

projections for 154 countries up to the end of this century. The HDI projection exercise found that the degree of vulnerability to climate change varies based on different development trajectories.

In the article ‘**A Four-dimensional Population Module for the Analysis of Future Adaptive Capacity in the Phang Nga Province of Thailand**’ by *Loichinger, KC*, and *Lutz*, multi-dimensional population projections are innovatively applied to forecast future adaptive capacities at the sub-national level based on data from Phang Nga province located in the south of Thailand, which was severely affected by the Indian Ocean tsunami in 2004. The projection is prepared by age, sex, level of education, and labour force participation. This four-dimensional module made it possible to forecast the level of the province’s adaptive capacity using a relatively comprehensive understanding of population dynamics and future changes in distribution and composition of the population. Having shown that individuals with higher education were better prepared for disasters (*Muttarak and Pothisiri*, 2013; *Hoffmann and Muttarak*, 2015), the shift in the educational composition of the province’s labour force toward higher levels means that it is possible to assume that the population will have higher levels of disaster preparedness in the future.

The articles presented in this volume extend our understanding of different dimensions of demographic differential vulnerability in various geographical contexts and demonstrate how demographic methodological tools and data can be applied to the study of vulnerability. In particular, the application of demographic knowledge in investigating and forecasting demographic differential vulnerability is a key contribution of demographers to the vulnerability research community. There is considerable potential for the further development of climate change research in demography.

THE HISTORICAL POPULATION ATLAS OF THE CZECH LANDS¹⁾

Jaroslav Maryáš

The Historical Population Atlas of the Czech Lands is one of the main outcomes of a project titled 'Providing Access to Historical Spatial and Statistical Data in a GIS Environment' (DF12P01OVV033), which was conducted in 2012-2015 under the NAKI programme (Applied Research and Development on National and Cultural Identity) by a research team in the Urban and Regional Geography Laboratory in the Department of Social Geography and Regional Development at the Faculty of Sciences, Charles University in Prague, in cooperation with other researchers.

The atlas is a remarkable piece of work that contains more than 330 cartograms and cartodiagrams (55 at a scale of 1:2 mil., 46 at a scale of 1:3 mil., and 224 at a scale of 1:5 mil.), accompanied by figures, tables, and age pyramids, distributed across twelve chapters. The first two introductory chapters are devoted to the methods used to create the atlas and territorial-administrative divisions. The ten analytical chapters contain 42 map sheets, most of them on population-related phenomena and processes, such as the distribution and demographic structure of the population and other processes addressed in separate chapters that include mortality and migration, the economic and cultural structure, social status (this covers a wide range of topics, from education levels to household facilities), crime, and voting behaviour. The final chapter is devoted to a subject of prominent interest to the Department of Social Geography and Regional Development, namely, the settlement structure, and it also includes all of professor Martin Hampl's sociogeographic regionalisations of the Czech Republic.

The Atlas uses time series for a number of basic population statistics drawing on population census data from 1921 up to 2011, population registers from the post-war years, and other statistical sources covering periods of time. Almost all of the maps contain data covering a period from 1921 to 2011, or 2013 in the case of election results, and usually also in reference to the time horizons when important political changes occurred – 1946/47, 1970, and 1991. The territorial detail of the indicators represented extends to the district level – judicial districts in the interwar period, administrative in the post-war period, and from 1960 the districts that currently exist. The last chapter is an exception, as it contains analyses at the lower territorial level of municipalities and settlements.

The maps are unfortunately not accompanied by text, but this shortcoming is partly made up for by the description of methods in the first part of the publication and the thematic sections of the atlas and by the references to data sources that accompany the maps.

The map's chosen scale, 1:2 mil., 1:3 mil., and 1:5 mil., usually corresponds to its content, although in some cases a smaller scale could have been used to present the particular phenomenon – e.g. maps at a scale of 1:3 mil. for ethnic minorities, 1:2 mil. for years of school attendance, or 1:2 mil. for areas of maximal population density (in the case of the latter the map sheet also includes Korčák's map of areas of maximal population density from the Atlas of the Czechoslovak Socialist Republic dating from 1966, which clearly presents them using a scale of 1:5 mil.).

The use of certain colours to mark administrative borders (black for regions and white for districts) probably decreased production costs, but another result is that indicators represented using very light colours (especially light yellow or light green) cannot

1) Ouředníček, Martin – Jichová, Jana – Pospíšilová, Lucie (eds.) 2017. *Historický atlas obyvatelstva českých zemí* (Historical Population Atlas of the Czech Lands). Prague: Karolinum, 2017. 131 pp. ISBN 978-80-246-3577-4.

be clearly distinguished territorially and the impression of the final map is of an unfinished piece of work. This applies, for example, to the cartodiagrams and some cartograms showing the old-age index, mortality, economic activity, nationality and educational structure, election results, and others. Apart from this small shortcoming, the colour differentiations are good, with a few exceptions, such as the cartodiagram for 'The Religious by Region' in 1921 or 'The Municipality Statute and Urbanisation Rate' for municipalities with more than 1,000 inhabitants, where districts with a level of urbanisation lower than

65% show through the municipalities with a smaller population size.

The Atlas is one of the first works in almost half a century to assess the country's spatial features with an unusually wide thematic focus, while some topics, such as crime, are presented here for the time in such a scope. An important contribution also is that the Atlas captures trends in the spatial differentiation of the selected indicators using the same legend for individual time intervals. The databases used to create the Atlas are publicly accessible at: www.atlasobyvatelstva.cz/cs/historie.

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