Wittgenstein Centre
FOR DEMOGRAPHY AND GLOBAL HUMAN CAPITAL

Cognition Driven Demographic Transition: What is the final phase?

VID Conference, 2 December 2015

Wolfgang Lutz

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

Vienna Institute of Demography

ÖAW Austrian Academy of Sciences

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Who needs this kind of analysis?

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- Identity Sciences and Intervention Sciences
- For the long-term future of humanity the number and human capital (education and health)
- Achieving SDGs will greatly depend on those trends
- Long-term population and human capital are also key variables in the assessing to mitigative and adaptive capacity to climate change.

Adding Education to Age and Sex:
What is the education/cognition effect?

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We have good reasons to assume "functional causality" from cognition/education to health, fertility and behavior. Education is not just a proxy for SES (Socio-Economic Status).

- Every learning experience builds new synapses in our brains and makes us "physiologically different" (Eric Kandel)
- Enhancement of cognitive skills
  - change risky behavior
  - extend personal planning horizon
  - learn from past damage
- Better access to relevant information
- Higher income at the individual and household level

OXFORD

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Wittgenstein Centre FOR DEMOGRAPHY AND GLOBAL HUMAN CAPITAL

EXECUTIVE SUMMARY

WORLD POPULATION & HUMAN CAPITAL IN THE TWENTY-FIRST CENTURY

EDITED BY
WOLFGANG LUTZ | WILLIAM P. BUTZ | SAMIR KC

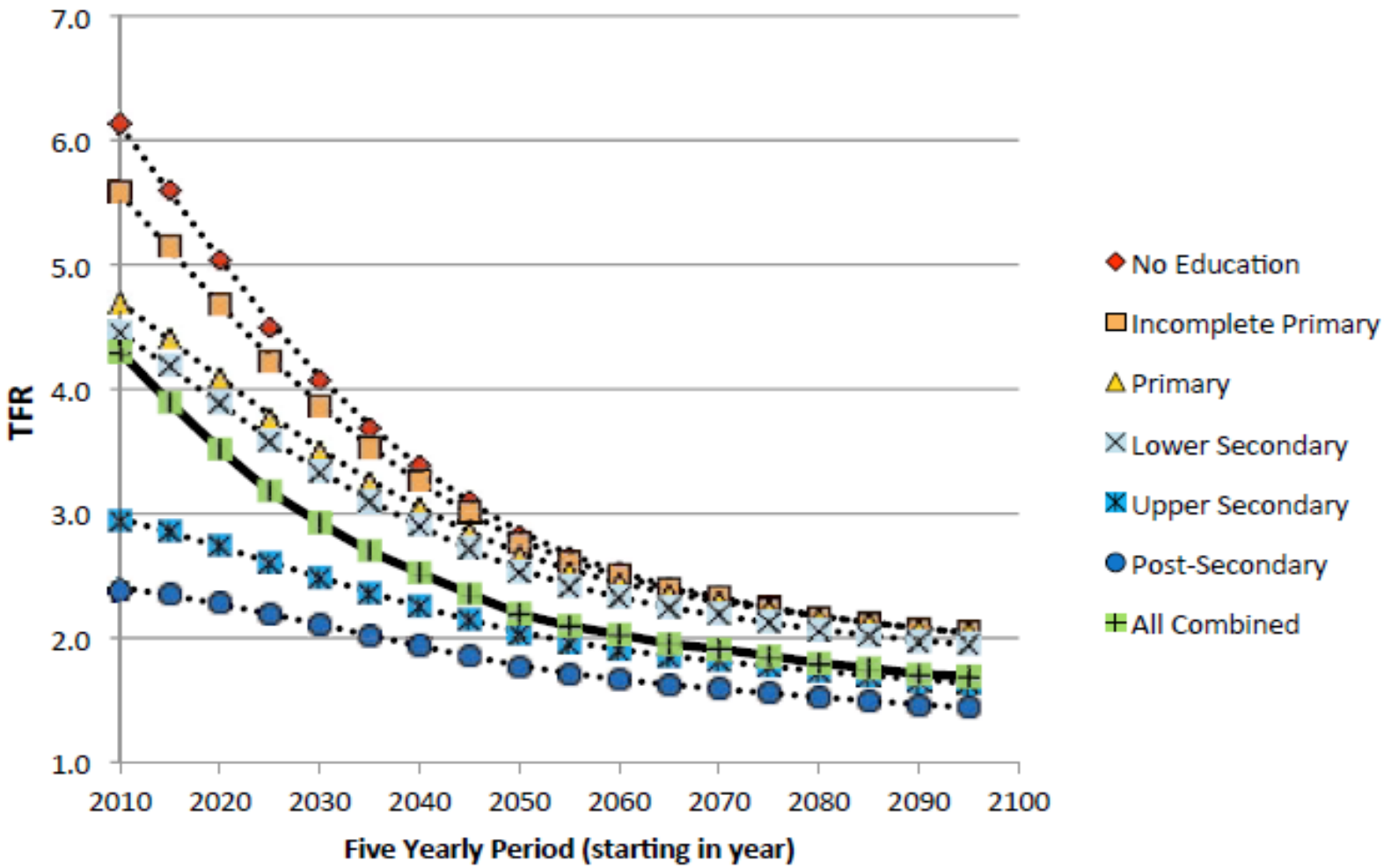
DEDICATED TO THE MEMORY OF NATHAN KEYFITZ ON THE OCCASION OF HIS 100TH BIRTH YEAR, 2013.

Oxford University Press

2014

1056 pages,
26 lead authors,
46 contributing authors,
550 expert assessments,
191 country tables

Fertility by Education in Kenya Empirical (2010) and Assumed (IIASA)



REVIEW

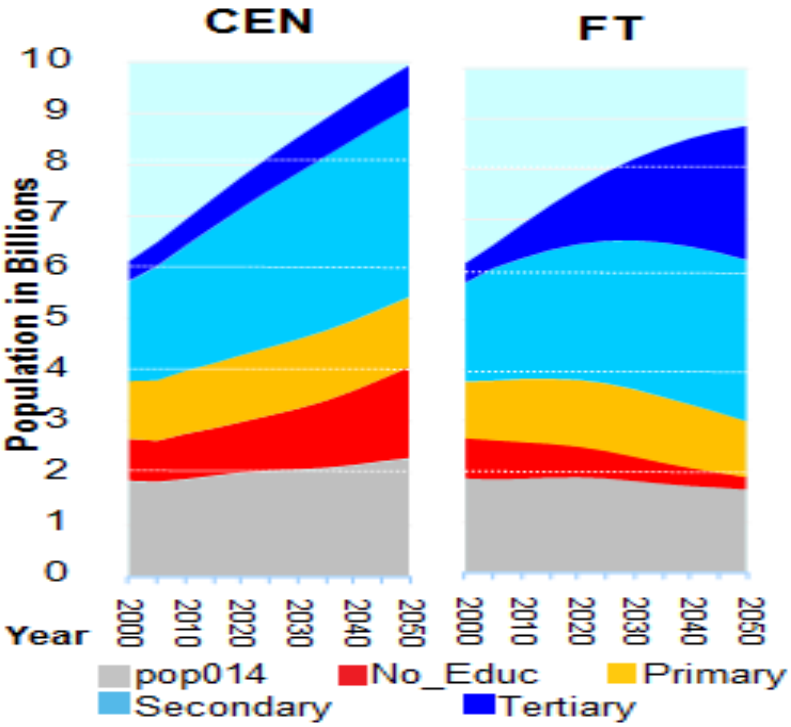
Global Human Capital: Integrating Education and Population

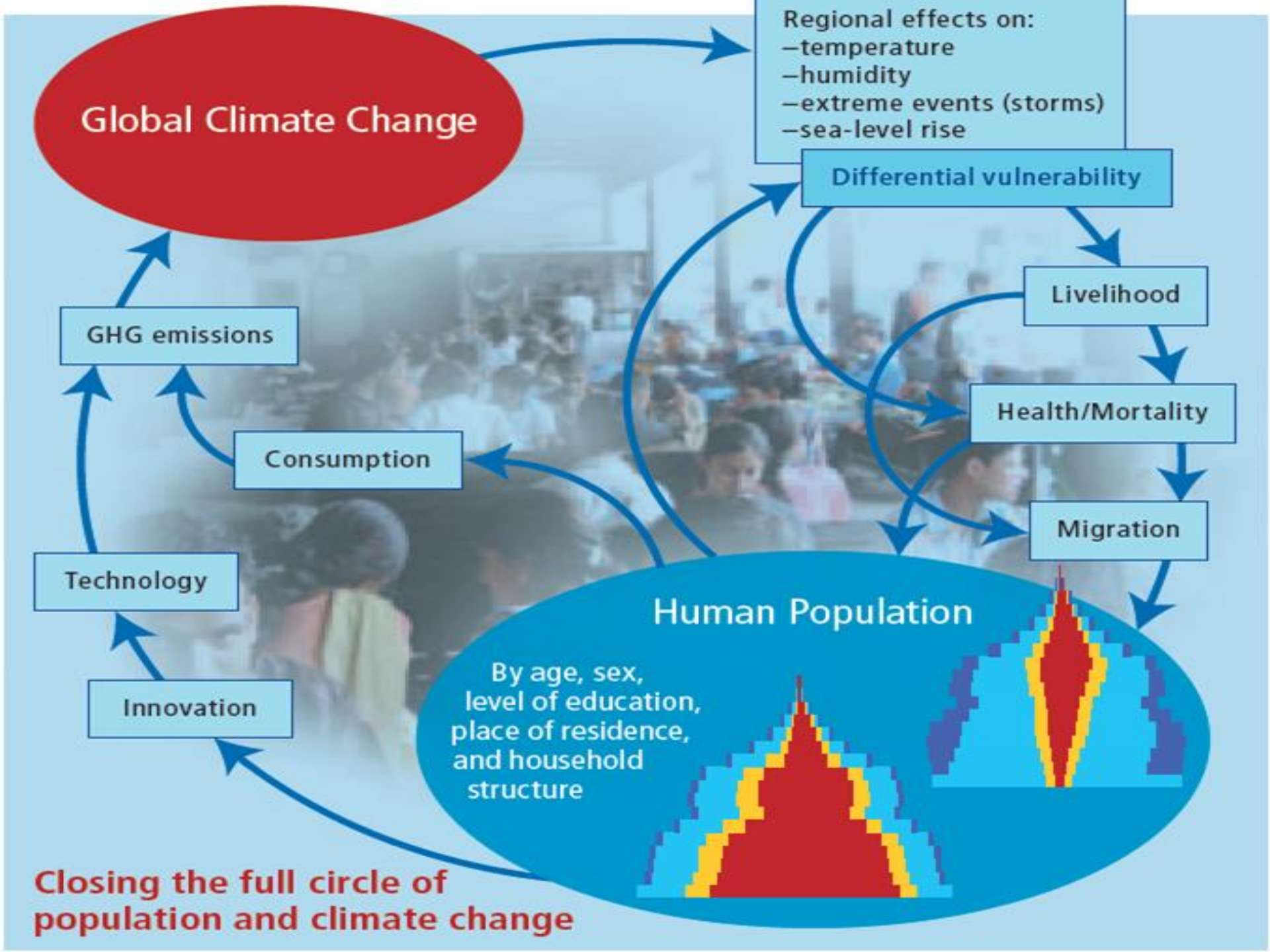
Wolfgang Lutz[1,2,3,4]* and Samir KC[1,2]

Almost universally, women with higher levels of education have fewer children. Better education is associated with lower mortality, better health, and different migration patterns. Hence, the global population outlook depends greatly on further progress in education, particularly of young women.

Assuming identical education-specific fertility trends, different education scenarios make a difference of more than 1 billion people by 2050.

- CEN gives the world population trend according to the most pessimistic scenario assuming that no new schools will be built
- FT gives the most optimistic scenario assuming that countries can achieve the rapid education expansion that South Korea achieved




Global Climate Change
Regional effects on:
–temperature
–humidity
–extreme events (storms)
–sea-level rise
Differential vulnerability
Livelihood
Health/Mortality
Migration
GHG emissions
Consumption
Technology
Innovation
Human Population
By age, sex,
level of education,
place of residence,
and household
structure
Closing the full circle of
population and climate change

REPRINT

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Special Feature

IIASA RP-14-001 • March 2014

Education and Differential Vulnerability to Natural Disasters

Guest Editors: William P. Butz, Wolfgang Lutz, Jan Sendzimir
Managing Editor: Stefanie Andruchowitz

Ecology and Society

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

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E&S

ENVIRONMENT AND DEVELOPMENT

Universal education is key to enhanced climate adaptation

Fund more educators rather than just engineers

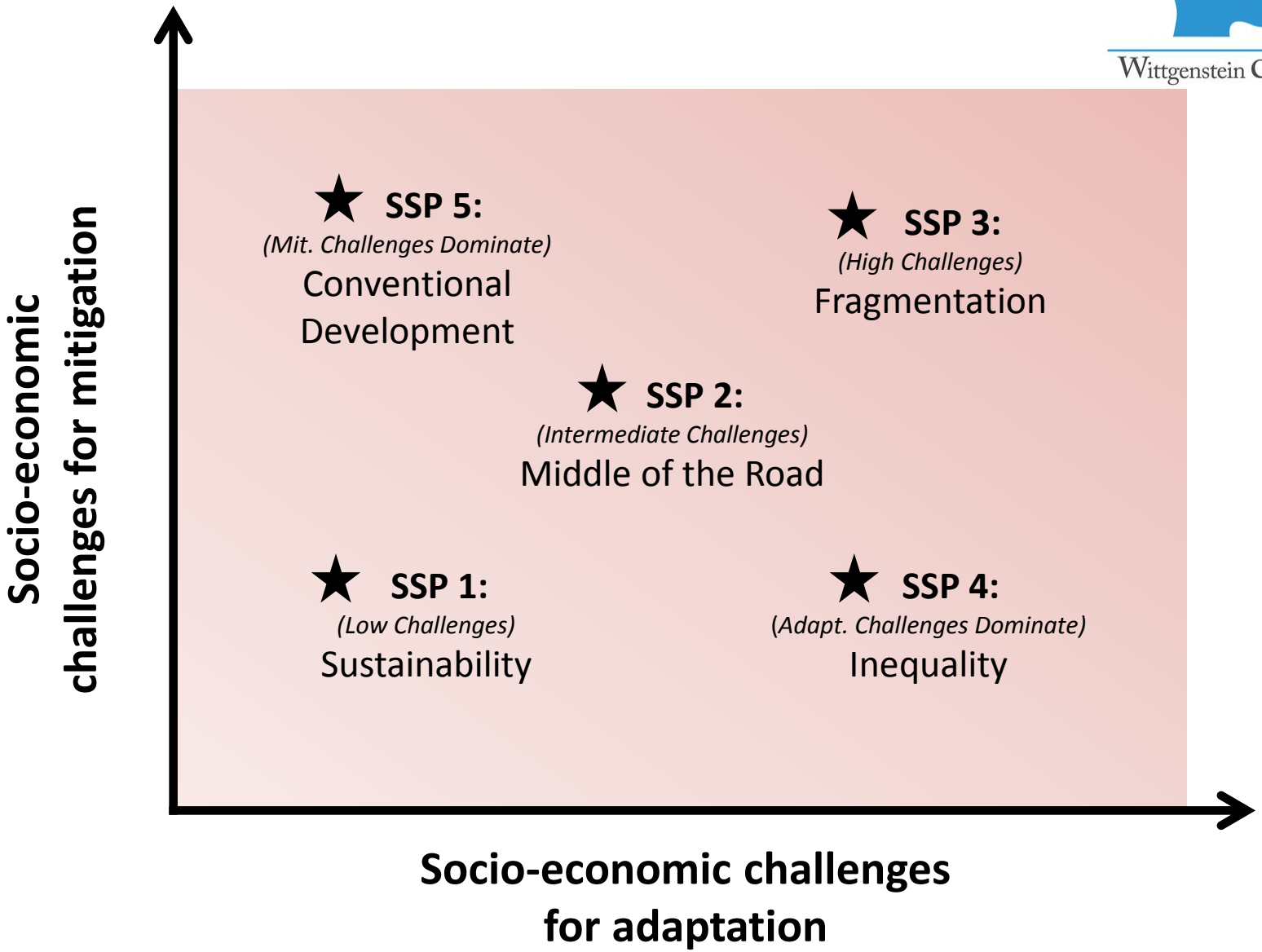
By **Wolfgang Lutz, Raya Muttarak, Erich Striessnig***

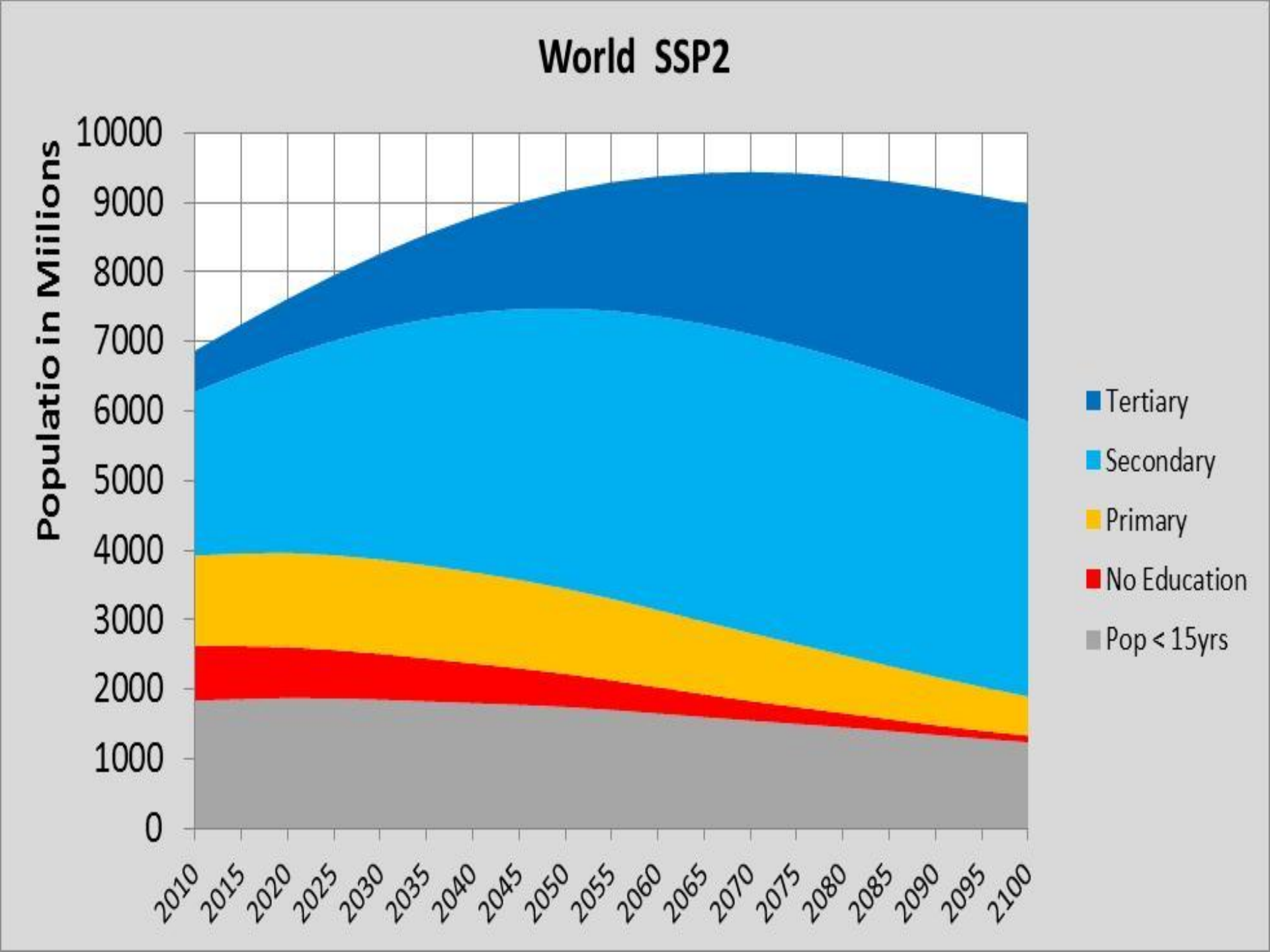
Over the coming years, enormous amounts of money will likely be spent on adaptation to climate change. The international community recently made pledges of up to $100 billion per year by 2020 for the Green Climate Fund. Judging from such climate finance to date, funding for large proj-

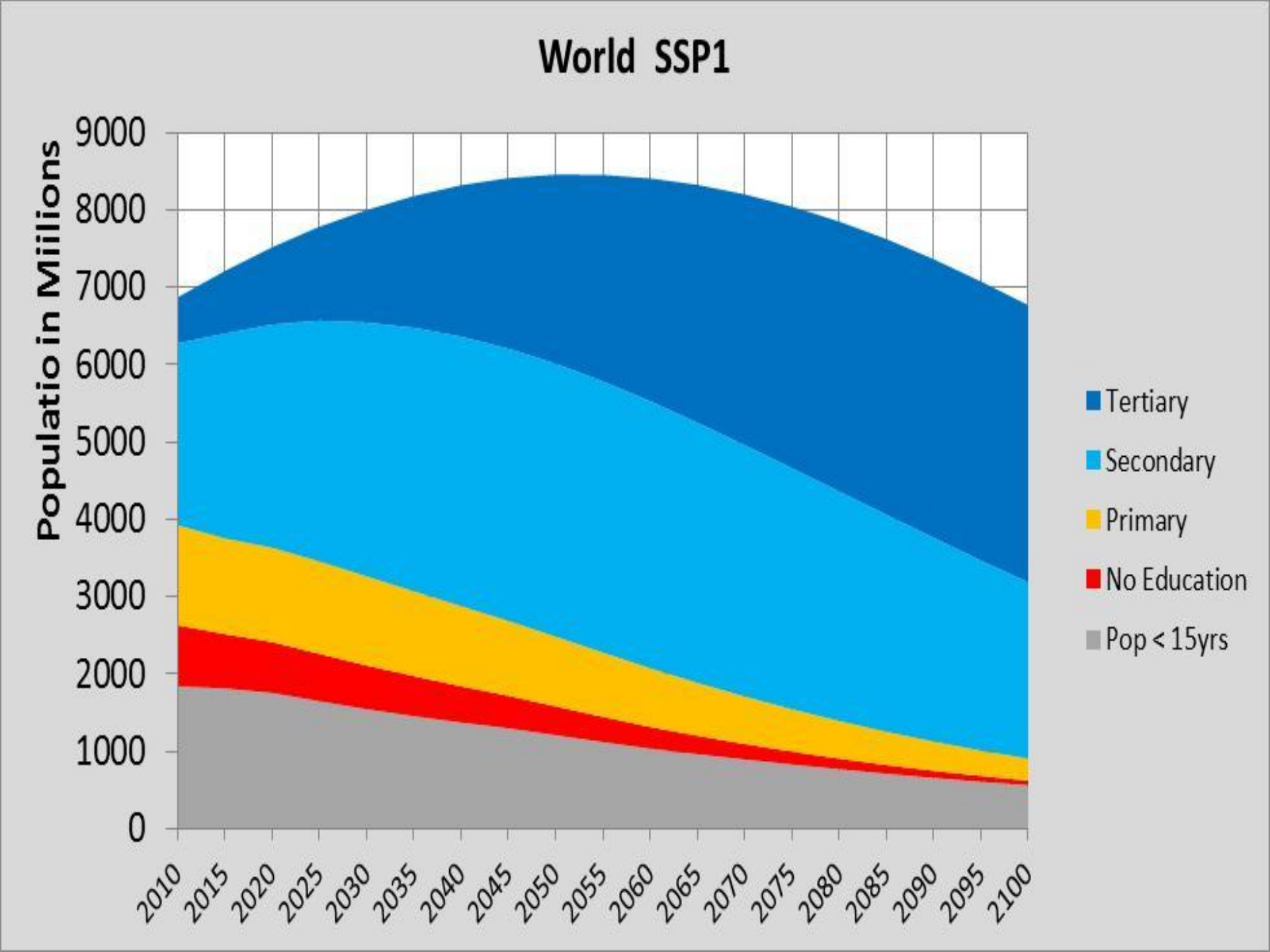
the best available information on the number of disasters and reported fatalities from around the world (*5*).

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)

Shared Socioeconomic Pathways (SSP) Logic




World SSP2
Populatio in Miilions
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
Tertiary
Secondary
Primary
No Education
Pop < 15yrs


World SSP1
Populatio in Miilions
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2015
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2035
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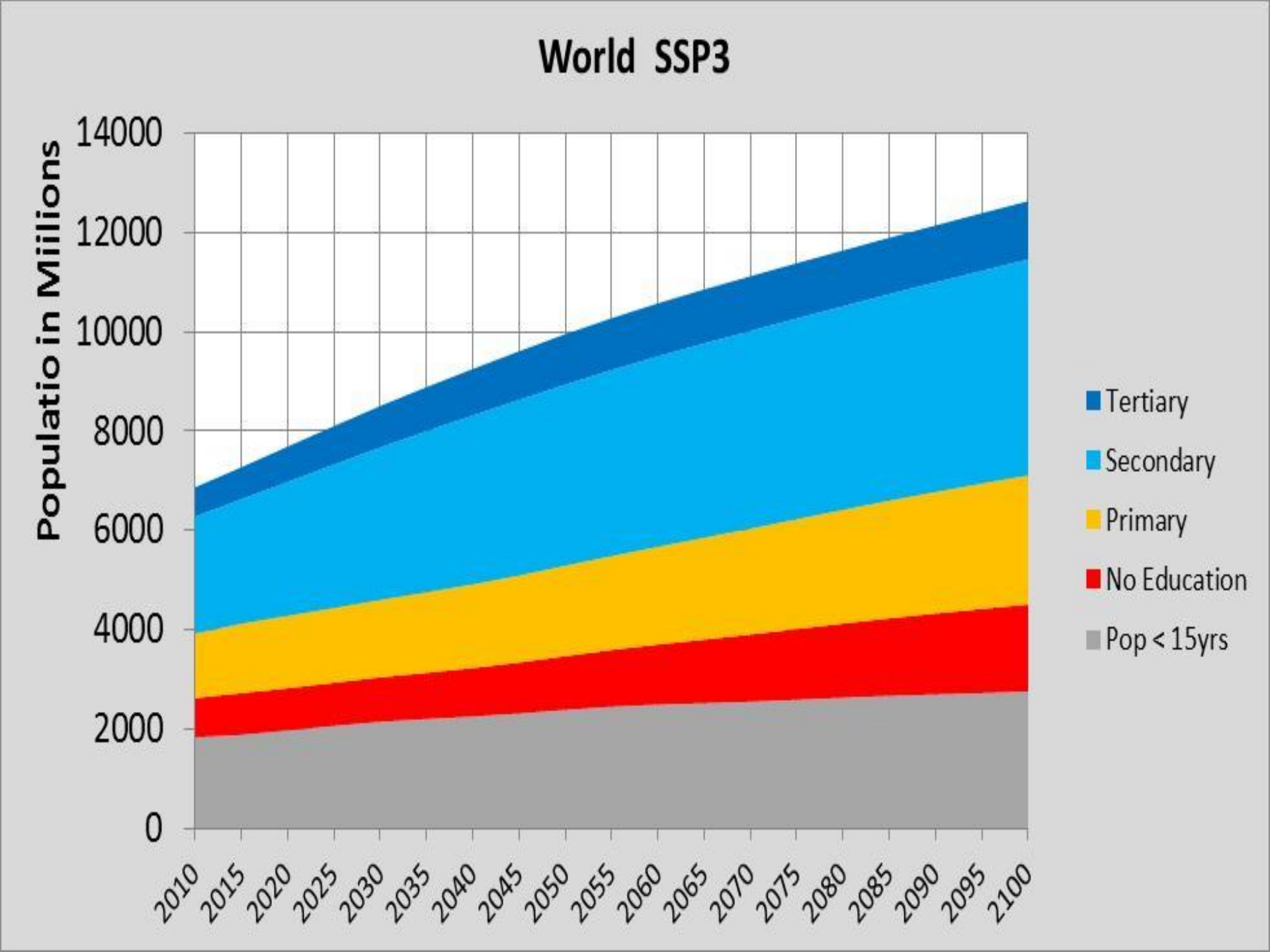
Tertiary
Secondary
Primary
No Education
Pop < 15yrs


World SSP3
Populatio in Millions
14000
12000
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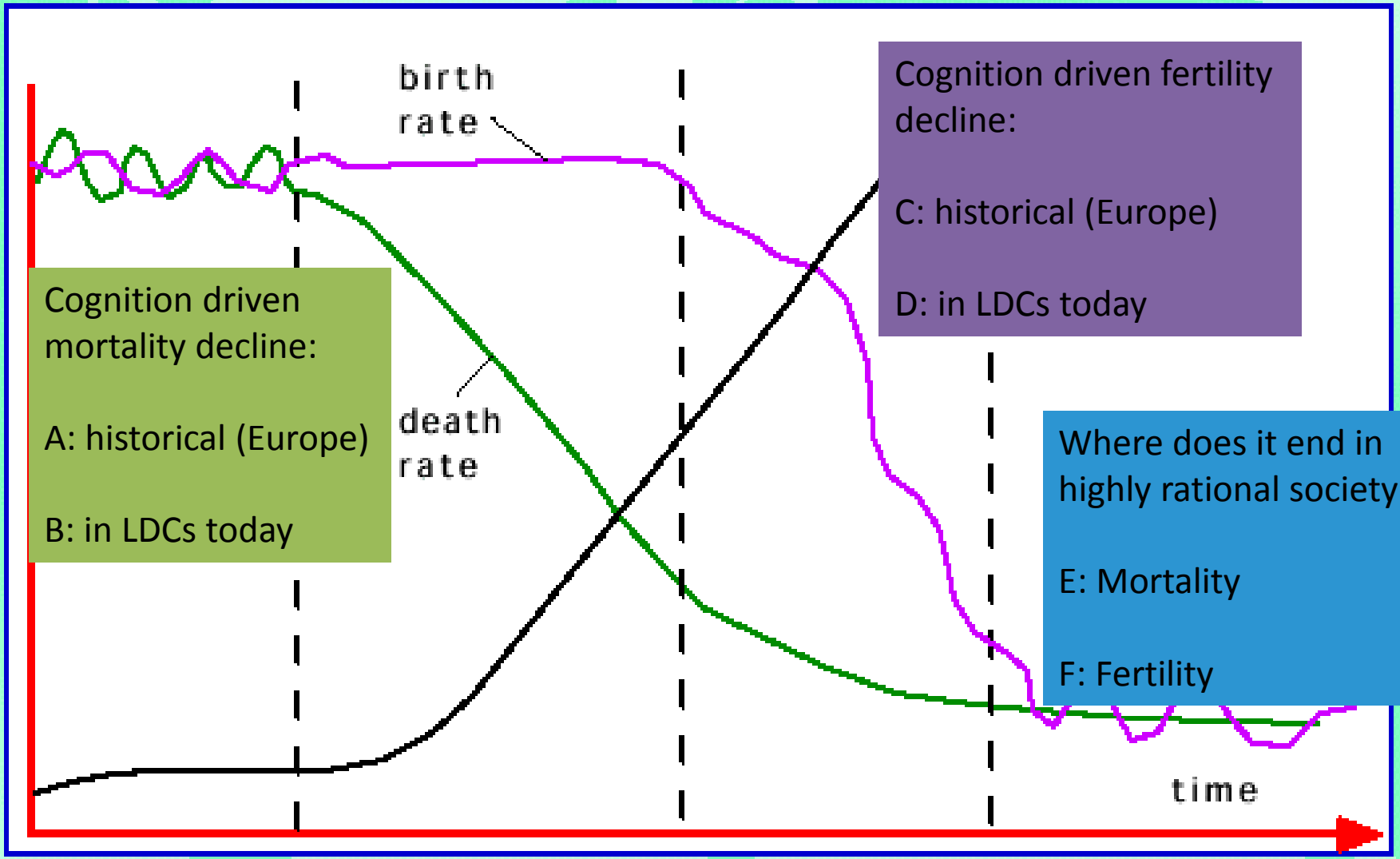
Tertiary
Secondary
Primary
No Education
Pop < 15yrs

The Demographic Transition



Stage 1	Stage 2	Stage 3	Stage 4
High birth rate high, but fluctuating death rate	Declining death rates and continuing high birth rates	Declining birth and death rates	Low death rates and low, but flutuating birth rates

Cognition in the Fertility Transition

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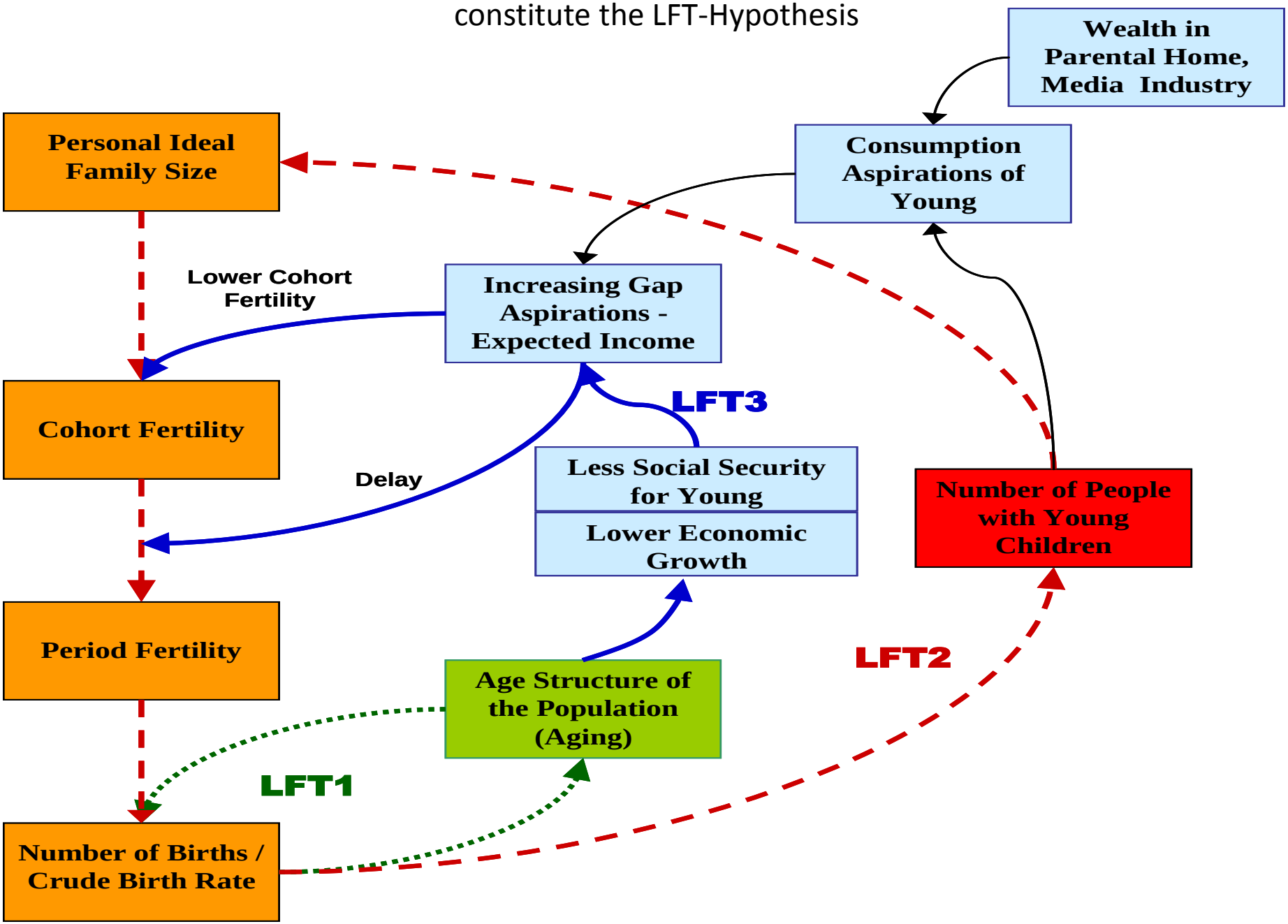
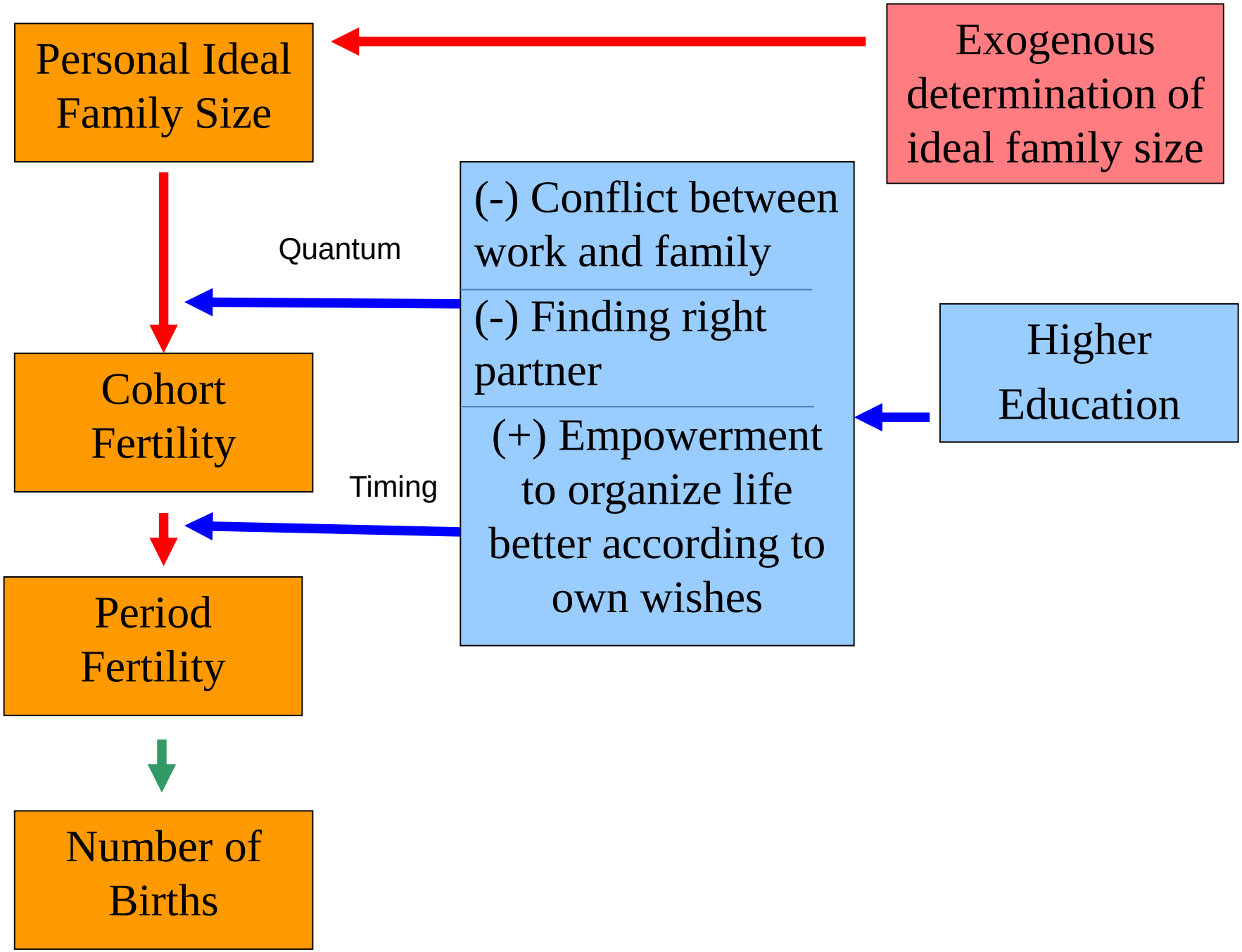
- Ansley Coale (1974): One of three preconditions for lasting fertility decline: “Fertility must be within the calculus of conscious choice”
- Philippe Aries (1980): “The great change came when husband and wife began to plan their own lives and the births of their offspring. They introduced foresight and organization where formally there had been only automatic unplanned behavior …”.
- Etienne van de Walle (1992): “Numeracy and the conceptualization of family size was a necessary condition for adopting family limitation”

The demographic (LFT-1), sociological (LFT-2) and economic (LFT-3) mechanisms that constitute the LFT-Hypothesis




Personal Ideal Family Size
Exogenous determination of ideal family size
(-) Conflict between work and family
(-) Finding right partner
(+) Empowerment to organize life better according to own wishes
Higher Education
Quantum
Timing
Cohort Fertility
Period Fertility
Number of Births

Implications for Future Fertility by Level of Education

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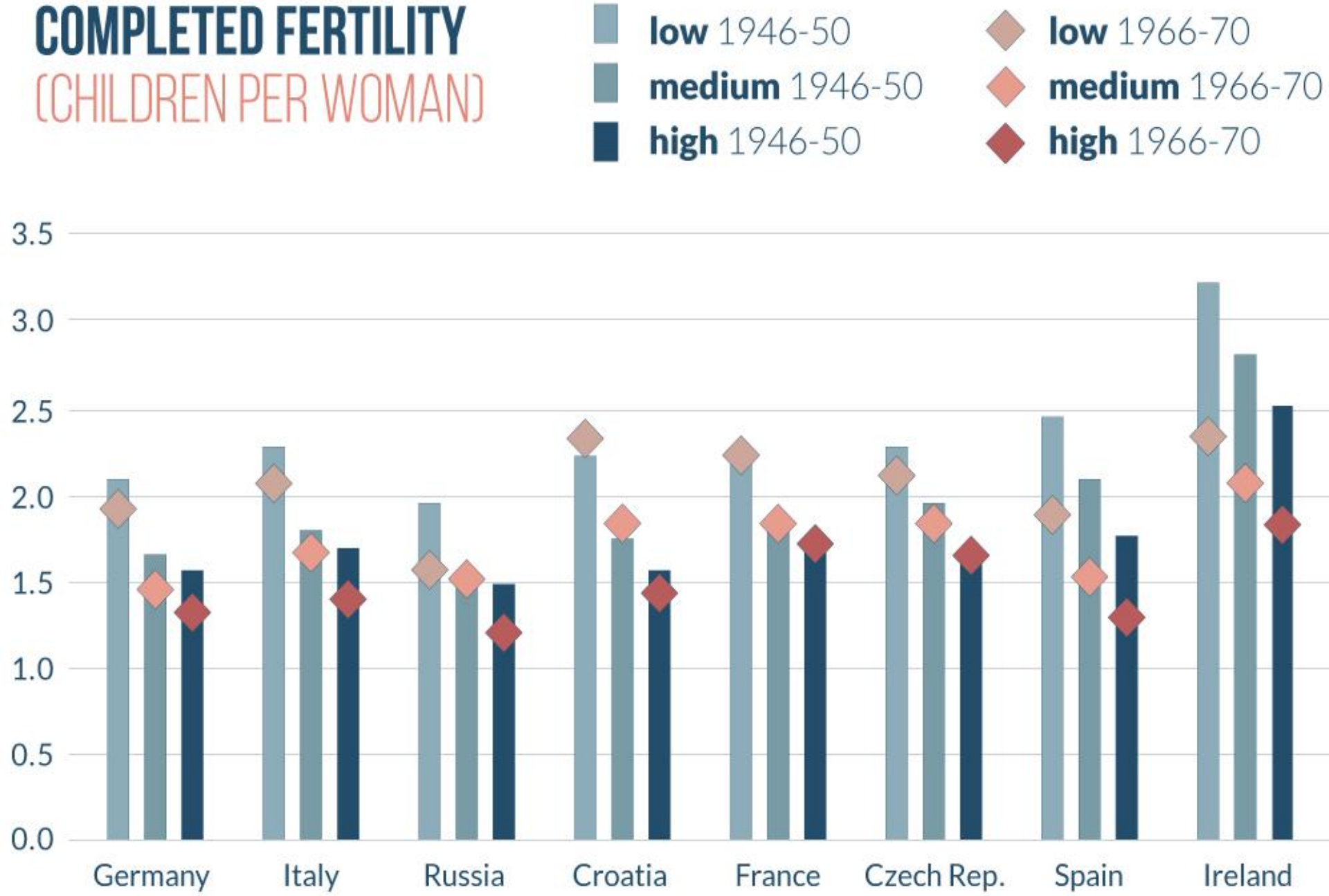
Two main determinants:

- **Desired family size** (exogenously determined)
- **Empowerment** to realize desire and overcome obstacles, most importantly
  - A: Avoiding unplanned pregnancies
  - B: Conflict between career and family
  - C: Partnership
  - D: Biological clock

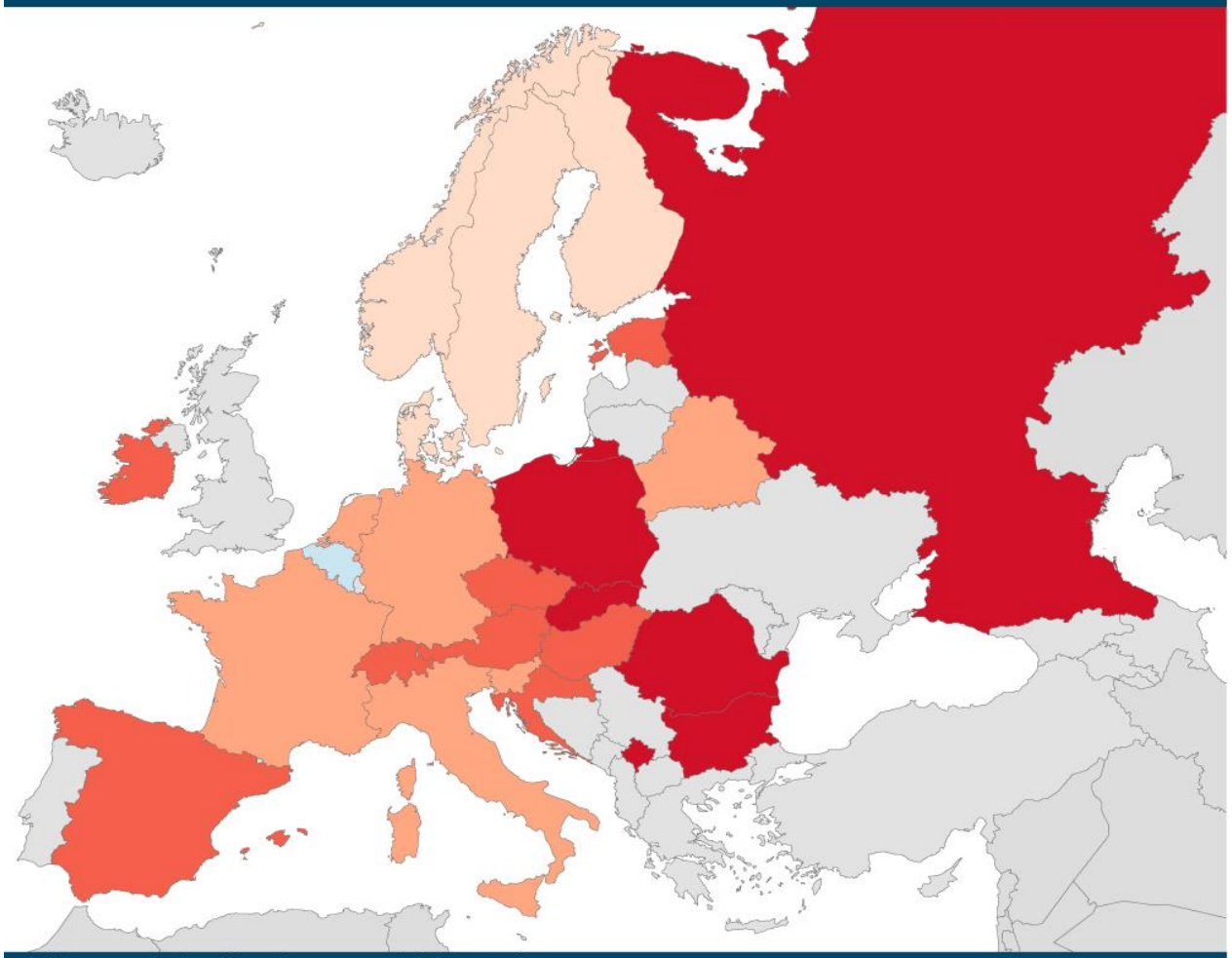
Empowerment generally increases with education – but some of the obstacles may also increase

What is the net outcome of these forces ?

COMPLETED FERTILITY
(CHILDREN PER WOMAN)



DIFFERENCE IN COMPLETED COHORT FERTILITY BY EDUCATION, WOMEN BORN 1950 - 1959



Difference in fertilty of women with low and high education, in children per woman

Min: Belgium - 0.03 | Max: Kosovo 2.34

- ≤ 0.00
- > 0.00 to 0.25
- > 0.25 to 0.50
- > 0.50 to 0.75
- > 0.75
- No data

Data: EURREP | Geometry: EUROSTAT

Cartography: Eder/Potančoková, ÖAW/VID DataLab

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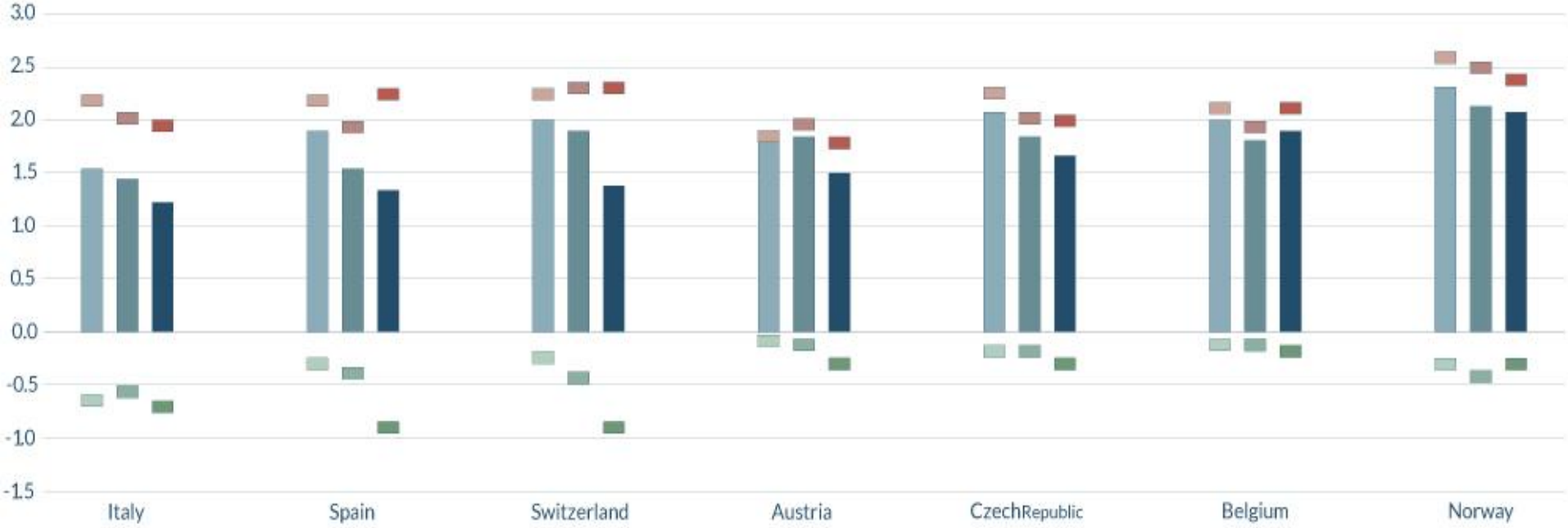
MEAN INTENDED FAMILY SIZE BY LEVEL OF EDUCATION AT AGE 25-29, COMPLETED COHORT FERTILITY, AND THE GAP BETWEEN INTENDED AND COMPLETED FERTILITY (CHILDREN PER WOMAN), WOMEN BORN IN THE LATE 1960



Low Medium High

Completed fertility

Mean intended family size

Gap

Low = no education, primary and lower secondary
Medium = upper secondary
High = tertiary

Sources: Mean intended number of children: calculations are based on the 1990s Family and Fertility Surveys. Completed fertility computations based on the following datasets: Austrian Mikrozensus 2012, Belgian GGS 2008-10, Czech census 2011, Italian Familia e sogetti sociali 2009, Norwegian GGS 2007-08, Spanish census 2011, Swiss Household Panel survey 2013.

Journal of the
Royal Statistical Society
SERIES A
Statistics
in Society

J. R. Statist. Soc. A (2009)
172, *Part* 4, *pp.* 701–705

Editorial: Towards a world of 2–6 billion well-educated and therefore healthy and wealthy people

… who will be able to successfully adapt to already unavoidable climate change