



International Institute for
Applied Systems Analysis
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Wittgenstein Centre

FOR DEMOGRAPHY AND
GLOBAL HUMAN CAPITAL

Global Population Trends consistent with the SDG Health and Education Goals

Royal Society, 2 December 2016

Wolfgang Lutz

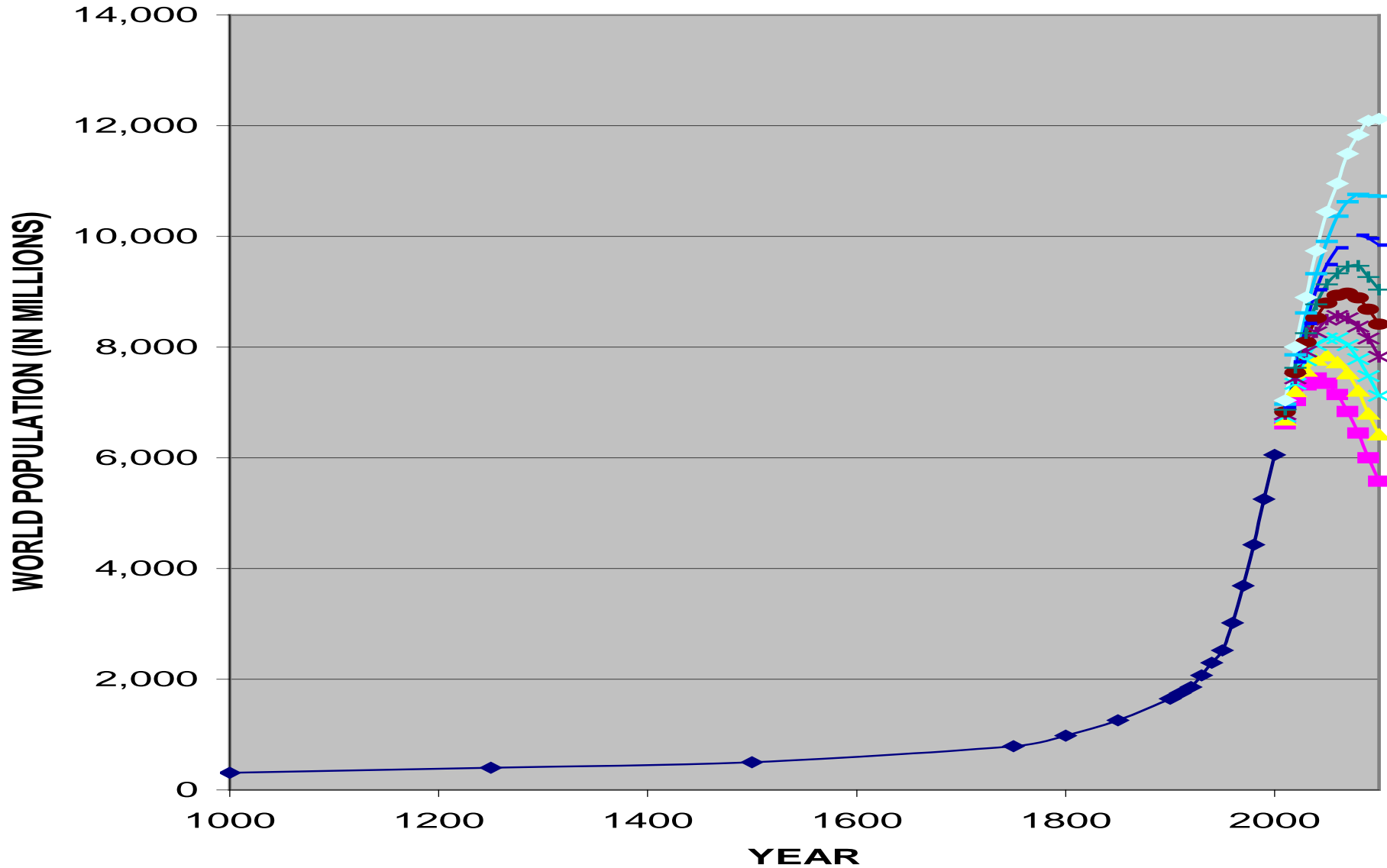
Director, World Population Program, IIASA

Founding Director, Wittgenstein Centre



IIASA, International Institute for Applied Systems Analysis

World Population from the year 1000 to 2100



World Population Growth

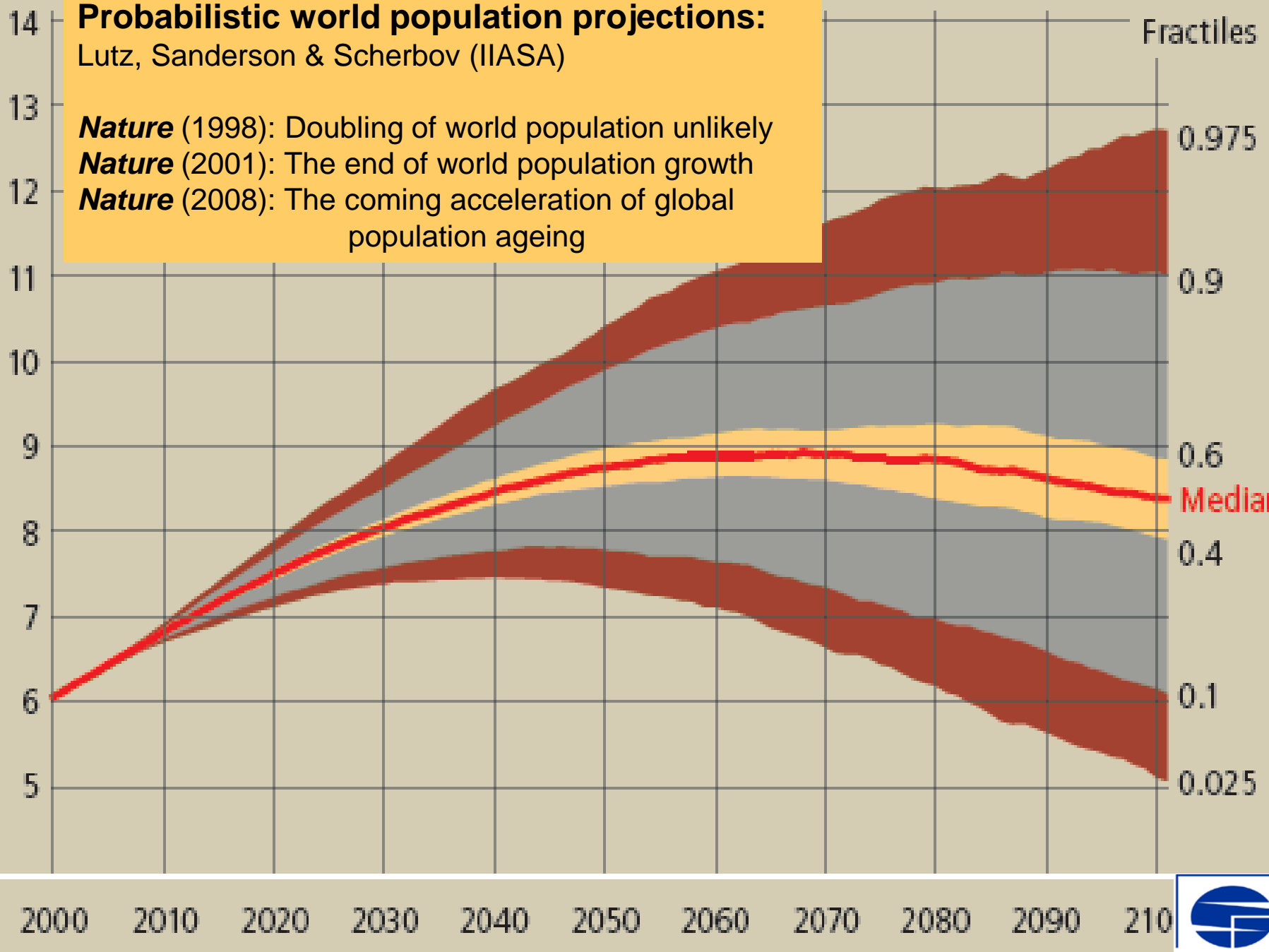
... is sometimes called the elephant in the room because it is not explicitly mentioned in the SDGs although it matter greatly ...

- ... through the number of consumers and their impact on the environment (at given levels of per capita consumption),
- ...through making it more difficult to expand education, improve health and reduce poverty,
- ... through more people with higher vulnerability being exposed to natural disasters and other environmental change,
- ... through possibly increasing the likelihood of conflict and uncontrolled mass migration...

Probabilistic world population projections:
Lutz, Sanderson & Scherbov (IIASA)

Nature (1998): Doubling of world population unlikely
Nature (2001): The end of world population growth
Nature (2008): The coming acceleration of global population ageing

Total World Population



Fractiles

0.975

0.9

0.6

Median

0.4

0.1

0.025

2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

Year



OXFORD



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FOR DEMOGRAPHY AND
GLOBAL HUMAN CAPITAL
A COLLABORATION OF IASA, THE ICM, AND
THE ICGI

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

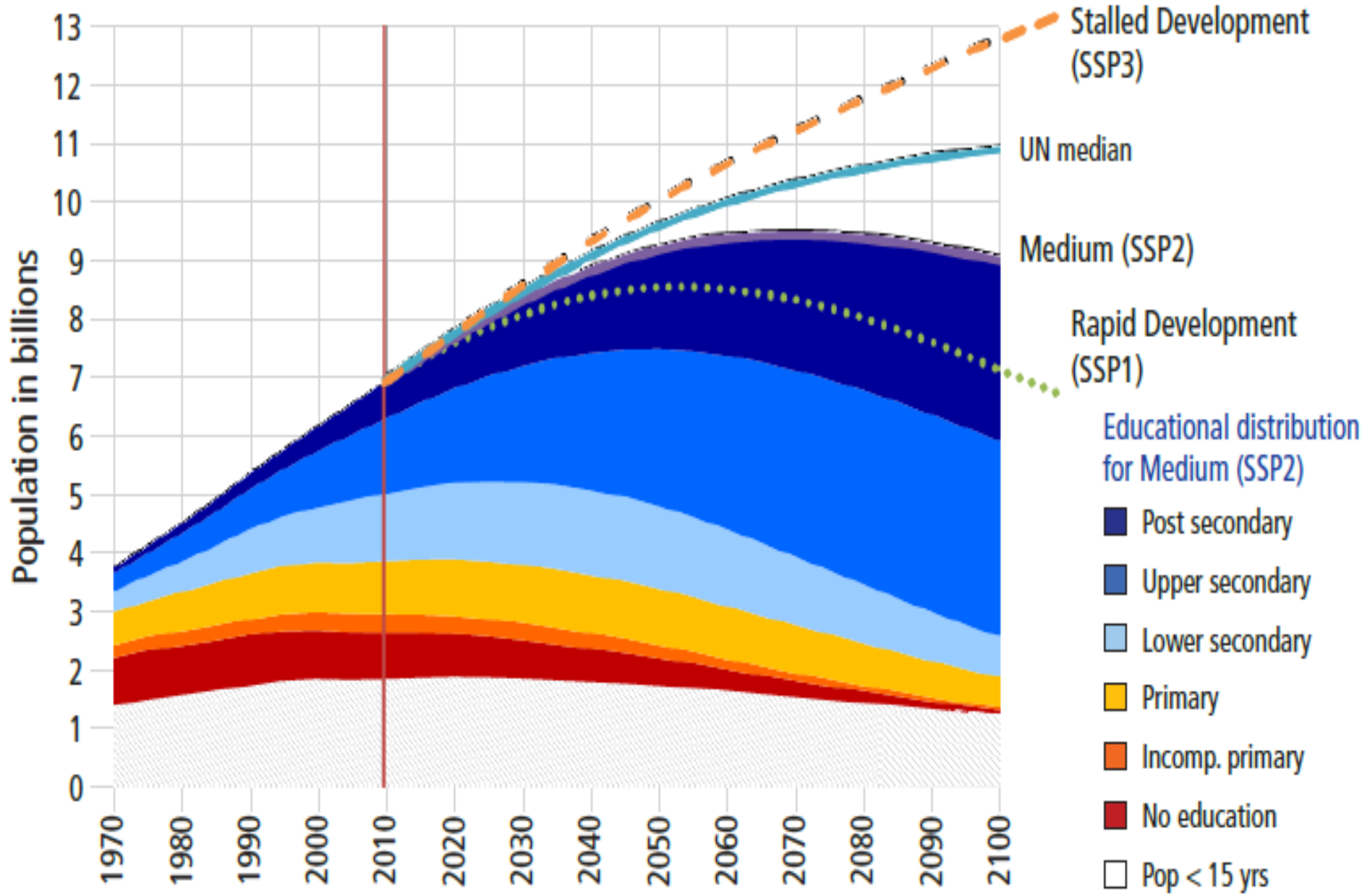


Chart 1. Historical trend and projections according to the medium scenario (SSP2) for the world population by six levels of educational attainment (see color coding). The additional lines superimposed

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 Sanderson³ (all IIASA)

2015: Sustainable Development Goal 4:

.... *quality* **primary and secondary**
education

for **all girls and boys**

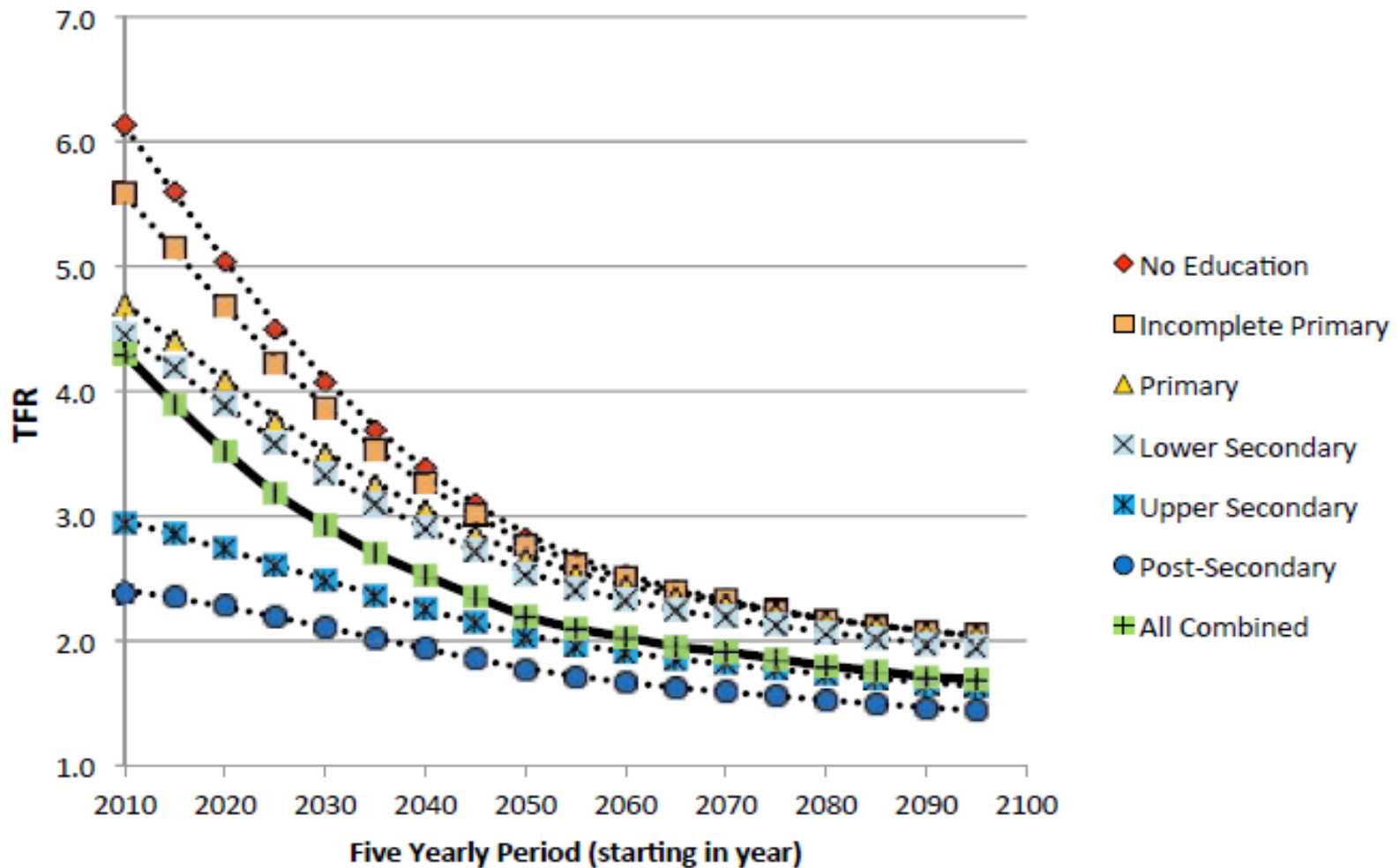
Adding education to age and sex in population analysis

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).

Fertility by Education in Kenya Empirical (2010) and Assumed





REVIEW

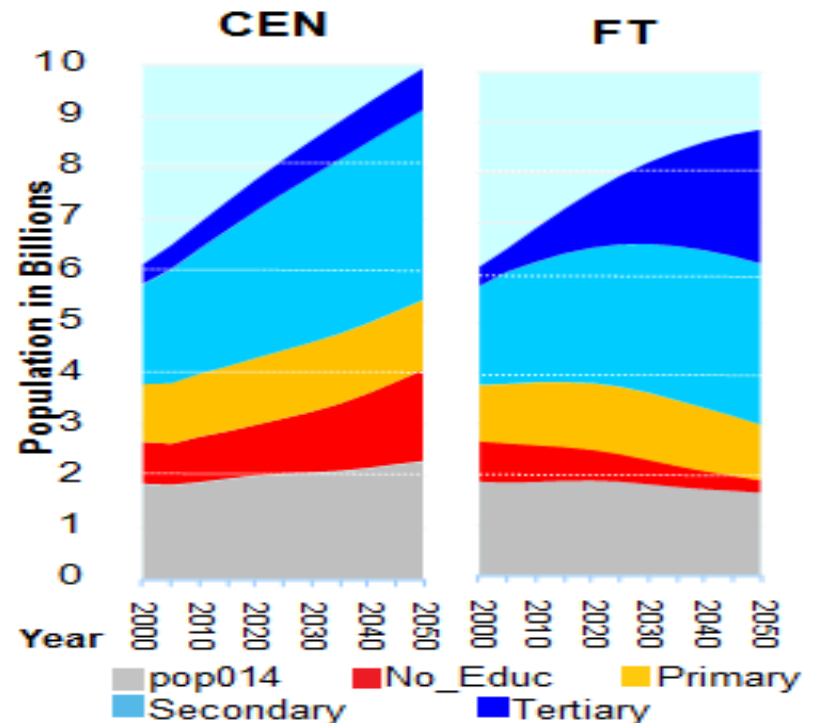
Global Human Capital: Integrating Education and Population

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



Toward Constructing a SDG Population Scenario

Translating the health and education targets into fertility and mortality assumptions

- Child mortality, maternal and other adult mortality targets,
- Reproductive health targets,
- Indirect effect of education targets on mortality and fertility trajectories

Nigeria - Education Specific and Total Fertility Various Scenario

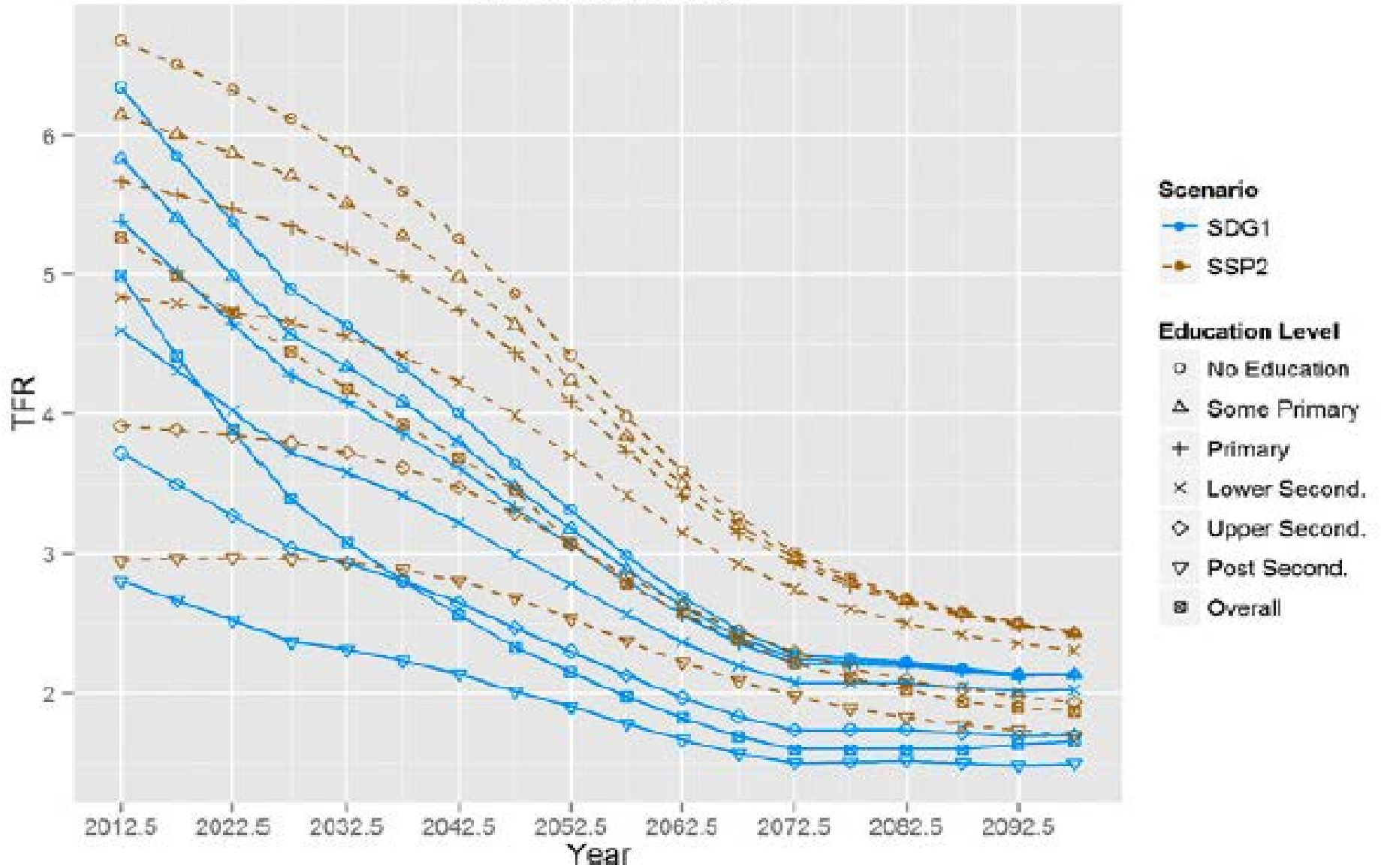


Fig. 2. Education-specific fertility rates for Nigeria under the assumptions of the SSP2 scenario and the 20% lower SDG1 scenario.

Nigeria - Population Projections - Various Scenarios and Ranges

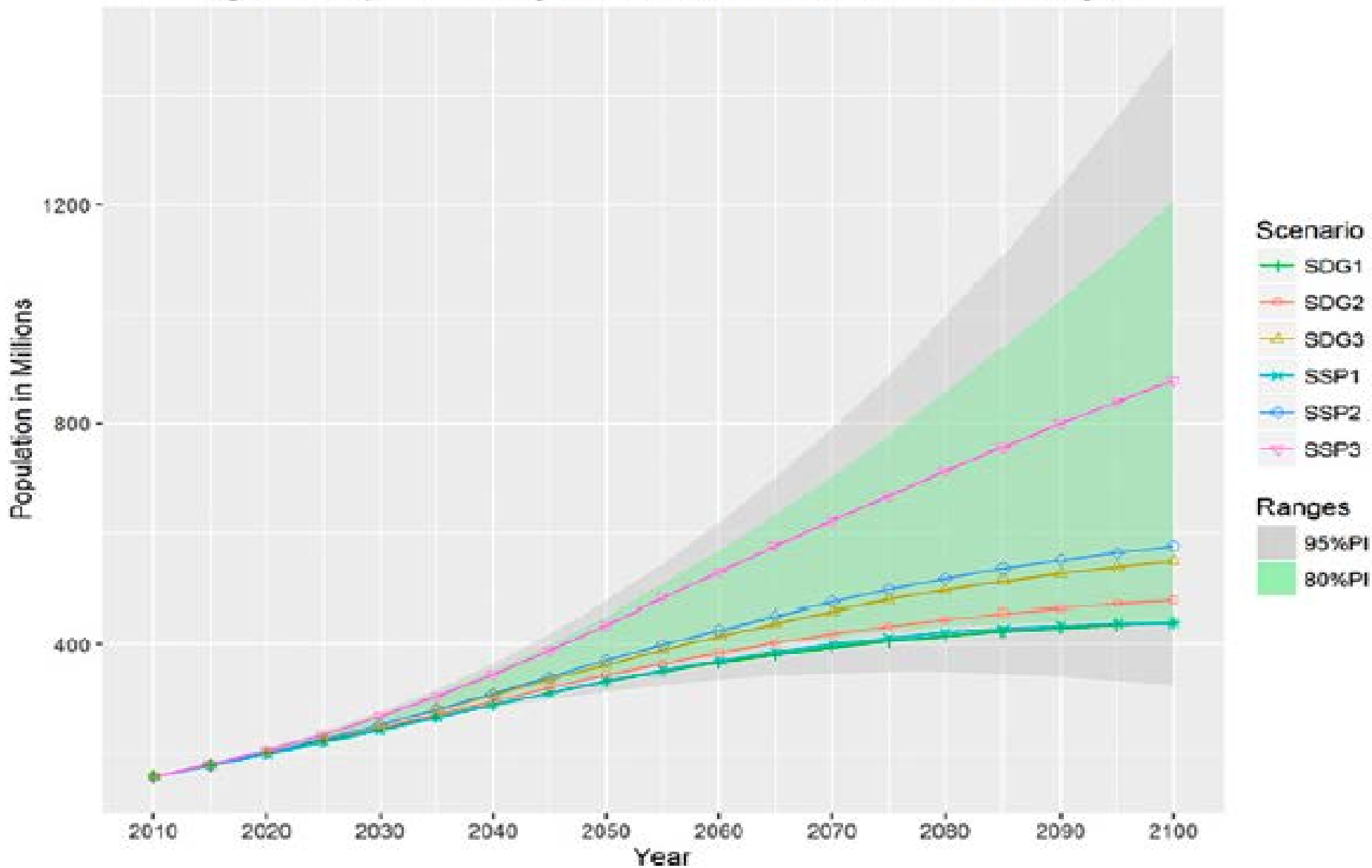
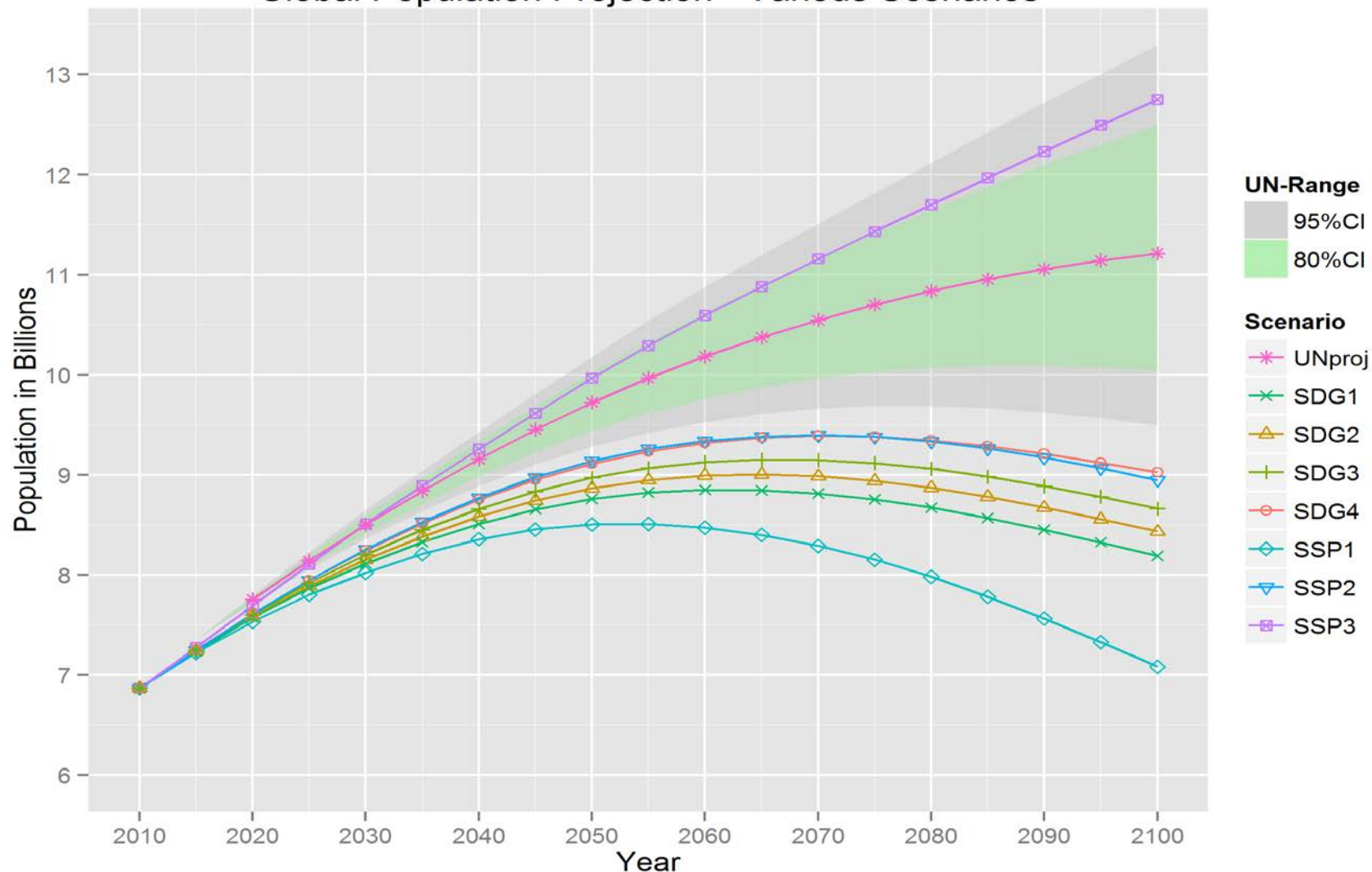


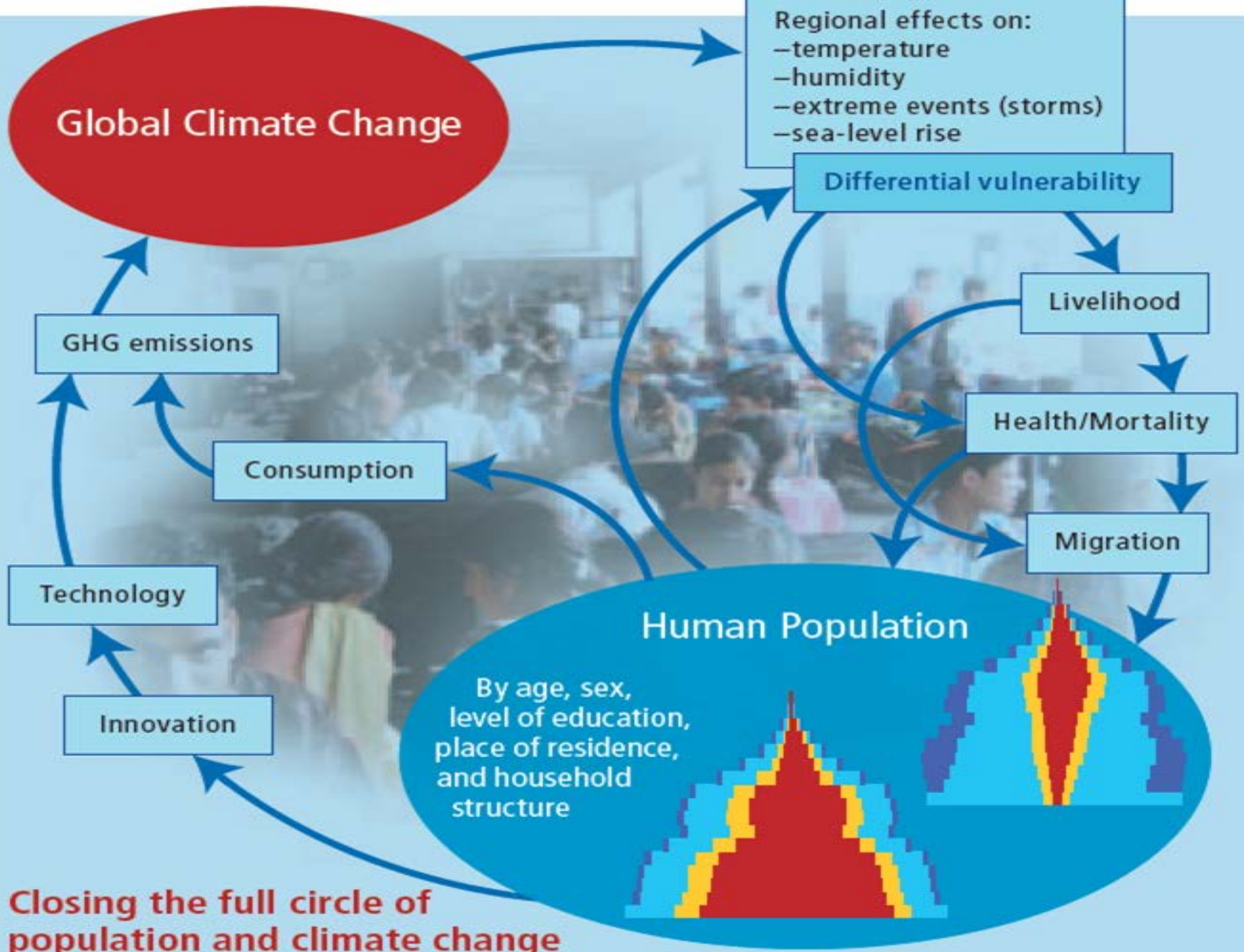
Fig. 3. Nigeria: Resulting population size for the SDG1–3 and the SSP1–3 scenarios and UN ranges.

Meeting the Sustainable Development Goals leads to lower world population growth

Guy J. Abel^{a,b}, Bilal Barakat^b, Samir KC^{a,b,1}, and Wolfgang Lutz^{b,1}

Global Population Projection - Various Scenarios





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)