Wittgenstein Centre

FOR DEMOGRAPHY AND GLOBAL HUMAN CAPITAL

The Demography of Global Human Capital Formation and Economic Performance

Wolfgang Lutz

IGIER, 9 June 2011

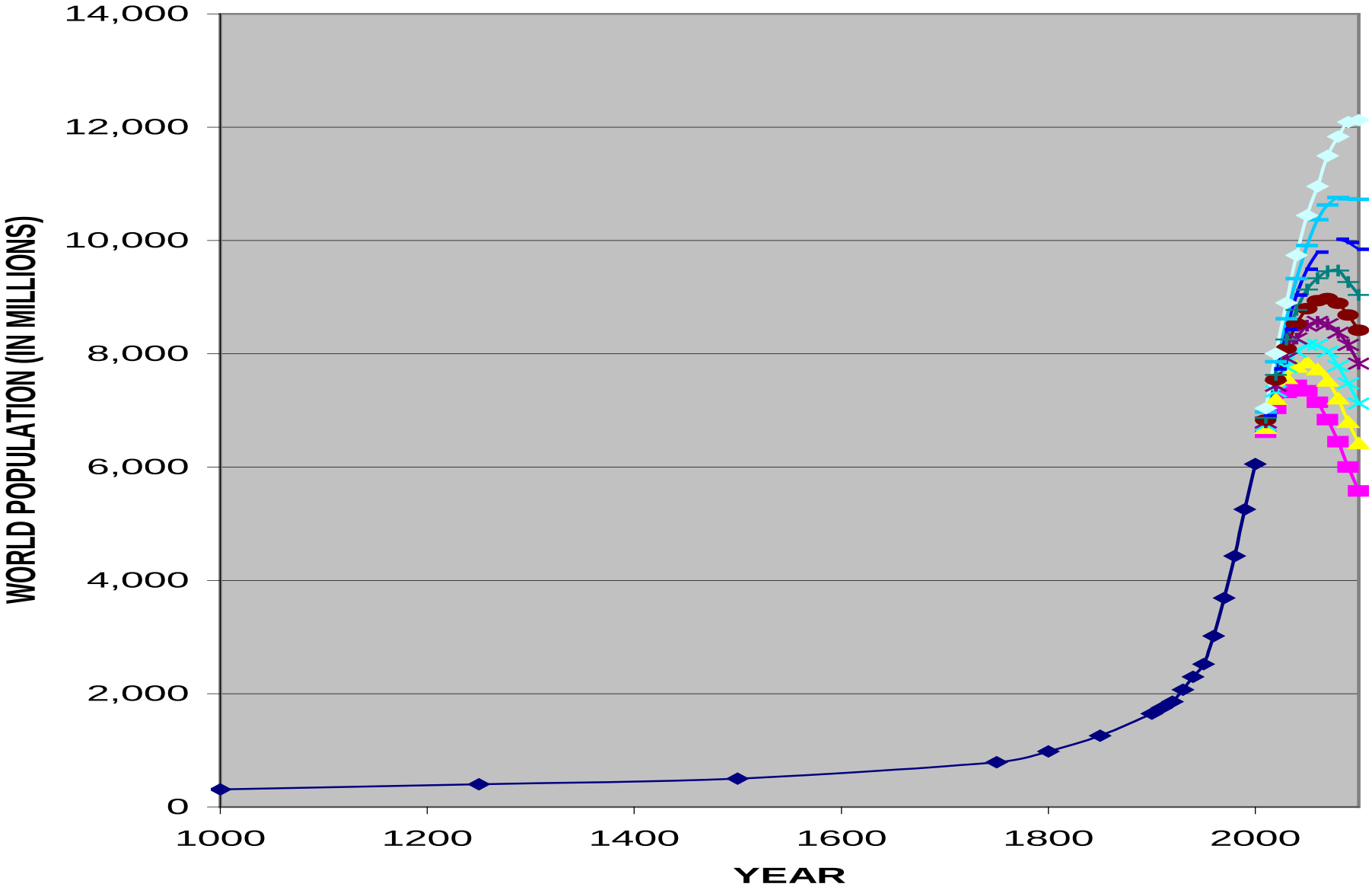
International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

Vienna Institute of Demography

ÖAW Austrian Academy of Sciences

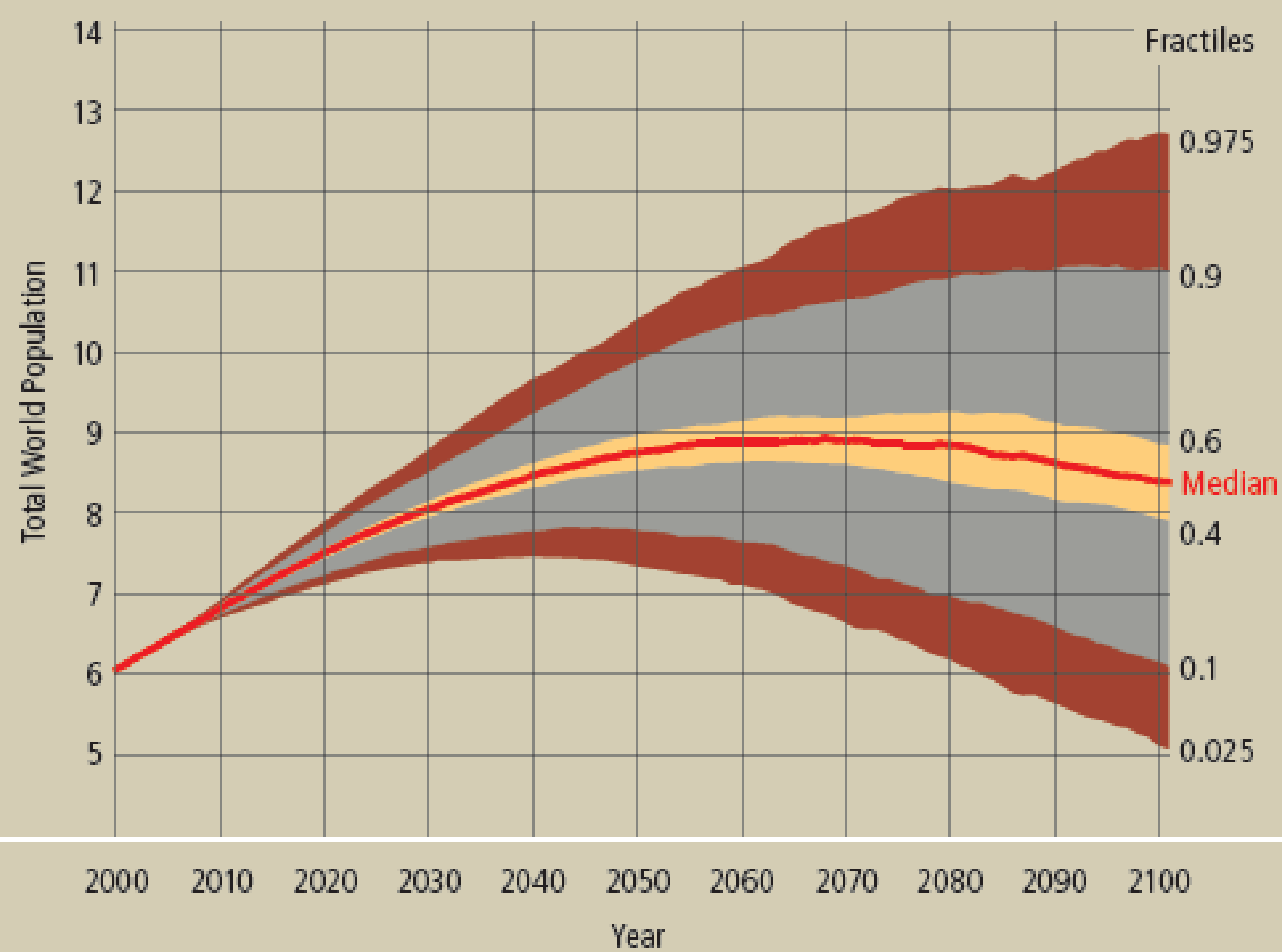
WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

World Population from the year 1000 to 2100



Forecasting the Population

- For forecasting the population we need the current population by age and sex for each region.
- We need to make assumptions on the three components of change:
- Fertility (birth rates)
- Mortality (death rates, life expectancy)
- Migration
- The future paths of all three factors are uncertain.
- Therefore we produce probabilistic population projections.


Fractiles
0.975
0.9
0.6
Median
0.4
0.1
0.025
Total World Population
14
13
12
11
10
9
8
7
6
5
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
Year

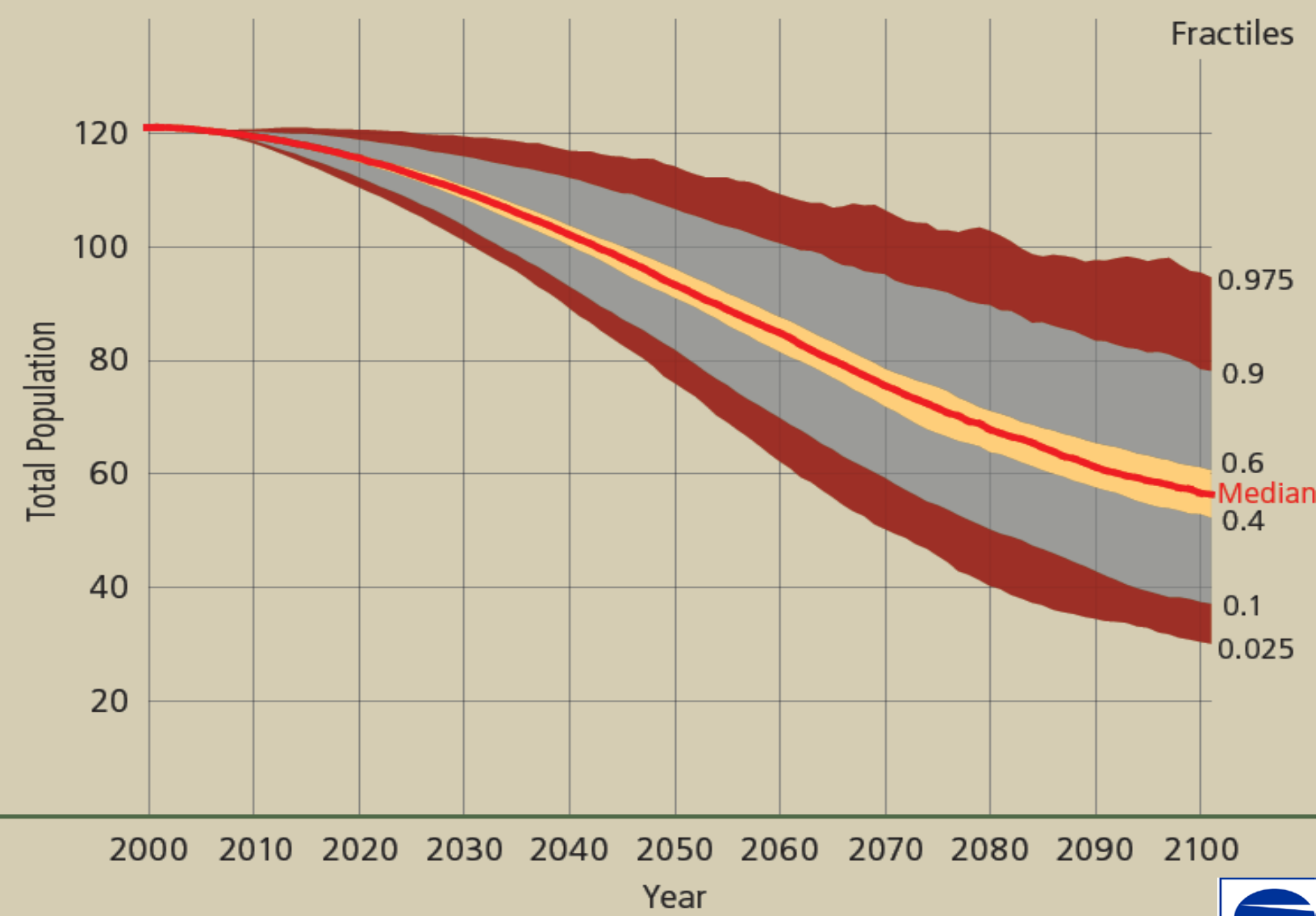


Figure 3. Eastern European population, in millions.

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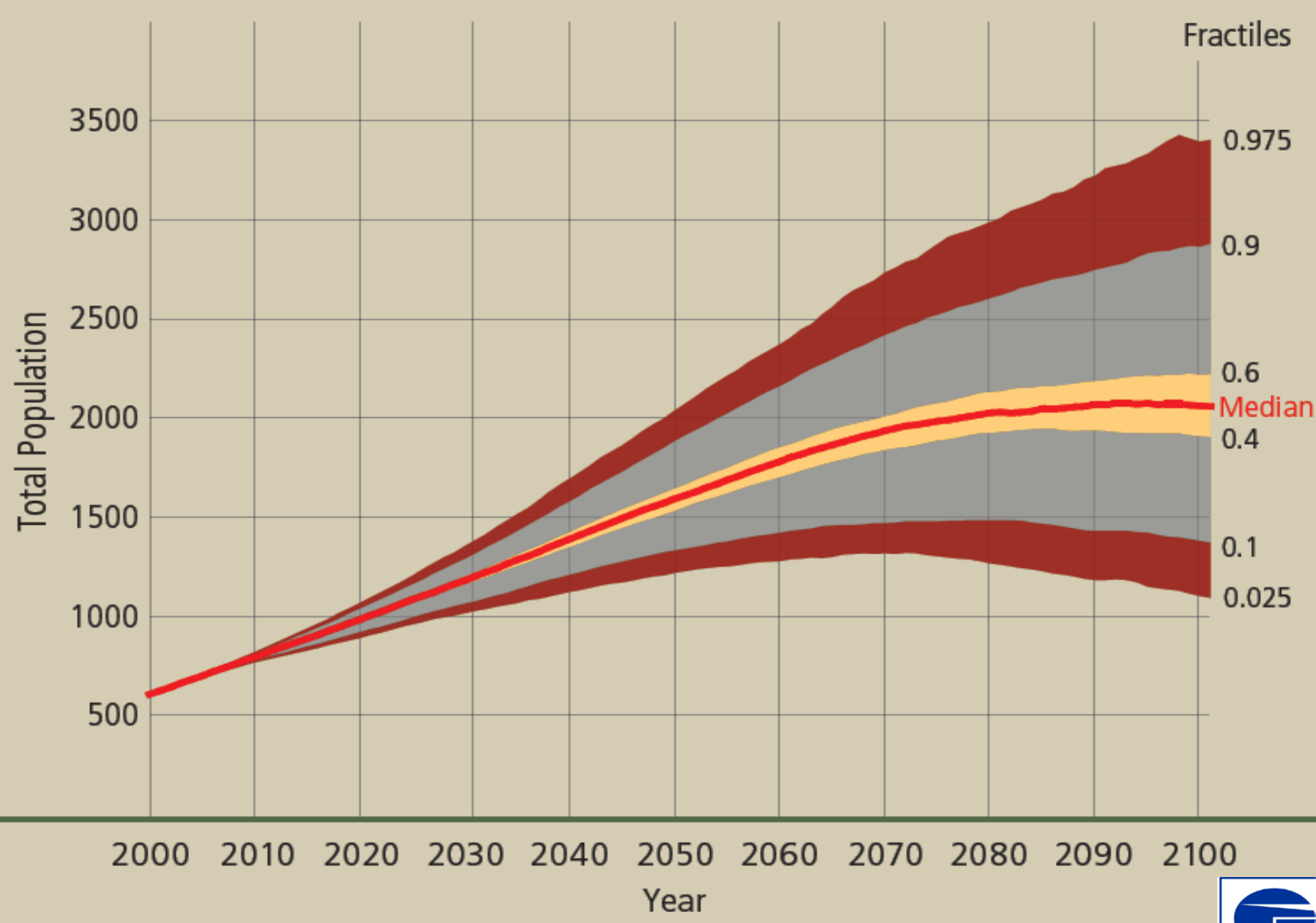

Figure 2. Sub-Saharan Africa population, in millions.

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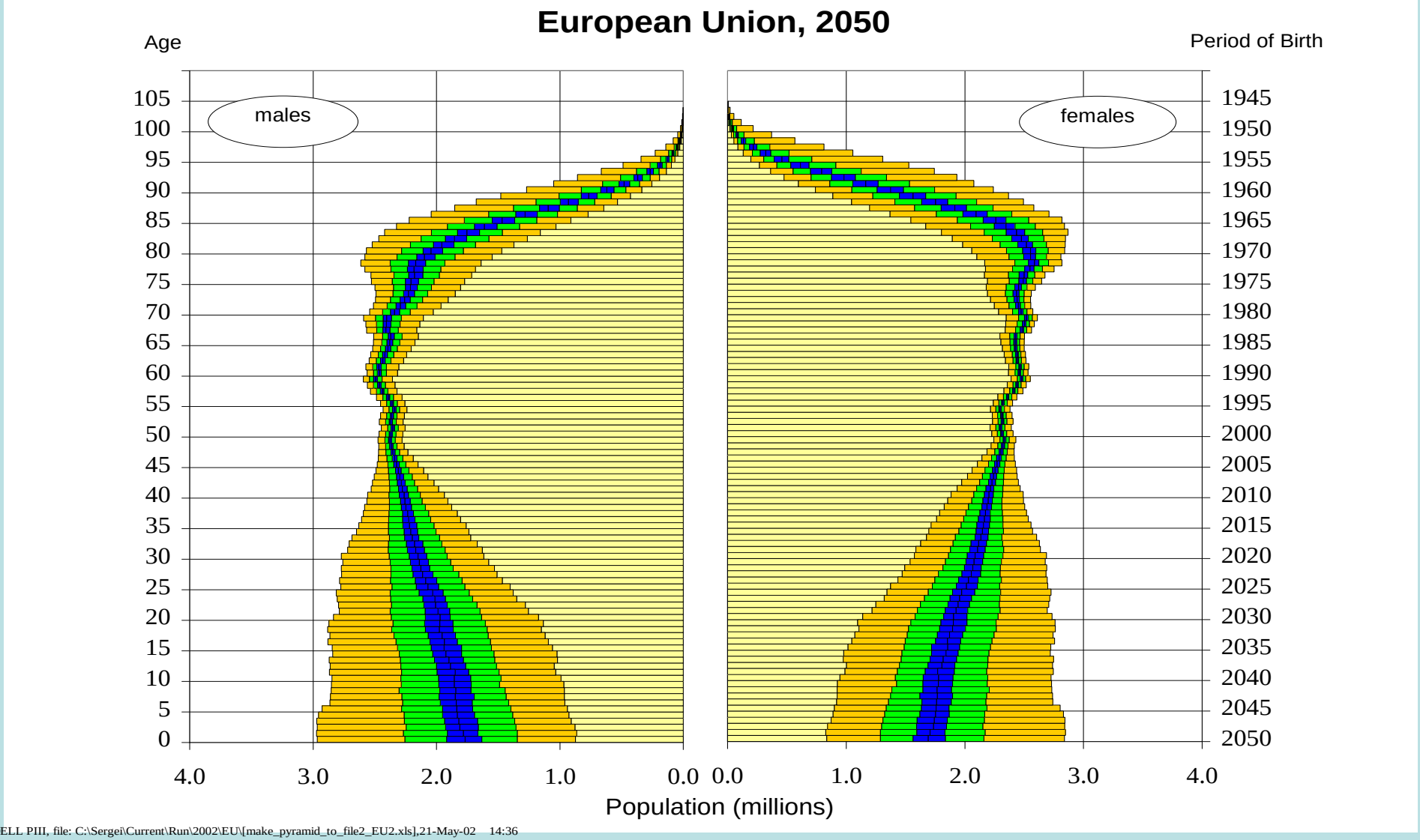
Probabilistic Population Pyramid



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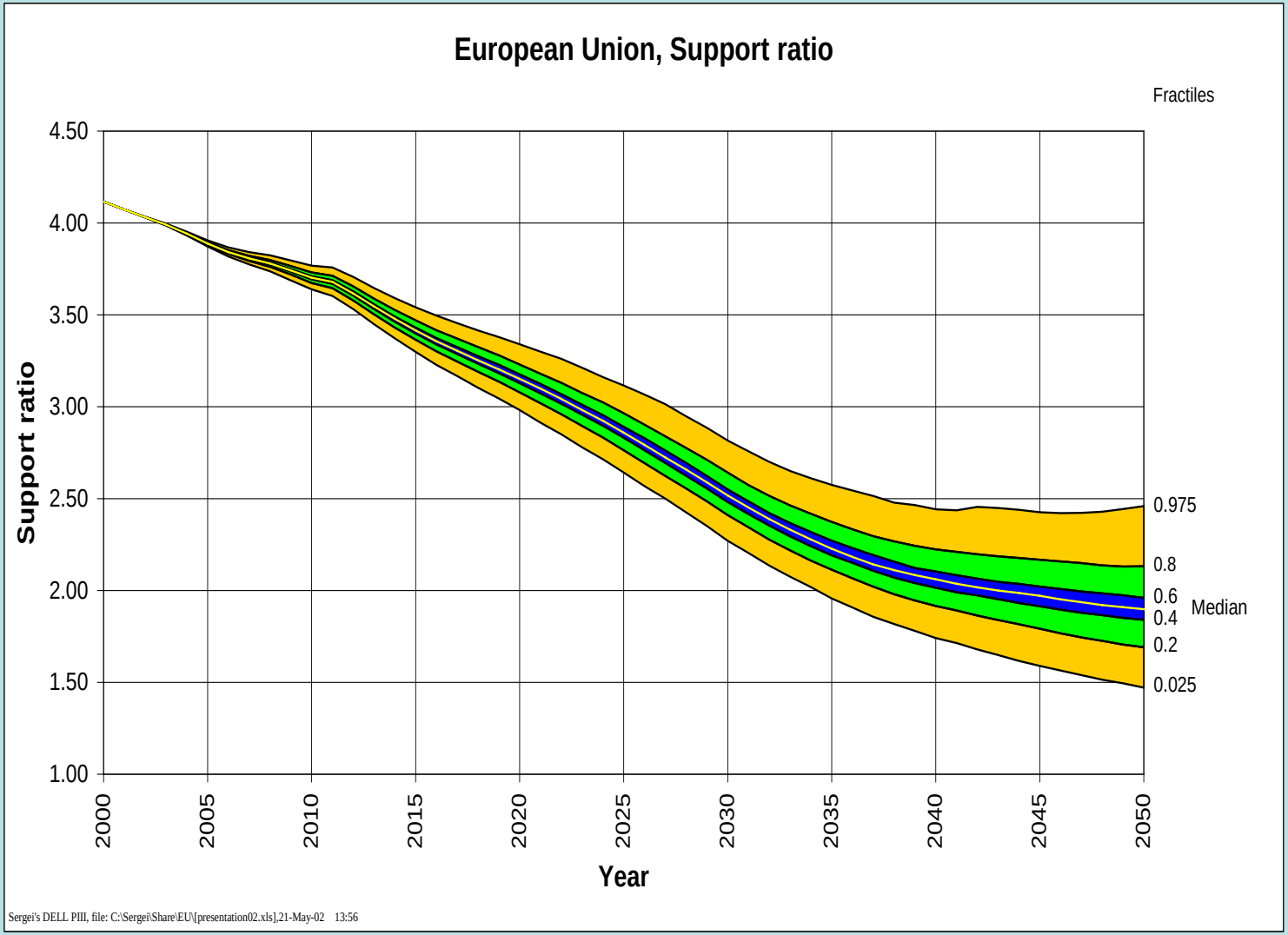
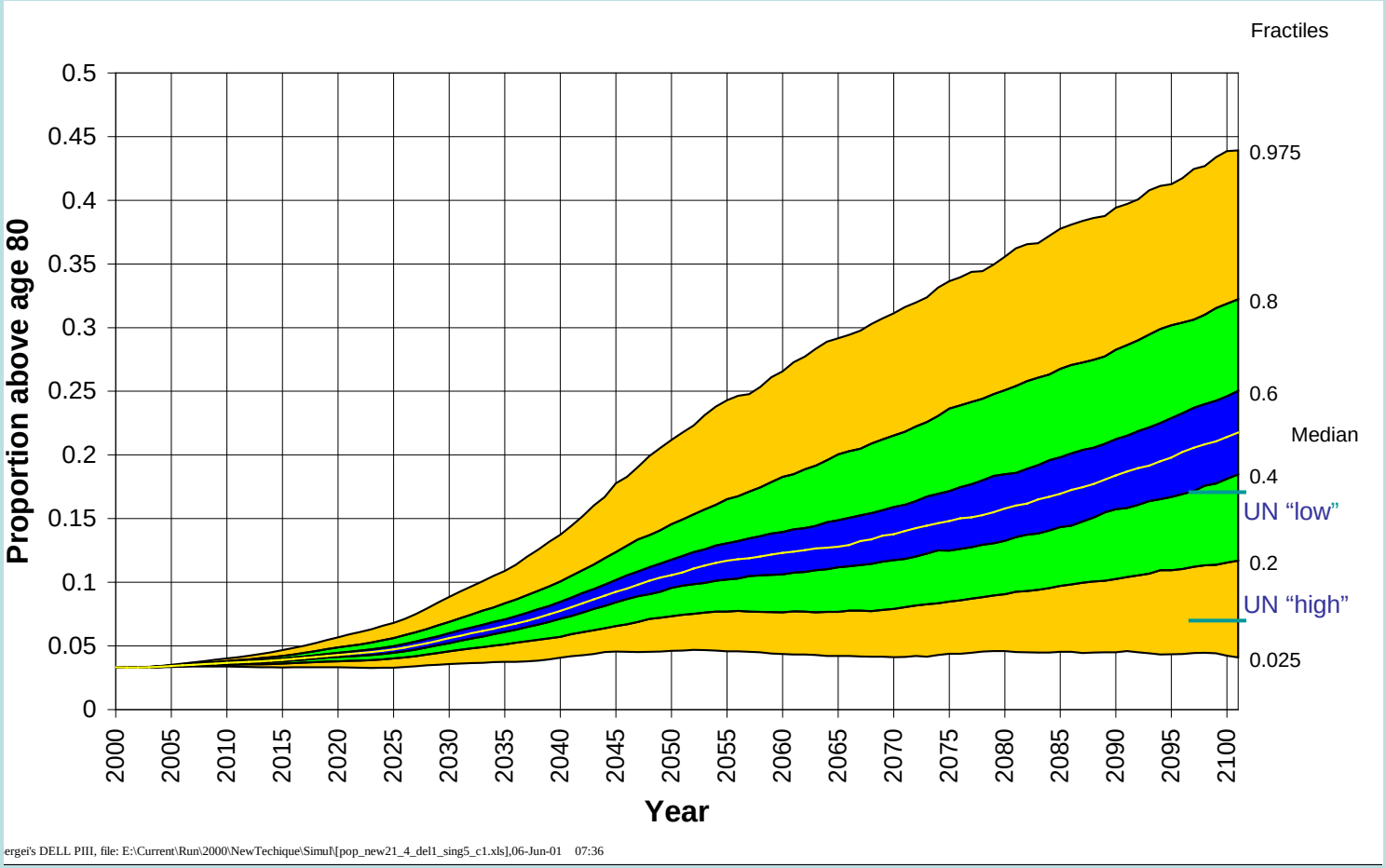
European Union,

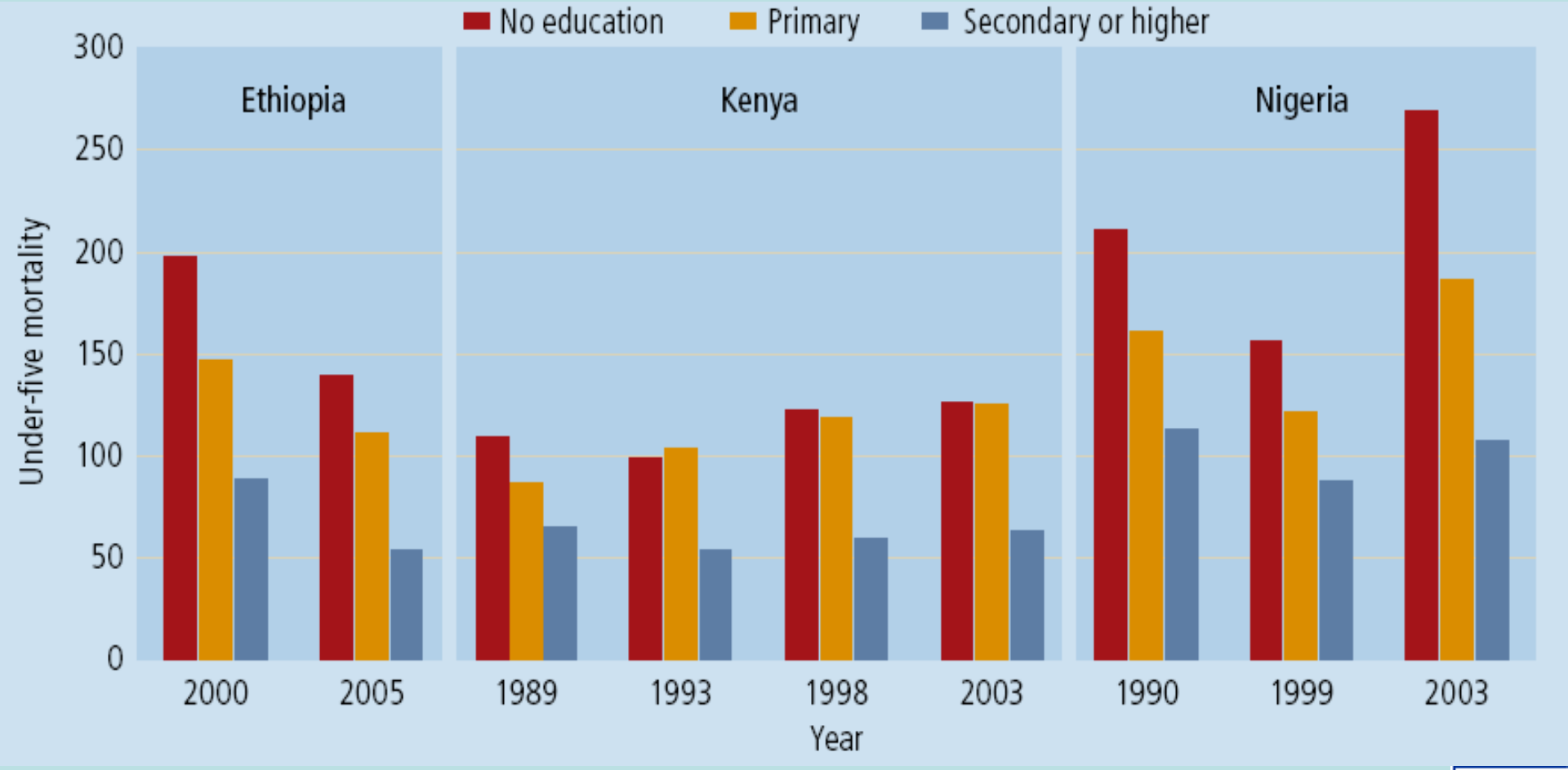
Demographic Support Ratio (20-64/65+)



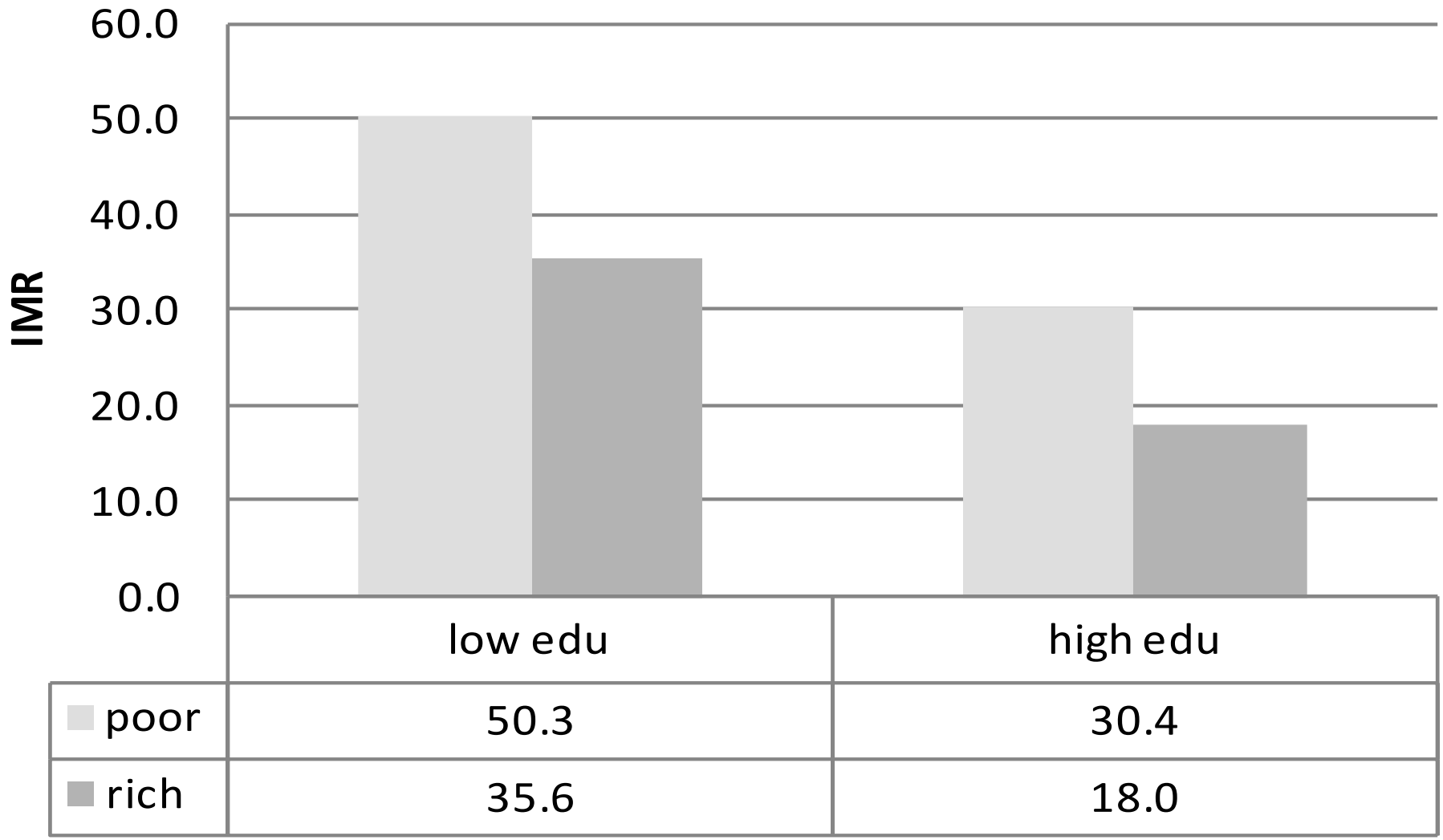
Western Europe, Uncertainty Distribution of Proportion above Age 80 (2000-2100)



Mortality under age 5 by mothers' education (Source: DHS)

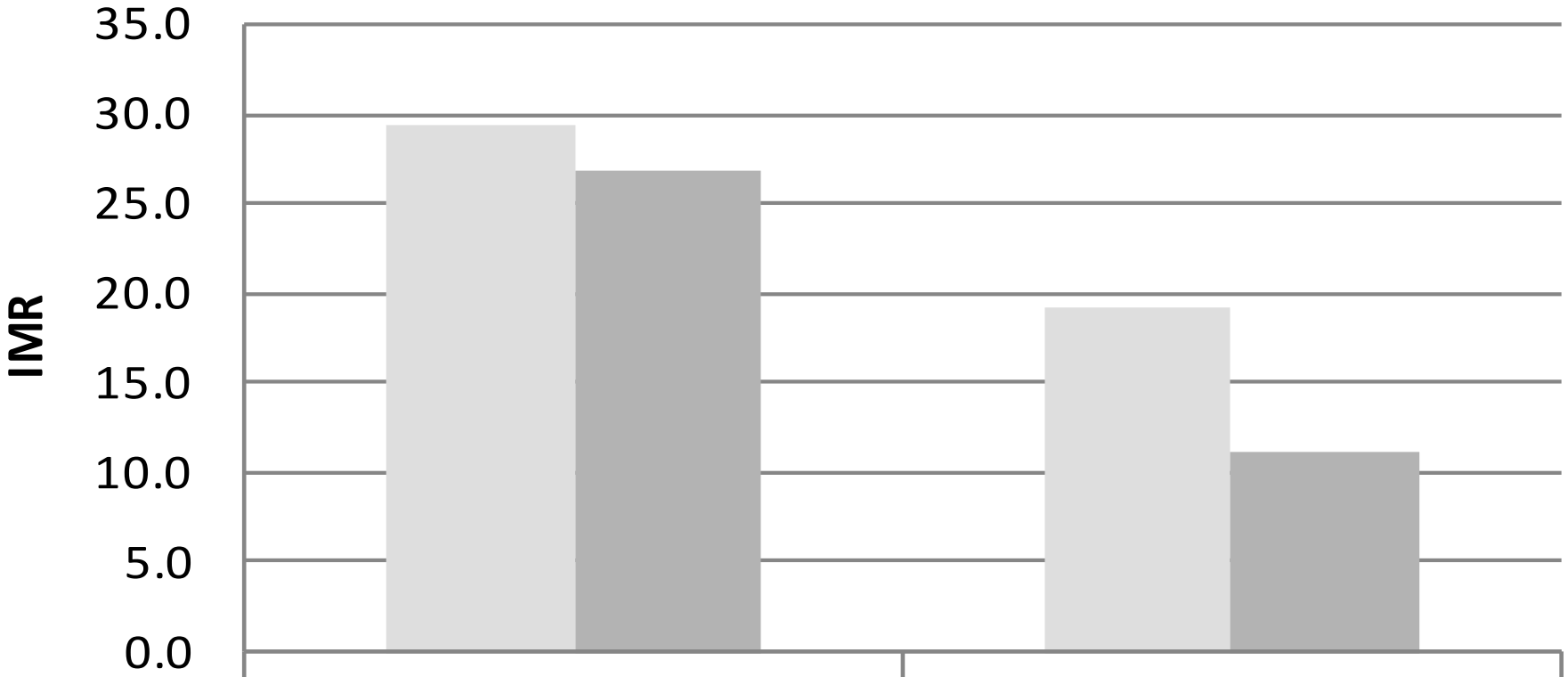


India



Source: IIASA

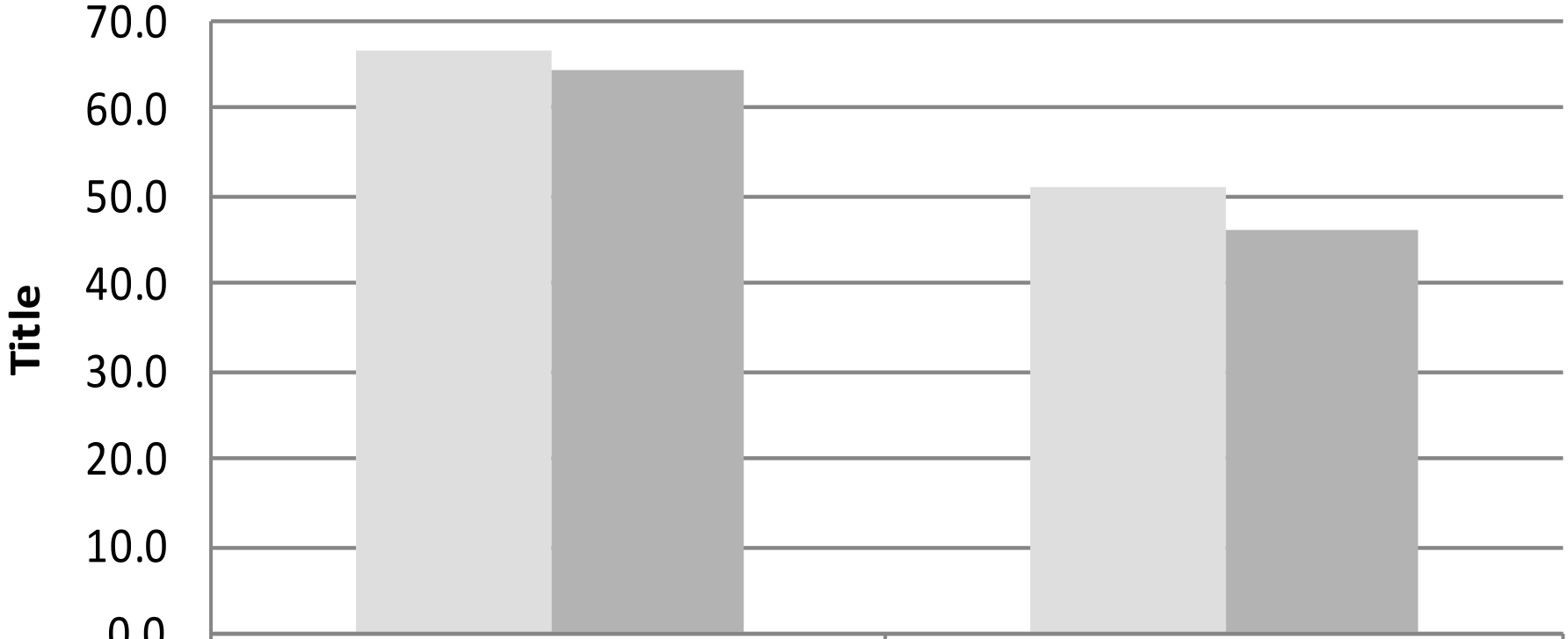
Indonesia



	low edu	high edu
poor	29.3	19.2
rich	26.8	11.3

Source: IIASA

Malawi



	low edu	high edu
poor	66.7	51.2
rich	64.5	46.2

Source: IIASA

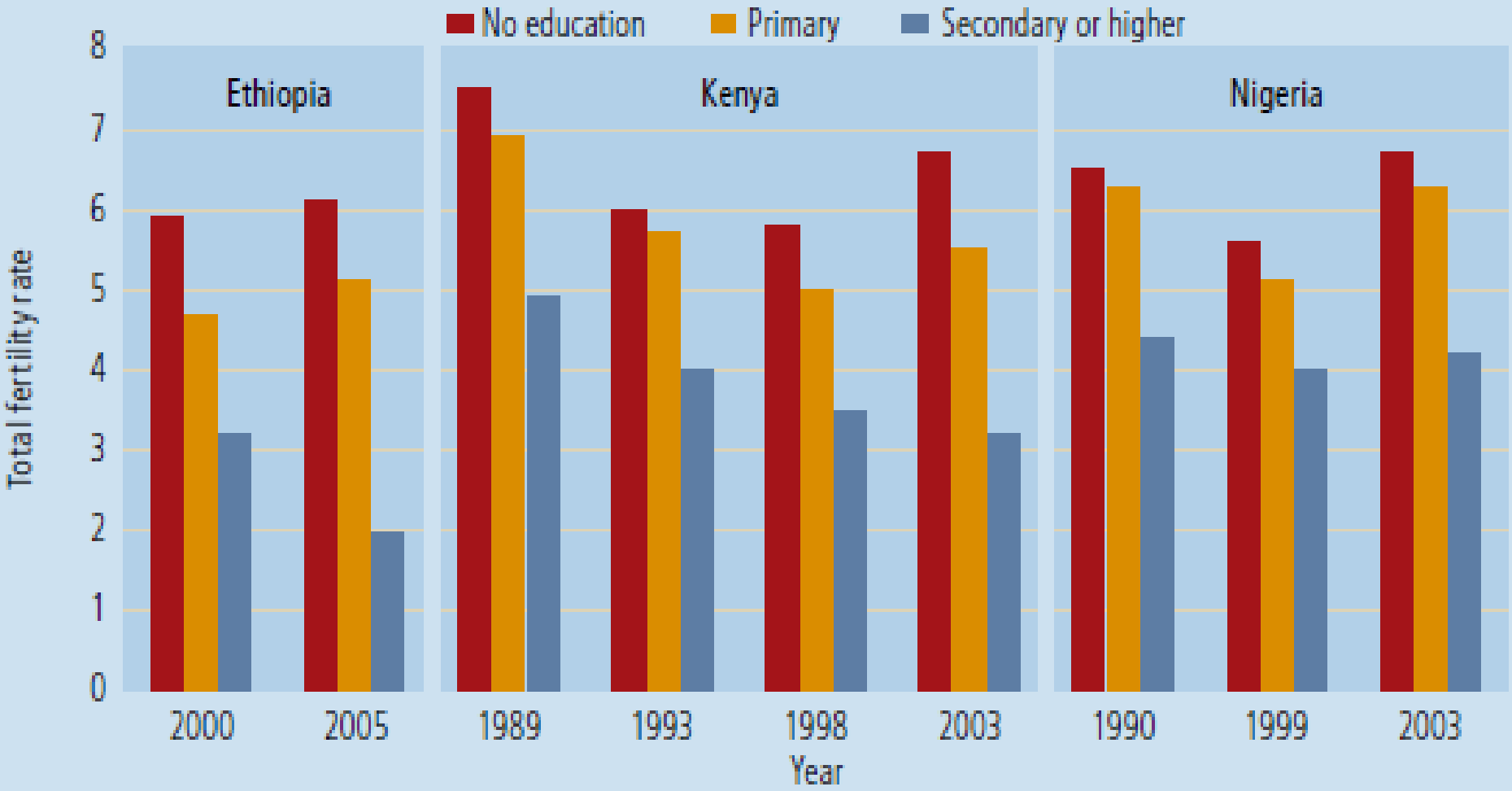


FIGURE 2 Total fertility rates by level of educational attainment. (*Source*: Several DHSs)

People as a liability – People as an asset

- The study of economic growth must start with the study of the people who produce it (with their own hands or through designing, building and operating the machines or institutions that make it possible).

- But people do not come as an amorphous mass. Not every member of a given population makes the same contribution to the economy.

- People differ by age, sex, educational attainment, health status, labor force participation and other dimensions.

Human Capital = POP x Education x Health

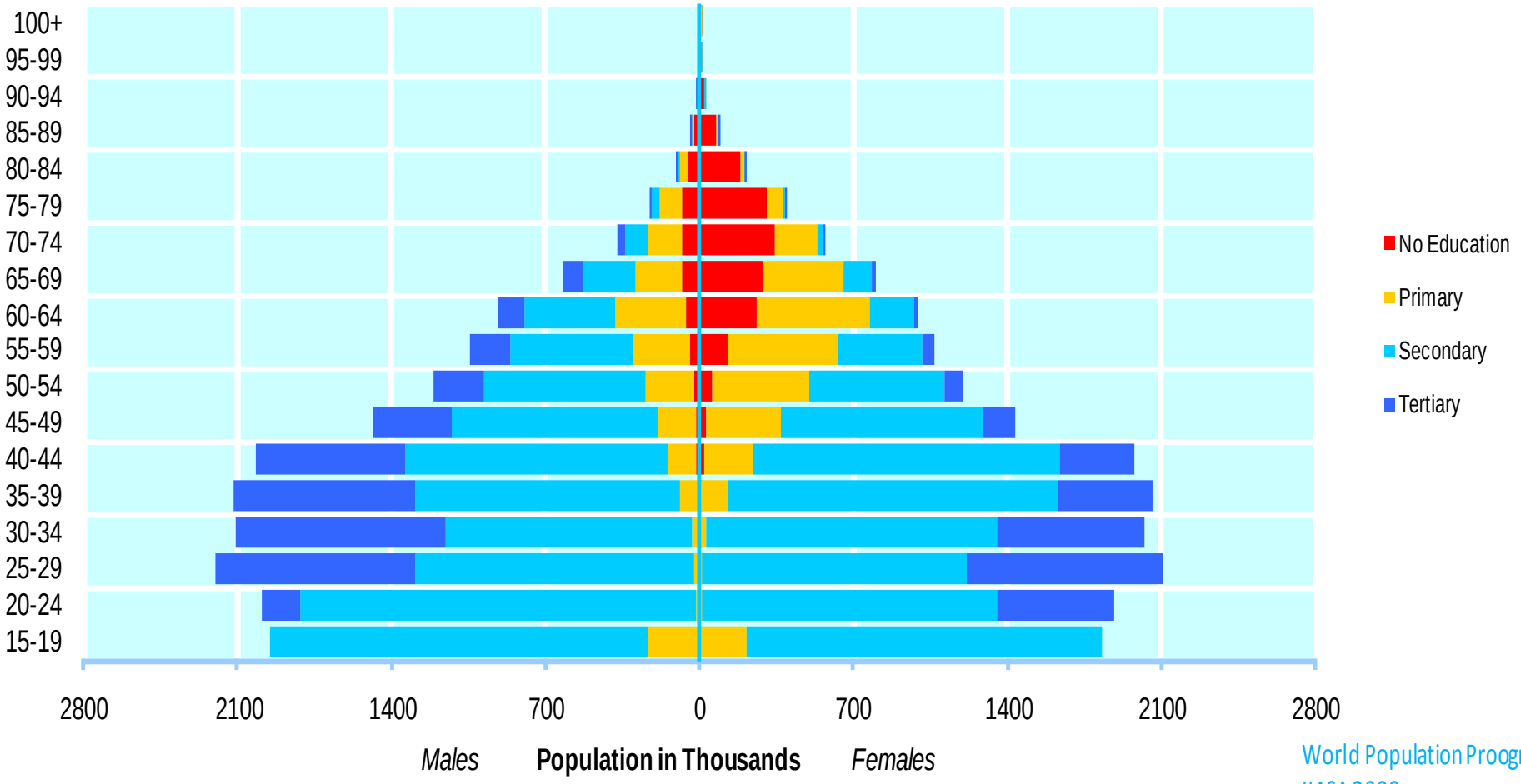
- **Education:** formal – informal
  quantity – quality – content

- <u>Formal Education:</u>
- **Education Flows** – Policy variable

(Gross and Net Enrolment by Age, Repetition Rates)

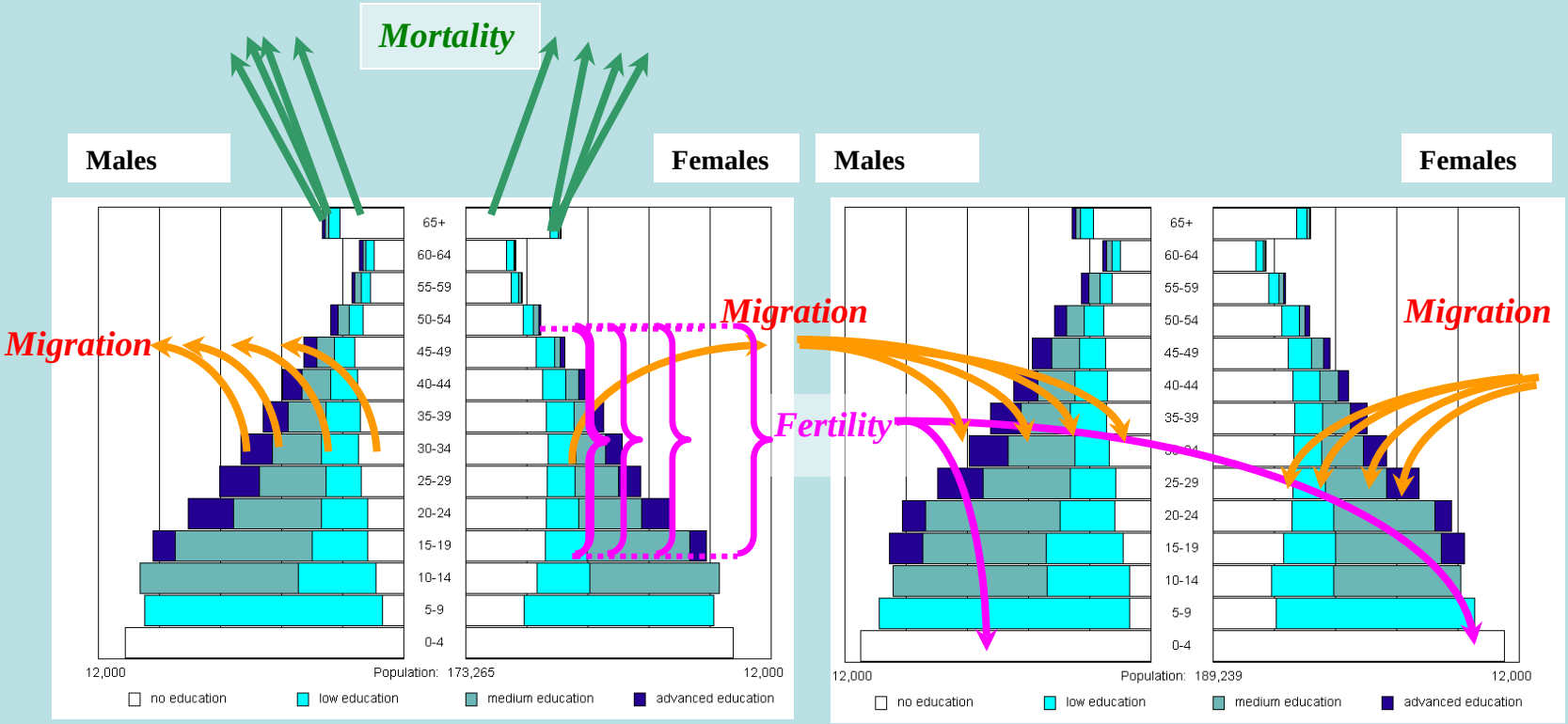
- **Education Stocks** - Change very slowly due to great momentum
  - Mean years of schooling
  - Distribution by highest educational attainment
  - Functional literacy (IALS, LAMP)

Republic of Korea - Population by Age, Sex and Educational Attainment in 2000 - Global Education Trend - Scenario



World Population Program
IIASA 2009

The Demographic Multi-Sate Model: Principles of Population Dynamics by Age, Sex, and Education



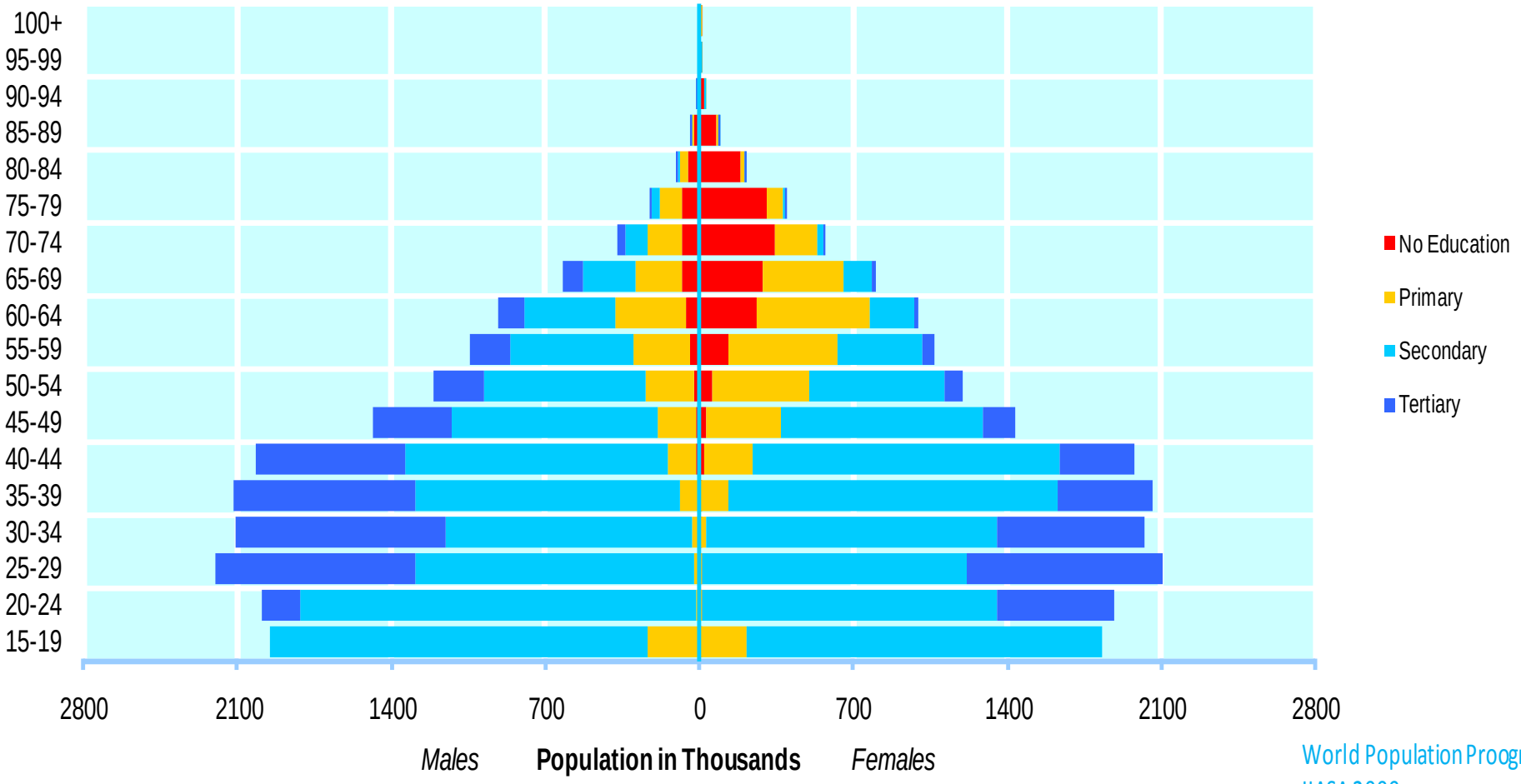
Population by Age, Sex, and Education 2000

Population by Age, Sex, and Education 2005

The IIASA-VID Human Capital Reconstructions

- Start with the empirical distribution of populations by age, sex and four levels of educational attainment (none, some primary, completed junior secondary and completed first tertiary – following ISCED) around 2000 (given by censuses and surveys).
- Go backwards in 5-year steps, i.e. those aged 50-54 with certain education level in 2000 become those aged 45-59 in 1995.
- Adjust for the fact that mortality differs by level of education (empirical association from a sub-sample of countries with data).
- For younger age groups adjust for those who still complete their education.
- For oldest age groups (i.e. open ended interval 80+ in 2000 that will become 75+ in 1995) assume smooth continuation of trend.
- Make sure that the age and sex structure at any year fully corresponds to that of the UN estimates for 1970-2000 to cover impact of migration.
- Compare to fragmentary UNESCO attainment data base.

Republic of Korea - Population by Age, Sex and Educational Attainment in 2000 - Global Education Trend - Scenario



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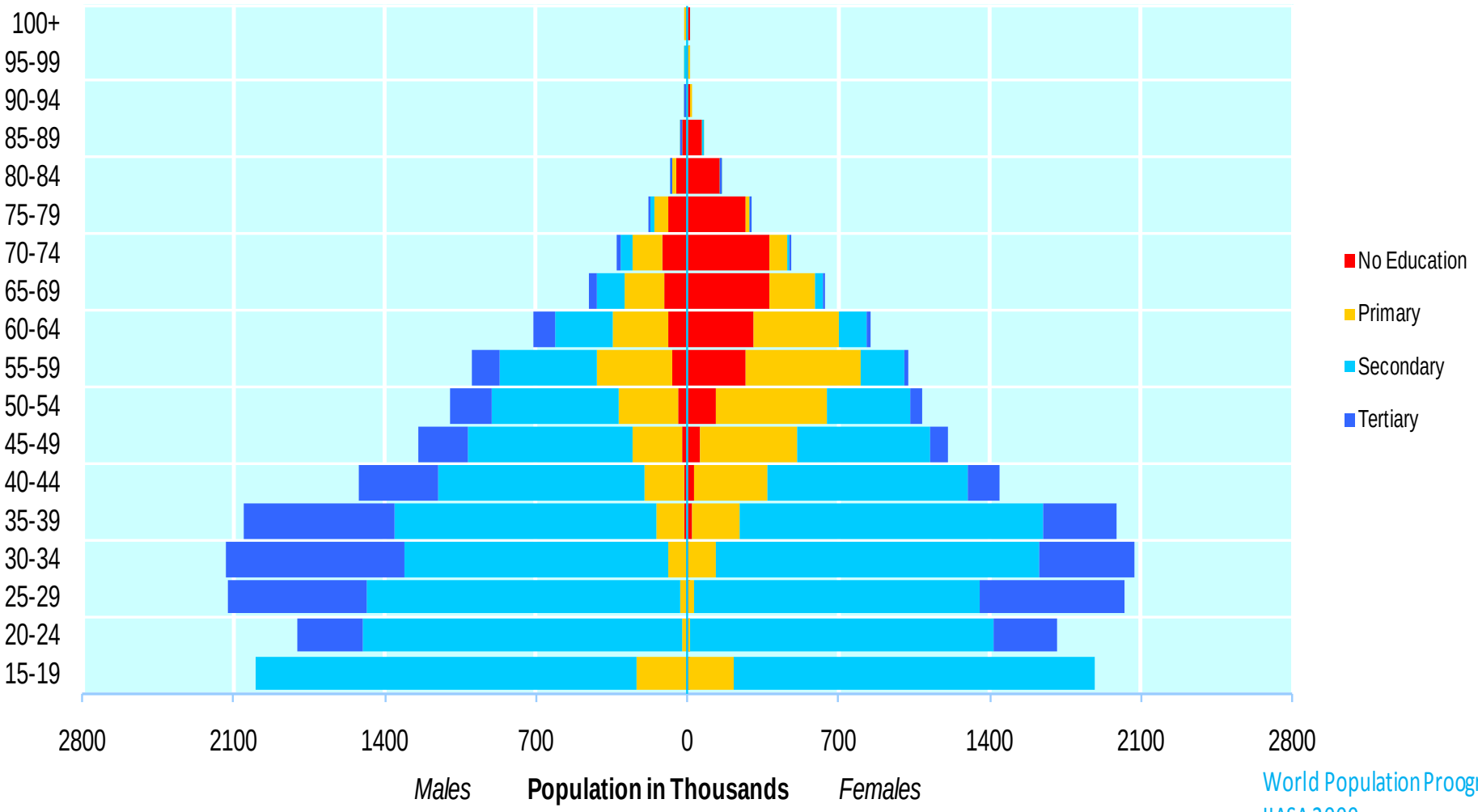
Republic of Korea - Population by Age, Sex and Educational Attainment in 1995



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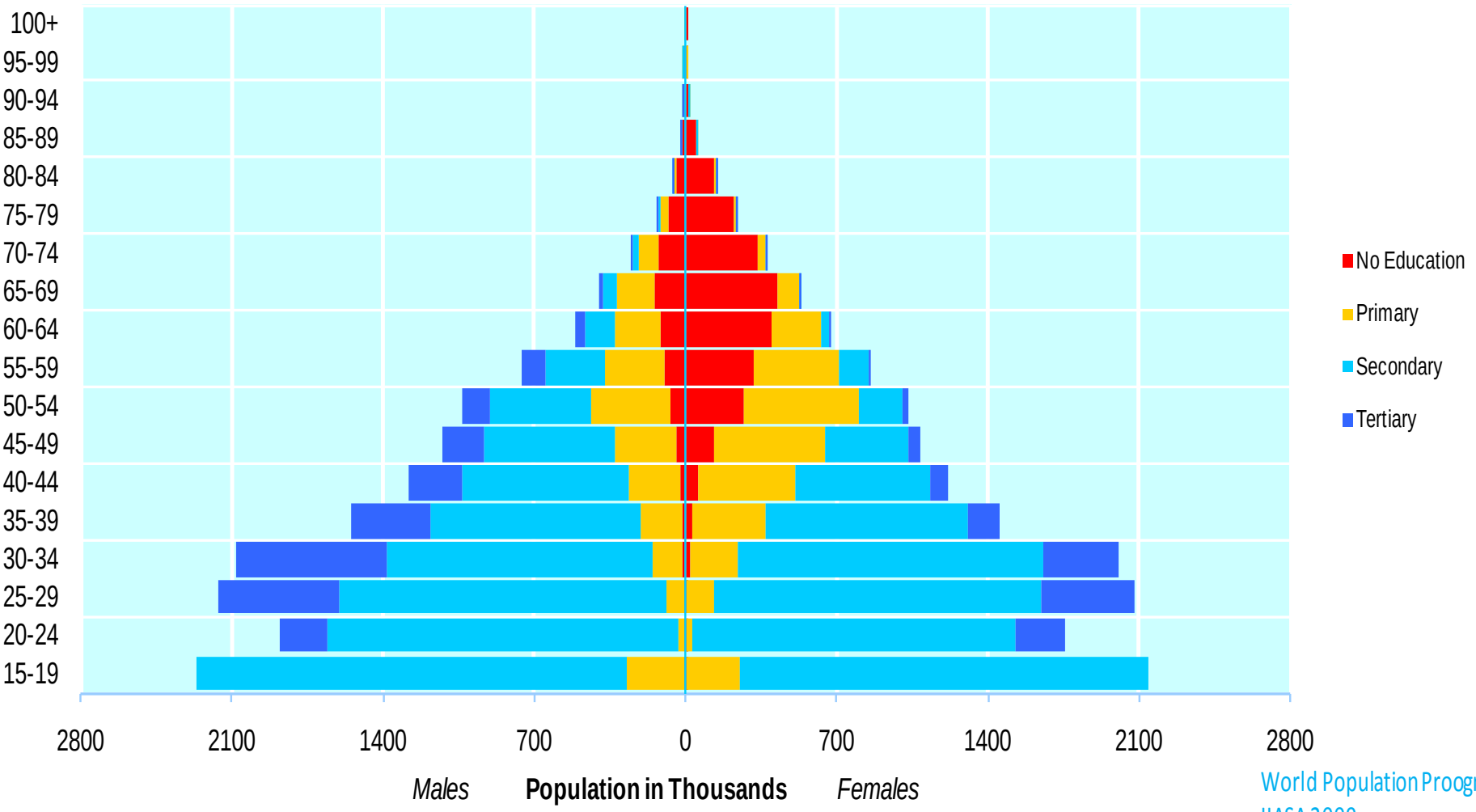
Republic of Korea - Population by Age, Sex and Educational Attainment in 1990



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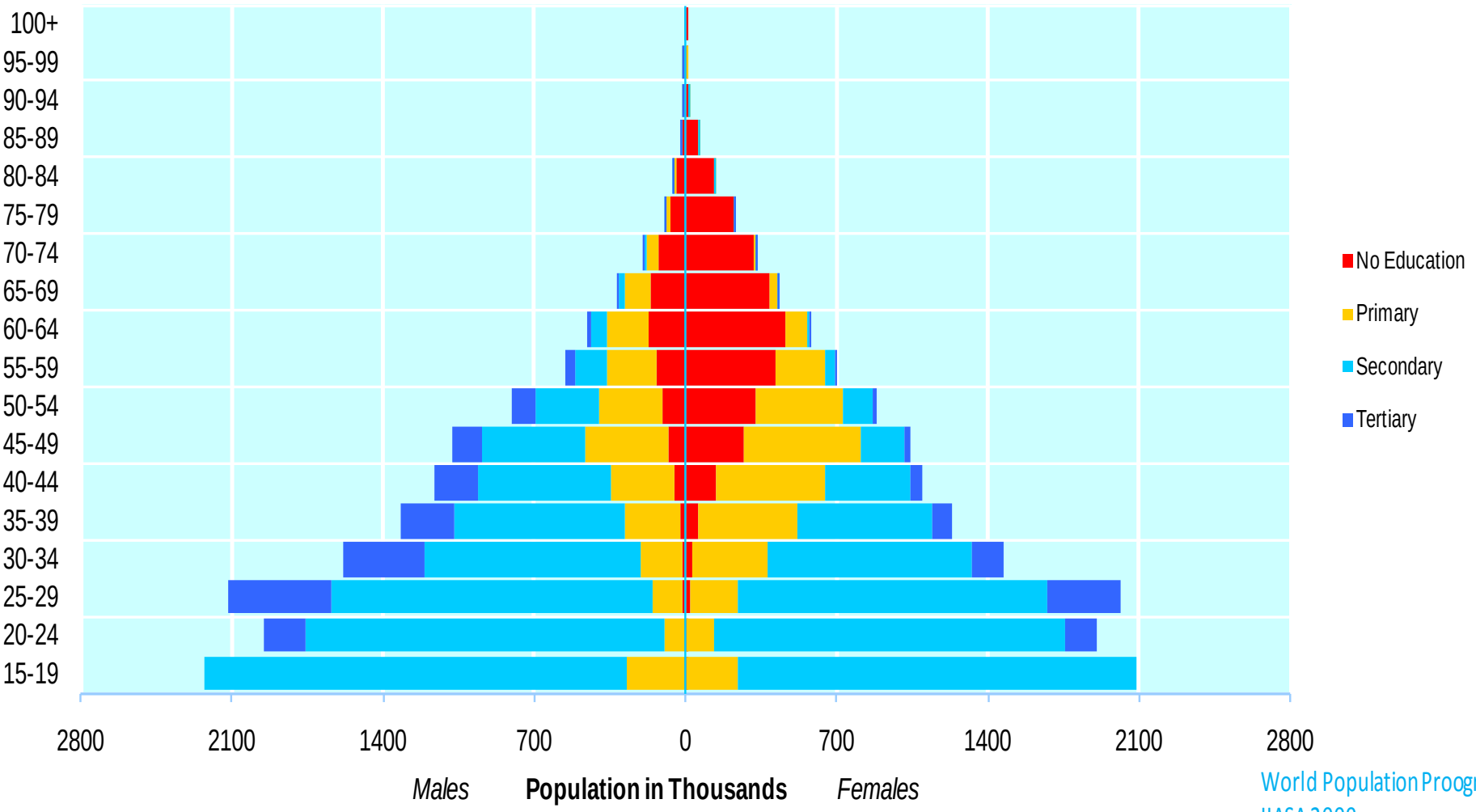
Republic of Korea - Population by Age, Sex and Educational Attainment in 1985



World Population Program
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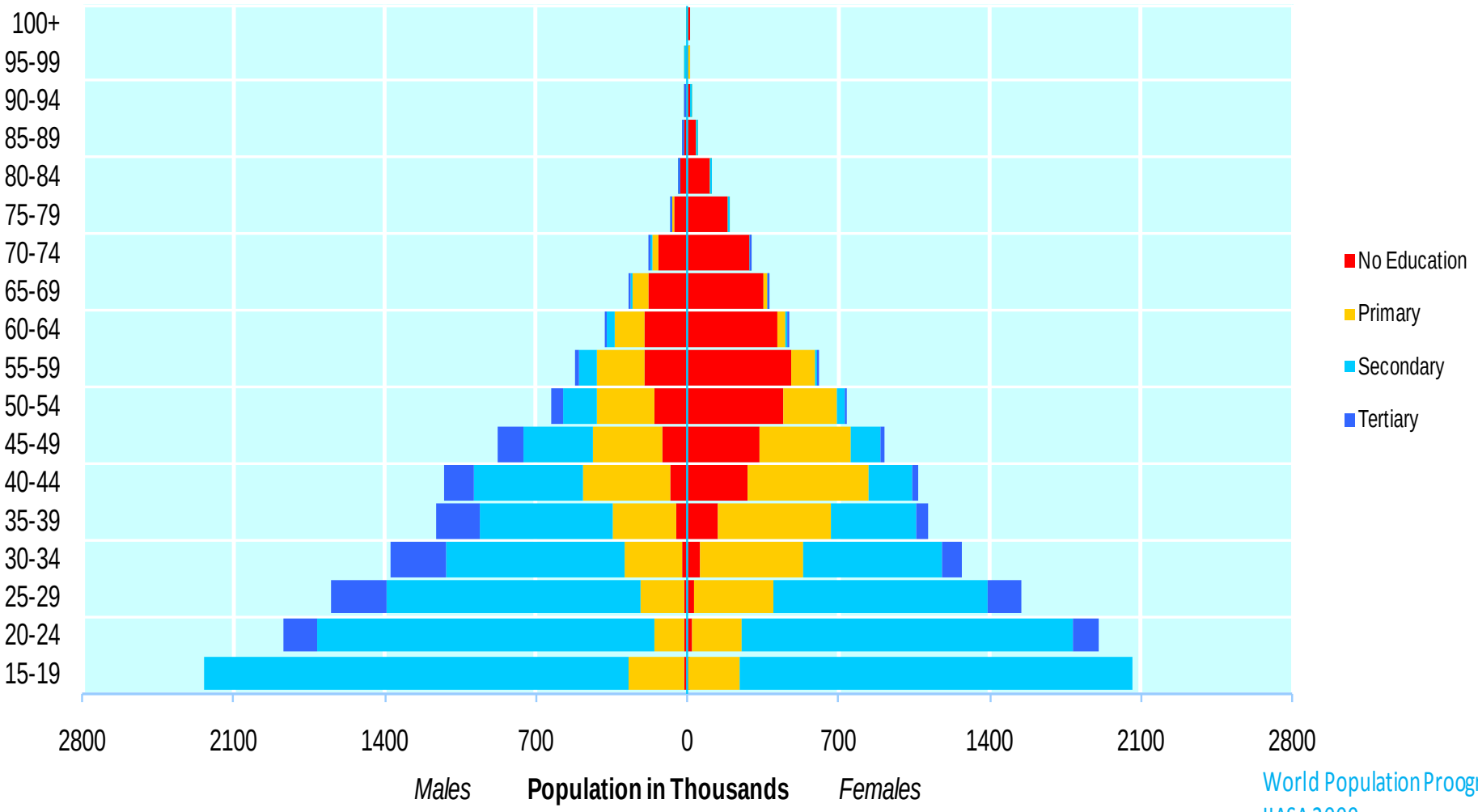
Republic of Korea - Population by Age, Sex and Educational Attainment in 1980



World Population Program
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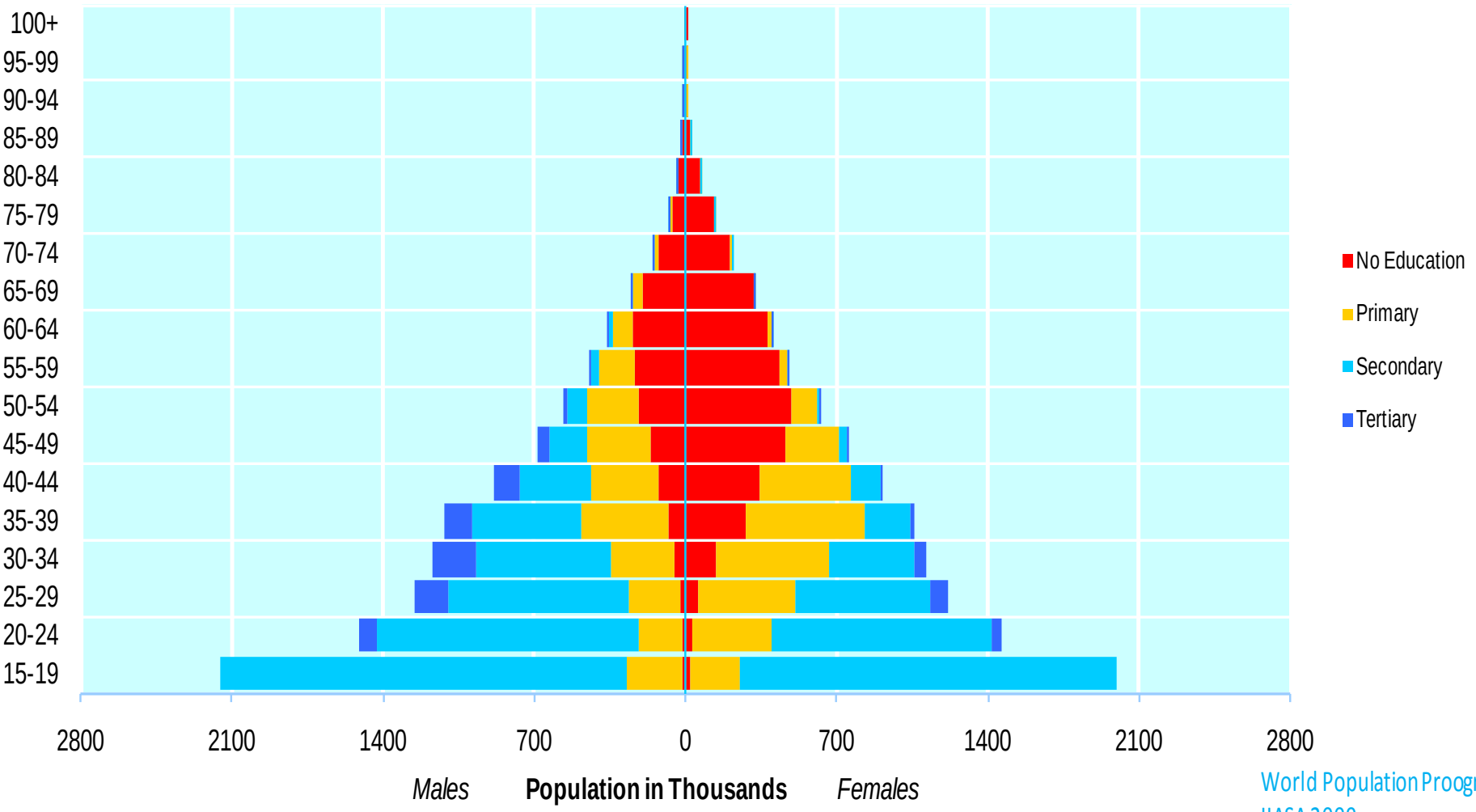
Republic of Korea - Population by Age, Sex and Educational Attainment in 1975



World Population Program
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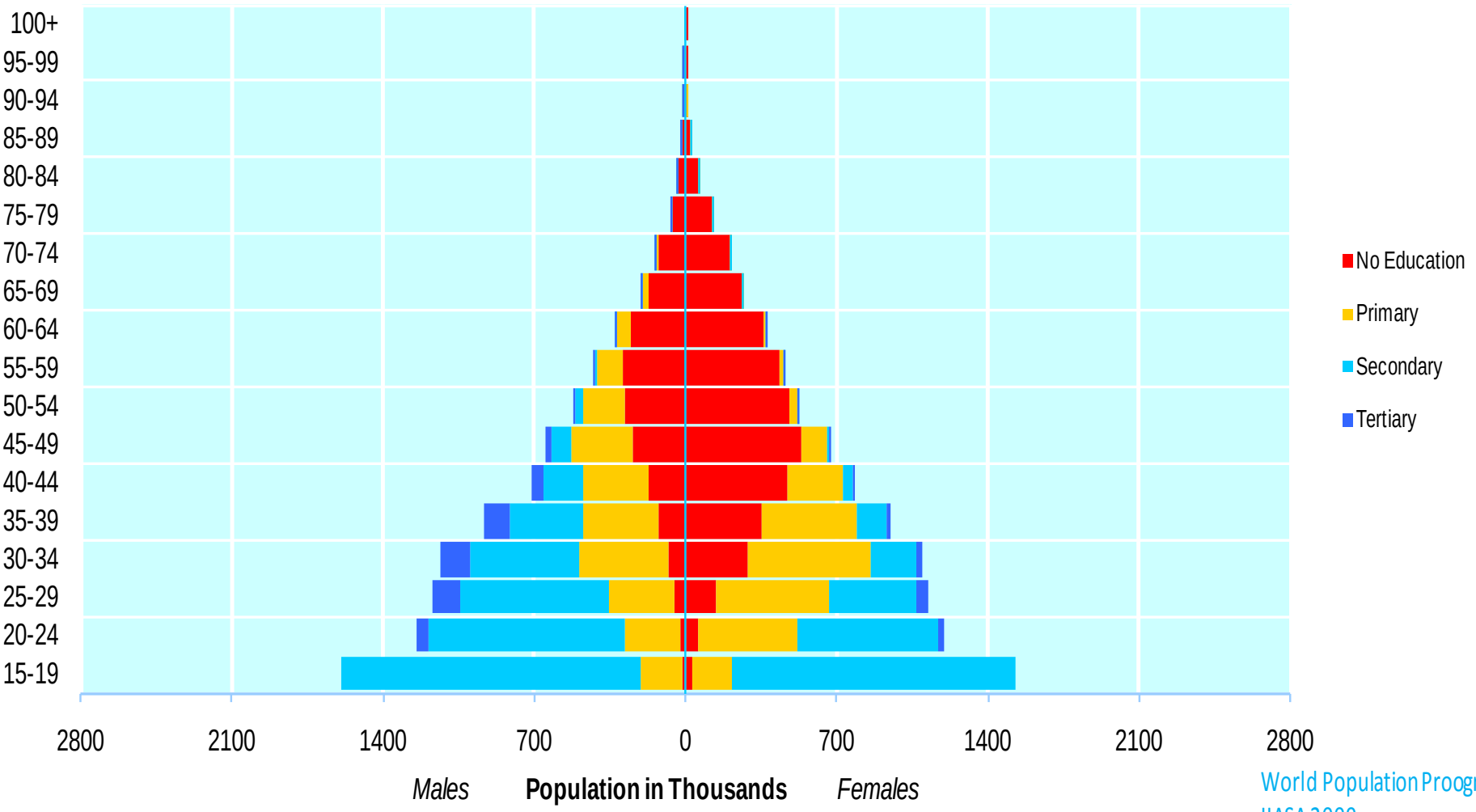
Republic of Korea - Population by Age, Sex and Educational Attainment in 1970



World Population Program
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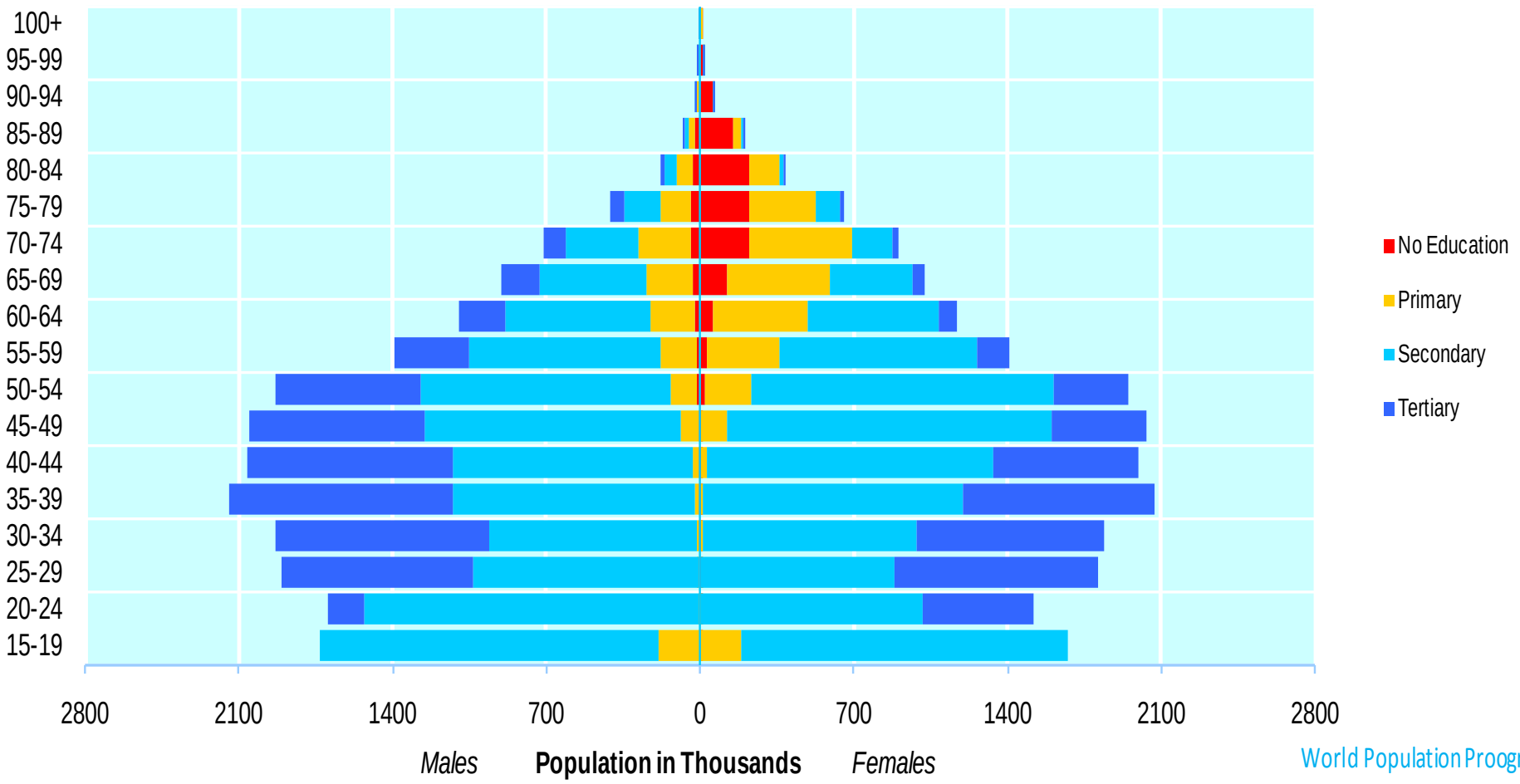
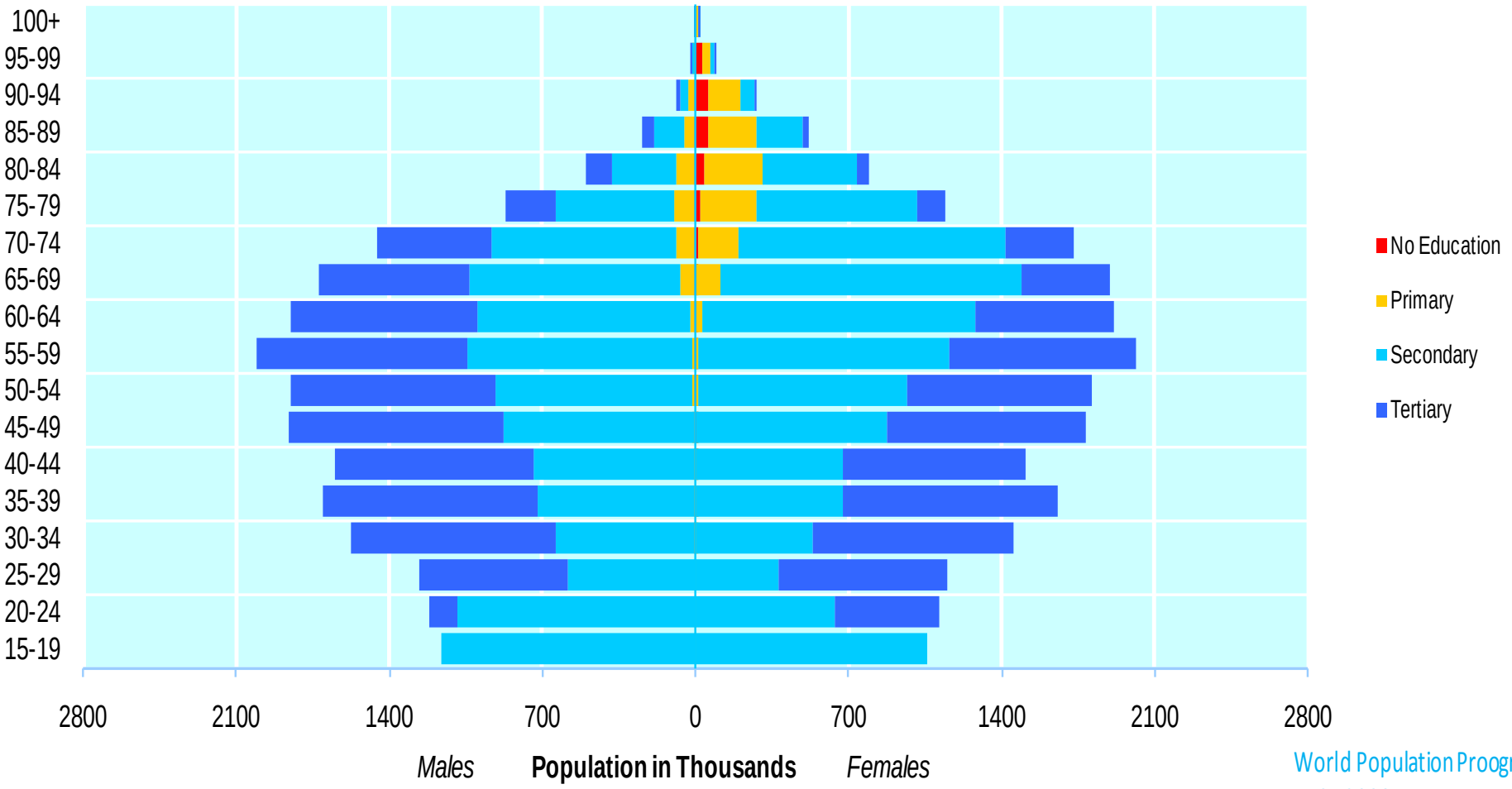
Republic of Korea - Population by Age, Sex and Educational Attainment in 2010 - Global Education Trend - Scenario



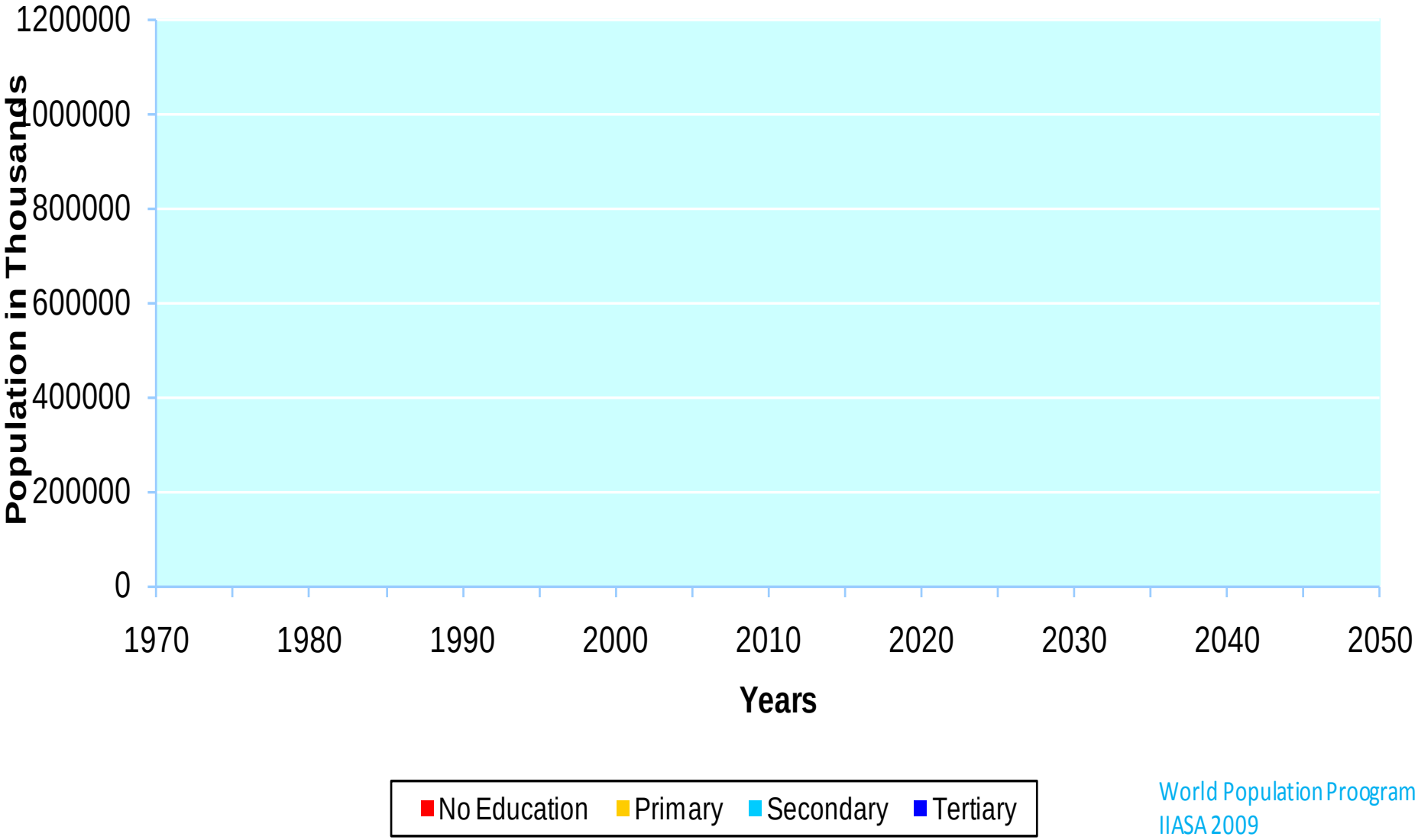
World Population Program
IIASA 2009

Republic of Korea - Population by Age, Sex and Educational Attainment in 2030 - Global Education Trend - Scenario



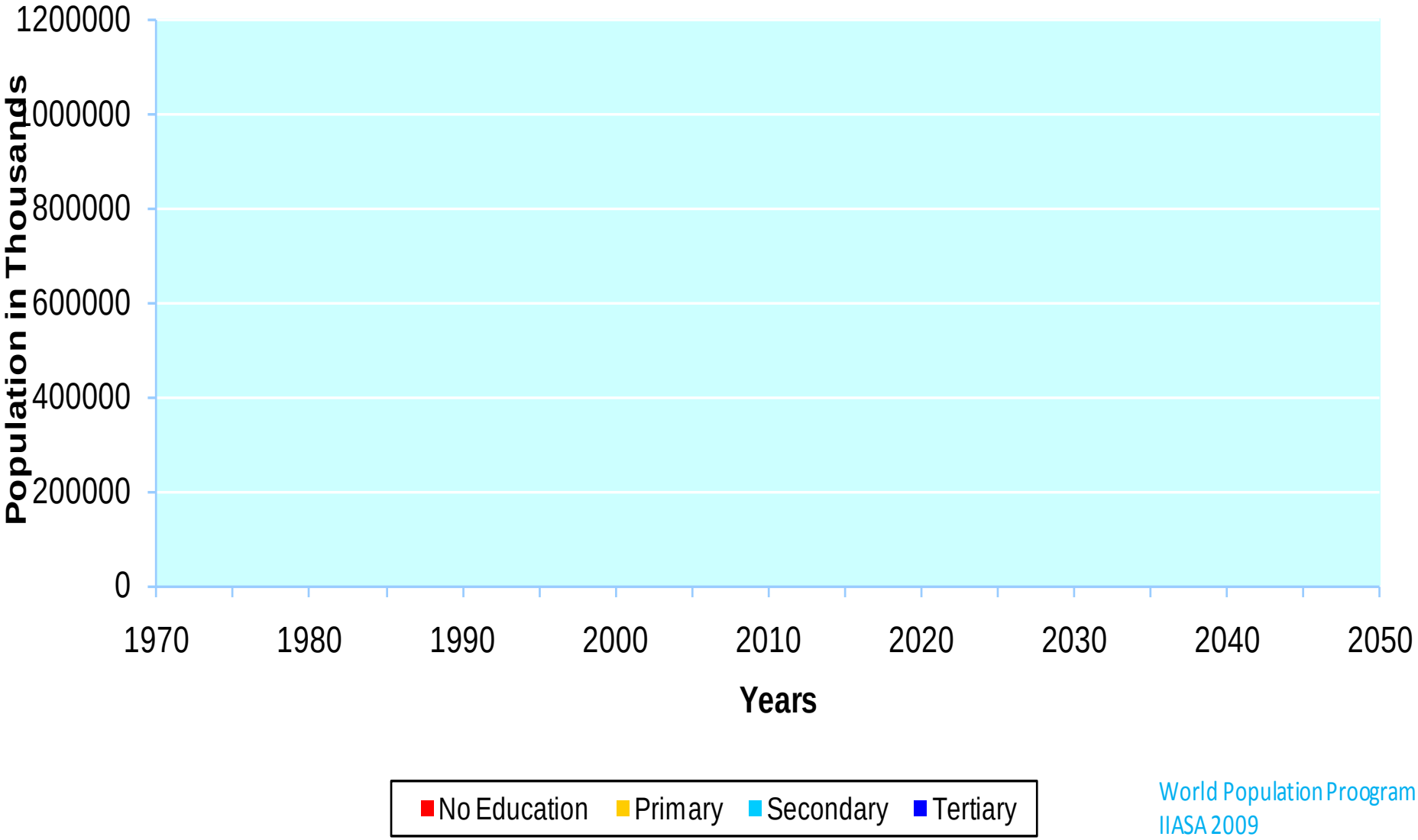
World Population Proogram
IIASA 2009

China - Population Aged 15-64 by Level of Educational Attainment in 1970-2050 - Global Education Trend (GET) Scenario



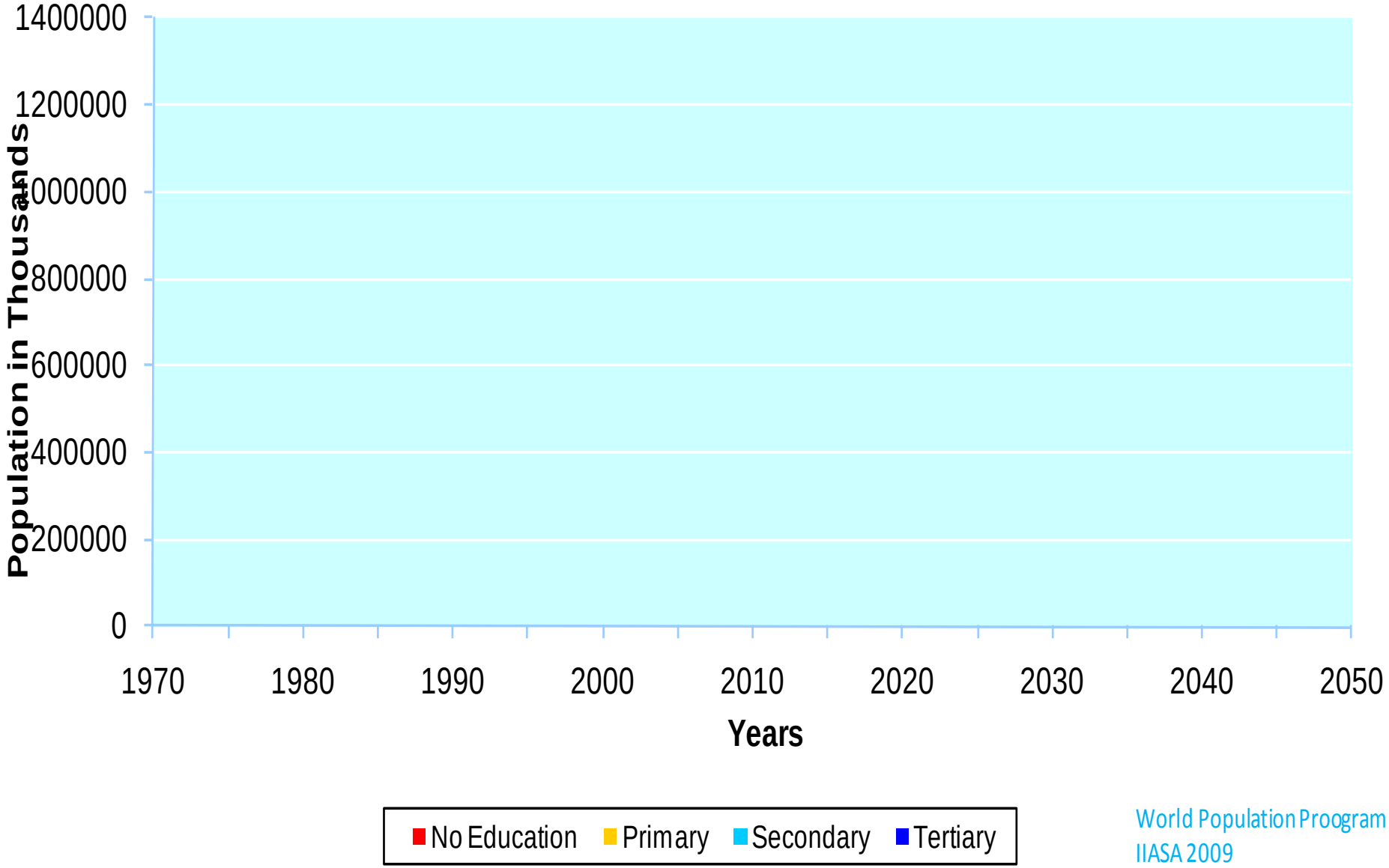
World Population Proogram
IIASA 2009

India - Population Aged 15-64 by Level of Educational Attainment in 1970-2050 - Global Education Trend (GET) Scenario



World Population Proogram
IIASA 2009

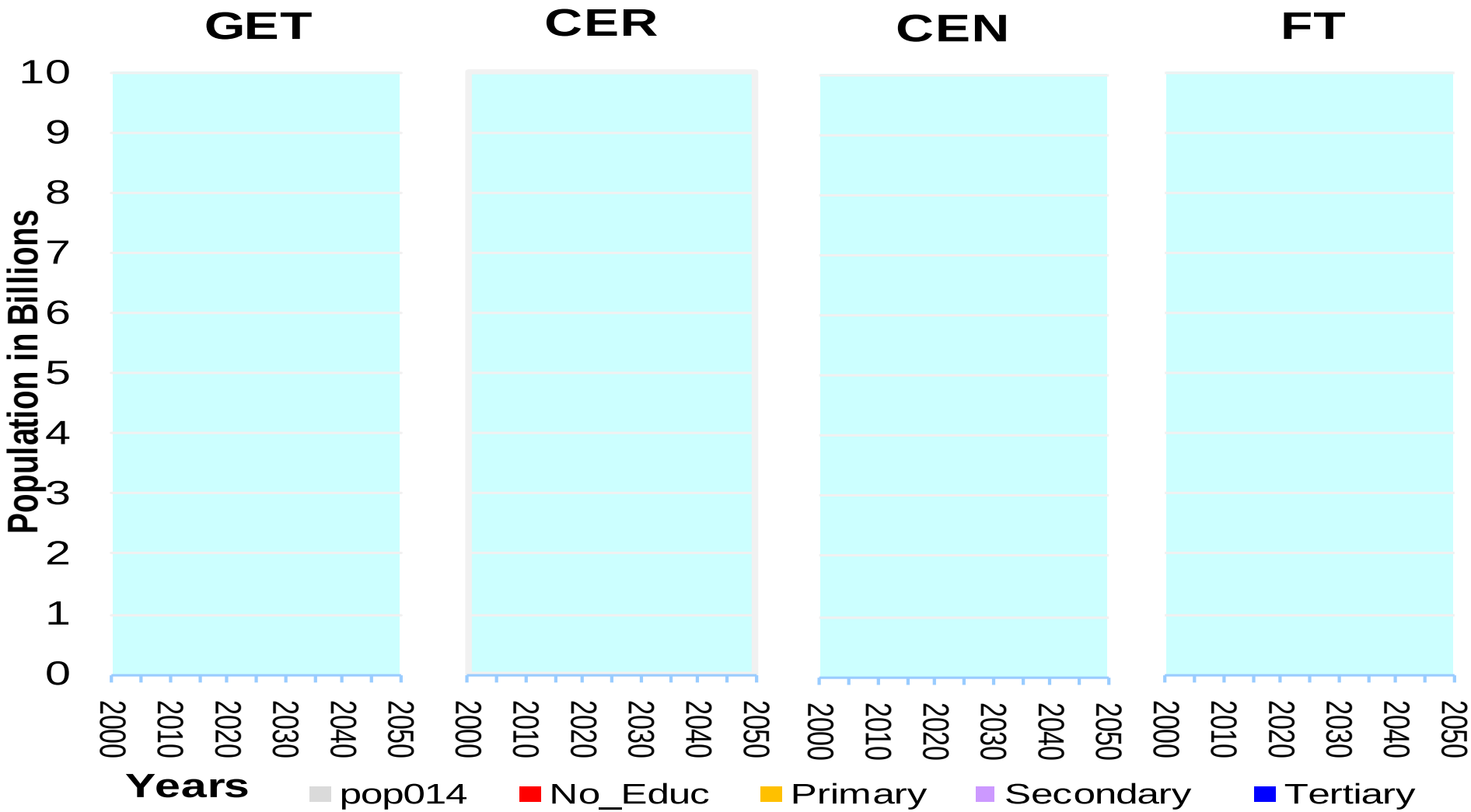
India - Population Aged 15-64 by Level of Educational Attainment in 1970-2050 - Constant Enrollment Number (CEN) Scenario



World Population Program
IIASA 2009

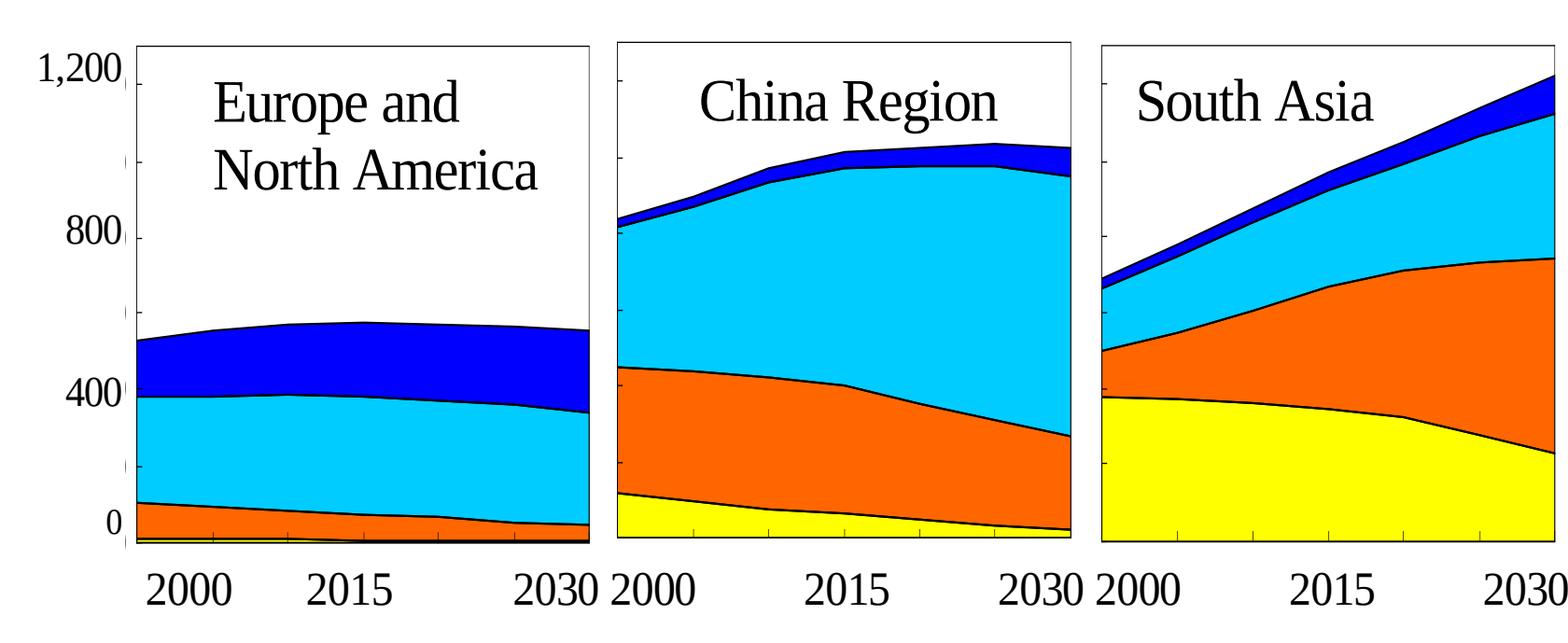
Female Education is Key to reducing World Population Growth (*Lutz and KC, Science 2011*)

Different education scenarios assuming identical education-specific fertility rates



Advantages of this new human capital data set based on the application of demographic multi-state methods

- Contains full age detail of attainment distributions by age and sex
- Has by definition consistent education categories over time (not the case for UNESCO attainment data)
- Explicitly considers differential mortality by level of education
- Naturally lends itself to applications that include projections



www.sciencemag.org SCIENCE VOL 319 22 FEBRUARY 2008 POLICYFORUM

ECONOMICS

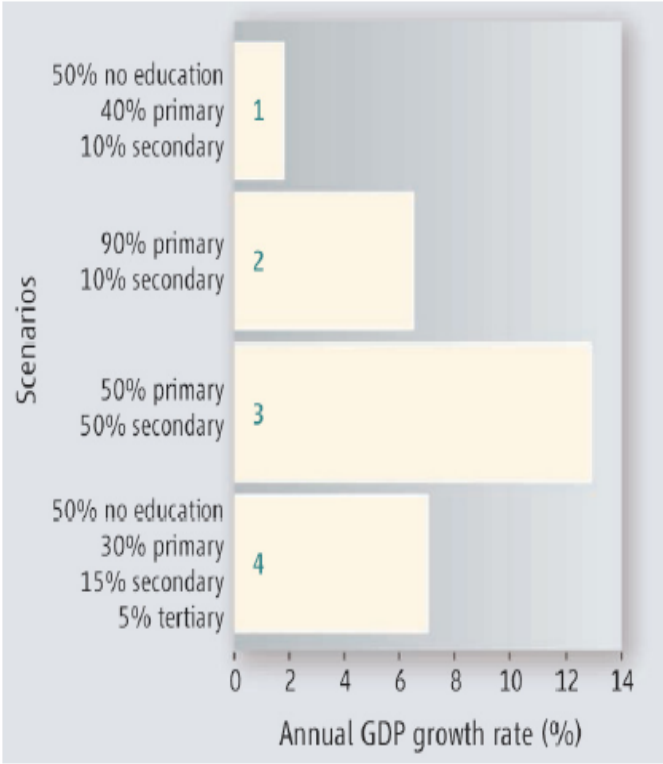
The Demography of Educational Attainment and Economic Growth

Complementing primary education with secondary education in broad segments of the population is likely to give a strong boost to economic growth.

Wolfgang Lutz,[1*] Jesus Crespo Cuaresma,[2] Warren Sanderson[3]

Human capital, age structure and economic growth

- The age distribution of educational attainment plays a key role on the effects of human capital on growth.
- Strong effects of secondary education.
- A small simulation exercise for a stereotype African developing country:

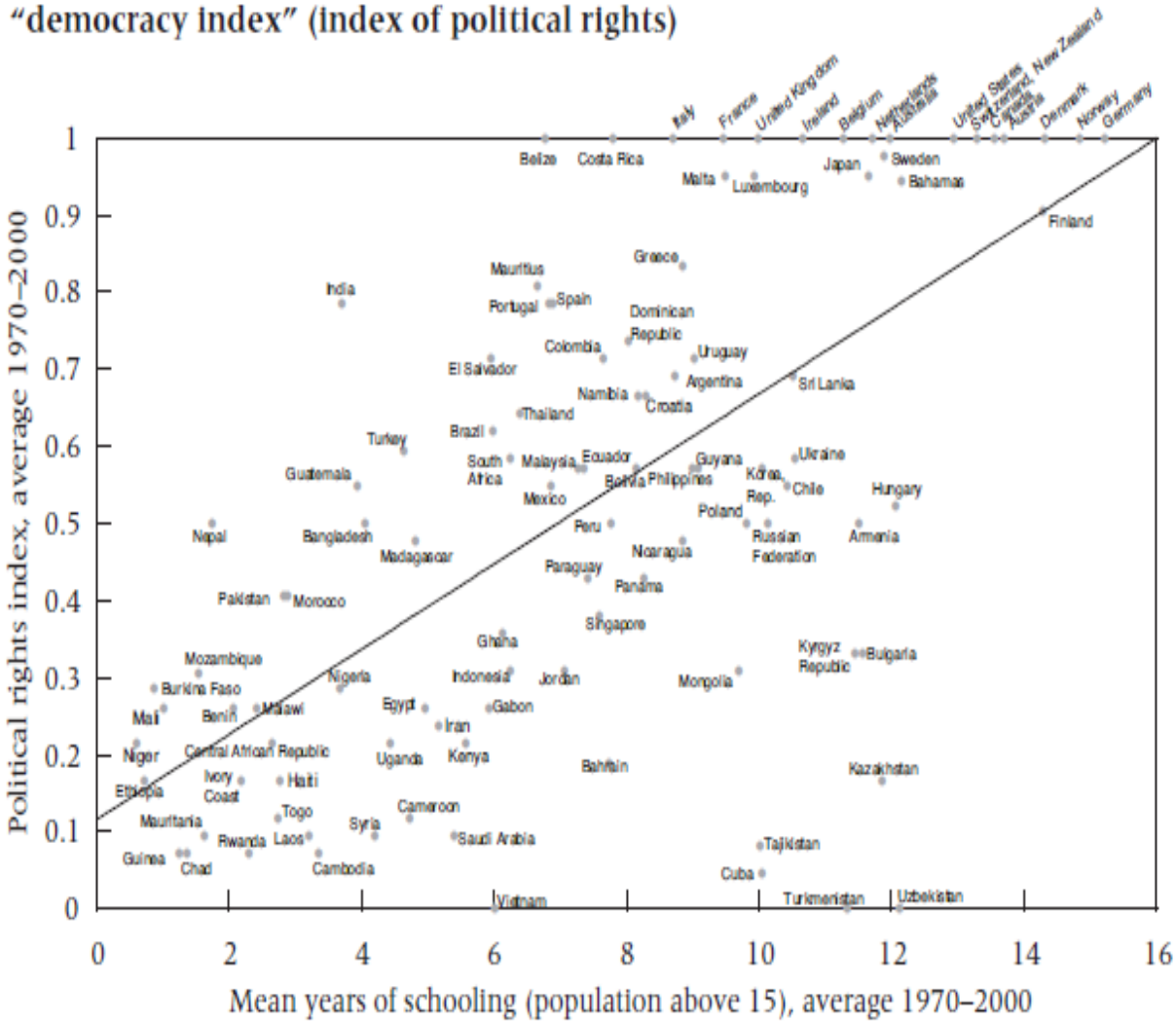


Education is a key factor in enhancing democracy

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)



Demography, Education, and Democracy
A Global Perspective

An international symposium to celebrate the establishment of the Wittgenstein Centre for Demography and Global Human Capital

Thursday, 29 September 2011
The Austrian Parliament

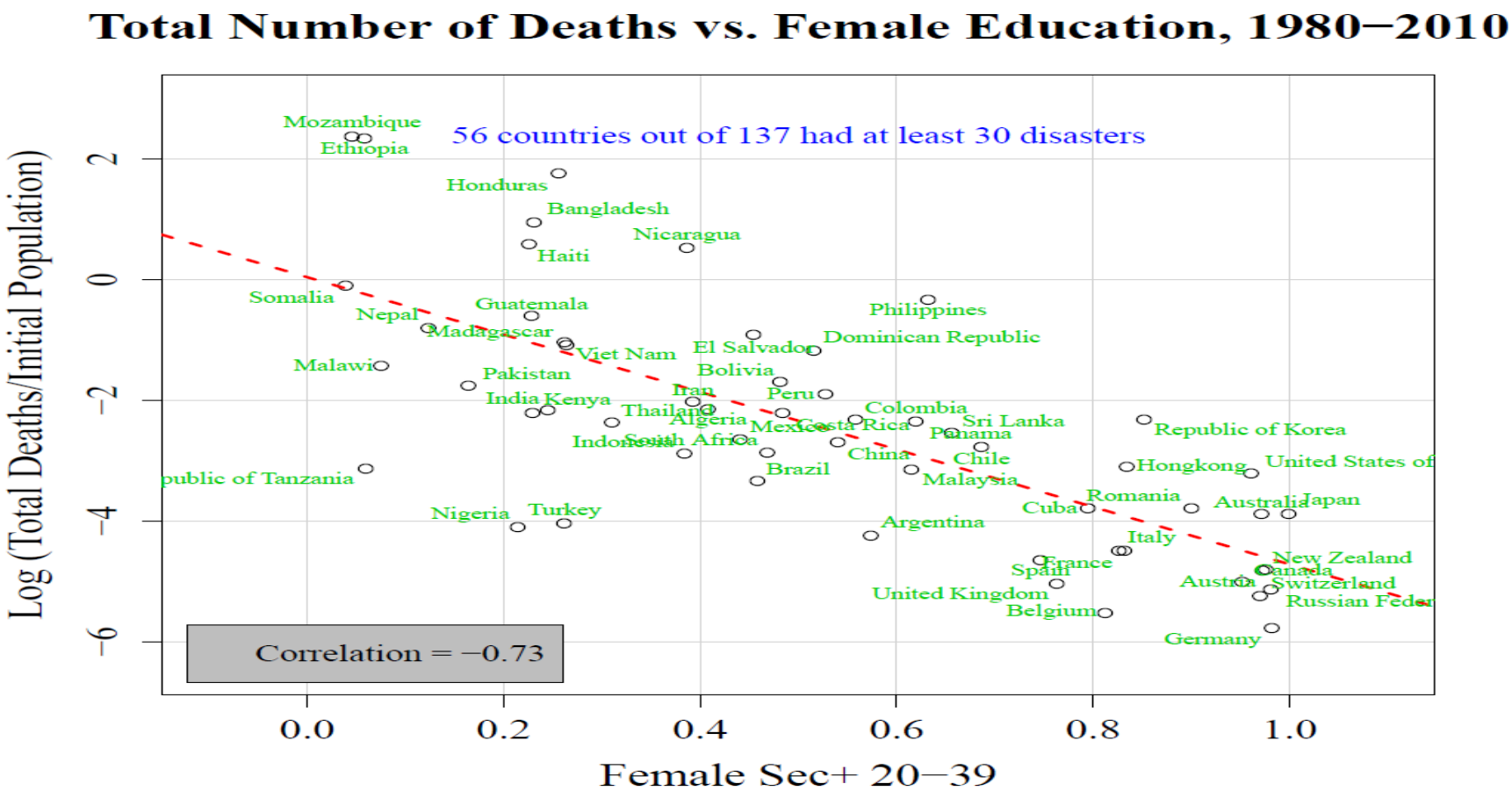
Speakers include:

(Univers

Wittgenstein Centre

FOR DEMOGRAPHY AND GLOBAL HUMAN CAPITAL

Education reduces diaster mortality and enhances adaptive capacity to climate change



PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

***Sola schola et sanitate*: human capital as the root cause and priority for international development?**

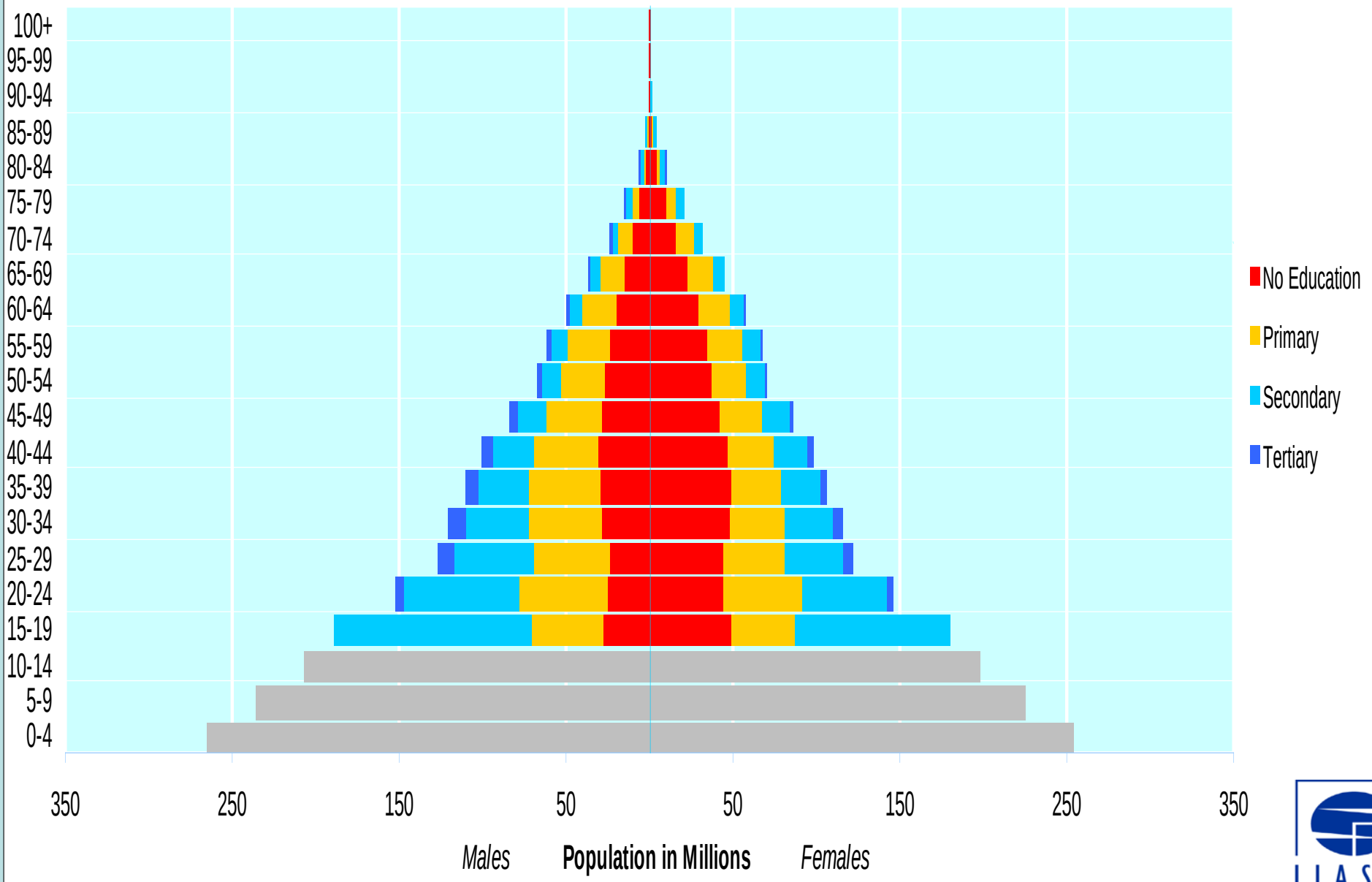
Wolfgang Lutz

Phil. Trans. R. Soc. B 2009 **364**, 3031-3047

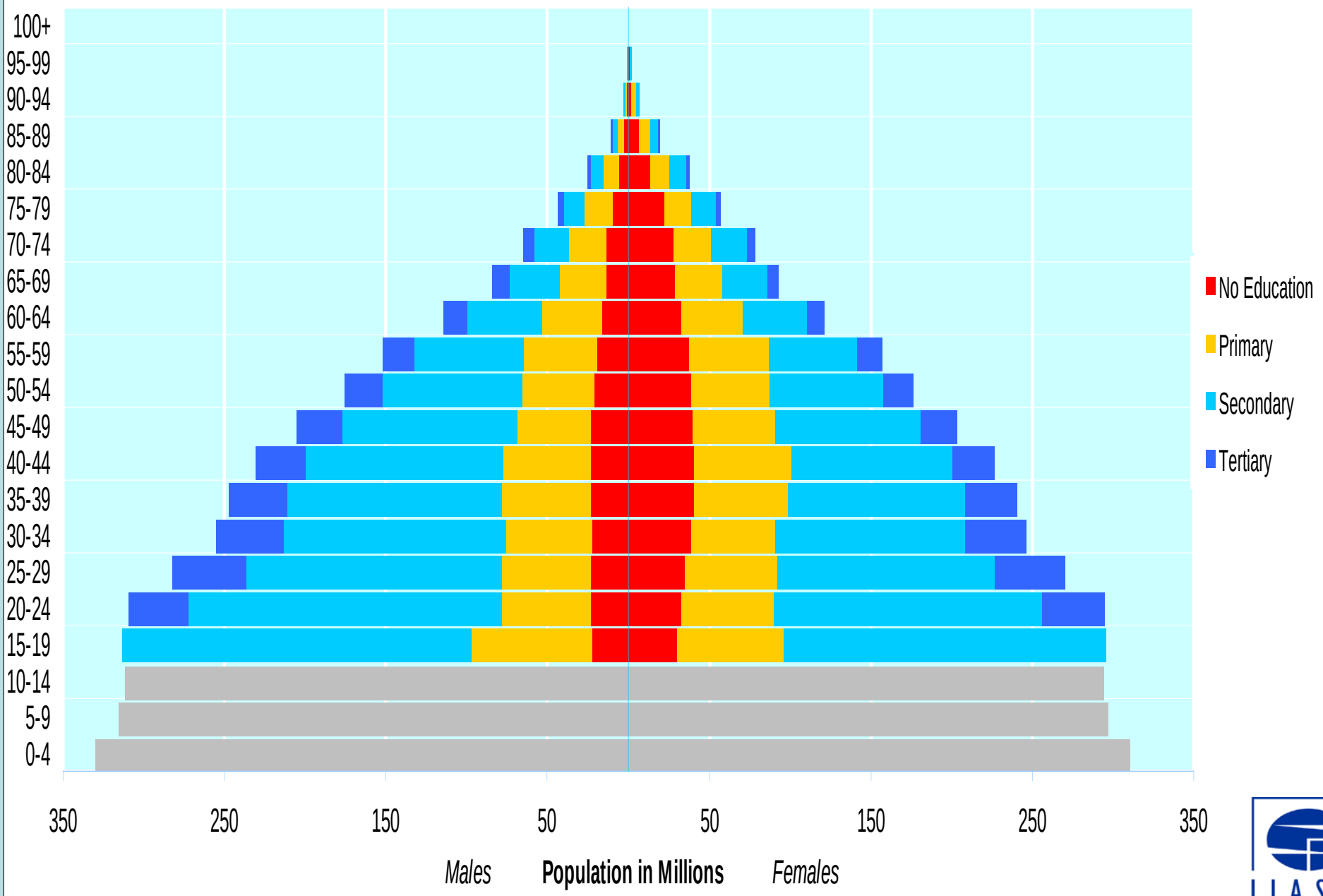
A policy focus on female education and basic health (*sola schola et sanitate*) is a multiple-win strategy for the reduction of

(a) **mortality** and disability
(b) **unintended pregnancies and desired family size and hence population growth,**
(c) **poverty**
(d) quality of institutions and democracy
(e) environmental impact at given level of income
(f) **vulnerability to environmental change ….**

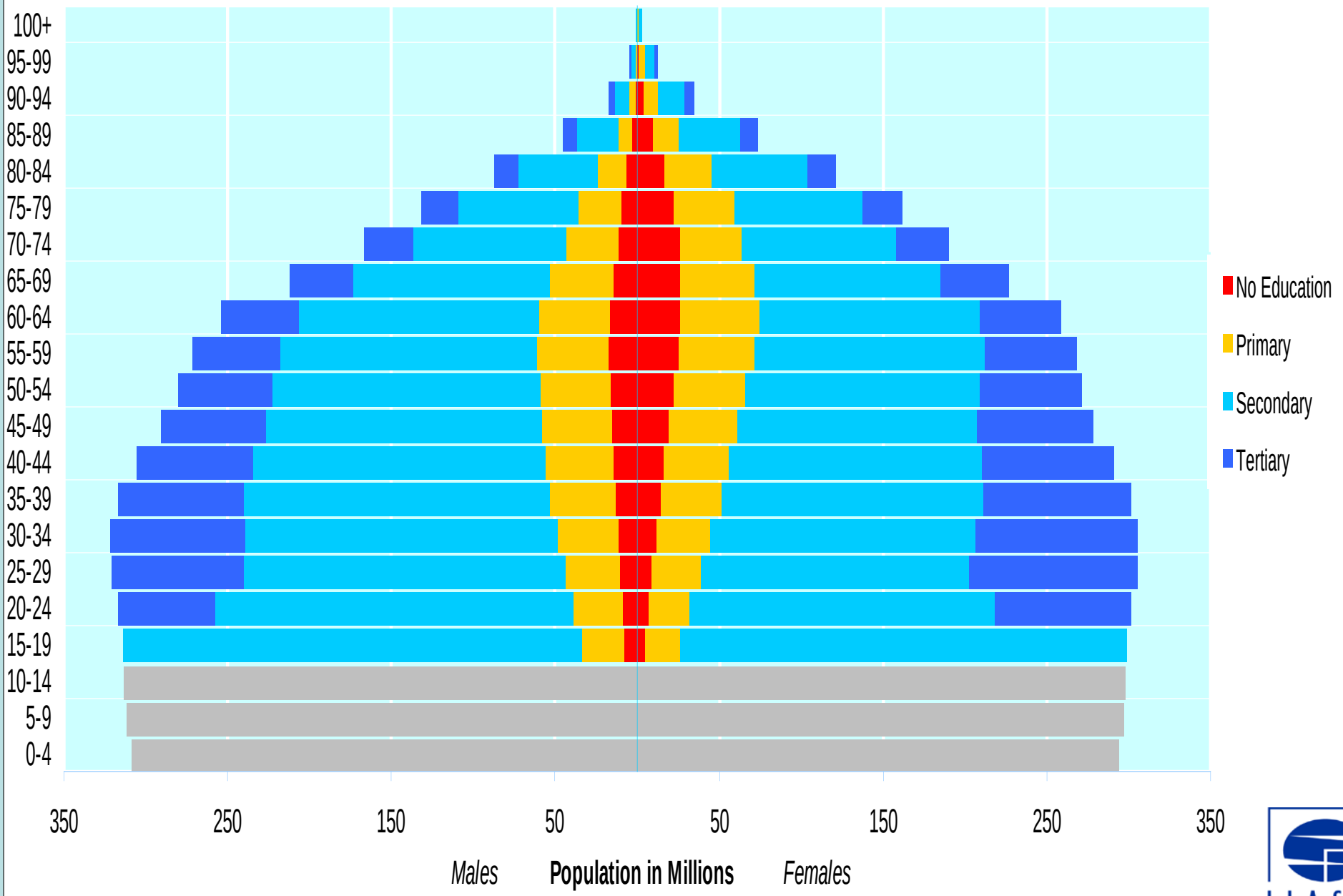
World - Population by Age, Sex and Educational Attainment in 1970



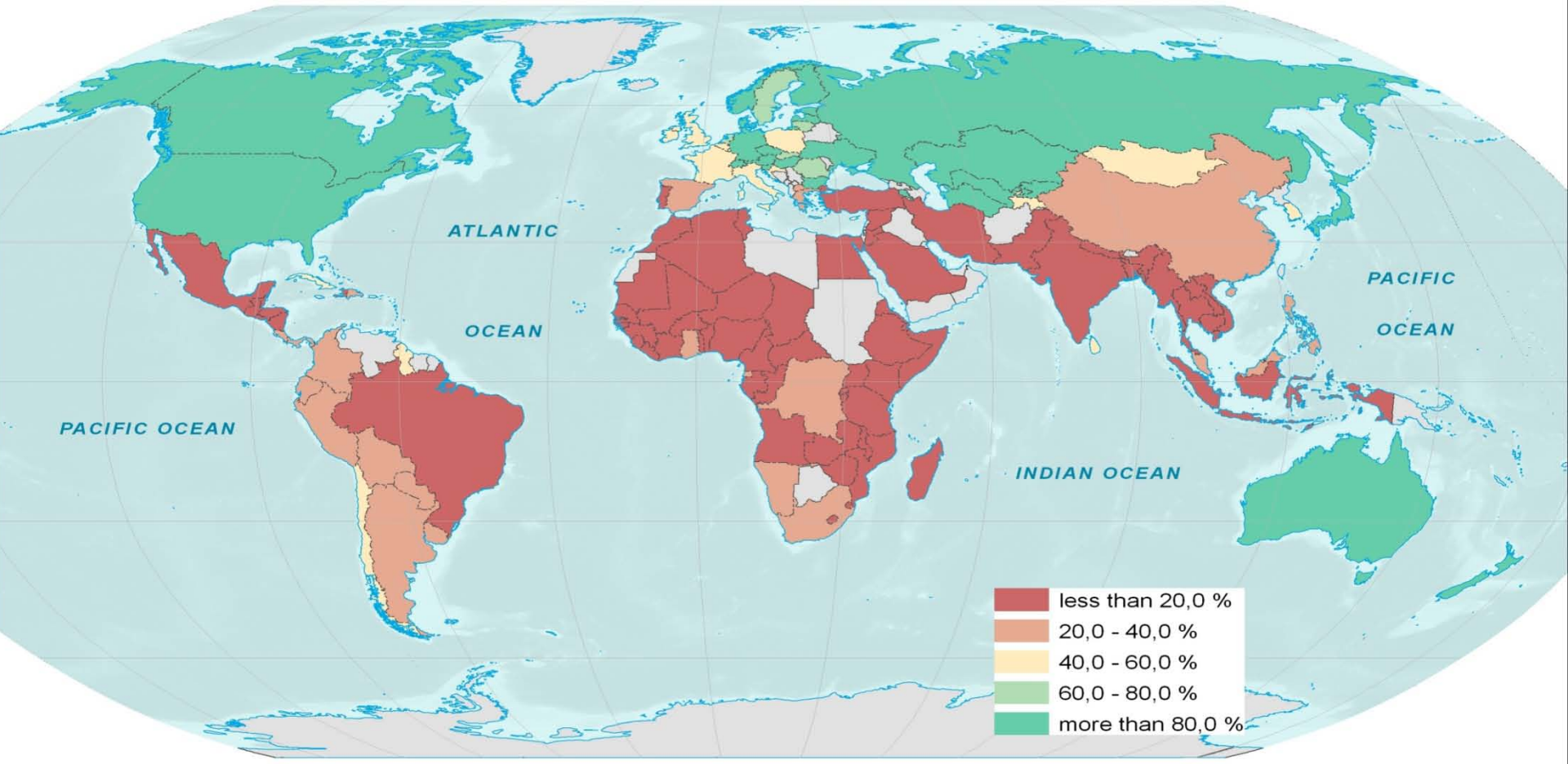
World - Population by Age, Sex and Educational Attainment in 2010 - Global Education Trend - Scenario



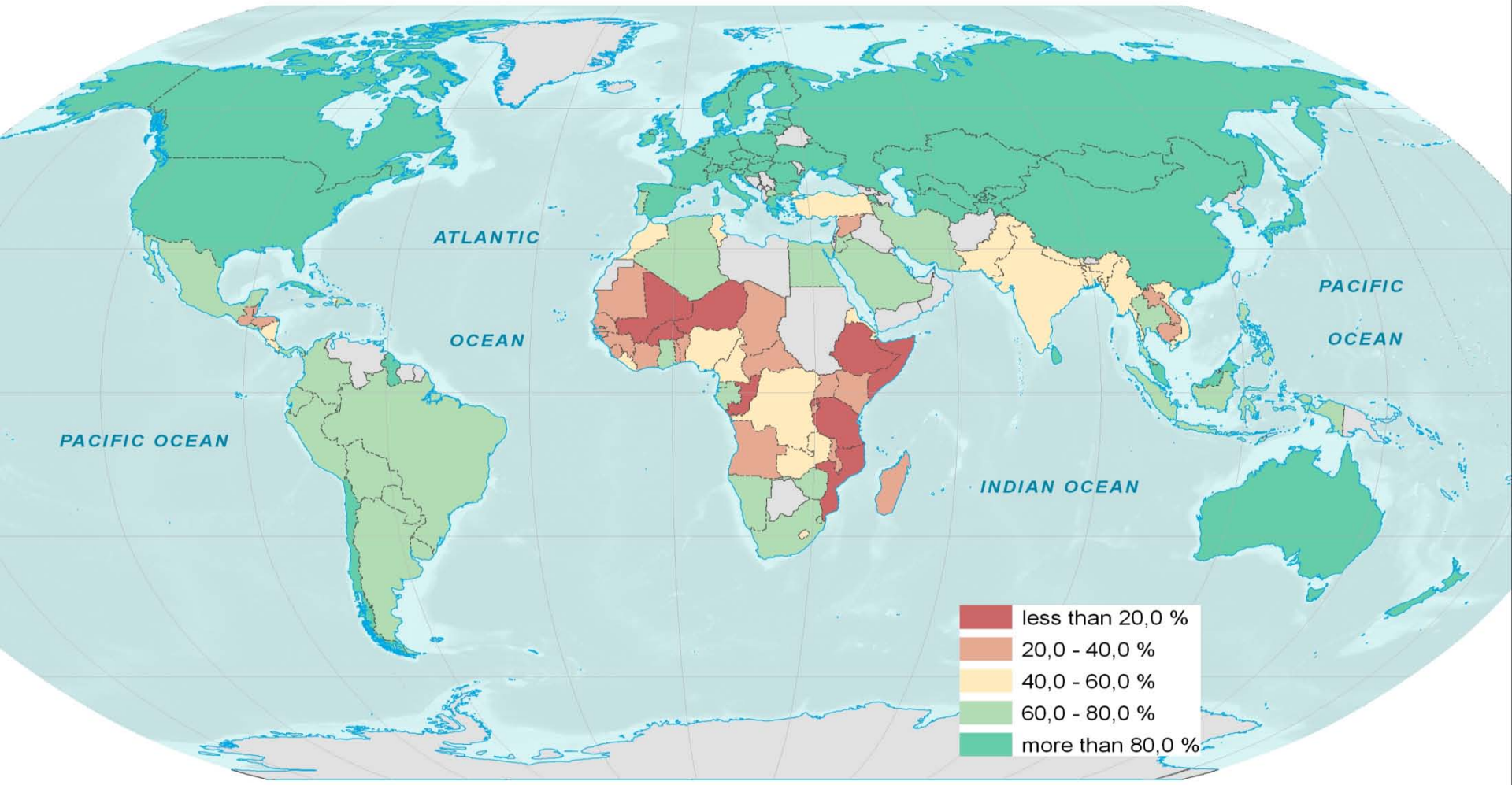
World - Population by Age, Sex and Educational Attainment in 2050 - Global Education Trend - Scenario



1970: Proportion of women aged 20-39 with at least junior secondary education



2010: Proportion of women aged 20-39 with at least junior secondary education



2050: Proportion of women aged 20-39 with at least junior secondary education (GET Scenario)