

Contribution of demography to the study of population and global environmental change

What more can be done in Asia

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Wittgenstein Centre

FOR DEMOGRAPHY AND
GLOBAL HUMAN CAPITAL



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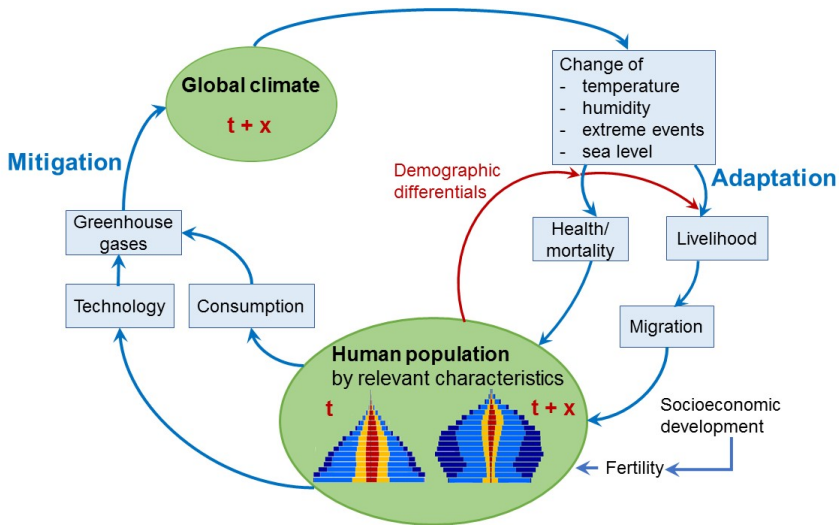
Overview

- Relevance of demography to the study of global environmental change
- Applications of demographic concept and tools
 - 1) Demographic differential vulnerability
 - 2) Forecasting societies' adaptive capacity
 - 3) Environmental change and migration
- Potential research and collaborations in Asia

Funding

1) Advanced Grant of the European Research Council to Wolfgang Lutz "Forecasting Societies Adaptive Capacities to Climate Change": grant agreement ERC-2008-AdG 230195-FutureSoc; 2) the "Wittgenstein Award" of the Austrian Science Fund (FWF): Z171-G11; and 3) Ratchadaphiseksomphot Endowment Fund of Chulalongkorn University for the project "Understanding Social Barriers to Coping with and Adapting to Extreme Climate Events" (Grant agreement number: RES560530150-CC)

Relationship between human population and global climate system



Demographic concepts and methods

1) Demographic differentials is central to demographic research

- "Hazard function" – the risk of dying by age and sex

2) Demography is built upon empirical evidence and quantifiable facts

- Knowledge of population dynamics (e.g. size, distribution and composition) allowing for:
 1. identifying *who* are most at risk to certain natural hazards and *where* they are
 2. calculating carbon emissions

3) Demography has concepts and tools for forecasting

- Demographic metabolism (Lutz 2013)
- Population projections

IUSSP Climate Change Panel conference in Kao Lak, 23-25 April 2014

Jointly organized by Chulalongkorn University and Wittgenstein Centre



CPS, Chulalongkorn University



Elke Loichinger



Vipana Prachuabmoh



Samir KC

上海大学人口研究所暨亚洲人口研究中心
Asian Demographic Research Institute

Wittgenstein Centre (IIASA, VID/OAW, WU)



Raya Muttarak



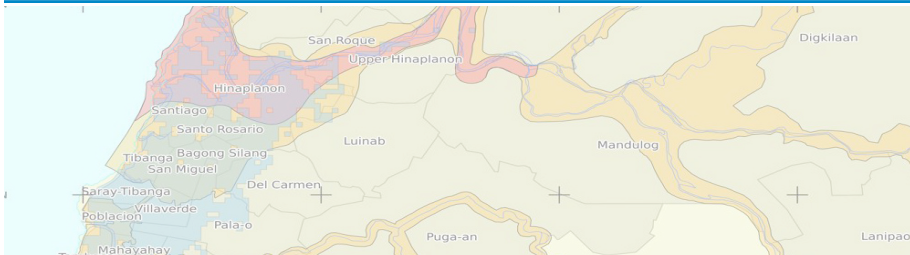
Wolfgang Lutz



Leiwen Jiang

Demographic Differential Vulnerability to Climate-Related Disasters

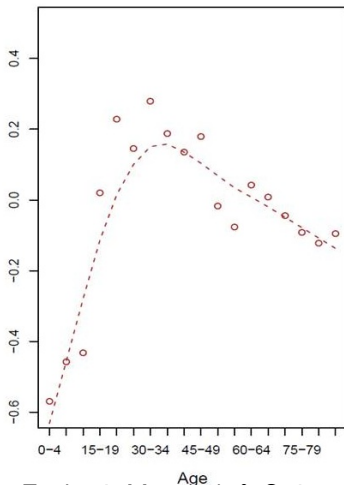
VIENNA YEARBOOK *of* Population *Research* 2015



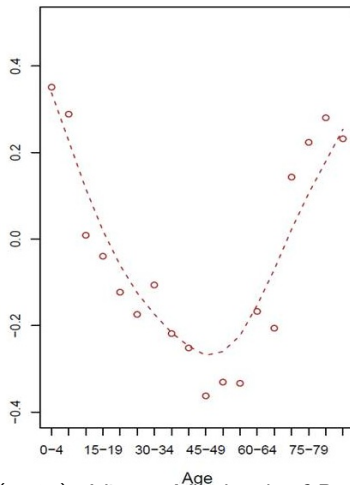
Demographic differential vulnerability to climate-related disasters
Guest Editors: Raya Muttarak and Leiwen Jiang

Who is more likely to perish during floods and storms?

Male mortality profile



Female mortality profile



Source: Zagheni, Muttarak & Striessnig (2015), *Vienna Yearbook of Population Research*, pp.47-70

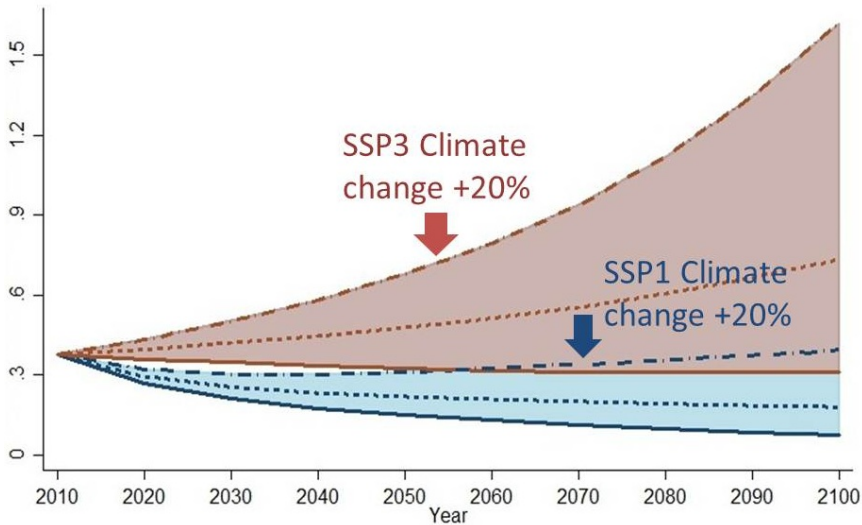
Countries with higher level of education experience lower disaster mortality

Determinants of national deaths from natural disasters per million of population: 174 countries, 1970 to 2010

Variable	Coefficient	(Std. Err.)
Log (Number of Disasters)	0.821***	(0.140)
Infant mortality rate	0.344**	(0.164)
Population growth rate	0.730***	(0.094)
Share women with secondary education	-0.414**	(0.165)
Log(GDP per capita)	0.062	(0.195)
Intercept	-2.969***	(0.722)

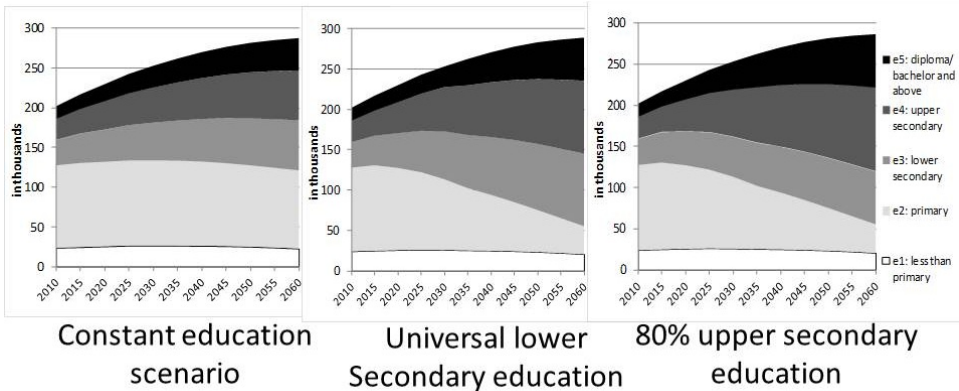
Source: Striessnig & Loichinger (2015), *Vienna Yearbook of Population Research*, pp.221-240.

Predicted number of deaths from natural disasters (millions)



Source: Lutz, Mutarak & Striessnig (2014) *Science*

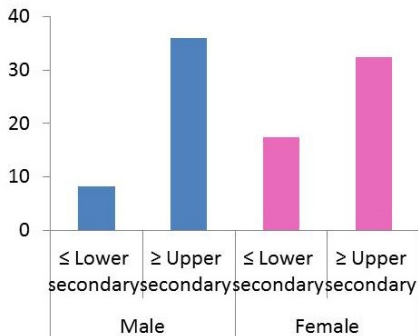
Educational composition of population ages 15+, Phang Nga (Thailand), by education scenario, 2010 to 2060



Source: Loichinger, KC & Lutz (2015) *Vienna Yearbook of Population Research*, pp.263-287

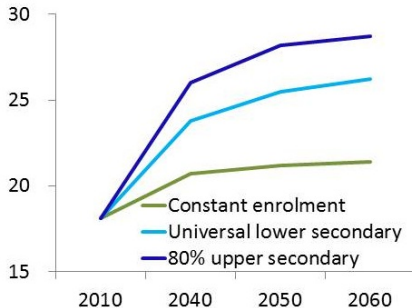
Predicted number of population who are prepared for natural disasters, Phang Nga, Thailand 2010 to 2060

Proportion of Phang Nga population who are prepared for disasters in 2013



Source: Hoffmann & Muttarak (2015)

Projected proportion prepared for natural disasters by education scenario



Source: Loichinger, KC & Lutz (2015). *Vienna Yearbook of Population Research*, pp.263-287

Climate variability and migration (with Guy Abel)

Motivations

- Impacts of climate change on migration has increasingly attracted the attention of the media, policy-makers and researchers
- Inconclusive evidence: wide-ranging methodologies, different geographic foci, varying climate definitions. (Hunter et al. 2014)

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- 1) Empirically examine the connection between climate, conflict and migration using UNHCR refugee flows data: 150 countries, 1989-2014

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- 2) Empirically examine the connection between climate variability and **internal migration** using micro censuses data

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Research projects

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- 2) Empirically examine the connection between climate variability and **internal migration** using micro censuses data
 - Explore demographic differentials (by gender and education) in climate-related migration patterns

Climate and internal migration: Data and methods

Data: Integrated Public Use Microdata Series (IPUMS) International

- A sample (0.4-16.6%) of a full census conducted by the national statistical agency in a country
- 15 African, 10 Asian and 16 Latin American countries between 1970-2011

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Measurement

- **Migration:** Counts of bilateral flows taken from questions on
 - 1) Place of residence 1, 5 or 10 years ago
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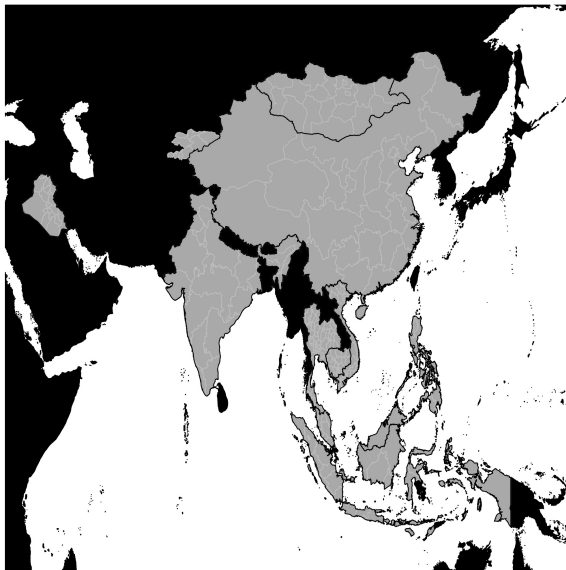
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 - 1) Place of residence 1, 5 or 10 years ago
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- **Climate:** CRU-TS Historical Climate Database
 - Monthly and annual precipitation and temperature at 0.5x0.5 degree spatial resolution
 - Match with IPUMS spatial files at level 1 administrative boundaries

Asia

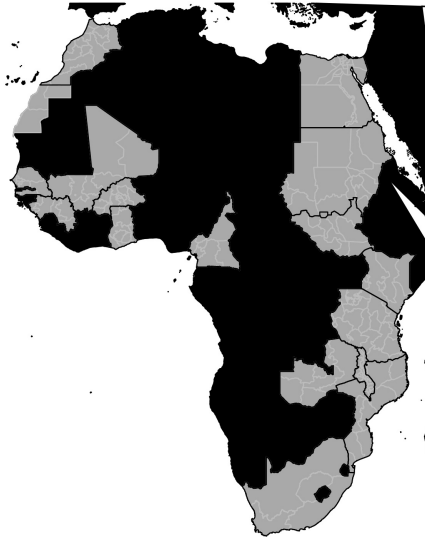


Asia Samples

— 5 year — 1 & 5 year — 1 year — 10 year

Country	Year
Cambodia	1998 2008
China	1990
India	1983 1987 1999
Indonesia	1971 1976 1980 1985 1990 1995 2005 2010
Iraq	1997
Kyrgyzstan	1999
Malaysia	1991 2000
Mongolia	2000
Philippines	2000 1990
Thailand	1970 1980 1990 2000
Vietnam	1989 1999 2009

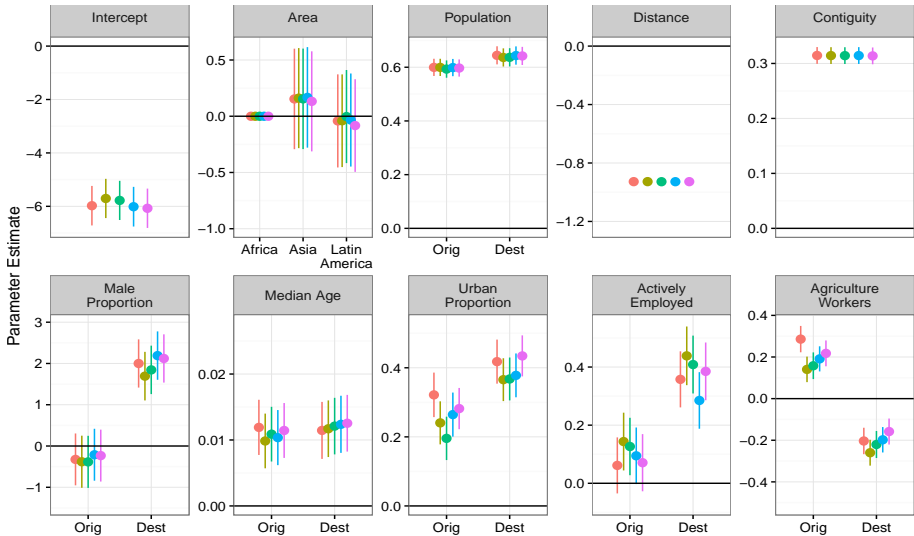
Africa



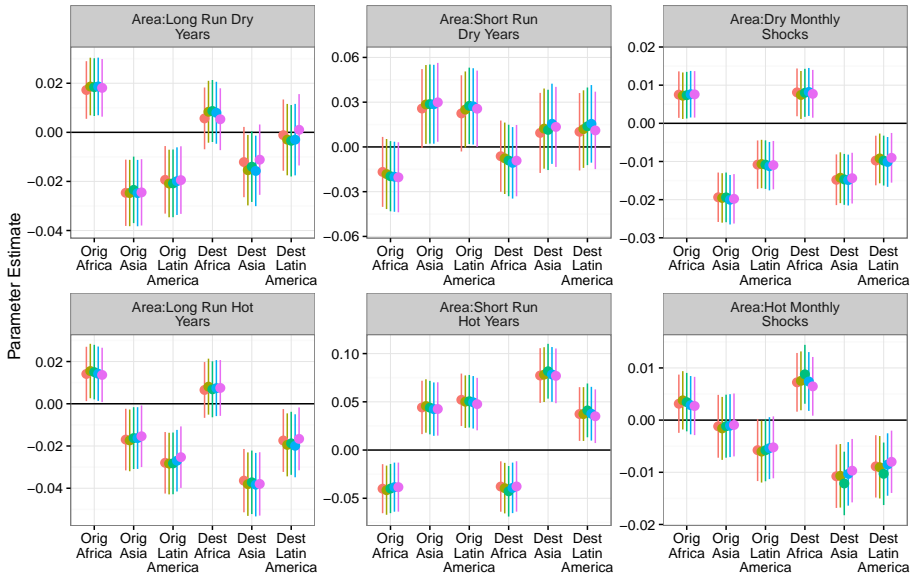
Latin America



Fixed effects parameter estimates of migration flows



Environment parameter estimates by areas



Potential research and collaboration in Asia

1) Application of available data

- Climate data widely available at relatively refined spatial resolution
- Repeated cross-sectional or household panel survey (e.g. Demographic and Health Surveys; Micro census; Household and expenditure survey; ICD-10 Cause of death data)

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2) Adding relevant questions to new surveys

- Questions on disaster experience, impacts, coping strategies, adaptation
- Questions on climate change perception and knowledge
- Questions on migration, relocation

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3) Collaboration with other disciplines/demographic fields

- Fields of mortality, migration, methods and population projection are relevant
- Other disciplines e.g. geography, economics, environmental science, development, public health

Thank you for your attention &
looking forward for collaboration!

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frames=yes](http://hw.oeaw.ac.at/vypr_collection?frames=yes)