



Wittgenstein Centre

FOR DEMOGRAPHY AND
GLOBAL HUMAN CAPITAL

A COLLABORATION OF IIASA, VID/ÖAW, WU

Global Population Ageing in the context of the Sustainable Development Goals

Wolfgang Lutz, CPS 28 Feb 2019



International Institute for
Applied Systems Analysis
www.iiasa.ac.at



ÖAW

AUSTRIAN
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SCIENCES

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WIRTSCHAFTS
UNIVERSITÄT
WIEN VIENNA
UNIVERSITY OF
ECONOMICS
AND BUSINESS

Agenda 2030: 17 Goals, 169 Targets





Demography

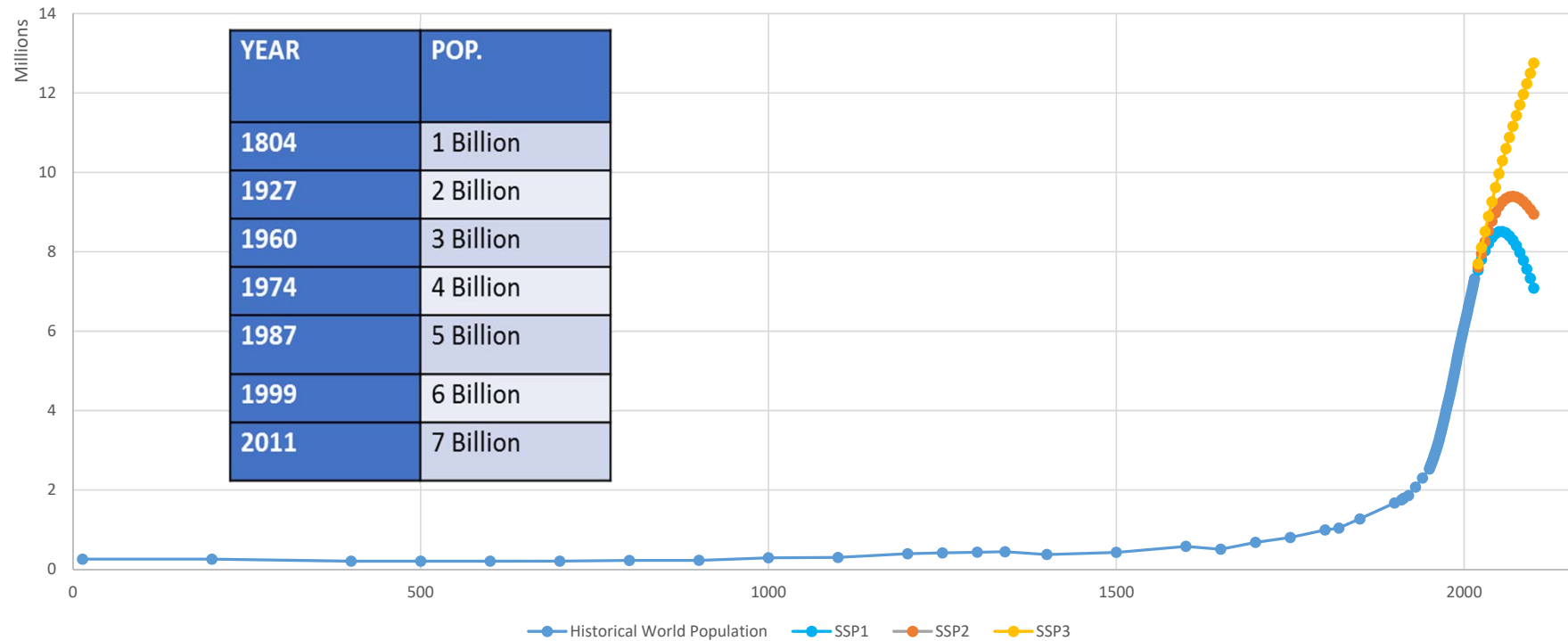
- Mathematics of Groups of People
- Studies the changing size and composition of human populations
- Populations change through
 - Births (Fertility)
 - Deaths (Mortality)
 - Migration
- In the case of multi-dimensional analysis (more than age and sex structure), the models also include transition rates from one state to another.

World Population Estimates, AD



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Historical Global Population Size and Total Literate Population



The demographic transition

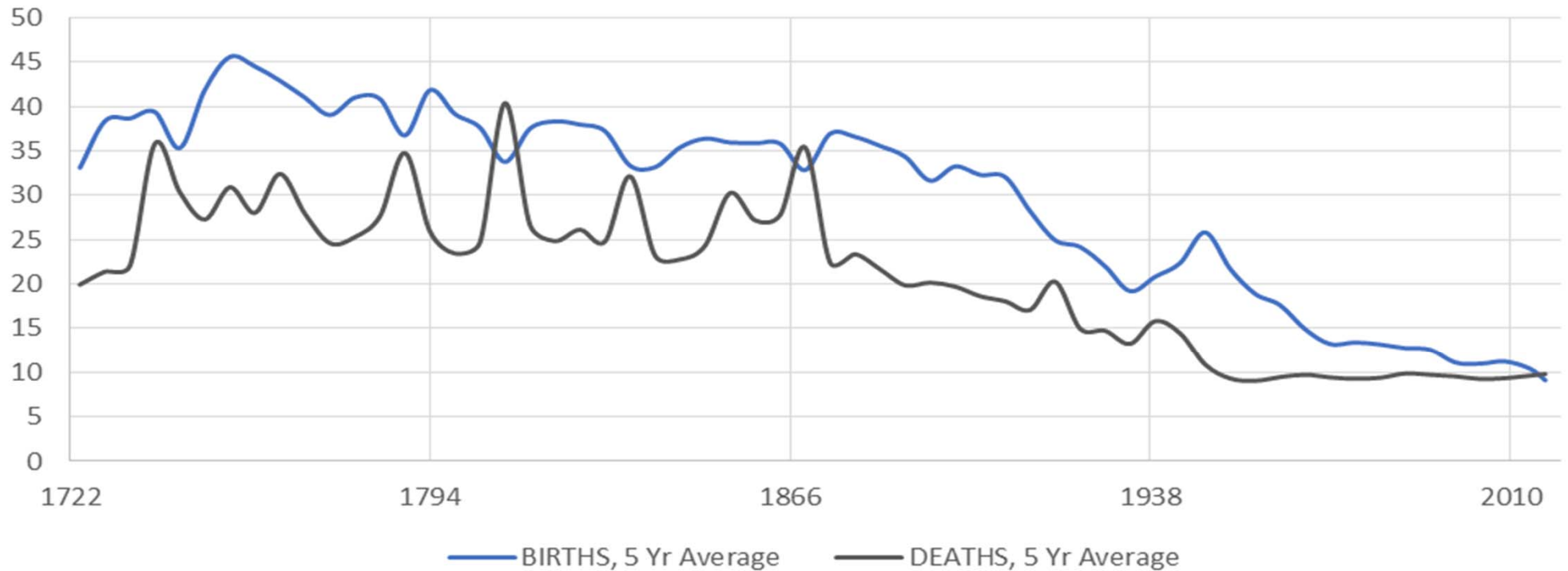
- Universal process of “demographic modernization” with different countries currently at **different stages of the same process.**
- Hence we see **a demographically divided world**
- In this process first death rates fall due to better sanitation and medical advance – birth rates remain high because they are culturally determined.
- This results in **high population growth.**
- Finally birth rates also fall, leading to low or even negative population growth.

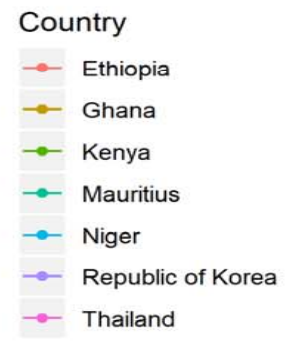
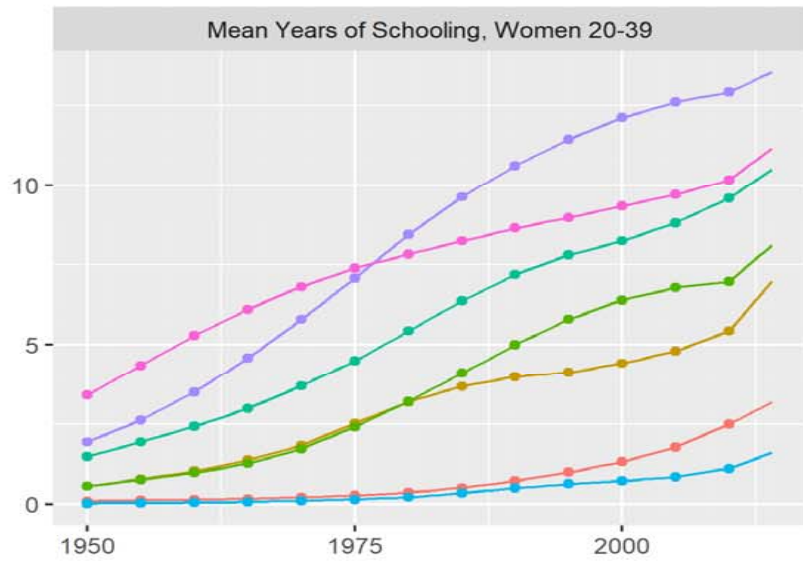
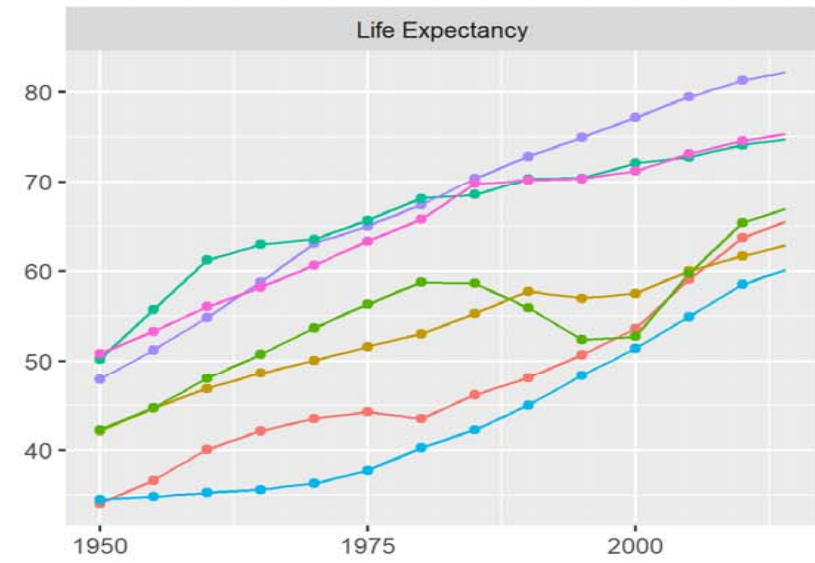
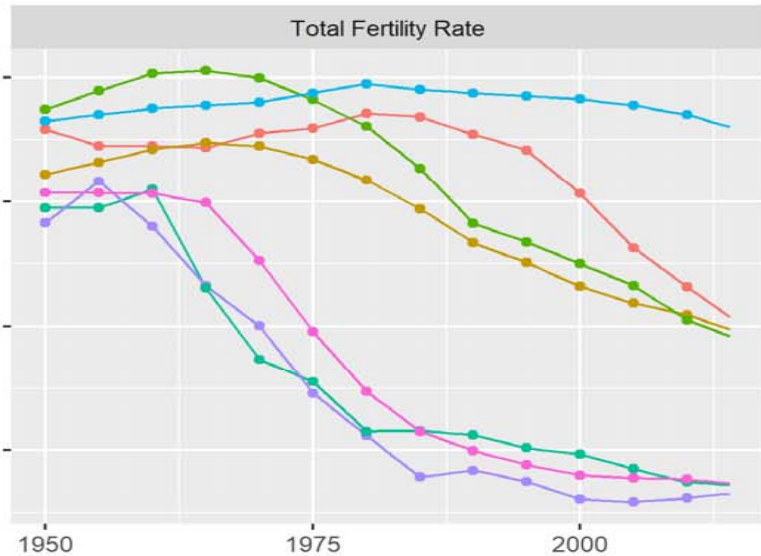
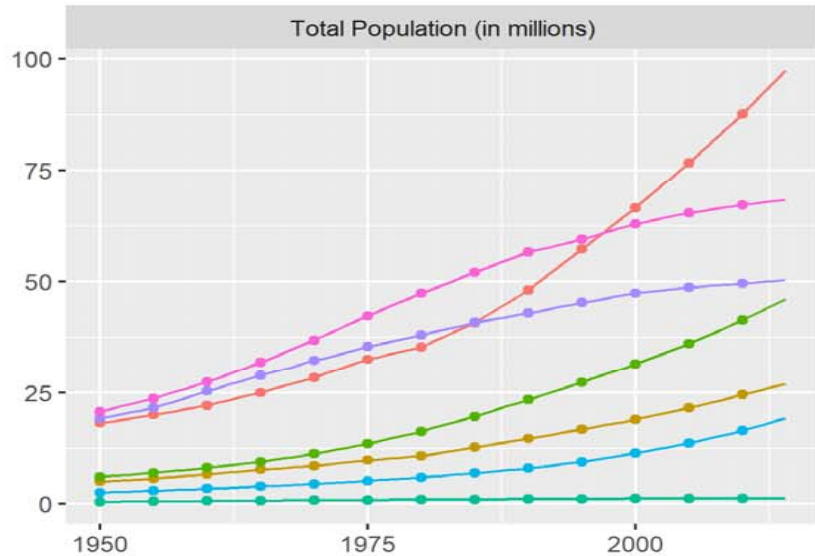
Demographic Transition: Finland 1722 - 2017



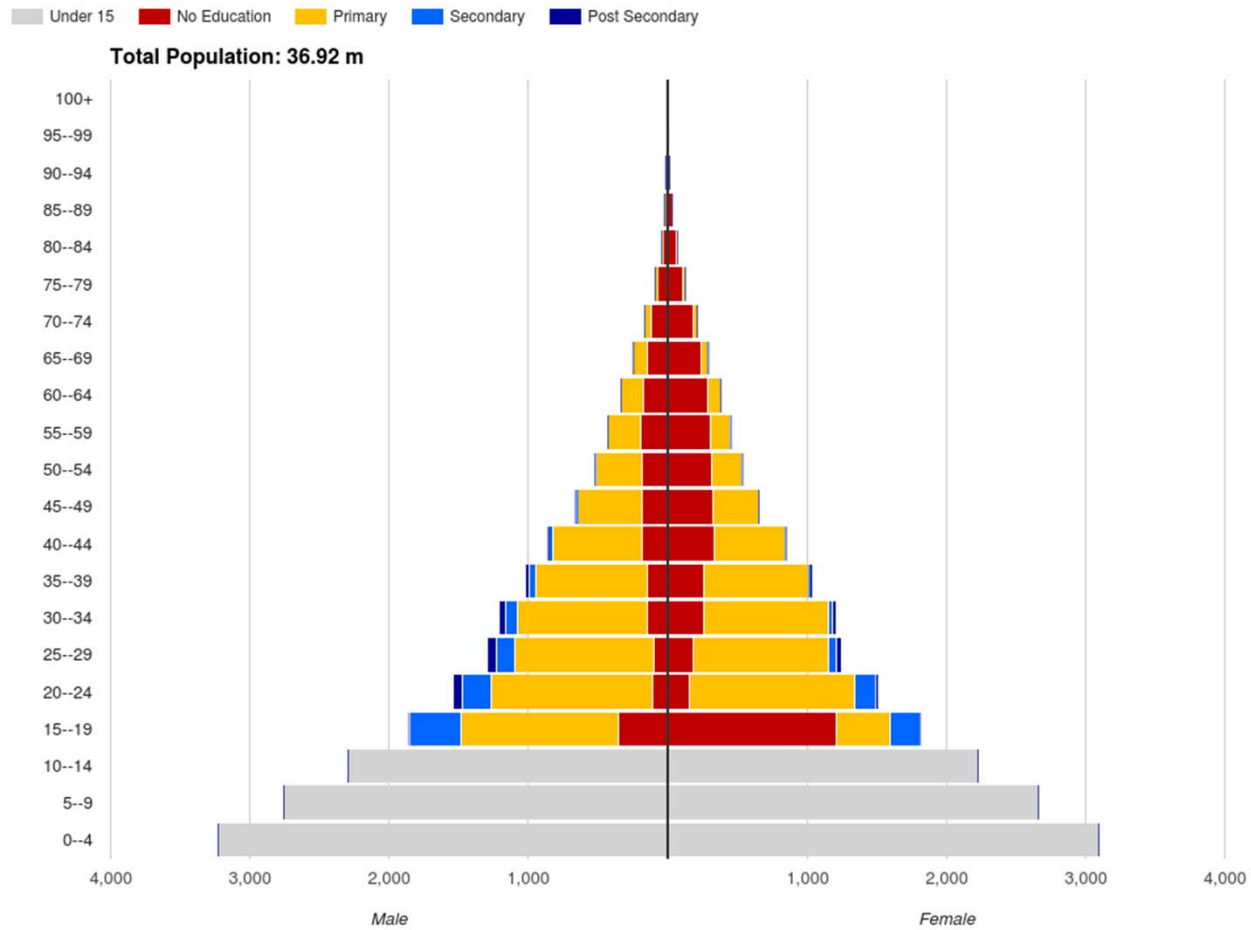
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Finland: 5-Year Averages for Births and Deaths per 1,000 people (1722-2017)





1970

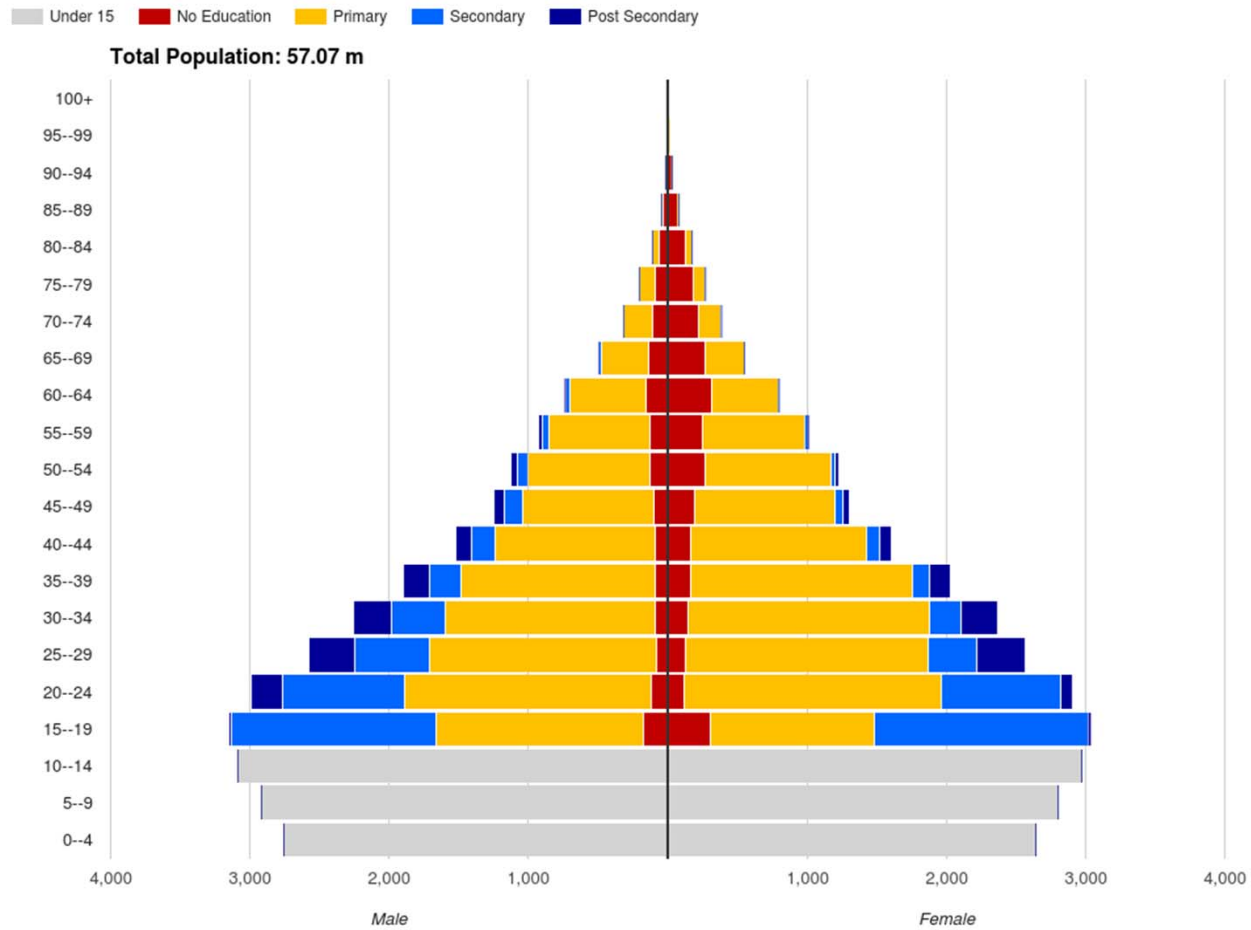


Source: Wittgenstein Centre for Demography and Global Human Capital, (2015). *Wittgenstein Centre Data Explorer Version 1.2*.
Available at: www.wittgensteincentre.org/dataexplorer

Population (000's) Pyramid
Thailand
1970
Medium (SSP2)

R version 3.1.2 (2014-10-31) • [Google Terms of Use](#) • [Data Policy](#): See individual charts

1990

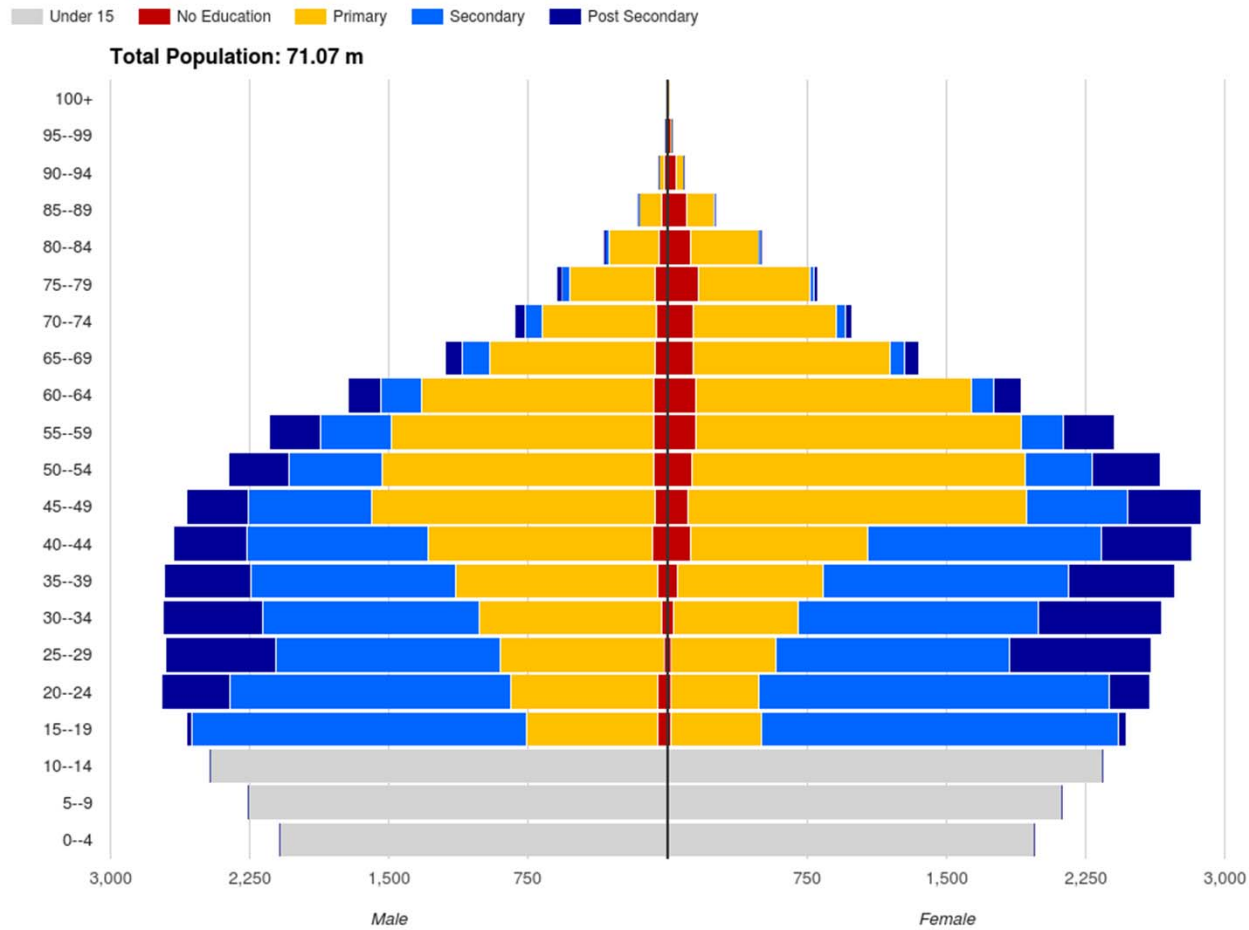


Source: Wittgenstein Centre for Demography and Global Human Capital, (2015). *Wittgenstein Centre Data Explorer Version 1.2*. Available at: www.wittgensteincentre.org/dataexplorer

Population (000's) Pyramid
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1990
Medium (SSP2)

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2015

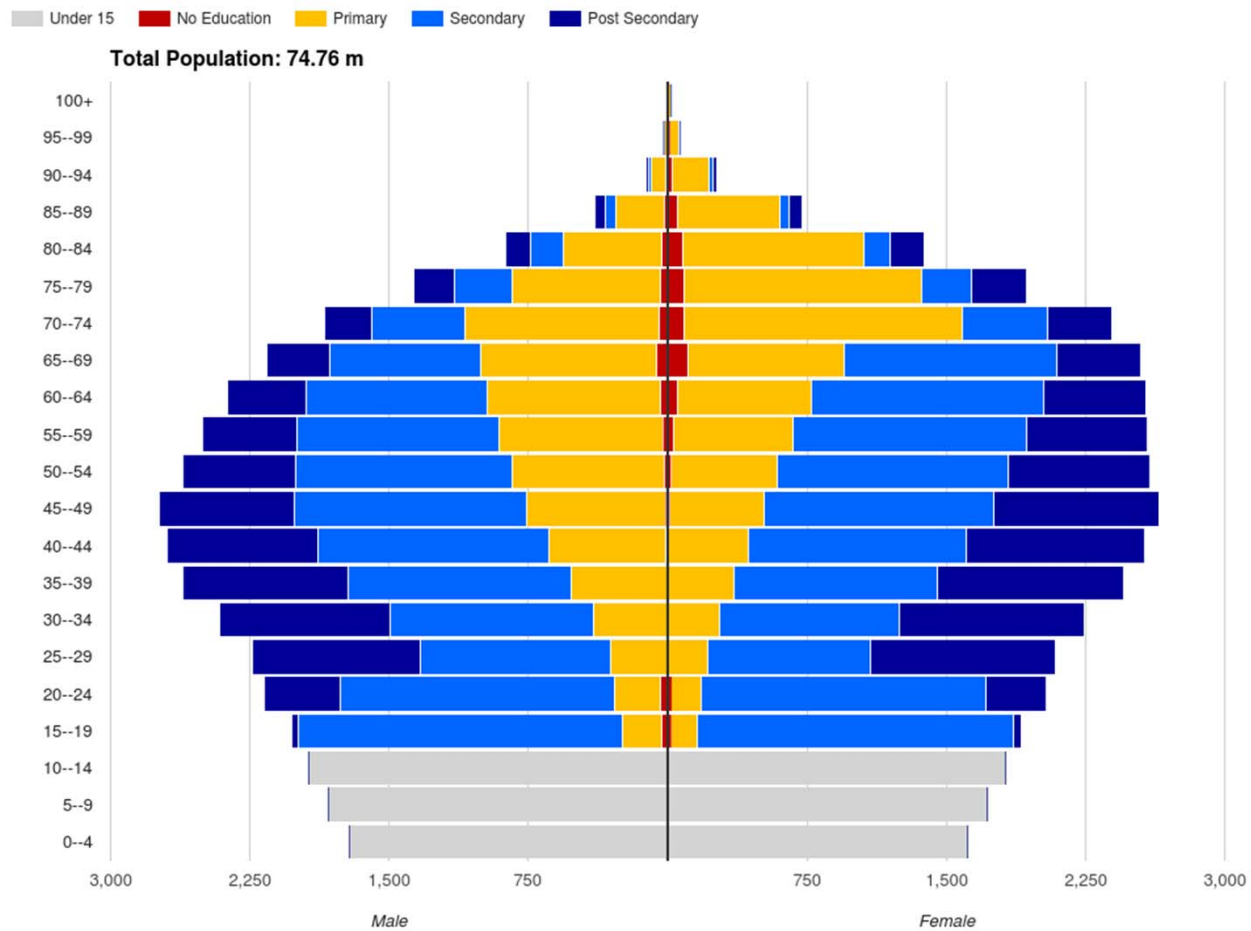


Source: Wittgenstein Centre for Demography and Global Human Capital, (2015). *Wittgenstein Centre Data Explorer Version 1.2*. Available at: www.wittgensteincentre.org/dataexplorer

Population (000's) Pyramid
Thailand
2015
Medium (SSP2)

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2040

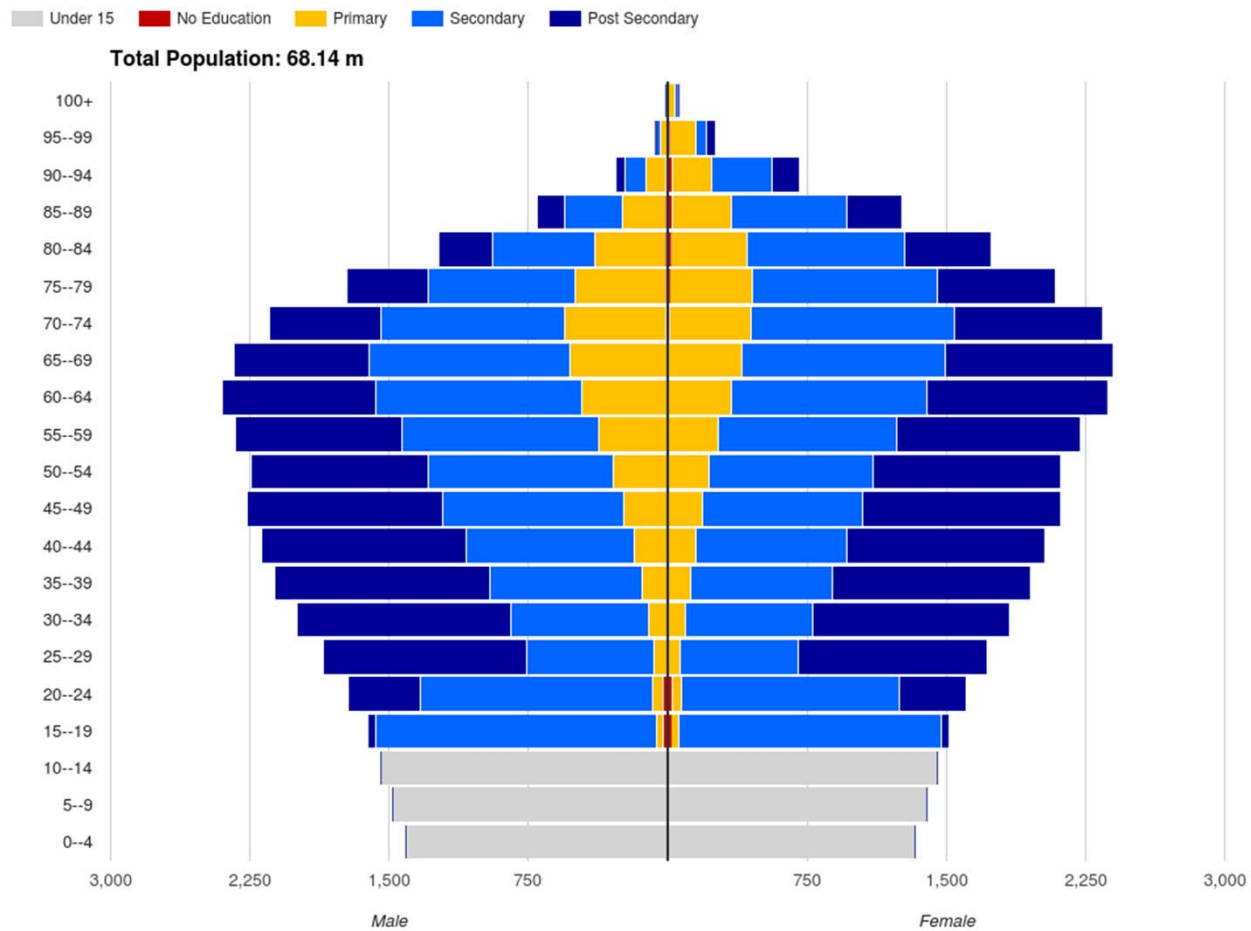


Source: Wittgenstein Centre for Demography and Global Human Capital, (2015). *Wittgenstein Centre Data Explorer Version 1.2*.
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Population (000's) Pyramid
Thailand
2040
Medium (SSP2)

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2065



Source: Wittgenstein Centre for Demography and Global Human Capital, (2015). *Wittgenstein Centre Data Explorer Version 1.2*.
Available at: www.wittgensteincentre.org/dataexplorer

Population (000's) Pyramid
Thailand
2065
Medium (SSP2)

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Demographic Metabolism:

A predictive theory of socio-economic change

Focus on persistent individual characteristics over life course.

Societies change through the

- changing composition of the population (new generations replacing the older ones) – Ryder: **cohort effect**
(changes of all people as they become older – age effect)
- external changes affecting all cohorts at the same time
– period effect, difficult to predict (X-events, slow changes)

Population-based Sustainability Science: For studying intergenerational tradeoffs this concept provides an analytical handle through focus on stable characteristics.

Adding education to age and sex in population analysis



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Education is the most important source of observable population heterogeneity after age and sex.

This matters because:

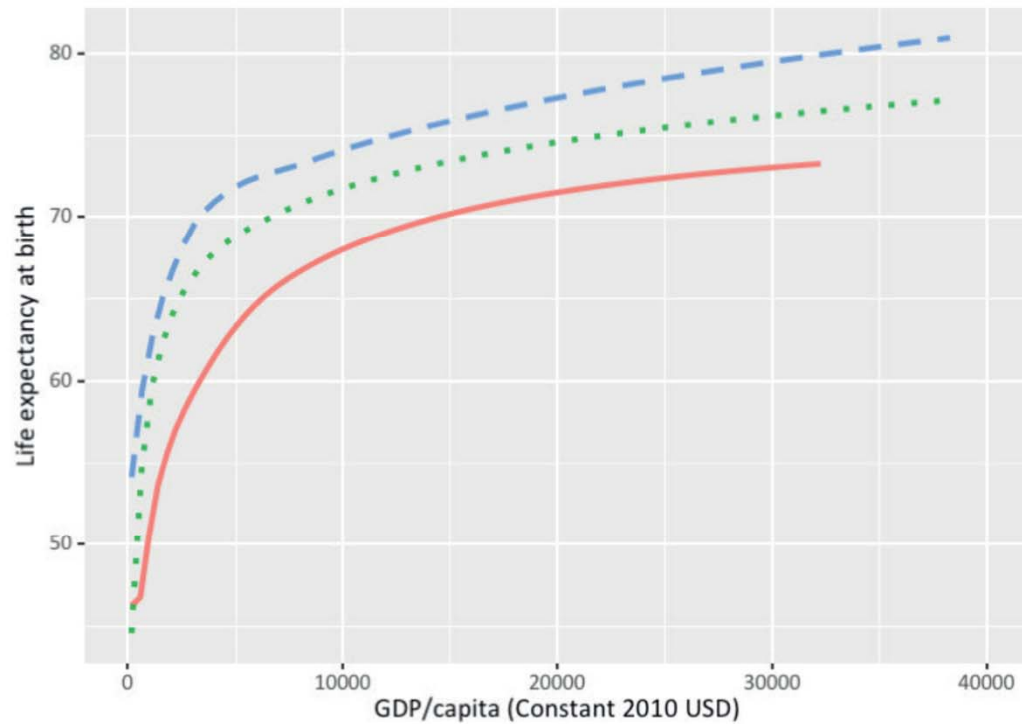
- Almost universally during demographic transition more educated women have fewer children, have lower child mortality, and more educated adults live longer. Changing education composition **changes population forecasts**.
- Education is a crucial determinant of individual **empowerment and human capital**, is a key driver of socio-economic development (public health, economic growth, quality of institutions and democracy, and adaptive capacity to climate change).

Education matters more than income when it comes to survival and life expectancy

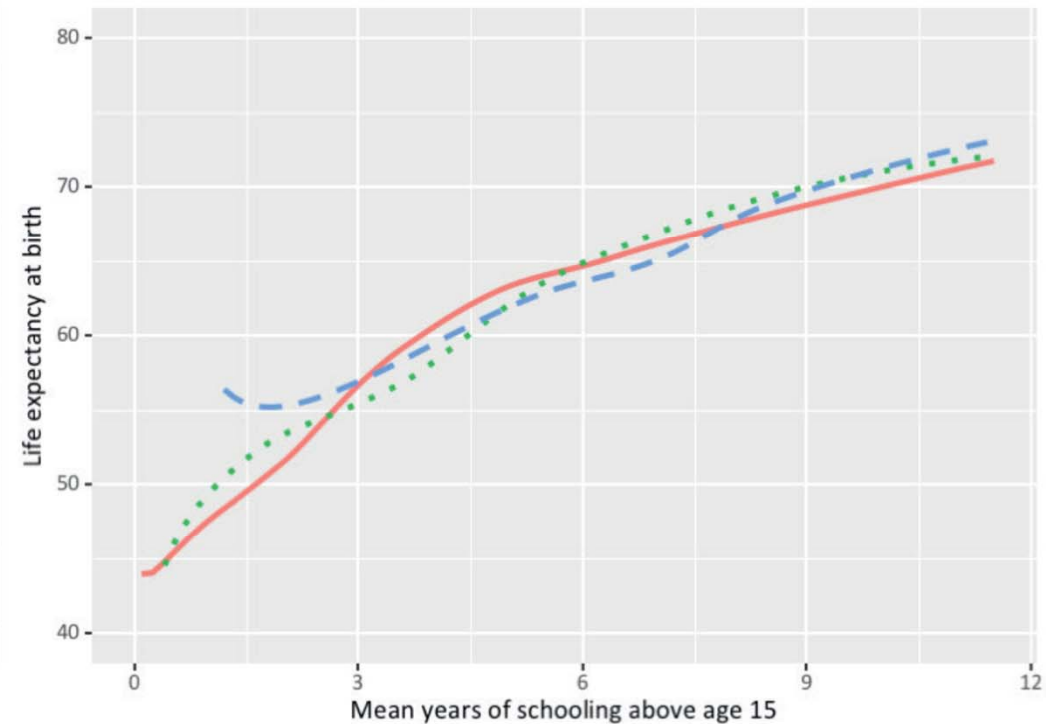


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(A). Income vs life expectancy at birth

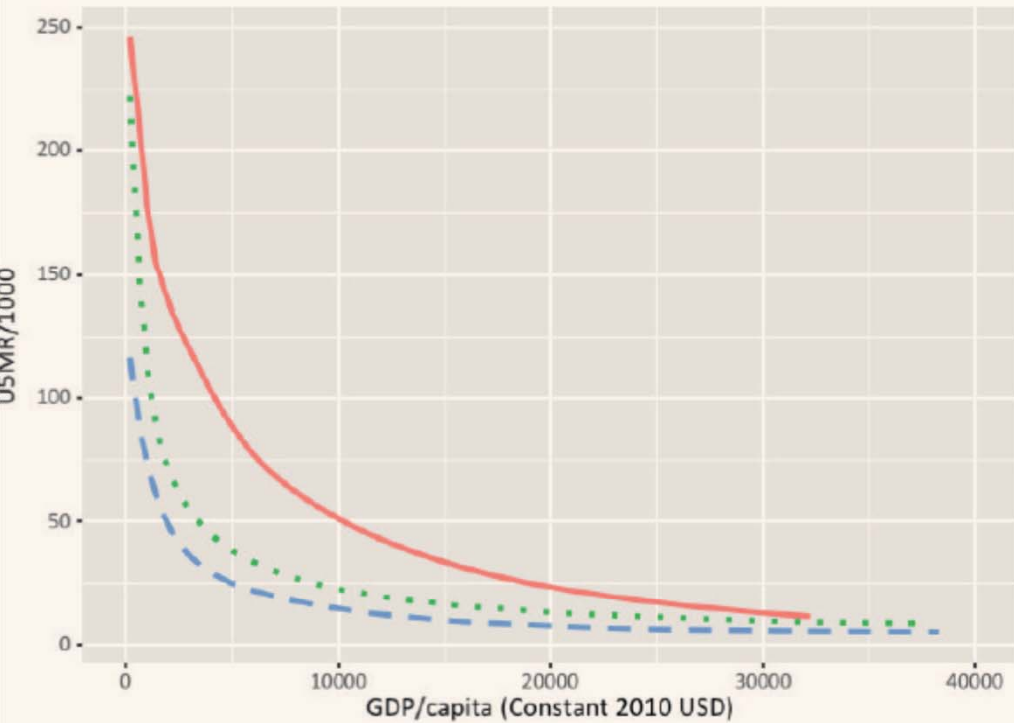


(B). Education vs life expectancy at birth

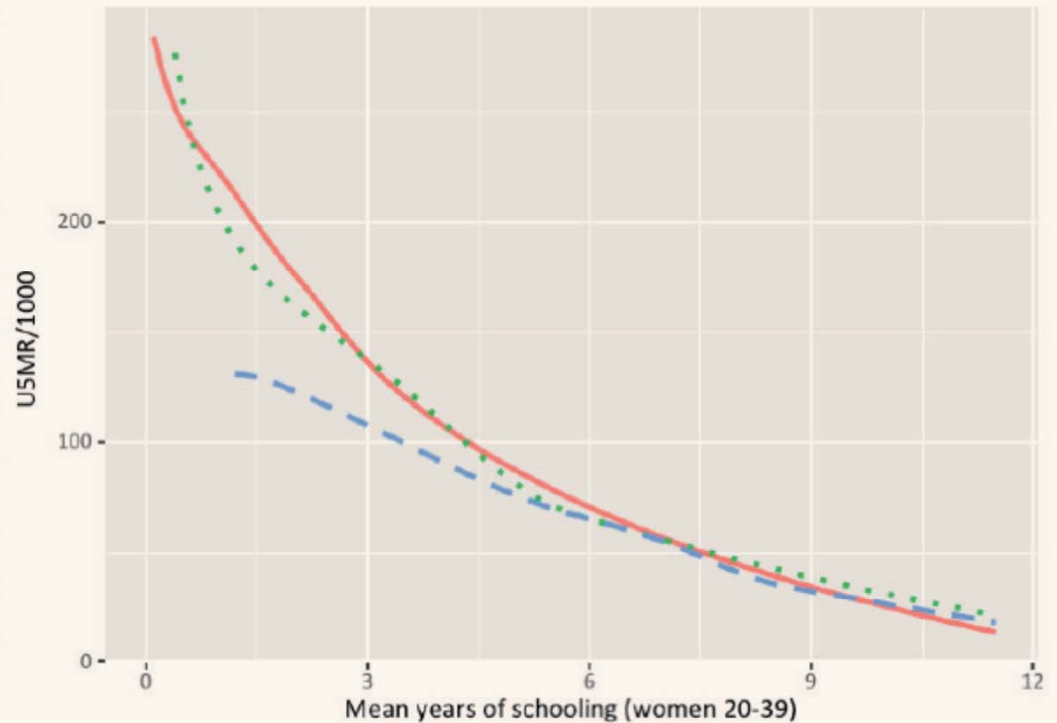


year — 1970 — 1990 — 2010

(C). Income vs child mortality



(D). Education vs child mortality



year — 1970 — 1990 — 2010

Figure 3: Effect of income (C) and education (D) respectively on the under-five mortality rate (U5MR).



Life expectancy at birth has increased dramatically across

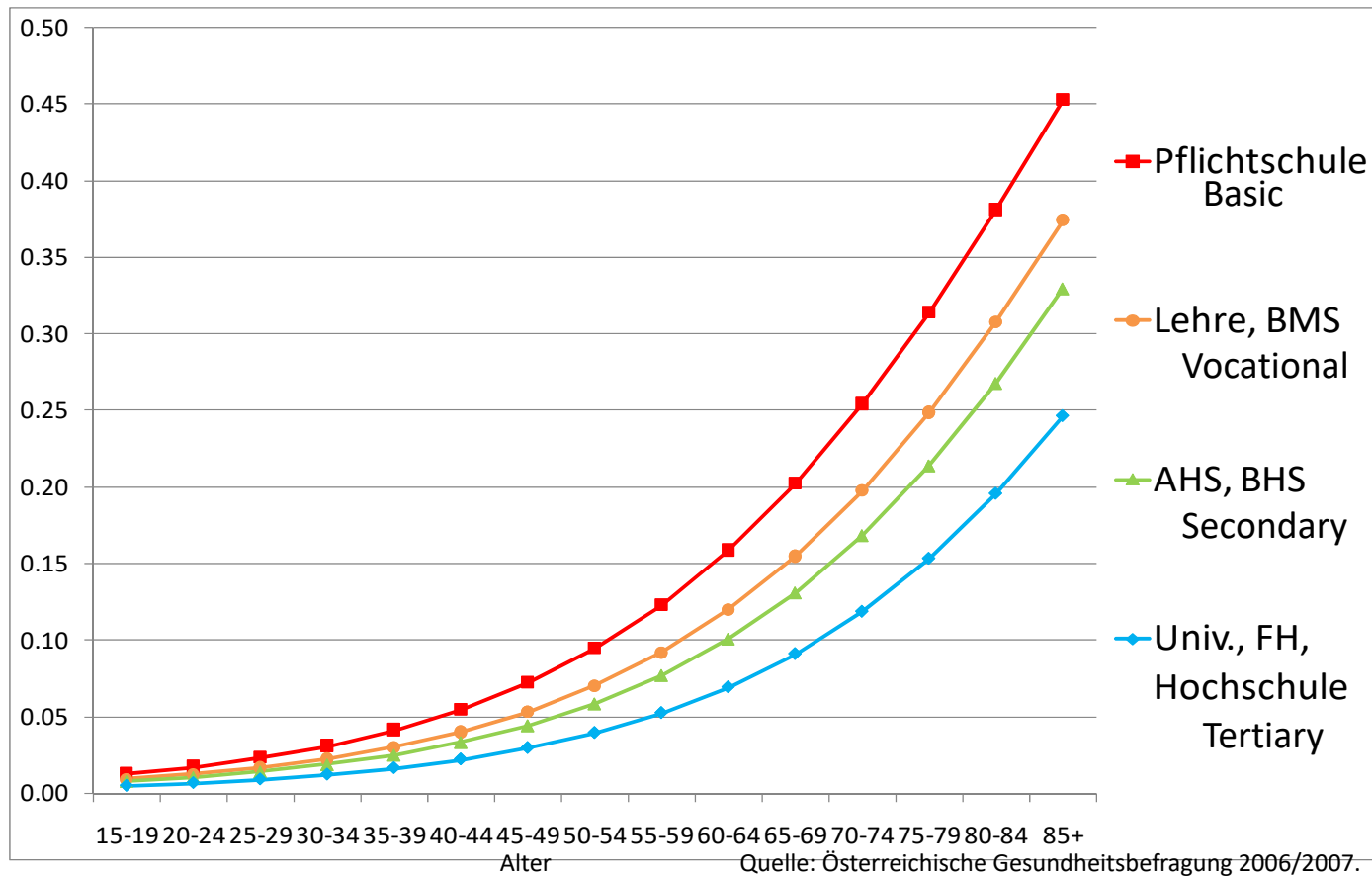
When it comes to survival, mind matters more than money

- Setting policy priorities in both developing and industrialized countries is influenced by whether income or education is the most important underlying determinant of mortality decline. The answer matters for choosing between programs that directly promote income growth and

Education and Health: Austria 2007: Proportion of women with strong disability for activities of daily life (Daly)



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Education and disability at old age

Conventional age-specific forecast:

- Disability rates increase strongly with age
- We foresee a significant increase in the elderly population

Therefore: We can expect a major increase in disability

Education- and age-specific forecast:

- In every society more educated elderly have significantly lower disability rates at given age
- We know that the future elderly will be much better educated than today's elderly

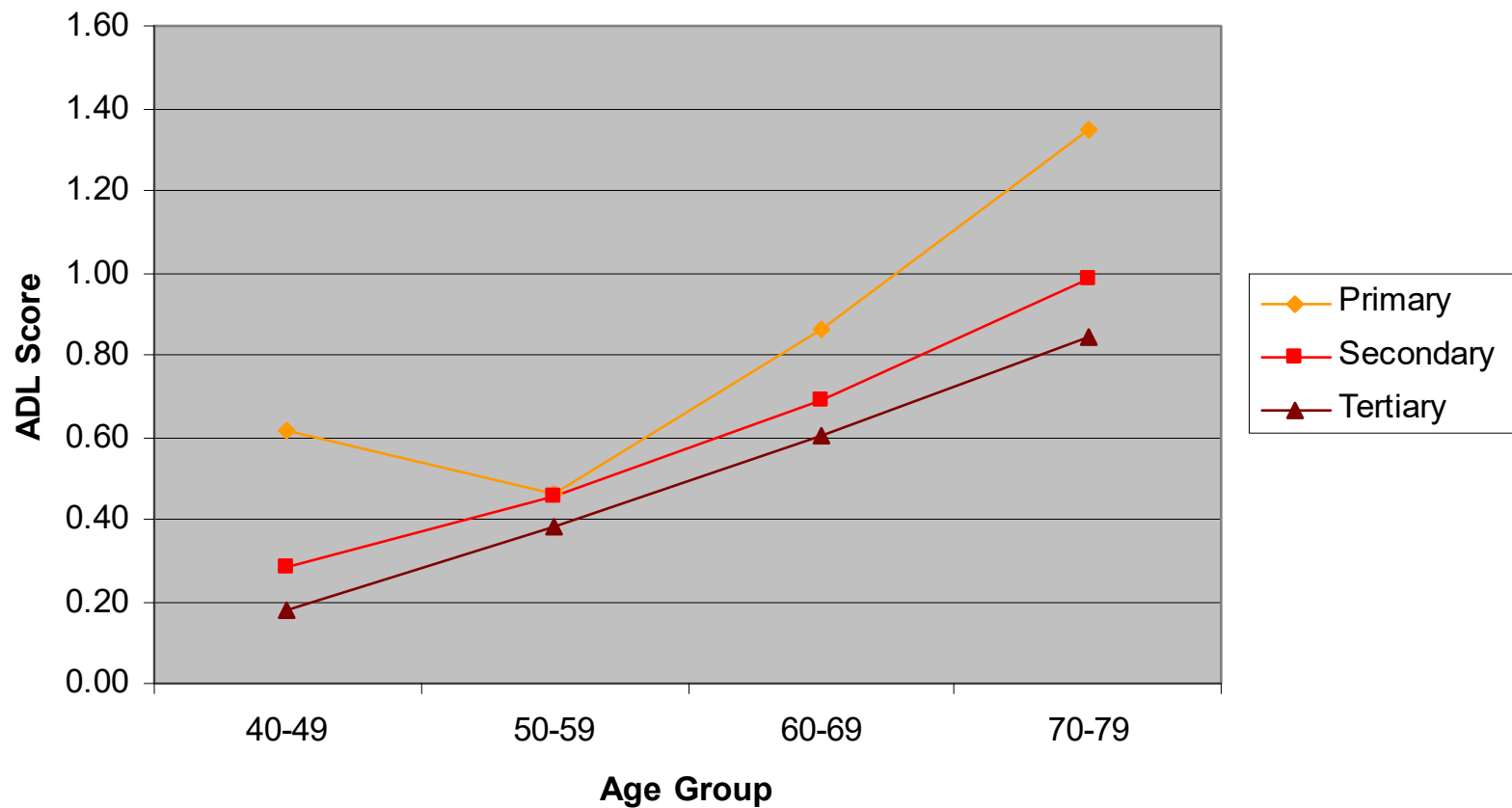
Therefore: We may expect much less of an increase in disability

Age- and Education-specific Disability Rates (ADL= Activities of Daily Life) in a Number of Asian Countries



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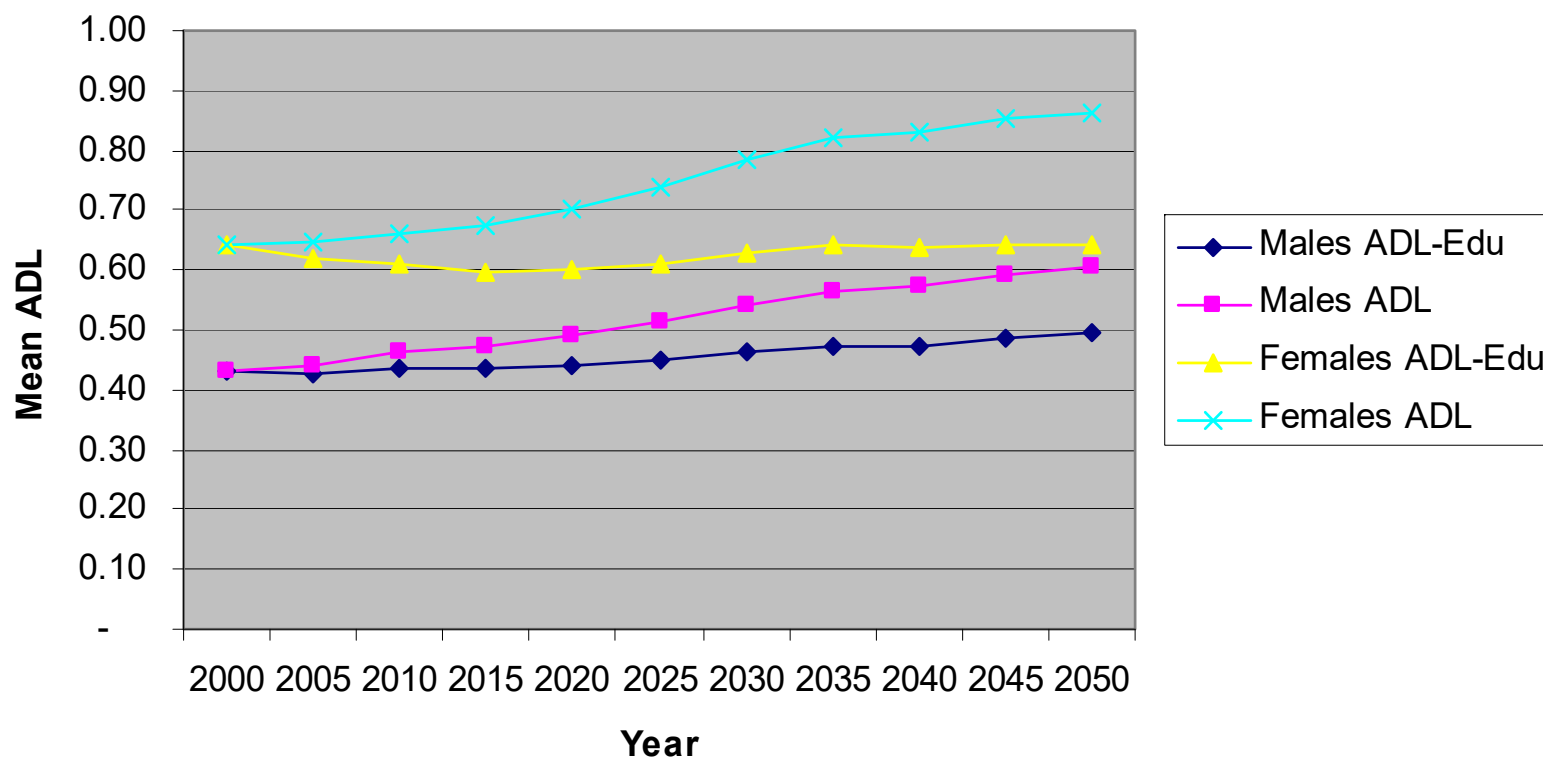
Pooled ADL Score by Age and Education Attainment



ADL score for the population aged 40-79 by sex for the period 2000-2050 for South Korea using constant ADL scenario and pooled ADL score



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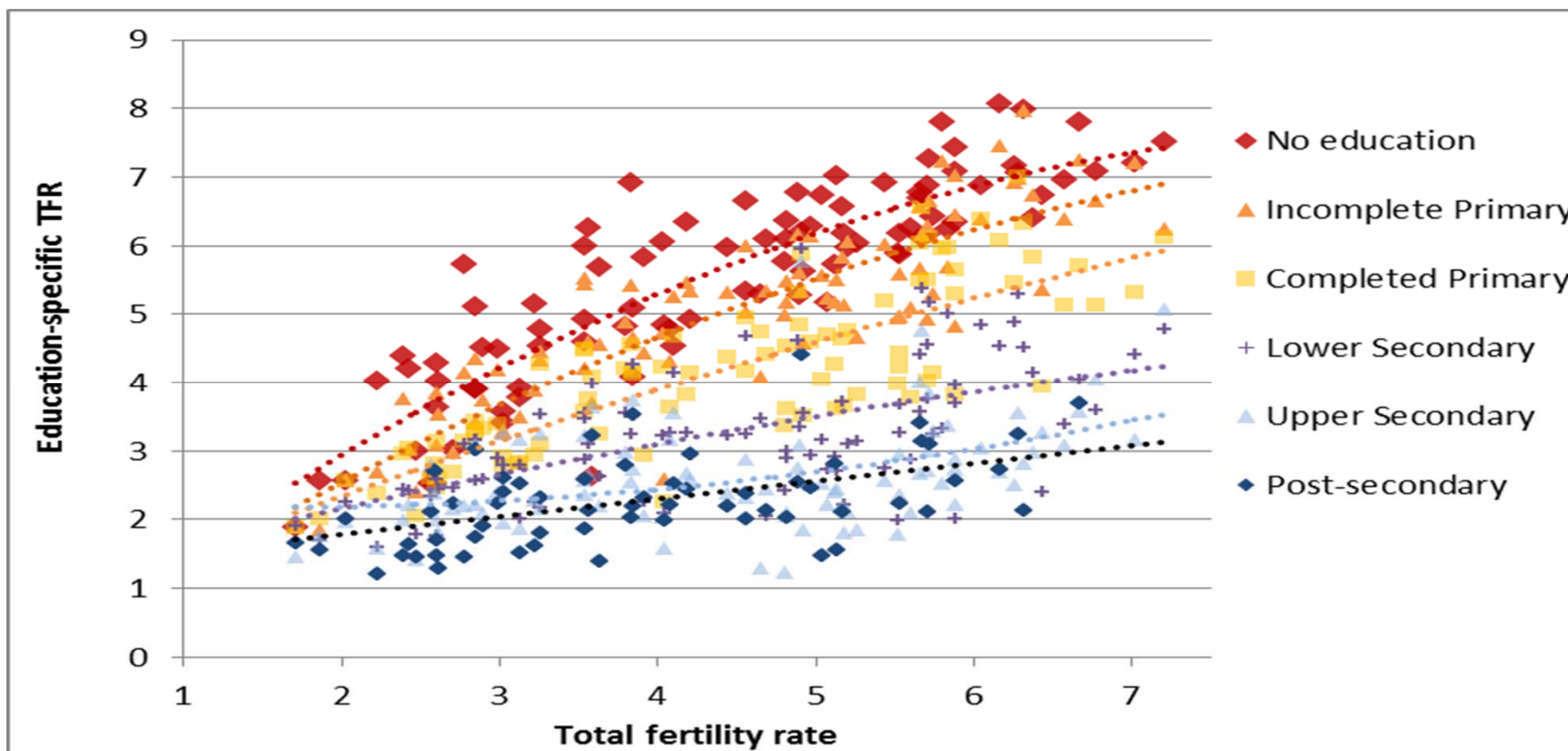


Fertility by Level of Female Education

58 DHS countries (multiple time points)



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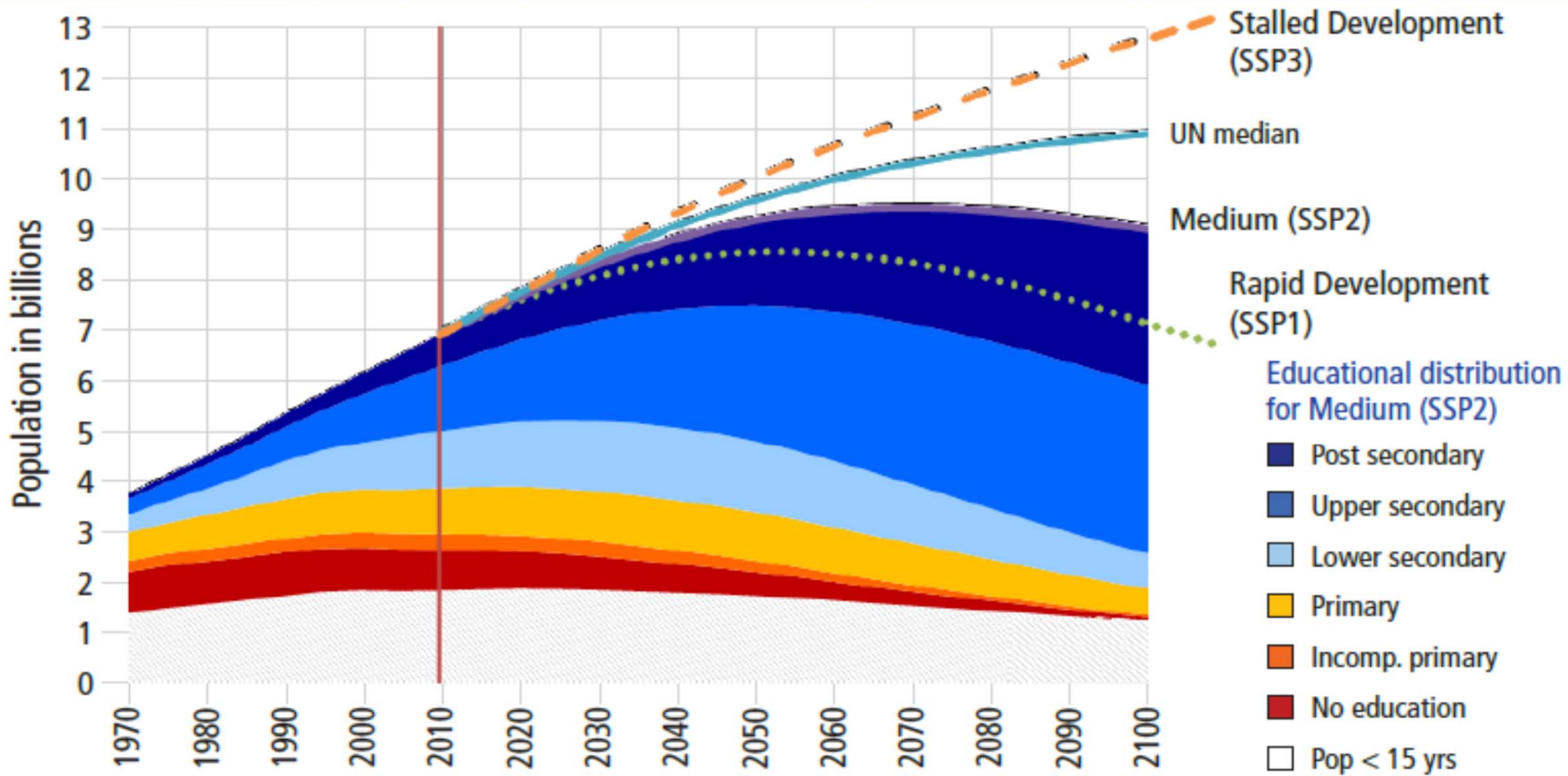


Chart 1. Historical trend and projections according to the medium scenario (SSP2) for the world population by six levels of educational attainment (see color coding). The additional lines superimposed

Agenda 2030: 17 Goals, 169 Targets



Implementing SDG3 and SDG4 leads to significantly lower world population growth than in the case of the medium scenario

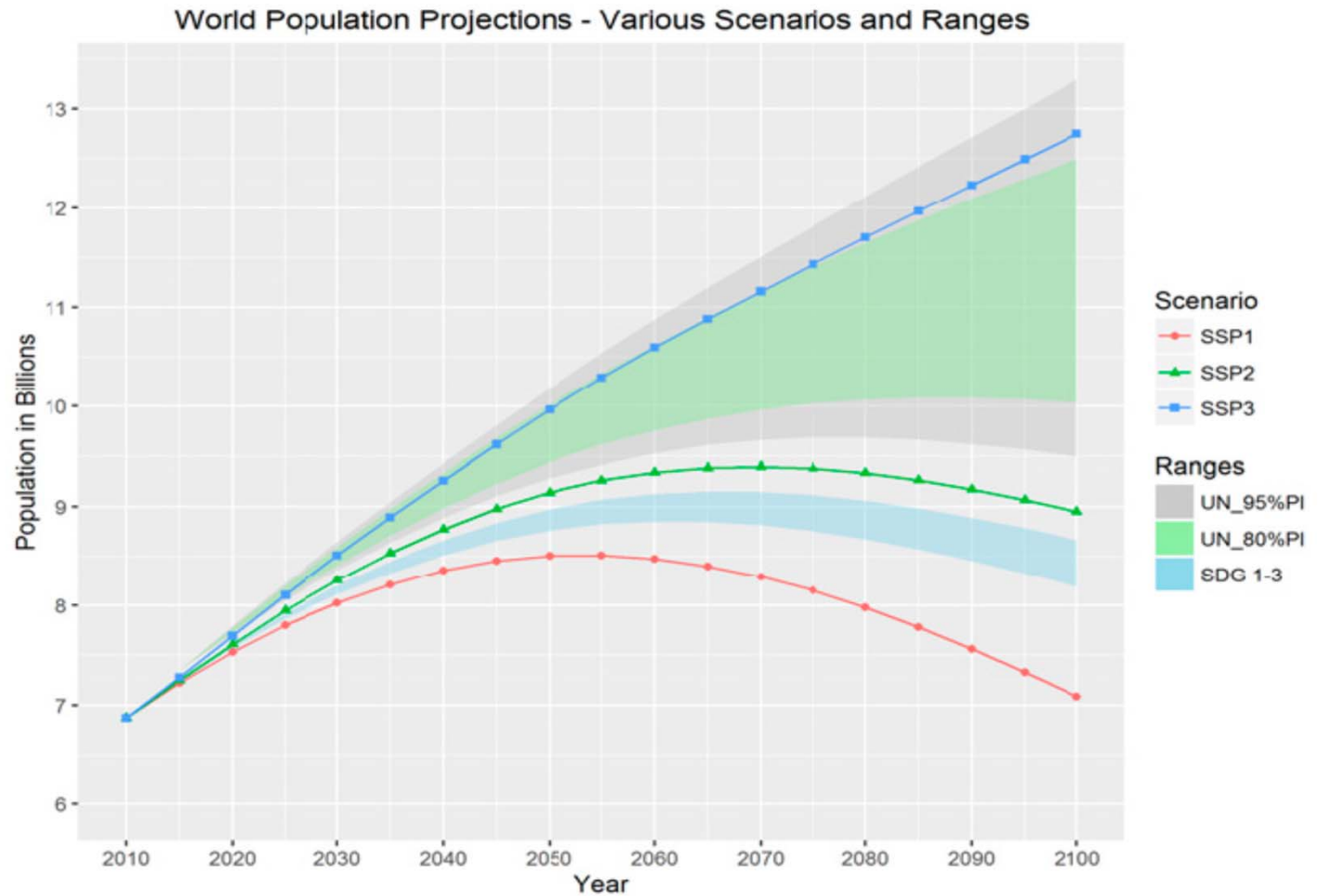
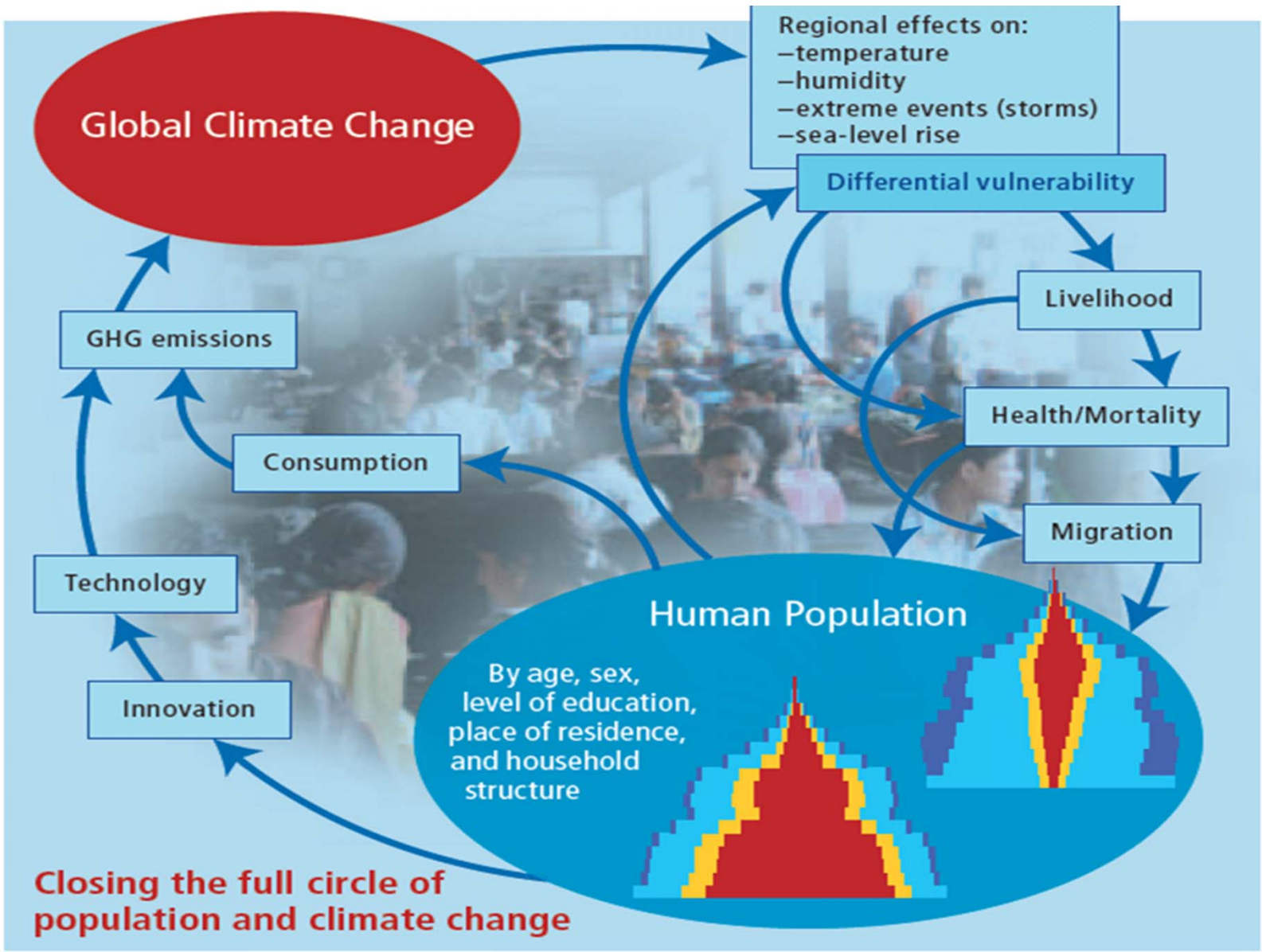


Fig. 1. Future world population growth as projected according to the three SSP scenarios, the range of SDG scenarios presented here, and the probabilistic ranges given by the UN population projections.



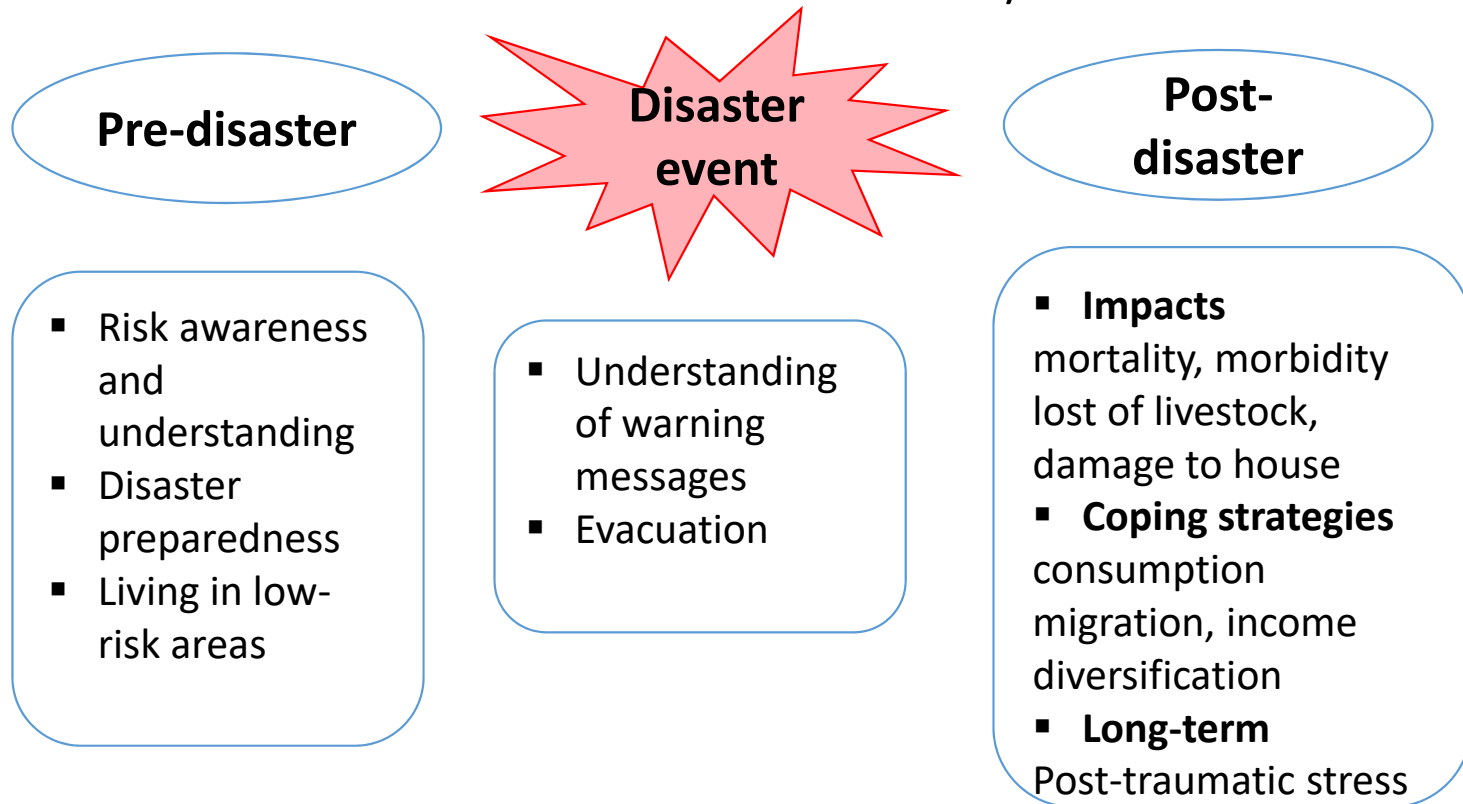


Special Issue in *Ecology & Society* :

Education and Differential Vulnerability to
Natural Disasters



Education and Disaster Vulnerability



ENVIRONMENT AND DEVELOPMENT

Universal education is key to enhanced climate adaptation

Fund more educators rather than just engineers

By Wolfgang Lutz, Raya Muttarak,
Erich Striessnig*

Over the coming years, enormous amounts of money will likely be spent on adaptation to climate change. The international community recently made pledges of up to \$100 billion per year by 2020 for the Green Climate Fund. Judging from such climate finance to date, funding for large proj-

the best available information on the number of disasters and reported fatalities from around the world (5).

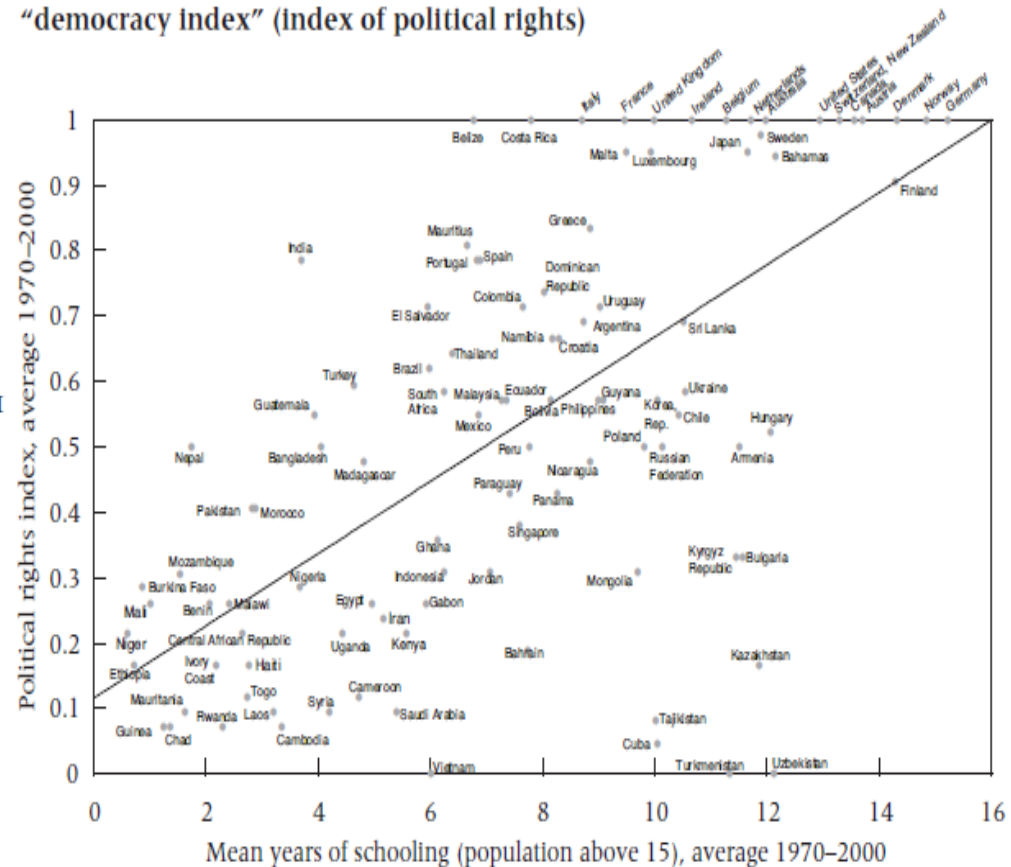
EDUCATE FEMALES, REDUCE FATALITIES. Because the literature on disaster vulnerability has conventionally emphasized economic growth while disregarding education, our statistical analysis focuses on the relative assessment of these two factors as measured by Gross Domestic Product (GDP)

Education is a key factor in enhancing democracy

Demography, Education, and Democracy: Global Trends and the Case of Iran

WOLFGANG LUTZ
JESÚS CRESPO CUARESMA
MOHAMMAD JALAL ABBASI-SHAVAZI

FIGURE 3 Relationship between mean years of schooling and the “democracy index” (index of political rights)



Conclusions for Population Policy



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All bigger companies have Human Resource management to enhance the productivity and performance of the company

For countries

**National Human Resource Management
should be seen as the
Population Policy for the 21st Century**