



Wittgenstein Centre

FOR DEMOGRAPHY AND  
GLOBAL HUMAN CAPITAL

A COLLABORATION OF IIASA, VID/ÖAW, WU

# *Progress Report*

## 2011–2017



International Institute for  
Applied Systems Analysis  
[www.iiasa.ac.at](http://www.iiasa.ac.at)



Vienna  
Institute of  
Demography

ÖAW

AUSTRIAN  
ACADEMY OF  
SCIENCES

WU

WIRTSCHAFTS  
UNIVERSITÄT  
WIEN VIENNA  
UNIVERSITY OF  
ECONOMICS  
AND BUSINESS





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online to be able to access all links:

[www.wittgensteincentre.org/en/reports.htm](http://www.wittgensteincentre.org/en/reports.htm)

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Cover: Picture taken during the Wittgenstein Centre Conference 2016  
"Variations on the Themes of Wolfgang Lutz", WU Vienna, 5–7 December 2016.  
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# About us

*Wittgenstein Centre for Demography  
and Global Human Capital (IIASA,  
VID/ÖAW, WU) – WIC*

The WIC is a collaboration among the World Population Program of the International Institute for Applied Systems Analysis (IIASA), the Vienna Institute of Demography of the Austrian Academy of Sciences (VID/ÖAW) and the Demography Group of the Vienna University of Economics and Business (WU) and was made possible by the funding associated with the Wittgenstein Award – the highest Austrian science prize – which in 2010 for the first time went to a social scientist: Wolfgang Lutz. In the application for the prize, the establishment of such a joint centre had been stated as the explicit goal, and in December 2010 a Memorandum of Understanding among the three pillar institutions was signed. The process was facilitated by the fact that Wolfgang Lutz served as head of all three pillar units. The Wittgenstein funding available for 2011–2017 has been strategically invested to strengthen the coherence of the three research groups and cover new fields such as “the demography of education” that advance the unique research focus of the centre. This helped to increase the value of the core funding from the three institutions together with third party funding, including so far eight ERC grants.

The Centre combines the partners' strengths in the fields of demography, human capital formation and analysis of the returns to education. It builds on a highly successful collaboration that has already generated significant scientific advances. “Human capital” refers to the human resource base in terms of the number of people and their changing structure by age, gender, location, education, health status, cognitive skills and other relevant characteristics. Our intent is to use this broader multi-dimensional demographic approach to provide sound analyses as a basis for decision-making at various levels.

## Our Mission Statement

**The Wittgenstein Centre aspires to be a world leader in the advancement of demographic methods and their application to the analysis of human capital and population dynamics. In assessing the effects of these forces on long-term human wellbeing, we combine scientific excellence in a multidisciplinary context with relevance to a global audience.**

## Demography and Democracy

### Wittgenstein Centre Opening Symposium (2011)

The Symposium held at the Parliament in Vienna, Austria, on 29 September 2011, was in celebration of the opening of the new Wittgenstein Centre for Demography and Global Human




Capital (WIC). The inaugural Wittgenstein Symposium involved scientists, policy advisors and academics from the developed and the developing world. The event explored the relationship between demography, education and democracy across continents and cultures. Participants also discussed the benefits of refocusing international development priorities toward education and health.

The opening ceremony can be watched online. [👉](#)

## Demography that Matters

### Celebrating 40 years of Population Research (2015) [👉](#)

On the occasion of several anniversaries (40 years population research at IIASA, 40 years Vienna Institute of Demography and 5 years Wittgenstein Centre), the Centre hosted a high-level symposium on "Demography that Matters". The symposium took place on 9 September 2015 at the new campus of the Vienna University of Economics and Business (WU). The event included an extended presentation of research highlights and plans



40 years – Vienna Institute of Demography (VID) of the Austrian Academy of Sciences

40 years – Population Research at the International Institute for Applied Systems Analysis (IIASA)

5 years – Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU)

Opening of the new premises of the VID at the WU Campus

9<sup>th</sup> September 2015

WU Campus

followed by festivities. Besides the three leaders of IIASA, ÖAW and WU, high-level politicians, Rudolf Hundstorfer (Minister for Social Affairs at the time) and Sophie Karmasin (Minister for Family at the time) gave speeches. The Centre directors concluded the festive event with a roundtable discussion on how demography matters in the 21<sup>st</sup> century.

# Message from the Directors

The Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU), abbreviated as WIC, was established on the basis of the Wittgenstein Award 2010 with the vision to use the enormous and still untapped potential of multi-dimensional demographic methods developed in and around IIASA during the 1970s and 80s to analyse and forecast broader socio-economic changes that explicitly include in the models more relevant demographic characteristics than just the conventional variables of age and sex. In particular, the theoretical and empirical analysis of changes in educational attainment (as a proxy for human capital) is a promising direction of research which helps to make demography more relevant for answering a broad range of important social, economic and even human-environment questions.

Another unifying theoretical concept is the model of "Demographic Metabolism" (introduced by Ryder and operationalised by Lutz) which describes how societies change as a function of young cohorts with different characteristics replacing older ones. It formalises the widely held view that the entry of new generations brings change into organisations and societies. Combined with multi-dimensional demographic methods it becomes a powerful tool for forecasting socioeconomic change. It may be the only model in the social sciences with predictive power for decades.

Over the past years this multi-dimensional approach has already shown its immediate practical potential for dealing with key policy challenges of our rapidly changing world, along the way

## WIC Directors



Wolfgang Lutz is founding director of the Wittgenstein Centre. He holds a PhD in demography from the University of Pennsylvania and joined IIASA in October 1985, where he is program director of the World Population (POP) Program. Since 2002 he is also director of VID and since 2008 full professor of applied statistics (part-time) at WU. He is also professorial research fellow at the Oxford Martin School (UK) and at Shanghai University (China). He works on fertility, population projections, population-development-environment interactions and human capital formation. He is member of the Austrian Academy of Sciences, the Finnish Societas Scientiarum, the German National Academy Leopoldina, the US National Academy of Sciences, and the World Academy of Sciences (TWAS).

**William P. Butz** served as the Centre's Director of Coordination and Outreach in the years 2011–2013 during which he played essential roles in helping to strengthen the interactions among the three pillars of the new Centre and in establishing its external communication strategy. He was also involved as co-editor in the most important joint product of the WIC, namely the book on "World Population and Human Capital in the 21<sup>st</sup> Century" published with Oxford University Press (OUP).

Jesus Crespo Cuaresma is director of economic analysis at the Wittgenstein Centre and has an oversight function of three WIC research groups. He is professor of economics at the Vienna University of Economics and Business (WU), and research scholar at the International Institute of Applied Systems Analysis (IIASA). He studied Economics at the University of Sevilla (Spain) and received his PhD from the University of Vienna. He has published numerous articles in renowned scientific journals and acts as a scientific consultant to the World Bank and the Austrian Institute of Economic Research. Professor Crespo Cuaresma's scientific fields of interest include applied econometrics, macro-economics, economic growth, human capital and economic policy.





providing new and sometimes surprising answers to questions such as: What is the desirable level of fertility and how can it be measured and assessed? Will population ageing actually result in the often feared massive increase in disability? Is population ageing a threat to economic wellbeing? Does Europe need migrants for demographic reasons? Can education help to slow cognitive ageing and what should be the priority investments for our ageing Western populations? What are the drivers of continued population growth in Africa and what are the best investments for enhancing the adaptive capacity for coping with already unavoidable climate change? Using these multi-dimensional demographic approaches researchers at the WIC deal with many such questions in an innovative way.

Based on this joint vision, the WIC was established to bundle the existing strengths in demography in the Vienna area to create the critical mass for a globally leading research centre. It is not a separate legal entity but rests on three pillars (IIASA, VID/ÖAW and WU) which will be described on the following pages. Over the first seven years of its existence it has already had a significant impact in terms of publications and advancing our vision. On top of its rather limited core funding it has acquired significant competitive funding, not least in the form of already eight ERC grants. In this brochure, we provide an overview over these activities and hope you will find it an interesting read.

Alexia Fűrnkranz-Prskawetz is director at the Wittgenstein Centre and executive director at VID, the largest institute of the WIC. She is also professor at the Institute of Statistics and Mathematical Methods in Economics at the Vienna University of Technology. Professor Fűrnkranz-Prskawetz holds a doctorate in mathematical economics and a second doctorate (habilitation) in population economics and applied econometrics from the Vienna University of Technology. She works in the field of the economics of population and individual ageing, long-run economic growth, agent-based models and environmental economics. Alexia Fűrnkranz-Prskawetz has published numerous articles in refereed scientific journals and edited special issues of economic and demographic journals.



Raya Muttarak is director of population, environment and sustainable development at the Wittgenstein Centre and also research group leader of the corresponding WIC research group. She holds a DPhil in sociology from the University of Oxford (UK). She is a senior lecturer (associate professor) in geography and international development at the School of International Development, University of East Anglia (UK). Her research focuses on differential vulnerability, climate change adaptation and mitigation, health, migration and education and sustainable development. She has published numerous articles in refereed scientific journals and has conducted commissioned research for UNICEF and UNESCO.

Sergei Scherbov is director of demographic analysis at the Wittgenstein Centre. Demographic analysis has a very prominent role among activities of the Centre, as the size, composition and structure of populations affect almost every aspect of our lives. Demographic analysis is about methods of measuring dimensions and dynamics of populations. Development of population size and its composition to a large extent defines the whole subject of demography. Sergei Scherbov is deputy program director of IIASA's World Population Program (POP) and research group leader of WIC's population ageing group. He is also affiliated professor at the College of Population Studies, Chulalongkorn University (Thailand).





# International Institute for Applied Sys World Population Program

*IIASA (founded in 1972) is an international scientific institute that conducts research into the critical issues of global environmental, economic, technological and social change that we face in the twenty-first century.*



Schloss Laxenburg, the headquarters of IIASA  
Photo: IIASA

# tems Analysis



**International Institute for Applied Systems Analysis – IIASA:** Founded in 1972, IIASA is an international scientific institute that conducts policy-oriented research into problems that are too large or complex to be solved by a single country or academic discipline. IIASA is non-governmental in nature and has currently 24 national member organisations (national academies or research councils) to scientifically address difficult problems like climate change that have a global reach and can be resolved only by international cooperative action. Funded by research funding agencies in Africa, the Americas, Asia, Europe and Oceania, IIASA is independent and unconstrained by political or national self-interest.

**World Population Program (POP):** Since 1974 IIASA's research agenda has included an explicit focus on population analysis. Wolfgang Lutz followed Andrei Rogers (1974-84) and Nathan Keyfitz (1984-94) in 1994 as leader of the World Population Program. In the context of the Wittgenstein Centre, POP focuses primarily on global population trends and the analysis of population in sustainable development. Human population matters for sustainable development in two important ways. First, it is an agent of change, bringing about many of the environmental, economic and social changes that continually challenge the sustainability of our current development paths. Second, the human population and its living conditions are the ultimate objects of development, with long-term human survival, health and wellbeing serving as criteria for judging whether development is sustainable.



# Austrian Academy of Sciences ➡

## Vienna Institute of Demography ➡

*Founded in 1847 as a learned society – today the ÖAW is Austria's central non-university research and science institution. Its statutory mission is to “promote science in every way”.*

**Austrian Academy of Sciences – ÖAW:** The Austrian Academy of Sciences is Austria's central non-university research and science institution. Its statutory mission is to “promote science in every way”. Founded in 1847 as a learned society, today the ÖAW has over 770 members (including full, corresponding, junior and foreign members) and 1,700 employees dedicated to innovative basic research, interdisciplinary exchange of knowledge and the dissemination of new insights with the aim of contributing to progress in science and society as a whole. The ÖAW currently has 28 institutes.

**Vienna Institute of Demography (VID):** Founded in 1975 under the name *Institut für Demographie* the institute was closely linked to the Austrian Central Statistical Office whose president was also the first director of the institute. Later on the head of the demographic branch of the Statistical Office, Richard Gisser, followed as director. In 2001 the ÖAW received additional government funding and decided that the demographic institute should broaden its focus and become more international with Wolfgang Lutz as (external) director. In 2002 the institute changed its name to Vienna Institute of Demography (VID) recruiting scientists from around Europe and developing a specific focus on comparative European demography.

**In summer 2015 the Centre celebrated 40 years of population research at IIASA and VID as well as the 5-year anniversary of the Wittgenstein Centre at its high-level symposium “Demography that matters”.**

**This event took place on 9 September 2015 at the new campus of the Vienna University of Economics and Business. The ceremonial act also acknowledged the opening of the new premises for both VID and WU's Demography Group in building D5 at Campus WU (see p. 3).**



Campus WU – Building D5  
VID/ÖAW on 2<sup>nd</sup> floor / WU's Demography Group on 3<sup>rd</sup> floor.  
Photo: Wittgenstein Centre (IIASA, VID/ÖAW, WU)

# **Vienna University of Economics and Business**

## **Demography Group**

*As a research-intensive public university with a keen awareness of its obligations to society, WU (founded in 1898) prepares its students to take on responsibility in business and society.*

**Vienna University of Economics and Business – WU:** The mission of the Vienna University of Economics and Business (German: Wirtschaftsuniversität) goes well beyond providing a high-quality education for the university's over 23,000 students, which makes it Europe's biggest Business School. Research-led teaching is important to WU. This includes not only strengthening WU's profile as a research university, but also participating in public discourse with society and exchanging knowledge with all relevant stakeholders.

**Demography Group:** In 2008 Wolfgang Lutz was appointed professor of applied statistics (full professor – part-time) at WU and belongs to the Department of Socioeconomics. The main reason for seeking this appointment was the need for the growing demographic research community in the Vienna area to have a university link through which academic degrees can be offered and young researchers be recruited. Population is taught as a concentration area in the English MSc Program Socio-Ecological Economics and Policy (SEEP) with annually around 30 students choosing this concentration area and 5–8 of them writing their MSc thesis in demography. Recently there have been 2–3 doctorates in demography per year, and on average one habilitation (qualification for full professorship in the German-speaking academic system).



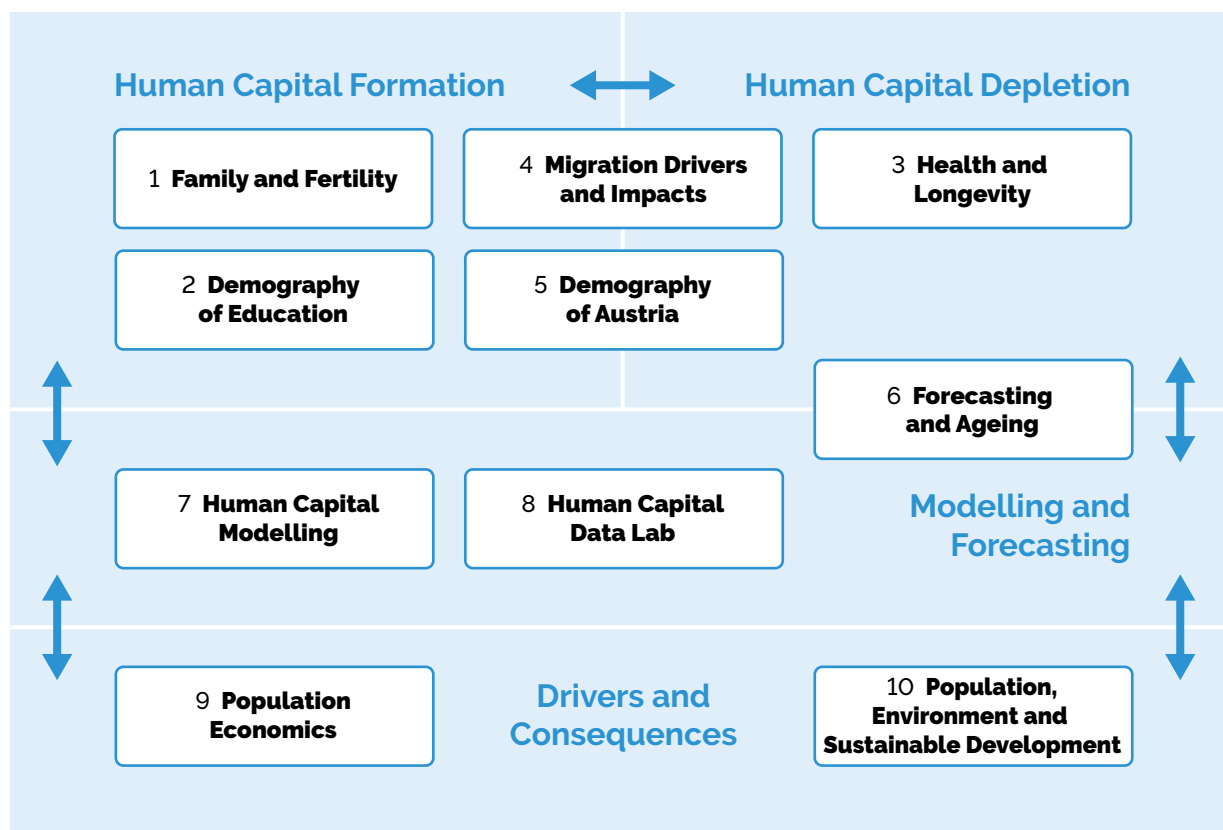




VID's Nathan Keyfitz Library  
Photo: Heike Barakat (WU)



# Research Themes and Groups



The scientific goal of the Wittgenstein Centre's research is to significantly advance the global frontier in modelling and understanding the drivers and consequences of changing population structures around the world – past, present and likely future. We explicitly address multiple dimensions of population structures that go beyond the conventional analysis by age and sex. Substantively, we focus in particular on the roles of human capital formation and global population ageing and on the interactions of these trends with the social, economic and natural environment. We use the rich methodological toolbox of demography and in particular the methods of multi-dimensional population dynamics for quantitatively addressing the "quality dimension" of changing human populations. As shown in the chart, the research of WIC can be

structured into four broad research themes that together form a coherent and comprehensive research agenda. These four themes focus on human capital formation and depletion, on modelling population dynamics, and on studying the interactions with the social, economic and natural environment. This focus on human capital is based on the broader understanding of demography as studying the changing size and structures of populations (definition according to IUSSP, the International Union for the Scientific Study of Population) notably by important sources of heterogeneity that go beyond the conventional age and sex. It applies the methods of multi-dimensional population dynamics (developed in and around IIASA in the 1970s) and gives special attention to education, health and labour force participation as constituents of human capital.

# 1 Family and Fertility ➡

Research Group Leader: Tomas Sobotka

The Family and Fertility research group studies global fertility trends and family changes in low-fertility countries and regions. Our strength lies particularly in applying a comparative perspective which puts emphasis on the institutional, socio-economic and cultural determinants of family plans and their realisation. Our recent work has focused on educational differentials in fertility preferences and family behaviour across countries and over time. These topics are studied within a broader context of intergenerational relations and the shift to later parenthood. We are also engaged in analysing the consequences

of the recent economic recession on marriage and fertility in Europe. The group is developing life course and couple-level perspectives on family, reproductive plans, gender division of work and fertility as well as their interrelations. Our research is actively supported by the development of several international open-access databases, especially the Human Fertility Database (HDF ➡) and the Human Fertility Collection (HFC ➡) – two collaborative projects with the Max Planck Institute for Demographic Research in Rostock – and a database on Cohort Fertility and Education (CFE ➡) established in 2013.

## Projects ➡

### Early Fertility Desires: Hidden Drivers of Union Formation? – FERTUFORM

PI: Natalie Nitsche | FWF/M2188-G16 | 2017–2019

This project aims at studying and understanding how childbearing preferences early in life may drive union-formation outcomes.

### FamiliesAndSocieties

Work package leader: Dimiter Philipov | FP7-SSH 2012-1-320116 | 2013–2017

This work package analysed the impact that family-related policies have in the long-run on wellbeing and on satisfying family needs.

### Fertility, Reproduction and Population Change in 21<sup>st</sup> Century Europe – EURREP

PI: Tomas Sobotka | ERC-2011-StG-284238 | 2012–2017

This project analysed key issues related to fertility, reproduction and their implications in low-fertility societies.

### Couples and Childbearing: New Approaches to the Study of Fertility Outcomes and Family Formation Across Europe – COUPFER

PI: Natalie Nitsche | FP7-PEOPLE-2013-IIF-627543 | 2014–2016

In order to understand childbearing behaviour, partnership formation and the characteristics, behaviour and interactions of both partners were included.

### Reproductive Decision-making and Human Capital – ReCap

PI: Maria Rita Testa | FWF/V318-Elise Richter Grant | 2014–2016

This project aimed at investigating the dynamics between reproductive decision-making and human capital.



Tomas Sobotka



Eva Beaujouan



Caroline Berghammer



Zuzanna Brzozowska



Mengni Chen



Anna Matysiak



Natalie Nitsche



Maria Rita Testa



Krystof Zeman



Cuiling Zhang

## EURREP

### Fertility and Reproduction in 21<sup>st</sup> Century Europe

## EURREP

FERTILITY AND REPRODUCTION  
IN 21<sup>ST</sup> CENTURY EUROPE

#### What is the subject of the research? Why is it of interest?

The project has focused on reproductive preferences, low fertility and family change in highly developed countries, especially in Europe. We paid attention to education differences in family behaviours from a generational (cohort) perspective. We have also studied fertility changes during the recent economic recession in Europe and participated in the research on the likely future of fertility. Our work contributes to understanding cross-country differences in family and fertility trends, their determinants and consequences. All these issues are relevant far beyond the field of population research as rich societies are facing rapid family changes and contemplate different policies and approaches to address them.

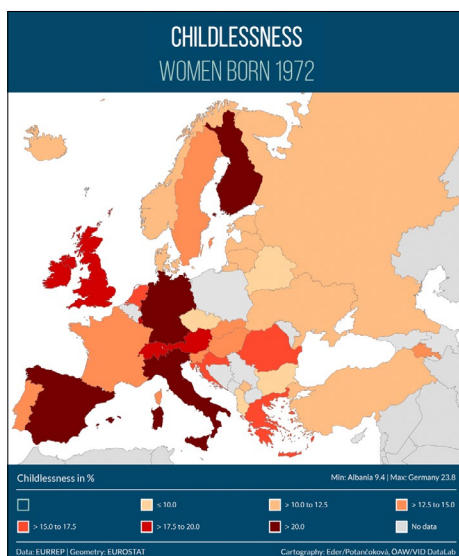
#### How did you approach the research?

Our comparative research required collecting detailed data on fertility preferences and fertility rates by age, education and other characteristics. These data were used not only for our analyses, but also for the open-access databases created within and supported by the project. We have also developed a new indicator of intergenerational population replacement that includes migration (with the UK colleagues) and a new index of conditions for work and family reconciliation. Our results were disseminated via the project website ([www.eurrep.org](http://www.eurrep.org)), specialised databases (HFD, HFC, CFE), the project newsletter, the European Fertility Datasheet ([www.fertilitydatasheet.org](http://www.fertilitydatasheet.org)) and peer-reviewed publications in top-tier journals.

#### What did you find out? Why are the results important?

Women's education remains a stratifying factor in family behaviour. With a few exceptions (Nordic countries, South Korea), highly educated women continue to have the lowest fertility and the highest childlessness. We also show long-term continuities in education-fertility differentials across regions. The fact that women with high education usually have fewer children is largely explained by the larger "gap" between intended and realised fertility among them.

Our findings address long-standing debates about the key factors driving fertility change and provide important information about the likely future fertility trends as rich countries experience continuing expansion of university education.



#### Key facts

PI: Tomas Sobotka

Time frame: 01.02.2012–31.01.2017

Website [↗](http://www.eurrep.org)

This project has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) / ERC Grant agreement n° 284238.



**European Research Council**  
Established by the European Commission

## 2 Demography of Education

Research Group Leader: Bilal Barakat

This research group uses mixed methods to conduct population-centred analyses of education policy and development, both globally and in a local context. Our research on education across the world takes the view that individual education behaviour and outcomes, as well as their aggregate dynamics at the population level, can usefully be studied as demographic events and characteristics. This leads to both a substantive focus on the role of education in demographic processes such as the fertility and mortality transition and migration, but also to the application and transfer of demographic

methods of analysis to the field of education. We combine this firm grounding in quantitative demographic analysis with a range of social science methodologies of a qualitative nature, to take account of the particularities, conventions and concerns of the education domain. This combination of methodological perspectives allows us to gain new insights on the demographic, socio-economic, long-term and spatial dimensions both of international educational development in low-income and transitional countries and of higher education in particular in countries with high-levels of schooling.

### Projects

#### Global Migration and Educational Expansion: Scenarios and Projections of Population-Level Interactions – MIGRED

PI: Bilal Barakat

UNESCO Global Education Monitoring Report (GEMR) | 2017–2018

The purpose of this cross-country analysis of data on international migration and education is to produce a background report for the Global Education Monitoring Report (GEMR).

#### Education and the Sustainable Development Goals (SDGs)

PI: Bilal Barakat | 2015–2016

1) A research study for the International Commission on Financing Global Education Opportunity provided a comprehensive review of synergies and trade-offs between SDG 4 on education and other SDGs, as well as a projection-based assessment of the feasibility of meeting the education SDGs.

2) A research study for the Global Education Monitoring Report (GEMR) assessed the potential contribution of an ambitious, but resource-constrained educational expansion path to selected other health and economic development goals.

#### Age-period-cohort Perspectives on Educational Measurement

This research projects looks at international education statistics that are frequently (mis)interpreted as relating unambiguously to specific reporting years. In reality, and similarly to demographic events, the underlying processes are best understood as varying along age, time (period) and cohort dimensions, and the correct interpretation of single-period summaries as 'synthetic cohorts' is subject to certain constraints.





# The Role of Education in Enabling the Sustainable Development Agenda



## What is the subject of the research? Why is it of interest?

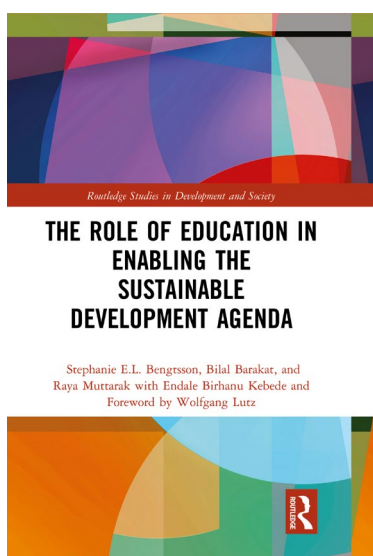
The question at the heart of this project and the book resulting from it is how education interacts with other dimensions of sustainable development. Crucially, we did not limit the scope to the most thoroughly researched areas of health and economics, but included interactions with the environment, conflict, and so on, across "the 5 Ps of sustainable development" as defined by the UN, namely People, Prosperity, Planet, Peace and Partnerships. When we say "interactions", we mean both synergies, whereby education brings development benefits or is facilitated by development, and trade-offs, whereby education acts as a barrier to development, or is constrained by other development sectors.

## How did you approach the research?

The project started out as a very long literature review to inform a background paper for UNESCO's Global Education Monitoring Report, but in the end it has certainly taken form as a more theoretically grounded argument, backed by the review, in favour of justifying educational development on its own terms, as capability-enhancing, rather than as an instrumental means to achieve specific ends. The nature of educational development, where many interesting findings and arguments can only be found in the "grey" literature of institutional reports, means we had to embrace a more informal approach over a strict "systematic review".

## What did you find out (so far)? Why are the results important?

Education interacts with practically all other dimension of sustainable development. In fact, upon compiling a comprehensive list of such interactions, we ourselves were surprised at its length. This is not sufficiently reflected in the weight given to education in the development discourse, which tends to only address the same handful of interactions (e.g. with infant mortality), especially given that communities themselves consistently rank education as their top concern. Also, it seems as if general education — as long as it is of good quality! — often delivers similar benefits as attempts to tailor educational interventions to achieve specific outcomes (environmental education, peace education, etc.).



## Key facts

Book title: The Role of Education in Enabling the Sustainable Development Agenda

Authors: Stephanie E.L. Bengtsson, Bilal Barakat, Raya Muttarak

Foreword: Wolfgang Lutz

Contributor: Endale Birhanu Kebede

© 2018 – Routledge, 216 pages

Website [🔗](#)

In a survey leading up to the SDGs, 'a good education' was chosen as their top priority by people all around the world: women and men, young and old, in rich and poor countries (My World 2015 Survey [🔗](#)).



### 3 Health and Longevity

Research Group Leader: Marc Luy

The main objective of the research group on Health and Longevity (HELO) is to disentangle the complex causation of healthy ageing. We want to better understand the factors and causal mechanisms that enable some (groups of) people to live longer and healthier than others. Existing knowledge about the central drivers of healthy ageing is still incomplete. This partial knowledge is like a huge jigsaw puzzle of which many—albeit not all—pieces are at hand, but without knowing the right position for many of them in the big overall picture. Our research is organised toward the aim of adding key pieces to this puzzle, which will contribute to a better understanding of

the determinants of healthy ageing. The work of HELO can be characterised by four specific features which distinguish our studies inside the community of health and mortality researchers: (1) Concentration on differentials in health and longevity with a particular focus on quasi-experimental settings, (2) Introduction of new hypotheses to explain extent and trends of differentials in health and longevity, (3) Estimation of levels and differentials in health and longevity in terms of life years, (4) Application-oriented development of innovative methods to estimate life expectancy and health expectancy for specific subpopulations.

#### Projects

##### **Ora et Labora: A Health-sociological Study on the Effects of Order Members' Extended Working Life Time on their Health and Life Quality.**

PI: Marc Luy | City of Vienna | 2016–2017

The absolute and relative increase of retired people entails increasing pressure on the social security systems. Policymakers intend to reduce this burden by increasing the statutory pension age. This study investigated the effects of a longer working life time on health and life quality of religious order members, who do not have a classic retirement age, to better assess the consequence of such a political measure.

##### **Levels and Trends of Health Expectancy: Understanding its Measurement and Estimation Sensitivity – LETHE**

PI: Marc Luy | Horizon 2020 Programme: 725187-LETHE-ERC-2016-COG | 2017–2022

This project aims at extending our knowledge on the technical characteristics and the usability of the Health Expectancy indicator. It is presented on page 35.



## HEMOX

### The Male-Female Health Mortality Paradox



#### What is the subject of the research? Why is it of interest?

The main objective of the project was to advance the understanding of the "gender and health paradox", describing the phenomenon that women live longer than men but experience worse health. We extended the state-of-the-art by the "CroHaM hypothesis" (Cross-sectional association between Health and Mortality) which states that the well-established longitudinal health compression and health expansion effects exist equivalently in a cross-sectional context regarding health differences between populations with different levels of life expectancy. Consequently, we hypothesised that women spend more life years in poor health than men not because they are female, but because they are the sex with higher life expectancy.

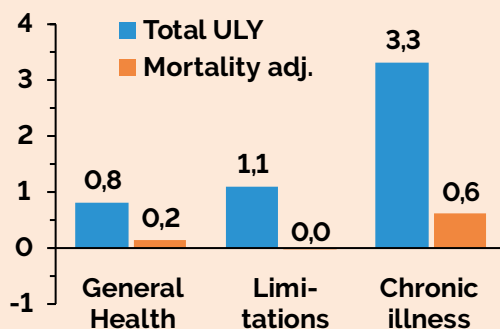
#### How did you approach the research?

We tested our hypothesis in a series of quasi-experimental settings in which we investigated the association between longevity and life years spent in poor health across subpopulations with different levels of life expectancy and corresponding gender gaps. The initial tests were done with Catholic nuns and monks for whom we collected information about health and mortality by two surveys conducted in 2012 and 2014. In a next step, we extended this quasi-experiment to other subpopulations of the general population with different levels of life expectancy. In total, we could identify more than 30 subgroups for which we estimated life expectancy and healthy life years.

#### What did you find out (so far)? Why are the results important?

In line with the CroHaM hypothesis we found that the disadvantage of women in healthy life years is mostly a direct consequence of their advantage in longevity. The remaining disadvantages of women in healthy life years after controlling for this "longevity effect" are eliminated when gender differences in health reporting are adjusted for. Based on these results we developed an explanation model for the "gender and health paradox" which does also advance our general understanding of the mechanisms behind healthy ageing. This makes the project outcomes highly relevant for society because they can influence corresponding public health measures.

Gender differences (women minus men) in the absolute number of Unhealthy Life Years (ULY) without and with adjustment for gender differences in mortality



#### Key facts

PI: Marc Luy

Time frame: 01.04.2011–30.09.2016

Website [↗](#)

This project has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) / ERC grant agreement n° 262663.



## 4 Migration: Drivers and Impacts

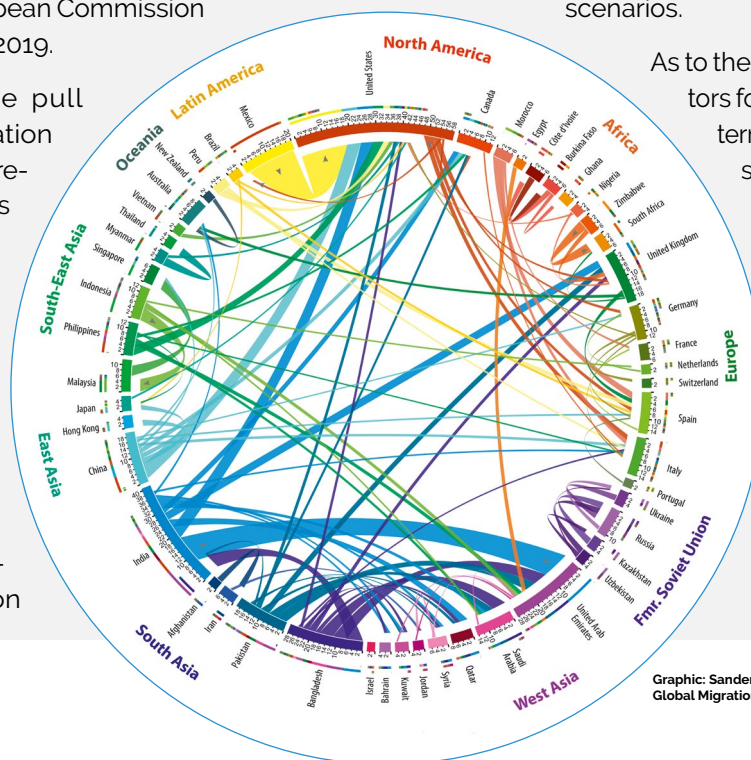
Research Group Leaders: Wolfgang Lutz and Alain Belanger

After an initial focus on estimating the global bilateral migration streams over the past decades this research group now focuses on assessing the demographic and other drivers of future migration streams. In collaboration with the Joint Research Centre (JRC) of the European Commission, the IIASA/JRC Centre of Expertise for Population and Migration (CEPAM) has been set up to conduct such studies in a comprehensive manner and feed into the migration policy development of national governments as well as the new European Commission to take office in 2019.

In terms of the pull factors of migration into Europe the research group tries to comprehensively address the questions to what degree Europe "needs" migrants for demographic reasons. This is done through multi-dimensional population

scenarios which in addition to the conventional age- and sex-structures of the population also include education levels and labour force participation rates by age, sex and level of education. This is the basis for anticipating the future size of the labour force and its productivity. In addition, micro-simulation models including many more demographic variables such as place of birth, duration of stay in the country, language use and others allow to assess the integration challenges associated with alternative future immigration scenarios.

As to the possible push factors for out-migration, alternative demographic scenarios for potential sending countries are being combined with statistical analyses of past migration drivers and scenarios about the possible consequences of climate change on migration.



Graphic: Sander, N., Abel, G.J. & Bauer, R. (2015). Global Migration Data Sheet 2005-10. 



Wolfgang Lutz



Alain Belanger



Guy Abel



Jesus Crespo Cuaresma



Endale Kebede



Elke Loichinger



Guillaume Marois



Patrick Sabourin



Patrick Sakdapoltrak



## CEPAM

# IIASA-JRC Centre of Expertise on Population and Migration



### What is the subject of the research? Why is it of interest?

The European Commission – similar to many national governments – was taken by surprise by the wave of refugees that entered Europe in 2015. Its in-house research service (JRC) with over 2000 scientists addresses many environmental and technical issues but had little expertise in social sciences and none in demography and migration. Therefore IIASA was invited to join forces in order to assess the scientific basis about the drivers of migration that should inform future migration-related policy making in Europe. This is likely to be a highly prominent and controversial field of future policy making.

### How did you approach the research?

Any informed choice among alternative possible migration policies requires an ex ante assessment of the likely consequences. This is what the project tries to do through applying methods of multi-dimensional demographic macro- and micro-simulations and showing what would be the long-term implications of alternative possible migration scenarios on the future labour force in Europe, its productivity, social cohesion and the integration of migrants. It will also consider possible consequences for sending countries in terms of brain drain and circular migration.

### What did you find out (so far)? Why are the results important?

We are currently at the stage of getting the macro- and micro-simulations in place and testing them with actual data. We also have reviewed the whole existing literature on the drivers of migration and performed a meta-analysis about the possible effects of climate change on migration. In April 2018 – in close interactions with policy makers – we will define a set of 12–15 alternative migration scenarios, which will be assessed in terms of their long-term consequences.

### Key facts

Acronym: CEPAM

Project Leaders: Wolfgang Lutz and Alain Belanger

Website [↗](#)

Funding Body: European Commission and IIASA

Time Frame: By the end of 2018 the first results shall be communicated in order to provide a scientific basis for the new European Commission to define their new migration policies

Knowledge Centre  
on Migration  
and Demography



Illustration: © European Union, 2017

## 5 Demography of Austria ➡

Research Group Leaders: Isabella Buber-Ennser and Richard Gisser

Demographic analyses with a focus on Austria are on the research agenda of this group. Using quantitative data and methods, fertility and families are core research topics, forced migration and ageing are also explored. The group has a service function regarding socio-demographic survey data on Austria for the Centre and the scientific community at large. Activities can be grouped into three main areas:

- 1) Co-organising national surveys and analysing these data: The group is involved in the "Generations and Gender Survey (GGS)" and the "Survey of Health, Ageing and Retirement in Europe (SHARE)", two European panel studies. The Centre is represented in the Consortium Board of the GGS.
- 2) Survey research on migration in Austria: This research line was developed very recently, along with the steep increase of refuge-seeking people in Europe in 2015. Researchers from all three pillars of the Centre joined for a pioneering survey aiming to uncover the characteristics of displaced persons, which already started in 2015.
- 3) Research data from Austrian official statistics (STAT): Cooperation with STAT has played an important role from the very beginning. Several joint ventures concerned matching of census populations and the deceased for studying mortality. The VID regularly commissions questions on childbearing in the Austrian micro-census.

## Projects ➡

### Running Against the Clock? – RAC

PI: Isabella Buber-Ennser | FWF/P28071-G22 | 2016–2017

Countries in Europe and around the world have witnessed a major family transformation in the past decades. The main research aim of the project is to investigate the influence of life course circumstances on the realisation of individuals' fertility plans in Austria.

### Realising Fertility in Vienna

PI: Isabella Buber-Ennser  
City of Vienna/2015/CA19 | 2015–2016

Using longitudinal data of the Generations and Gender Programme (GGP) the project addressed differences between Vienna and other parts of Austria in childbearing intentions and their realisation. In addition, realisation in Vienna was compared to realisation in other European capitals like Prague or Budapest.

### Childlessness of Highly Educated Women – KILAK

PI: Isabella Buber-Ennser  
German Procurement Agency of the Federal Ministry of the Interior/B1.11-1427/10/VV:1 | 2011–2012

The project focused on university degree holders in four European countries (Western Germany, Austria, France and Norway) and aimed to find out how different life domains are associated with fertility intentions and childlessness.

### SHARE-PERSONAs

PI: Isabella Buber-Ennser | FFG/825878 | 2010–2011

The concept of CURE-Elderly-Personas is designed to be applied in AAL (Ambient Assisted Living). The project applied the so-called "persona method", a powerful approach to focus on needs and characteristics of target users.

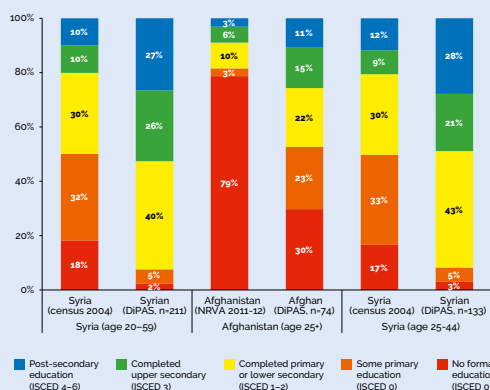




# DiPAS

## Displaced Persons in Austria Survey

Educational attainment in home countries and in DiPAS



Source: Buber-Ennsner I, Kohlenberger J, Rengs B, Al Zalal Z, Goujon A, Striessnig E, et al. (2016) Human Capital, Values, and Attitudes of Persons Seeking Refuge in Austria in 2015. PLoS ONE 11(9): e0163481. doi:10.1371/journal.pone.0163481

### What is the subject of the research? Why is it of interest?

Given the social impact of the large number of individuals applying for asylum across Europe in 2015, it is important to study who these persons are in terms of their skills, motivations and intentions. The project aims to provide empirical evidence on recent inflows of displaced persons to Austria, and to Europe at large. Research focuses are on education, values, attitudes, occupational profile and the match with the host society's labour market, the family context including the potential for family reunification, and methodological aspects of surveys on displaced persons. DiPAS enabled the team to carry out cutting-edge research and to acquire unique expertise in an area that will gain increasing relevance in the years to come.

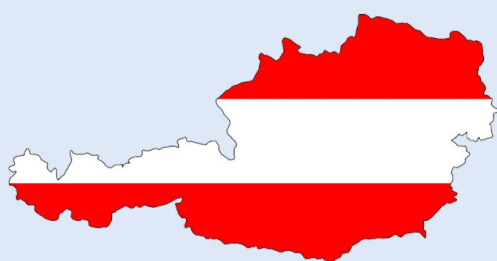
### How did you approach the research?

The research group has initiated a survey known as the 'Displaced Persons in Austria Survey (DiPAS)' among asylum-seekers and refugees who arrived in Austria in 2015. Researchers from all three pillars of the WIC with different academic and cultural backgrounds joined, including the Syrian demographer Al Zalal. In late 2015, more than 500 adult displaced persons originating mainly from Syria, Iraq and Afghanistan and residing in and around Vienna were interviewed in Arabic, Dari/Farsi and English. Including detailed information on partner and children yielded a unique dataset of almost 1500 persons. The survey focused on socio-demographic characteristics, in particular human capital, attitudes and values.

### What did you find out? Why are the results important?

The surveyed population comprised mainly young families with children, particularly those coming from Syria and Iraq. Their educational level is high compared with the average level in the country of origin. A vast majority of respondents are Muslims, rating their religiosity at medium levels. Judging from stated attitudes towards gender equity, interviewed men seem to have more liberal attitudes than their compatriots at home. In addition, the applied methodological technique and experiences during the fieldwork give valuable insights.

DiPAS provides data for political decision-making and the societal dialogue. Its findings help to inform assessments about the integration potential of refugees into the host society.



### Key facts

PI: Isabella Buber-Ennsner

DiPAS turned out to be the first social survey not only in Austria, but in Europe, focusing on the persons seeking asylum in Europe in 2015. Isabella Buber-Ennsner, Judith Kohlenberger and Bernhard Rengs were the core team carrying out this landmark survey. Zakarya Al Zalal (IIASA), a Syrian demographer and director at the Technical Statistical Institute in Damascus was part of the team and provided valuable scientific as well as cultural knowledge. A first peer-reviewed article was published in the renowned US journal PLoS ONE in 2016. In 2017, a follow-up survey was carried out, focusing on first steps in the host society.

Website [↗](#)

## 6 Forecasting and Ageing

Research Group Leader: Sergei Scherbov

The focus of the research group is on population dynamics, demographic analysis and forecasting as well as on particular analysis and forecasting of ageing. Main themes of the research are population projections (issues related to projections, such as deriving scenarios on fertility, mortality and migration), methodological issues of projecting mortality and migration, and population ageing.

The group comprehensively reassesses population ageing based on innovative alternative definitions of age and ageing. New scientific knowledge is produced that is useful in policy formulation and that can educate the public about population ageing and its consequences. Among other things, the group ascertains the extent to which advanced societies are actually ageing in

multiple dimensions, including health, cognitive abilities, and remaining life expectancy at certain ages. By addressing such fundamental issues this group has a pronounced impact on future population ageing research. The research builds on a new concept: the characteristics approach to the measurement of population ageing. When looking at characteristics other than chronological age the whole picture of ageing looks very different and much less alarming compared to traditional measures of ageing.

A strength of the developed approach is the conversion of characteristics related to ageing to the age metric, which allows comparisons of ageing based on very different indicators in a standard way.

### Projects

#### **Ageing Trajectories of Health: Longitudinal Opportunities and Synergies – ATHLOS**

PIs of Work Package 4: Sergei Scherbov and Warren C. Sanderson | EU H2020 Grant/635316-ATHLOS | 2015–2020

This project aims to achieve a better understanding of ageing by identifying patterns of healthy ageing pathways or trajectories and their determinants, the critical points in time when changes in trajectories are produced, and to propose timely clinical and public health interventions.

#### **Reassessing Ageing from a Population Perspective – Re-Ageing**

PI: Sergei Scherbov | ERC Advanced Grant/323947-Re-Aging | 2013–2019

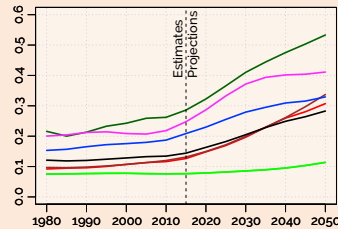
This project develops new approaches to the study of age and ageing that are appropriate for 21<sup>st</sup>-century conditions.



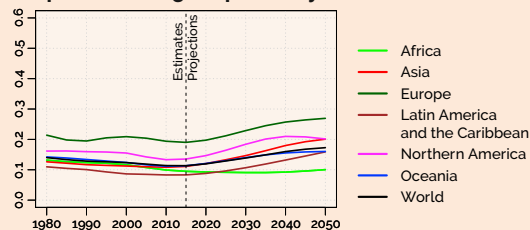
# RE-AGEING

## Reassessing Ageing from a Population Perspective

Conventional old-age dependency ratio



Prospective old-age dependency ratio



### What is the subject of the research? Why is it of interest?

Life expectancies in the EU and in many other countries around the world are increasing significantly. Age-specific health statuses have also generally been improving. In contrast to these profound changes, the concepts that demographers have used to analyse ageing on a population level have remained largely static. The substantial changes in life expectancy and health status have rendered these traditional demographic measures such as the proportion above age 65 inadequate for the analysis of ageing at the population level in the 21st century. This research comprehensively reassesses population ageing based on innovative alternative definitions of age and ageing. The new approach has strong implications for both research and policy. People's behaviour is defined by their characteristics and not solely by chronological age.

### How did you approach the research?

We developed a new paradigm in conceptualising population ageing: the characteristics approach to the measurement of population ageing. The hallmark of the approach is the consistent use of changing characteristic schedules together with changing age structures. The approach includes conventional measures of chronological age but is far more general. The initial focus was made on four characteristics: chronological age as a quantitative benchmark against which the importance of the other characteristics is to be assessed; remaining life expectancy for producing a forward-looking definition of age; the mortality rate as a rough but easily measurable health indicator; and the proportion of adult person-years lived after a particular age that can be used to construct a simple hypothetical demographically indexed public pension system.

### What did you find out? Why are the results important?

We look at ageing as a multi-dimensional process and developed new indicators of ageing that account for that. Traditionally, only one dimension – chronological age – is used to analyse ageing. We showed very big differences in the past, present and forecasted speed and level of ageing when using conventional measures of ageing and newly developed ones that take into account the changing characteristics of people. Newly developed measures show much less ageing in the future. We showed that the faster the projected increase in life expectancy, the lower the projected speed of ageing. Our approach could be used to define the speed of ageing based on different characteristics of people, life table indicators or derived from survey data on health status, physical or cognitive measures.



### Key facts

PI: Sergei Scherbov

Time frame:  
01.04.2013 – 31.03.2019

Website [↗](#)

The results of the project are used in the latest UN World Population Ageing 2017 Highlights and World Population Ageing 2017 Report.

This project receives funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement No 323947.



**European Research Council**  
Established by the European Commission

# 7 Human Capital Modelling

Research Group Leader: Samir KC

The research group on Human Capital Modelling addresses a core topic of the Wittgenstein Centre by extending conventional methods of population dynamics in a multi-dimensional way to explicitly include educational attainment as well as in some cases labour force participation and health status. This is based on the well-established toolbox of multi-state demography – which has been developed in and around IIASA's Population Program in the 1970s. In this context it has been argued that educational attainment is an individual characteristic that constitutes the third most important source of observable population heterogeneity after age and sex and therefore should be routinely included as an additional dimension in all demographic analyses whenever the data permit to do so.

Since fertility and mortality tend to vary systematically by level of education, explicitly incorporating this demographic dimension in population projections also results in different aggregate outcomes as compared to projections disregarding this source of heterogeneity. In addition, the explicit focus on educational attainment also adds the "quality dimension" to demographic analysis thus making demography more relevant for a large number of economic, social and political science considerations.

Currently, the research group considers the further expansion of the multi-dimensional approach to also explicitly consider rural/urban places of residence as well as sub-regions of big countries.

## Projects

### Combining Traditional and Emerging Big Data Sources to Model Population Movement Patterns – BIGMIG

PI: Guy Abel | Anniversary Fund of the City of Vienna for the OeAW/STE0059 | 2015–2017

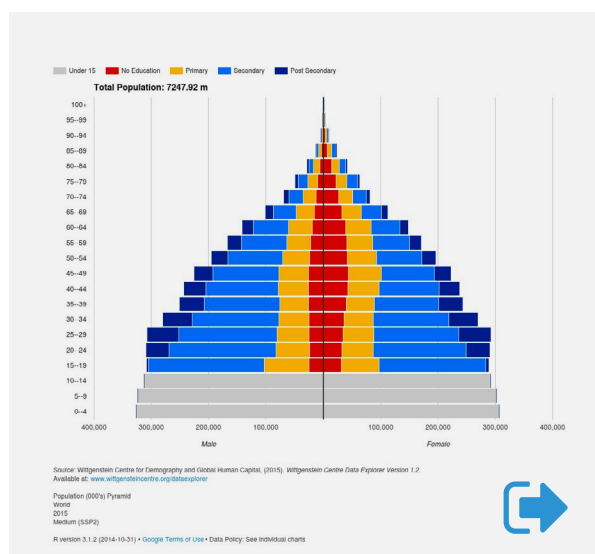
The overall aim of this project is to provide both insights into the differences between traditional data and big data on movement patterns and confine available data to provide synthetic estimates of the time flows with uncertainty.

### Addressing Human Heterogeneity in Systems Models – SCHEMA

In the context of a cross-cutting project on accounting for social heterogeneity across several IIASA models and programs this research group has been carrying out a detailed 5-dimensional case study on India in which the population of all Indian states has been stratified by age, sex, education and urban/rural place of residence. This project is also carried out in collaboration with the Asian MetaCentre for Population and Sustainable Development and its headquarters ADRI (Asian Demographic Research Institute).



# World Population and Human Capital in the 21<sup>st</sup> Century: Population Scenarios by Age, Sex and Level of Education for all Countries to 2100



## What is the subject of the research? Why is it of interest?

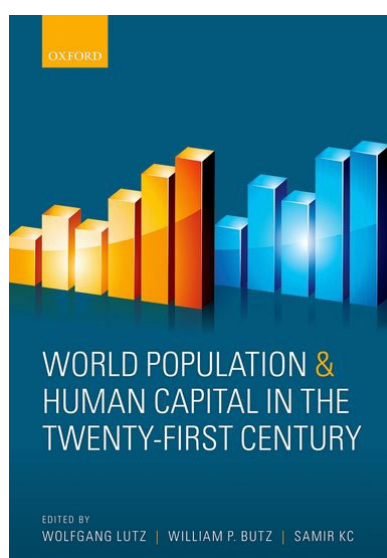
In 2011-13 the Wittgenstein Centre produced the first consistent set of world population scenarios by age, sex and six levels of educational attainment on the basis of individual countries to the end of the century. The assumptions on future fertility, mortality, migration and education trends were informed by a major international inquiry involving over 550 of population experts. A number of alternative scenarios were defined following the narratives of the SSPs (Shared Socioeconomic Pathways) which are being used by a broad consortium of international modelling teams in the context of integrated assessment and climate change.

## How did you approach the research?

These world population projections differ from the widely used UN population projections in several respects. First they go beyond the conventional projections based on age and sex only by consistently adding educational attainment as a third demographic dimension and considering education-specific fertility and mortality differentials. Second they blend statistical time series modelling with country-specific expert knowledge and systematic expert assessments about the validity of scientific arguments supporting the assumption of alternative future trends. Finally, unlike the UN projections which are based on statistical extrapolations, these scenarios are based on comprehensive substantive narratives that also consider interdependencies between demographic and other social, economic and environmental trends.

## What did you find out (so far)? Why are the results important?

One of the most important findings shows that female education is a major driver of future world population growth and in particular the speed of fertility decline in Africa. Depending on the speed of future education expansion among women, world population scenarios differ by more than one billion people. The explicit information about education also shows the future potentials for economic growth and environmental resilience. A comparison between India and China, e.g. shows that despite of more rapid population ageing China's population has a much broader general education whereas India had focused on elitist education while until recently leaving half of the population (mostly women) without formal education.



## Key facts

Book title: World Population and Human Capital in the Twenty-First Century  
Editors: Wolfgang Lutz, William P. Butz, Samir KC  
© 2014 – Oxford University Press, 1074 pages

Paperback version  
Book title: World Population and Human Capital in the Twenty-First Century. An overview.

Editors: Wolfgang Lutz, William P. Butz, Samir KC  
© 2017 – Oxford University Press, 680 pages

Recent update of scenarios in a new book  
Book title: Demographic and Human Capital Scenarios for the 21<sup>st</sup> Century  
Editors: W. Lutz, A. Goujon, S. KC, M. Stonawski, N. Stilianakis  
© 2018 – European Commission

This book presents an update of the scenarios of the Oxford University Press (OUP) named above. For details please refer to page 52.



## 8 Human Capital Data Lab

Research Group Leader: Anne Goujon

The research in the Human Capital Data Lab primarily aims at maintaining and offering a database of up to date, harmonised and validated shares of population by levels of education for all countries in the world. We further develop back-projections and historical reconstruction of educational attainment for the 20th century for as many countries as possible, together with the collection of historical data on literacy, and of sub-national data (mostly urban/rural) by levels of educational attainment. The main activities of collection, harmonisation and validation of the education data provide the basis for the analysis of consistent time series and

how the diffusion of education has varied across generations, countries and gender. This information is essential to study the role played by changes in education in social, economic, environmental and technological models for the past and the future. We further aim to develop the human capital data visualisation aspects, providing one or more interfaces where our datasets can be visualised and downloaded. The Data Lab is also interested in the global dimension of religion as a characteristic of individuals and how demographic changes affecting the main religious affiliations shape the religious landscape of the world.

### Projects

#### Religious Denominations in Austria and Vienna after the Refugee Crisis

PI: Anne Goujon | Austrian Integration Fund (ÖIF) | 2016–2017

This project was interested in the following research question: What is the impact of recent migration flows on the religious distribution of the Austrian and Viennese population in 2016 by age and sex, and how could the religious landscape be affected in the next 30 years according to several scenarios?



#### Reconstructing Educational Attainment of Populations in the 20<sup>th</sup> Century – EDU20C

PI: Anne Goujon | Anniversary Fund of the City of Vienna for the OeAW | 2015–2017

The EDU20C project provides a consistent and harmonised database on educational attainment covering the 20th century for as many countries as possible, using the methodology of back-projections.



#### Forward Looking Analysis of Grand Societal Challenges and Innovative Policies – FLAGSHIP

PI: Dimiter Philipov/Anne Goujon | EU-FP7-EUP0208V | 2013–2015

The FLAGSHIP Project aimed at driving change, supporting the policy shift from adapting to changes through short-term policy responses, towards anticipating, welcoming and managing changes properly.



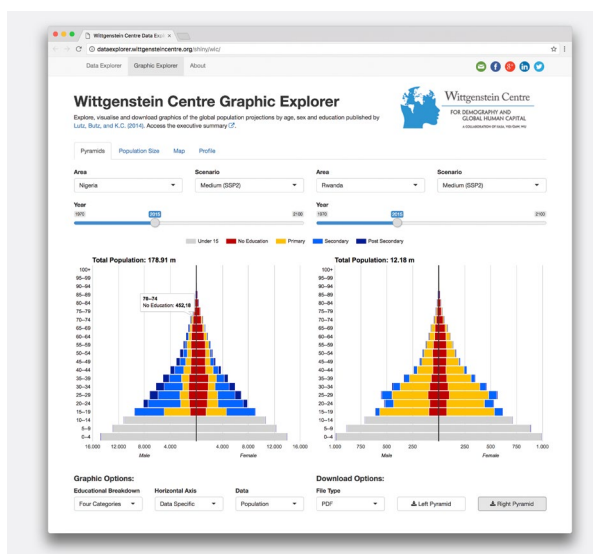
#### Past, Present and Future Prospects in Vienna 1950–2050 – WIREL

PI: Anne Goujon | WWTF Project SSH10-040 | 2011–2014

WIREL is a research project that studied different demographic and religious forces which have shaped Vienna's population composition throughout the past as well as the implications that such forces hold for the present and the future.



# Wittgenstein Centre Data Explorer



## What is the subject of the research? Why is it of interest?

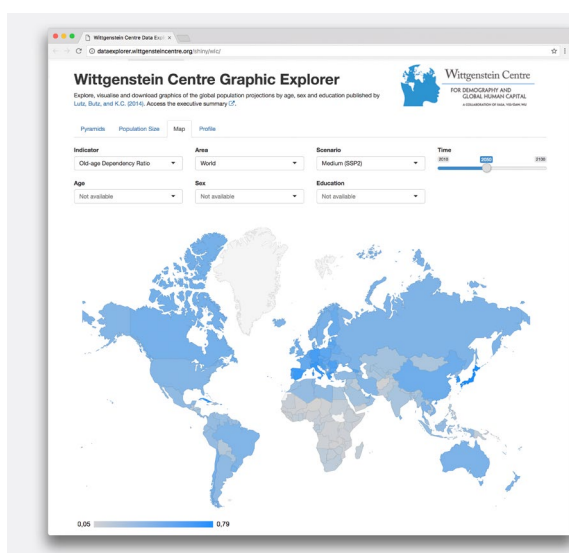
The Wittgenstein Centre Data Explorer presents the results of the set of population projections by levels of educational attainment produced by a large team of researchers at the Wittgenstein Centre and at other institutions. The project was documented in the Oxford University Press book edited by Lutz, Butz and KC in 2014 (see page 27). The Data Explorer also includes population projections developed for the Intergovernmental Panel on Climate Change (IPCC) according to a set of Shared Socioeconomic Pathways scenarios. Version 1.2 includes the back projections from 2010 to 1970. Version 2.0 updating the projections with more recent base-year data is under preparation and will be released in 2018.

## How did you approach the research?

The main philosophy behind the Data Explorer was to be as comprehensive as possible. Therefore, all kinds of indicators are available for 195 countries, grouped by region and sub-regions. Most data are available by sex and by age up to 100+, from 1970 to 2100, according to 7 scenarios for the projections. The data can be viewed on the screen or downloaded. There is also a Graphic Explorer with pyramids of population by education that can be compared across time, countries and scenarios. Other graphs are available such as stacked area charts – to show the composition of the total population during a period – or maps. Country and region profiles are also available in PDF format.

## What did you find out? Why are the results important?

The dataset has been used by the international global change community to assess the relationships between socioeconomic development and climate change (KC and Lutz 2014). In a similar way, it was incorporated in the analysis of the role of education to reduce vulnerabilities and increase resilience by UNDP. Some researchers have also used it to model the potential economic impact of future education trajectories in poverty stricken countries. As to the back-projections, they have been used to show the importance of education for economic growth over demography in an analysis of the demographic dividend.



## Key facts

The web interface was built by Guy Abel using Shiny for R, package version 0.11.1.

Twelve out of the thirty indicators available present data on education, such as the gender gap in educational attainment of the population 15+ or total fertility rates by mothers' education.

The work of more than 60 researchers is behind the data presented in the Data Explorer.


7,000 users visited the Data Explorer in 2017 and 11,000 sessions were recorded (google analytics).

Website [↗](#)

## 9 Population Economics

Research Group Leader: Michael Kuhn

We explore the economic determinants and consequences of changes in population structure and dynamics, covering the process of human capital creation and depletion at the micro and macro level. We bridge the micro-macro nexus by developing and applying economic life-cycle and overlapping generation models, advanced microsimulation and agent-based models using realistic demography. Key themes covered by our research 2011–2017: **The analysis of life-cycle behaviour, focusing on health and education as forms of human capital.** We have studied the efficiency of individual health investments, their relation to retirement, and the impact of increasing longevity and decreasing fertility

on education, retirement and economic growth. **The analysis of intergenerational transfers by way of National Transfer Accounts**, described as a highlight. **Macro-economic modelling of health and health care.** Particular emphasis was on studying the impact of medical progress and an expanding health care sector on economic performance and individual welfare (MEDPRO). **The impact of social interactions on fertility.** This research was based on advanced agent-based models and has contributed to the FamiliesAndSocieties  project. **The analysis of population processes and structures**, such as the dynamics of union formation and fertility also contributed to the project..

### Projects

#### Age-Specific Wellbeing and Transfer Accounts – AgeWellAccounts

PI: Alexia Fürkranz-Prskawetz  
JPI More Years Better Lives 2017–2020

The project measures and analyses wellbeing from a life course perspective.

#### Medical Progress, Health Expenditure and Population Ageing – MEDPRO

PI: Michael Kuhn | FWF/P26184-G11 | 2014–2017

The project employs a numerical intertemporal general equilibrium model with overlapping generations to study the dynamic relationship between medical progress, ageing dynamics and health care expenditure.

#### Long-run Economic Perspectives of an Ageing Society – LEPAS

Co-Investigator (Leader of VID Workpackages):  
Alexia Fürkranz-Prskawetz  
European Commission FP7 Grant/217275 | 2009–2012

As partners to this collaborative EU FP7 project, we have developed and analysed economic life-cycle models to study individual incentives to invest in their health.



Michael Kuhn



Gustav Feichtinger



Thomas Fent



Alexia Fürkranz-Prskawetz



Bernhard Hammer



Bernhard Rengs



Miguel Sanchez-Romero



Sonja Spitzer



Maria Winkler-Dworak



Stefan Wrzaczek

# AGENTA

## Ageing Europe – An Application of National Transfer Accounts for Explaining and Projecting Trends in Public Finances



Ageing Europe – An Application of  
National Transfer Accounts for Explaining  
and Projecting Trends in Public Finances

### What is the subject of the research? Why is it of interest?

The AGENTA project aims at explaining the past and forecasting the future of taxes and public transfers and services in the light of demographic change. AGENTA puts a special emphasis on the links between the public and the private sectors. Due to population ageing, each person in employment will have to support an increasing number of inactive elderly persons. It is of utmost importance for individuals and policy makers to understand to what extent demographic changes and the associated changes in individual behaviour affect the public transfer system. Incorrect projections and unmet expectations can result in economic hardship and a considerable loss of personal welfare.

### How did you approach the research?

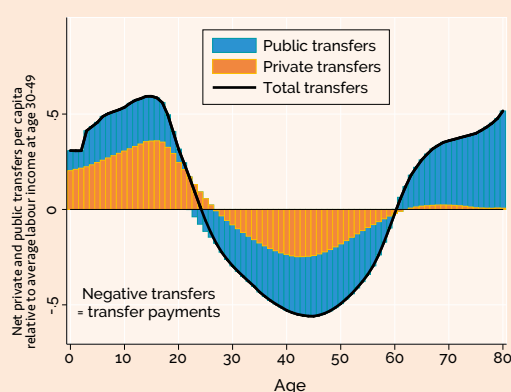
The analysis of the economic consequences of population ageing in the AGENTA project is based both on an empirical and a theoretical approach. The project is constructed along ten work packages that include the construction of European NTA and NTTA accounts, the analysis of the different retirement patterns throughout the EU, the study of the change in the age-reallocation of public expenditures over time, the implementation of general equilibrium models for simulation and projection of public transfer, and the construction of alternative indicators for the analysis of sustainability and fairness.

### What did you find out?

- Changes in the age structure and in the educational composition of the population account for about a quarter of per capita income growth in Austria and Spain since 1870.
- Population ageing exerts pressure on pension funding. Current age patterns of public transfers are unsustainable for future generations.
- Delaying retirement improves substantially the fiscal sustainability of pensions.
- Investing in education contributes to the sustainability of pensions by boosting labour force participation, income and contributions.

Our evidence-based policy proposals improve the decision-making of individuals and policy makers by showing which institutional adjustments ensure long-term fiscal sustainability in Europe.

Net Public and Private Transfers by Age:  
EU25 Average 2010



### Key facts

PI: Alexia Färnkranz-Prskawetz

Time frame: 01.01.2014–31.12.2017

Website [↗](#)

AGENTA Data Explorer [↗](#)

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement EC (FP7)/SSH.2013.1.3-1-613247.





# 10 Population, Environment & Sustainable Development

Research Group Leader: Raya Muttarak

The research group applies demographic concepts and analytical tools to empirically assess the complex relationship between population dynamics, environment and sustainable development. Our approach highlights the central role human population plays in the global environmental system both treating it as a determinant of environmental degradation and addressing the differential impacts of global environmental change on human population. The empirical studies carried out span across the global, national and local scales covering historical analysis of past data and projection exercises into the future. Current key research themes include: 1) Differen-

tial vulnerability – analysis of differential impacts of global environmental change on subgroups of population; 2) Interactions between human capital and global environmental change – how human capital contributes to vulnerability reduction and enhancement of adaptive capacities; 3) Application of the demographic metabolism model – how the aggregate-level change of composition of a population through generational replacement explains and predicts social change, concentrating on sustainable development as an outcome; and 4) Climate-induced migration – investigating the role of climate change as a potential driver of migration.

## Projects

### APCC Special Report: Health, Demography and Climate Change

PI: Raya Muttarak | Austrian Climate and Energy Fund/KR16ACoK13161 | 2017–2018

Addressing the complex relationship between climate change, health and population dynamics, this Special Report provides a comprehensive literature review of research on Austria and other research at European and global level.

### Sustainable European Welfare Societies

PI: Raya Muttarak | Research Council of Norway/236930/H20 | 2014–2018

The project's primary objective is to generate new knowledge about how researchers and policy makers may tackle issues of social welfare and environmental sustainability in coordinated and mutually supportive ways across policy fields.

### Welfare, Wealth and Work for Europe – Europe Moving Towards a new Path of Economic Growth and Social Development

Co-PI: Jesus Crespo Cuaresma | FP7-SSH-2011-1 | 2012–2016

The project aims at exploring science-based policies for Europe to participate more strongly in world growth, guarantee a maximum wellbeing of its population and reduce energy and material input, thus contributing to social and ecological sustainability. The research group unveiled the empirical relationship between education inequality changes and economic growth.

Two more ERC projects belong to this group:  
**ERC Advanced Grant: Empowered Life Years** (p. 34)  
**ERC-PoC: Future Markets** (p. 36)



Raya Muttarak



Alison Heslin



Anna Dimitrova



Anastasia Lijadi



Roman Hoffmann



Nandita Salkia



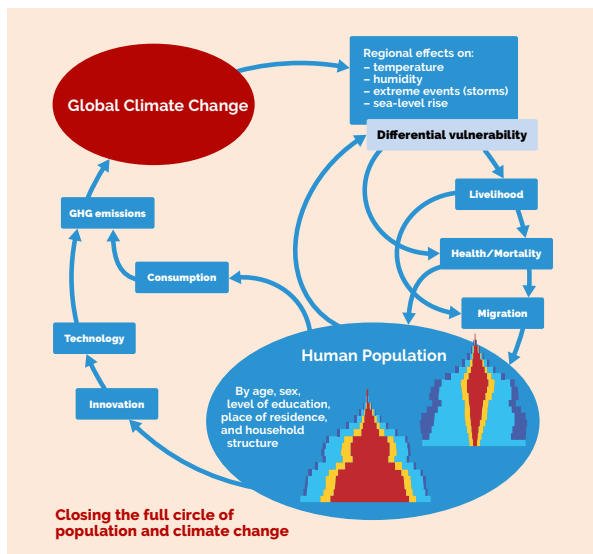
Wolfgang Lutz



Erich Striessnig

# FUTURESOC

## Forecasting Societies' Adaptive Capacities to Climate Change



### What is the subject of the research? Why is it of interest?

This project is testing the basic hypothesis that societies can develop the most effective long-term defense against the dangers of already unavoidable climate change by strengthening human capacity – primarily through education. Existing literature commonly emphasises financial or physical constraints as barriers to climate change adaptation. This project, on the opposite, introduces an innovative idea that investment in human capital can reduce vulnerability and enhance adaptive capacity.

### How did you approach the research?

The project rigorously employs a multidisciplinary approach to test the central hypothesis and presents empirical evidence from different societies based on analyses of various data sources from individual- and household-level data, village-level studies, and national case studies to global-level time series analysis. The results are relevant to the formulation of national and international development priorities. To gather the empirical data needed to reach supportable conclusions about the role of education, the project included multinational studies of the factors involved in vulnerability and adaptation of populations to hurricane Mitch which devastated Central America and the Caribbean in 1998, the Asian tsunami of 2004, and various flooding events in South Asia in the last years.

### What did you find out? Why are the results important?

We have demonstrated consistent evidence showing that countries, communities, households and individuals with higher average levels of education experience lower vulnerability to natural disasters. The cognitive empowerment associated with education turns out to be more important than income. This applies to a variety of disaster-related outcomes ranging from pre-disaster phase, during disaster events, to the disaster aftermath. Not only that the results support our hypothesis about the key role investment in human capital can play in reducing vulnerability, they also form a basis of empirical evidence used to forecast societies' adaptive capacity in the future.



### Key facts

PI: Wolfgang Lutz

Time frame: 01.03.2009–31.07.2014

Website [↗](#)

This project has received funding from the European Research Council under grant agreement ERC-2008-AdG 230 195-FutureSoc.



**European Research Council**  
Established by the European Commission

# EMPOWERED LIFE YEARS

## The Demography of Sustainable Human Wellbeing

William Clark's (2012) Wellbeing Function

Formalizing Brundtland's "meet the needs...":

$$W = f(C_i, I, K)$$

W is 'human well-being' (intra- and inter-generational)

$C_i$  are 'Capital assets' (from which services flow)

- $C_m$  is 'manufactured capital' (factories, homes, roads)
- $C_h$  is 'human capital' (population, health, education)
- $C_n$  is 'natural capital' (ecosystems and their services)

I is 'Institutions' (laws, rules; norms, expectations)

K is 'knowledge' (scientific, practical; innovation)

### What is the subject of the research? Why is it of interest?

The project will theoretically develop, empirically estimate, test and forecast an indicator of human wellbeing whose trend over time can be used as a criterion to judge whether any development can be viewed as sustainable. It is based on life table methods and hence reflects the basic – but often overlooked fact – that being alive is a necessary prerequisite for enjoying any quality of life. But since mere survival is not sufficient as an ultimate goal for most people, the person-years lived at each age will be weighted with four different dimensions of empowerment: health, literacy, being out of poverty and life satisfaction. These are four dimensions of an indicator called YoGL (Years of Good Life).

### Why are the results important?

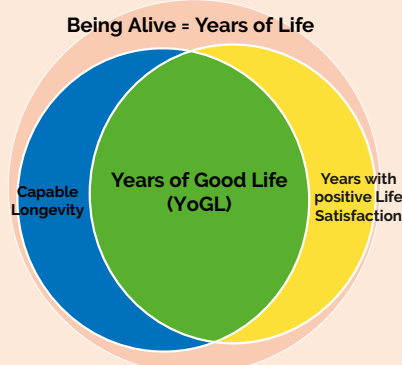
This project addresses in a way "the mother of all research questions". It tries to develop the most comprehensive scientific understanding about the preconditions for a good life on this planet.

The new indicator will also be tested in terms of its acceptability as comprehensively measuring well-being to people from very different cultures. It is (1) based on characteristics of people that can be flexibly aggregated to sub-populations; (2) has meaning in its absolute value in order to be comparable over time and across sub-populations; and (3) has a substantive interpretation in terms of some real-life analogy rather than just being an abstract index.

### How will you approach the research?

In addition to developing this comprehensive indicator the project addresses the most ambitious task of estimating a "production function" of wellbeing based on all essential determinants (such as the different capitals listed in the box above) including feedbacks from environmental change that have the potential of negatively impacting on future human wellbeing. It will also address effects of climate change on future human wellbeing considering differential vulnerability and adaptive capacity. To make this highly complex task a bit more manageable the study will include comprehensive case studies for specific populations at different levels of socioeconomic development and in different environmental settings.

An Indicator of (indivisible)  
Human Well-being  
based on Objective Capabilities and  
Subjective Life Satisfaction



### Key facts

PI: Wolfgang Lutz

Time Frame: 01.11.2017–31.10.2022

Website [↗](#)

This project receives funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 741105.

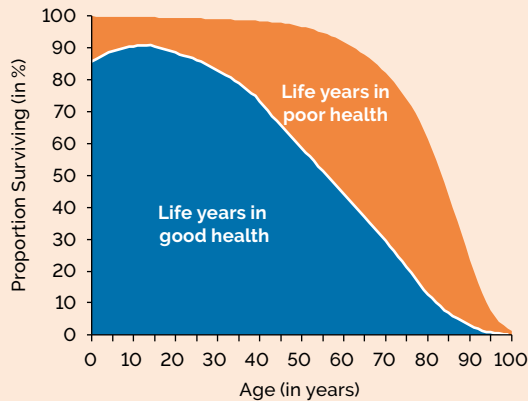


**erc** European Research Council  
Established by the European Commission



# LETHE – Levels and Trends of Health Expectancy: Understanding its Measurement and Estimation Sensitivity

**Division of total life years into life years spent in good or very good health and life years spent with health impairments**



## What is the subject of the research? Why is it of interest?

The project aims at assessing the effects of the methodological features of "Health Expectancy" (HE). The general understanding is that this indicator simply extends the average "Life Expectancy" by one dimension. Technically, this is correct because the total number of life years is divided into two quality dimensions: life years spent in good health and those spent in poor health. However, incorporating this additional dimension to the life table makes the indicator extremely sensitive to certain measurement and estimation issues. This is an important problem because HE is not only becoming more and more used in health research. It is also the most important structural indicator in health policy.

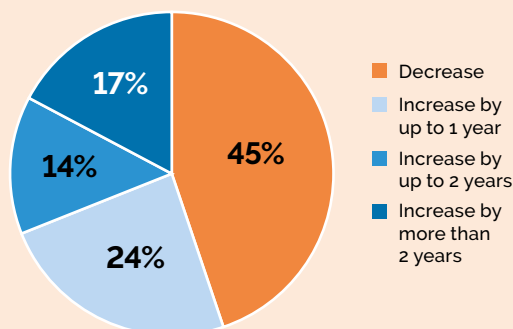
## How did you approach the research?

We browsed the literature and found that only a few of the specific measurement and estimation features which are likely to have significant effects on the HE indicator have been mentioned or demonstrated so far. Even so this was done only incompletely, unsystematically, and in the majority of cases not in relation to a specific research question. And this is the major difference we want to make: we will assess the effects of these sensitivities by direct empirical application to the most important research questions. These will include the expansion versus compression of morbidity debate as well as differences between socioeconomic status groups, between women and men, and between eastern and western Europe.

## What did you find out (so far)? Why are the results important?

The probably most obvious example for HE's estimation sensitivity is the definition of health. For example, when we calculate the proportions of European countries by level of change in HE from 2010 to 2013 on the basis of GALI, the health indicator used by the European Commission, we find that only a little bit more than half of the countries are on a good way with increasing HEs. However, when we evaluate the progress with the GBD as health measure, the health indicator used by the WHO, the situation looks much different: here, almost 95 percent of the populations are on a good or even very good track. This is an extreme difference to the GALI figures which leads to very different conclusions.

**Proportion of European countries by level of change in the healthy lifespan (at birth) between 2010 and 2013 on the basis of the GALI indicator, Men**



## Key facts

PI: Marc Luy

Time frame: 01.09.2017–31.08.2022

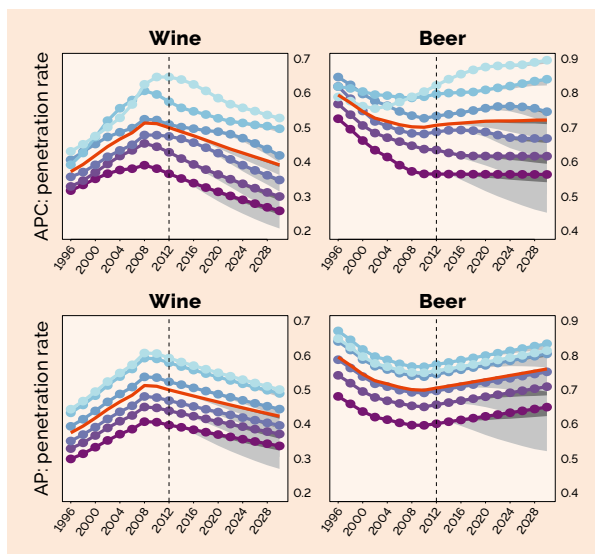
Website [↗](#)

This project receives funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (grant agreement No 725187).



**European Research Council**  
Established by the European Commission

## FUTURE MARKETS – Demography-based Market Forecasting Tools



### What is the subject of the research? Why is it of interest?

Demographic shifts, like the ageing and diversifying populations in North America and Europe are reported to have considerable impact on currently observable and most likely on future consumption patterns. Baby-boomers reaching retirement ages entail strong marketing implications for a number of industries and product or service categories (e.g., soda sales are declining due to increased prevalence of diabetes caused by the growing share of the elderly in the population and their demand for healthier low-sugar drinks). Likewise digital native Millennials are supposed to significantly impact future market trends (e.g. the rise of online streaming services and the parallel decline of cable TV).

### What did you find out? Why are the results important?

We demonstrate the capability of cohort analysis as a tool to study the dynamics of consumption patterns using purchase incidence rates of aggregate panel data in four fast moving consumer good categories (beer, wine, near water and organic food) ranging over a time horizon of 17 years. Our findings suggest that models which ignore cohort (AP: penetration rate) effects tend to underestimate variations in age group-specific forecasts (APC: penetration rate), which in turn might result in misleading managerial conclusions. The aggregated volume is also mainly driven by the future market size for wine and beer consumption (grey area indicating no net-migration scenario).

### Key facts

PI: Wolfgang Lutz

Time Frame: 01.02.2013–31.01.2014

Website [↗](#)

This project has received funding from the European Research Council under grant agreement ERC-2012-PoC 324617.

This project was carried out at WU in collaboration with the institute Service Marketing and Tourism.



European Research Council  
Established by the European Commission

## COHORT – The Demography of Skills and Beliefs in Europe



### Project

Titel: The Demography of Skills and Beliefs in Europe with a Focus on Cohort Change

Time Frame: 01.10.2009–31.03.2015

Final Report Summary [↗](#)

This project has received funding from the European Research Council under grant agreement 241003-COHORT.



European Research Council  
Established by the European Commission

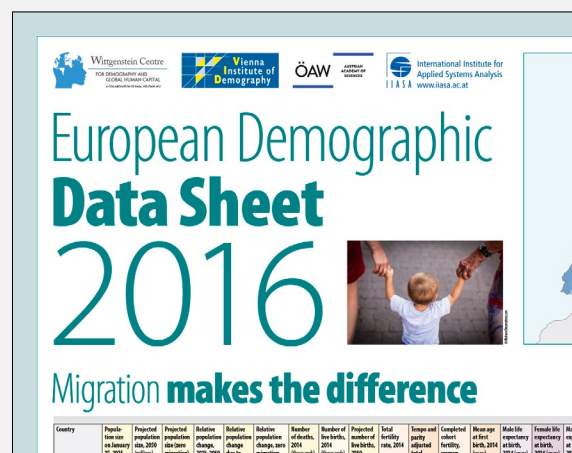
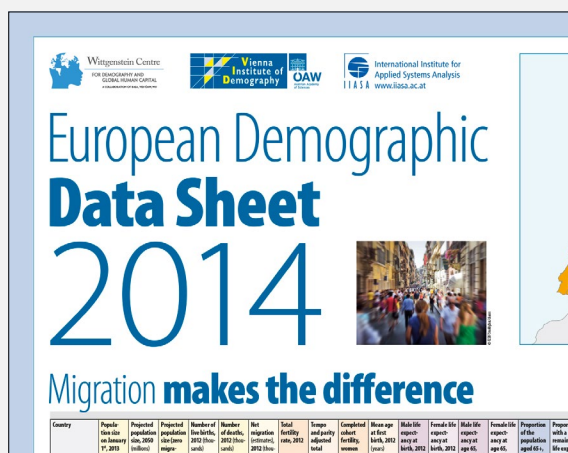
# Data Sheets

## European Demographic Data Sheets 2012, 2014, 2016, 2018

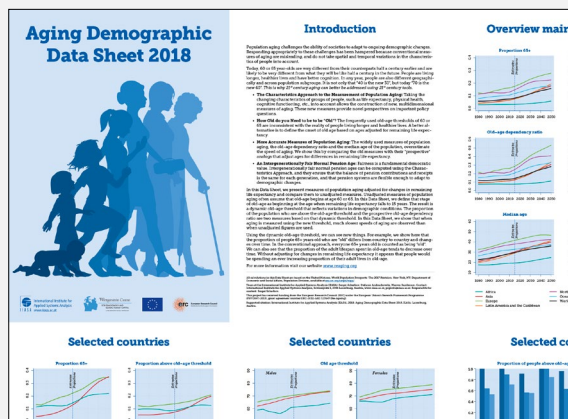


The European Demographic Data Sheets show key demographic data, population trends and projections. The 2012 and 2014 Data Sheets provide population projections from 2011/2013-2050 for 43/49 countries with and without migration. The European Demographic Data Sheet 2016 covers fertility, mortality, migration and population structure, including population ageing, and their changes. The new online version, optimised for mobile devices, provides expanded data coverage, additional maps and population pyramids, ranking charts and details about data sources and definitions. It also allows the users to download all the data.

The Data Sheet 2018 "Population – Human Capital – Diversity – Inequality" has been published in June.




## Data Sheet on Population Ageing 2018



The first Demographic Data Sheet focusing on population ageing comprehensively presents new measures of ageing, developed at IIASA, for all countries in the world and world regions, including projections for 2050.

The Data Sheet 2018 shows population ageing trends and projections until 2050 with a focus on traditional and alternative indicators of population ageing for current and future population changes across the world.

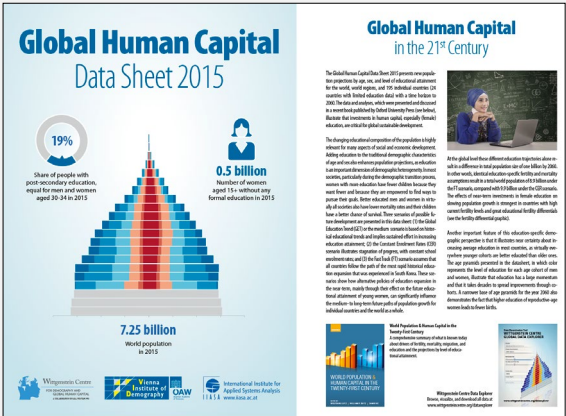
# Russian Demographic Data Sheet 2016



The first Russian Demographic Data Sheet provides a comprehensive look at key demographic indicators and main population trends for all subjects of the Russian Federation, including population projections to 2035. The Data Sheet combines data for the national level, all regions and districts, and features maps, population pyramids, rankings, graphs and a glossary.

The Data Sheet is available online in English and Russian.

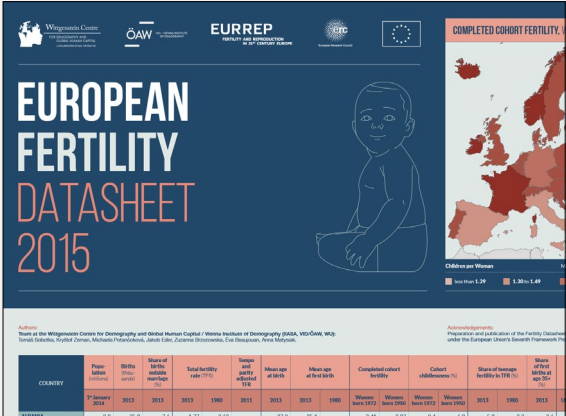
# Global Human Capital Data Sheet 2015



Progress in female education is critical for global sustainable development and better lives of future generations. This statement is illustrated by the 2015 Global Human Capital Data Sheet, which presents new population projections by age, sex and level of educational attainment for the world, world regions and 195 individual countries (24 countries with limited education data) with a time horizon to 2060.

Browse, visualise, and download all data from the Wittgenstein Centre Data Explorer. For details please see p. 29.

# European Fertility Data Sheet 2015



The European Fertility Data Sheet 2015 provides an in-depth look at European fertility through a combination of data for all countries of Europe and for broader European regions, maps, tables, graphs and featured thematic boxes. The online version is optimised for mobile devices and provides expanded coverage, including additional maps, ranking charts as well as details about data sources and definitions. It also allows the users to download all the data.

This Data Sheet was produced within the EURREP project (see p. 15).



## Asian Demographic and Human Capital Data Sheet 2012

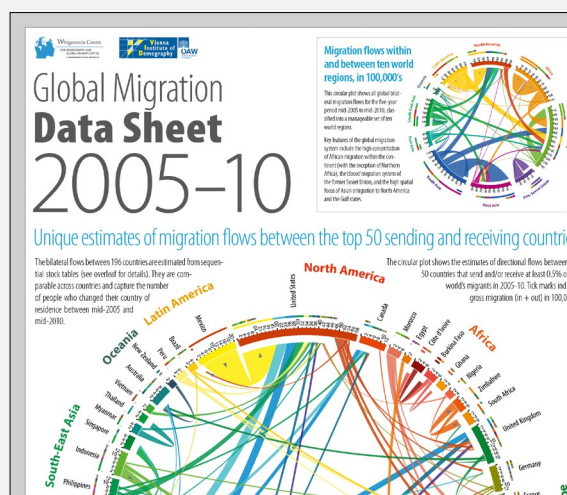


This Data Sheet provides information on a range of demographic indicators from fertility to ageing to education levels for countries in Asia.

The rise of human capital is particularly relevant for Asia, where the data sheet indicates that virtually all countries can expect further significant increases in their human capital – a major component of the wealth of Asian nations. Progress is especially impressive among younger women, who are likely to become more educated than men in a majority of Asian countries.

A 2018 Asian Data Sheet is currently under preparation together with the Asian Demographic Research Institute (ADRI) in Shanghai (see page 46).

## Global Migration Data Sheet 2005–10



This Data Sheet provides a comprehensive portrait of the global flow of people in 2005–10. It features the flows between the top 50 sending and receiving countries, each country's total immigration and emigration flow and the world's 20 largest country-to-country flows.

The Global Flow of People

Explore new estimates of migration flows between and within regions for five-year periods, 1990 to 2010. Click on a region to discover flows country-by-country.

[www.global-migration.info](http://www.global-migration.info)



All Data Sheets and more data can be accessed online

# Reaching out

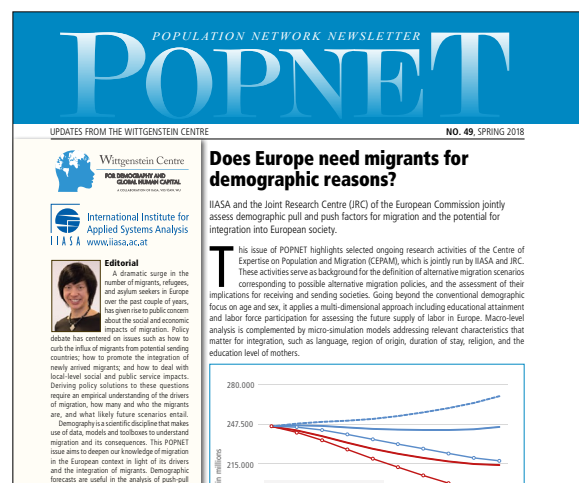


## Website (since 2011) and WIC Twitter (since 2013) ➡

In November 2011 the Centre's website went online for the first time and was relaunched in February 2016. The new website reflects the changed internal structure and navigation is now clearer. WIC's Twitter account was started in 2013 and so far we have tweeted nearly 2300 times and have almost 1500 followers. We take care to present our research in an attractive and interesting way and continuously update our web spaces to keep readers informed about our research and staff as well as news and events.

## Population Network Newsletter POPNET (since 1982) ➡

Since 1982 the World Population Program distributes the POPNET newsletter for an extensive network of researchers and institutes working in the field of population and sustainable development and since 2011 POPNET also acts as the newsletter of the Wittgenstein Centre. On a regular basis, collaborators and interested individuals are provided with details on developments at the Centre and its pillars, current research, latest publications and information on forthcoming meetings and conferences.



## Demografische Forschung aus Erster Hand DFaEH (since 2004) ➡



DFaEH is co-published by the Max Planck Institute for Demographic Research, Rostock, in cooperation with the Vienna Institute of Demography and the Wittgenstein Centre, Vienna, the Rostocker Zentrum zur Erforschung des Demografischen Wandels as well as the Federal Institute for Population Research in Wiesbaden. The open access newsletter is published four times a year and is available in both electronic and print versions. The editors, including Wolfgang Lutz, want to intensify the dialogue between research and the public. The newsletter is primarily addressed to journalists, politicians and interested parties in neighbouring fields of work. Presented are relevant studies for Germany and/or Austria.

## Popular Outreach Paper (in German): Fit für die Globalisierung durch Bildung (forthcoming)

In this paper some of the key policy-relevant findings of the Wittgenstein Centre are communicated to a broader audience in Austria and Germany. Countries such as Germany and Austria face the challenge of remaining competitive on the global market in the context of demographic change with their potential of gainfully employed persons declining, while rising countries in Asia are aspiring. Numerous global studies show that investing in human capital is the main lever for securing prosperity and quality of life in Europe in the long-term. In order to cope with this, strong efforts need to be made for universal high-quality education including a stronger focus on support for early childhood development as well as lifelong learning for mature adults. In addition, investments in cutting-edge research and innovation are necessary. An education-friendly environment is a prerequisite for both. Germany and Austria also carry responsibilities for global sustainable development (partly through the EU). Thus a focus and priority in international development cooperation on universal education will also be a major contribution to long-term development, a slowing of world population growth and global security.

The findings are presented in German with illustrative graphics.



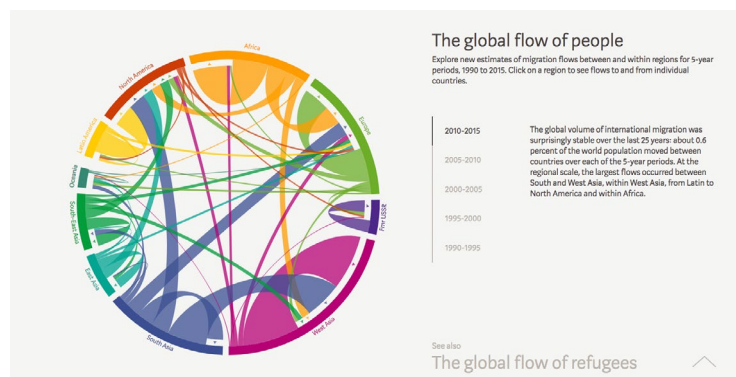
## Aesthetics of Change: 150 Years of the University of Applied Arts Vienna (2017–2018)

The jubilee exhibition at the Austrian Museum of Applied Arts (MAK) casts a glance back onto 150 years of the University's history, while at the same time daring to look into the future. For the latter part, the Wittgenstein Centre, represented by Judith Kohlenberger and Roman Hoffmann, contributed insights from recent demographic research to explore the question of how migration will affect society, the arts and education.

## The Global Flow of People at Weltmuseum Wien (since 2017)

The new Weltmuseum Wien, which celebrated its Grand Reopening on 25 October 2017, commissioned the development of an interactive installation for the permanent exhibition "World in Motion". This newly developed touch screen installation that allows to explore migration and refugee flows between and within regions is based on the online data visualisation "The Global Flow of People" created by Nikola Sander, Guy Abel and Ramon Bauer at the Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU) in 2014.

Design: konkret WELTMUSEUM Version  
Ramon Bauer, Nikola Sander, Tina Frank, Christoph Fink  
based on the online data visualisation "The Global Flow of People" ([www.global-migration.info](http://www.global-migration.info)) created by Nikola Sander, Guy Abel and Ramon Bauer at the Wittgenstein Centre for Demography and Global Human Capital (2014).







## Kinderuni (2015–2017)



The Children's University is held every year in July at various universities and research institutions in Austria. Children between 7 and 12 years of age can choose from a variety of courses from all academic disciplines and celebrate their successful completion in a final graduation ceremony. In the last years the Wittgenstein Centre represented by Isabella Buber-Ennser, Judith Kohlenberger, Maria Rita Testa and Daniela Weber, contributed sessions to the following topics: "How many people will live in Austria in the future?" and "Who are the refugees?"

## How to Get to 100 – And Enjoy It (2015)



In cooperation with the Federal Ministry of Labour, Social Affairs, Health and Consumer Protection, the Centre presented the travelling exhibition "How to get to 100 – and enjoy it" developed by Population Europe at WU Vienna. It provides information about the life course of individuals as well as major population trends. Visitors can access texts, graphs, video interviews and interactive games through the use of iPads.



Photo: German Federal Ministry of Education and Research (BMBF)

## MS Wissenschaft (2012 & 2013)



The Centre in cooperation with the Austrian Science Fund (FWF) participated in the interactive science exhibition on sustainability for students aged 10 to 14 years in 2012 and 2013. The MS Wissenschaft, an old cargo ship filled with interactive science exhibits, visits cities in Germany and Austria every year – 2012 featured the theme "Future Project Earth" and 2013 was about "Digital Society". The Centre helped to create interactive exhibits that invited students to explore how human behaviour now can affect future generations.



Photo: T. Gabriel/studio grau



# Popular Science Books



## Zukunft denken. Werden es unsere Kinder besser haben? ➡

**Franz Fischler**  
**Wolfgang Lutz**

Parents all over the world hope that their children have better lives than their own. And today? What is the future of our children? Will global warming lead to more hunger and global migration? Will there be a rush of refugees from Africa and Asia? And will Europe become a "fortress"? Who will pay for the pensions in Austria and Germany if the birth rate continues to fall? Are all these conflicts preprogrammed and inevitable for demographic reasons? Answers to such questions for the future are provided by demographer Wolfgang Lutz and former EU Commissioner Franz Fischler. Their profound conversation, spiced with humour, gives hope for the future.

This book is available in German.

## Education First! From Martin Luther to Sustainable Development ➡

***Wer überlebt? Bildung entscheidet über die Zukunft der Menschheit*** ➡

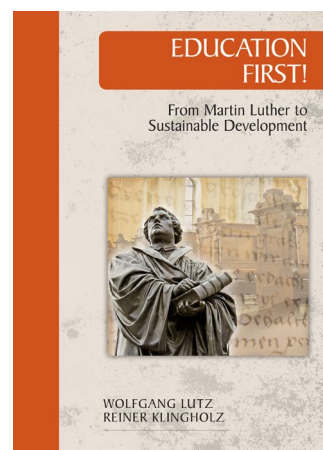
**Wolfgang Lutz**  
**Reiner Klingholz**

In this new book by Wolfgang Lutz and Reiner Klingholz, the authors argue that education is a key prerequisite for modern social and economic development, as well as for the successful achievement of the Sustainable Development Goals (SDGs). It makes the case for a global alliance on education as a strategy for future wellbeing on the planet.

"This scholarly yet highly accessible volume by two renowned experts shows why education is under threat, and what should be done to counter this. The authors mobilise a fascinating array of compelling historical and current evidence which demonstrates the centrality of education to the creation of flourishing societies and show the dire consequences of its neglect. Anyone interested in education and development should read this book." – **Professor Ian Goldin, University of Oxford**

This book shows convincingly that education has been a key driver of human development in all parts of the world. Quality education for all – especially for all girls – will be absolutely essential for achieving the Sustainable Development Goals." – **Ban Ki-Moon, The 8<sup>th</sup> Secretary General of the United Nations**

This book is available in English and in German.



# Selected WIC Events 2011–2017

A series of meetings and workshops on five continents for the discussion of assumptions and testing of methods as well as scientific consultancy w.r.t. fertility, mortality and migration for the new set of global population projections.

The annual "December Conference" is dedicated to a pertinent scientific topic or third party funded project from WIC research groups. The results are presented in a special issue of the Vienna Yearbook of Population Research (see p. 53).

This economic demographic workshop focuses on economic analysis dealing with the interplay between demographic change and the labour market, health care and education in terms of empirical and theoretical contributions from both a micro- and macro-economic perspective.

This workshop's topic is heterogeneous dynamical systems and population systems, which allows to model dynamic processes realistically and to find a solution – "dynamic" referring to time as well as heterogeneity of the model components.

The Wittgenstein Centre is acting as host/organiser for a number of international conferences on various up-to-date topics.

In a regular Colloquium series taking place at the Vienna Institute of Demography researchers have the opportunity to present their work to the scientific community and receive feedback from their peers.

**2011**

**Asian Regional Planning Meeting for the New Set of Global Population and Education Projections, 28 February–12 March 2011, Bangkok, Thailand**

**Labour Markets and Demographic Change – 6<sup>th</sup> European Workshop, 7–8 April 2011**

**Health, Morbidity and Mortality: the State of the Art, 1–3 September 2011**

**Workshop on the Likely Future Trajectories of International Migration, 3–5 October 2011, Boulder, Colorado, US**

**Workshop on the Likely Future Trajectories of Fertility in High-fertility countries, 7–9 November 2011, Dhulikhel, Nepal**

**WIC Conference 2011 – Education and the Global Fertility Transition (EduGloFT), 30 November–1 December 2011**

**Workshop on the Likely Future Trends of Fertility in Low-fertility Countries, 1–2 December 2011, Vienna, Austria**

**2012**

**Workshop on the Likely Future Trajectory of Mortality in High Mortality Countries, 10–11 February 2012, Cape Town, South Africa**

**Workshop on Alternative Assumptions on Future Mortality in Low-mortality Countries, 21–22 February 2012, San Jose, Costa Rica**

**WIC Conference 2012 – Determinants of Unusual and Differential Longevity (DUDL), 21–23 November 2012**

**2013**

**Labour Markets and Demographic Change – 8<sup>th</sup> European Workshop, 12–13 September 2013**



**2014**

**Viennese Vintage Workshop – Heterogeneous Dynamic Models of Economic and Population Systems, 25–26 November 2013**

**WIC Conference 2013 – Health, Education and Retirement over the Prolonged Life Cycle, 27–29 November 2013**

**Demographic Differential Vulnerability to Natural Disasters in the Context of Climate Change Adaptation, 23–25 April 2014, Kao Lak, Thailand**

**Higher Education, Mobility and Migration in and out of Africa, 19–21 June 2014 (HEMMA)**

**Religion in Vienna: Urban Trends in a European Context, 20–21 November 2014 (WIREL)**

**WIC Conference 2014 – New Measures of Age and Ageing, 3–5 December 2014**

**2015**

**Labour, Health and Education under Demographic Change – 9<sup>th</sup> European Workshop, 17–18 September 2015**

**3<sup>rd</sup> Generations and Gender User Conference, 31 November–1 December 2015**

**WIC Conference 2015 – Education and Reproduction in Low-Fertility Settings (EDUREP), 2–4 December 2015**

**2016**

**Determinants of Unusual and Differential Health Expectancy (28th REVES Meeting), 8–10 June 2016**

**Summer School “The Demography of Health and Education”, 6–15 June 2016 (see p. 54)**

**Viennese Vintage Workshop – Heterogeneous Dynamic Models of Economic and Population Systems, 1–2 December 2016**

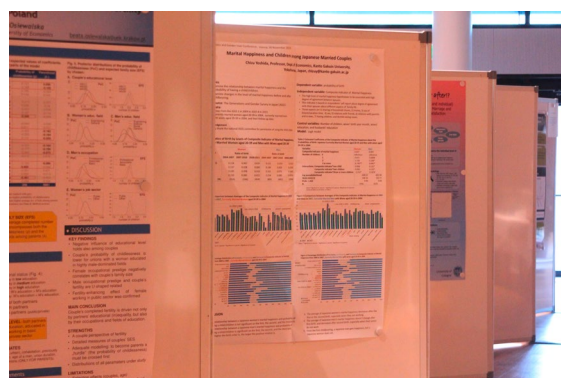
**WIC Conference 2016 – Variations on the Themes of Wolfgang Lutz, 5–7 December 2016**

**2017**

**Symposium on “Fertility Desires, Ideal, Motivations, Intentions, Ambiguity and Reality (DIMITAR), 12 October 2017**

**WIC Conference 2017 – AGENTA Final Conference, 20–22 November 2017**

**VID Colloquium, continuously**



Event/Conference Details  
can be accessed online



# International Partnerships

## Asian Demographic Research Institute at Shanghai University


**ADRI**

 Asian Demographic Research Institute  
 上海大学亚洲人口研究中心暨人口研究所

In 2015 the University of Shanghai (China) established the Asian Demographic Research Institute (ADRI) with IIASA alumnus Leiwen Jiang as its founding director. Wolfgang Lutz was appointed to serve as chair of the International Scientific Advisory Board of ADRI by University President Jin Donghan. Wittgenstein Centre researchers Samir KC and Guy Abel accepted the positions of full professors and leaders of the ADRI research pillars on human capital modelling and international migration, respectively.

ADRI also serves as the new headquarters of the Asian MetaCentre for Population and Sustainable Development Analysis – an ongoing collaboration among IIASA, National University of Singapore, Chulalongkorn University (Bangkok) and other partners with initial funding as a Wellcome Trust regional centre of excellence. Building on some of the demographic methods developed at the Wittgenstein Centre, the new institute will also create a platform for regional collaboration in demographic research and training through fostering research projects of common interest, holding annual Asian population fora, organising demographic training workshops around the region, and hosting international visiting scholars. Being home to 60% of the world's population, demographic research in Asia has traditionally been mostly carried out at the national level with ADRI now trying to strengthen comparative international work. In doing so, it also closely collaborates with the Asian Population Association (APA) hosting the 2018 Asian Population Conference in Shanghai.



Photo: istock/gyn9038

## JRC/IIASA Centre of Expertise on Population and Migration



On 20 June 2016, policy makers, analysts and researchers from around Europe came together to launch the new Centre of Expertise on Population and Migration, a joint effort between IIASA and the European Commission Joint Research Centre (JRC), under the scientific leadership of Wolfgang Lutz.

At the launch event in Brussels, EC-JRC Director General Vladimir Sucha said, "Migration is one of the biggest challenges we face today. Credible policies to tackle its various dimensions require solid evidence basis. The Commission's Knowledge Centre for Migration and Demography has the ambition to become the reference point for relevant knowledge and credible data on migration. I am very glad that today we are also launching the first partnership of the Knowledge Centre, namely the Centre of Expertise on Population and Migration which is a joint initiative with IIASA and I am convinced of its valuable contribution to our work."



Photo: Lieven Creemers © European Union 2016

The JRC/IIASA Centre of Expertise on Population and Migration has the ambition to become the reference point for relevant knowledge and credible data on migration. I am very glad that today we are also launching the first partnership of the Knowledge Centre, namely the Centre of Expertise on Population and Migration which is a joint initiative with IIASA and I am convinced of its valuable contribution to our work."

The JRC/IIASA Centre of Expertise on Population and Migration is presented in detail on page 21.



# Selected Publications in Leading Interdisciplinary and Demographic Journals

## Science



**Abel, G. J., & Sander, N.** (2014). Quantifying global international migration flows. *Science*, 343(6178), 1520–1522. <https://doi.org/10.1126/science.1248676>

Lee, R., Mason, A., members of the NTA Network (amongst others): **Fürnkranz-Prskawetz, A. & Zannella, M.** (2014). Is low fertility really a problem? Population aging, dependency, and consumption. *Science* (New York, N.Y.), 346(6206), 229–234. <https://doi.org/10.1126/science.1250542>

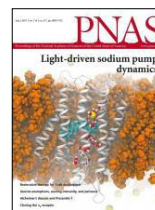
**Lutz, W., Butz, W., KC, S., Sanderson, W. C., & Scherbov, S.** (2014). Population growth: Peak probability. *Science*, 346(6209), 561–561. <https://doi.org/10.1126/science.346.6209.561-a>

**Lutz, W., Muttarak, R., & Striessnig, E.** (2014). Universal education is key to enhanced climate adaptation. *Science*, 346(6213), 1061–1062. <https://doi.org/10.1126/science.1257975>

**Lutz, W., Butz, W.P.,** Castro M., Dasgupta P., Demeny P.G., Ehrlich I., Giorguli S., Habte D., et al. (2012). Demography's role in sustainable development. *Science* 335 (6071). <https://doi.org/10.1126/science.335.6071.918-a>

**Lutz, W. & KC, S.** (2011). Global human capital: Integrating education and population. *Science* 333 (6042): 587–592. <https://doi.org/10.1126/science.1206964>

## Proceedings of the National Academy of Sciences



**Lutz, W.** (2017). Global Sustainable Development priorities 500 y after Luther: Sola schola et sanitate. *Proceedings of the National Academy of Sciences*, 114(27), 201702609. <https://doi.org/10.1073/pnas.1702609114>

**Lutz, W.** (2017). How population growth relates to climate change. *Proceedings of the National Academy of Sciences*, 114(46), 201717178. <https://doi.org/10.1073/pnas.1717178114>

**Abel, G. J., Barakat, B., KC, S., & Lutz, W.** (2016). Meeting the Sustainable Development Goals leads to lower world population growth. *Proceedings of the National Academy of Sciences*, 113(50), 14294–14299. <https://doi.org/10.1073/pnas.1611386113>

**Weber, D., Skirbekk, V., Freund, I., & Herlitz, A.** (2014). The changing face of cognitive gender differences in Europe. *Proceedings of the National Academy of Sciences*, 111(32), 11673–11678. <https://doi.org/10.1073/pnas.1319538111>

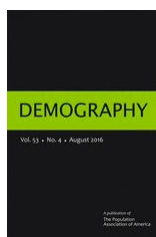
**Skirbekk, V., Loichinger, E. and Weber, D.** (2012). Variation in cognitive functioning as a refined approach to comparing aging across countries. *Proceedings of the National Academy of Sciences (PNAS)*, 109(3), p. 770–774. <https://doi.org/10.1073/pnas.1112173109>

## Nature Climate Change



**Lutz W., Muttarak R.** (2017). Forecasting societies' adaptive capacities through demographic metabolism model. *Nature Climate Change* 7 (3), pp. 177–184. <https://doi.org/10.1038/nclimate3222>

# Demography



**Crespo Cuaresma, J., Lutz, W., & Sanderson, W.** (2014). Is the demographic dividend an education dividend? *Demography*, 51(1), 299–315. <https://doi.org/10.1007/s13524-013-0245-x>

Schneeweis, N., **Skirbekk, V.**, & Winter-Ebmer, R. (2014). Does Education Improve Cognitive Performance Four Decades After School Completion? *Demography*, 51(2), 619–643. <https://doi.org/10.1007/s13524-014-0281-1>

**Luy, M.** (2012). Estimating mortality differences in developed countries from survey information on maternal and paternal orphanhood. *Demography*, 49(2), 607–627. <https://doi.org/10.1007/s13524-012-0101-4>

Thomson, E., **Winkler-Dworak, M.**, Spielauer, M., & **Fürnkranz-Prskawetz, A.** (2012). Union instability as an engine of fertility? A microsimulation model for France. *Demography*, 49(1), 175–195. <https://doi.org/10.1007/s13524-011-0085-5>

**Aparicio Diaz, B., Fent, T., Prskawetz, A., Bernardi, L.** (2011). Transition to parenthood: The role of social interaction and endogenous networks. *Demography*, Vol. 48(2), pp. 559–579. <http://www.jstor.org/stable/41237734>

# Population and Development Review



Neels, K., Murphy, M., Ni Bhrolcháin, M., & **Beaujouan, E.** (2017). Rising Educational Participation and the Trend to Later Childbearing. *Population and Development Review*, 00(0), 1–27. <https://doi.org/10.1111/padr.12112>

**Striessnig, E., & Lutz, W.** (2016). Demographic strengthening of European identity. *Population and Development Review*, 42(2), 305–311. <https://doi.org/10.1111/j.1728-4457.2016.00133.x>

**Beaujouan, E.** (2015). Book Review: Marriage in an Age of Cohabitation: How and When People Tie the Knot in the Twenty-First Century, by M. Baker and V. Elizabeth. *Population and Development Review*, 31(1), 161–163.

**Sanderson, W. C., & Scherbov, S.** (2015). Are we overly dependent on conventional dependency ratios? *Population and Development Review*, 41(4), 687–708. <https://doi.org/10.1111/j.1728-4457.2015.00091.x>

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**Lutz, W.** (2013). Demographic metabolism: A predictive theory of socioeconomic change. *Population and Development Review*, 38(Supplement), 283–301. <https://doi.org/10.1111/j.1728-4457.2013.00564.x>

**Sanderson, W. C., & Scherbov, S.** (2013). The characteristics approach to the measurement of population aging. *Population and Development Review*, 39(4), 673–685. <https://doi.org/10.1111/j.1728-4457.2013.00633.x>

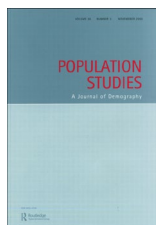
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**Sobotka, T., Skirbekk, V., & Philipov, D.** (2011). Economic recession and fertility in the developed world. *Population and Development Review*, 37(2), 267–306. <https://doi.org/10.1111/j.1728-4457.2011.00411.x>

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**Beaujouan, É., Brzozowska, Z., & Zeman, K.** (2016). The limited effect of increasing educational attainment on childlessness trends in twentieth-century Europe, women born 1916–65. *Population Studies*, 70(3), 275–291. <https://doi.org/10.1080/00324728.2016.1206210>

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Abio, G., Patxot, C., **Sanchez-Romero, M., & Souto, G.** (2017). The welfare state and demographic dividends. *Demographic Research*, 36(48), 1453–1490. <https://doi.org/10.4054/DemRes.2017.36.48>

**Al Zakak, Z., & Goujon, A.** (2017). Exploring the fertility trend in Egypt. *Demographic Research*, 37, 995–1030. <https://doi.org/10.4054/DemRes.2017.37.32>

**Barakat, B.** (2017). Generalised count distributions for modelling parity. *Demographic Research*, 36(26), 745–758. <https://doi.org/10.4054/DemRes.2017.36.26>

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- Testa, M. R., Bordone, V., Osiewalska, B., & Skirbekk, V.** (2016). Are daughter's childbearing intentions related to their mother's socio-economic status? *Demographic Research*, 35(21), 581–616. <https://doi.org/10.4054/DemRes.2016.35.21>
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- Barakat, B., & Basten, S.** (2014). Modeling the constraints on consanguineous marriage when fertility declines. *Demographic Research*, 30, 277–312. <https://doi.org/10.4054/DemRes.2014.30.9>
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**Prskawetz, A., & Sambt, J.** (2014). Economic support ratios and the demographic dividend in Europe. *Demographic Research*, 30(34), 963–1010. <https://doi.org/10.4054/DemRes.2014.30.34>

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**Striessnig, E., & Lutz, W.** (2014). How does education change the relationship between fertility and age-dependency under environmental constraints? A long-term simulation exercise. *Demographic Research*, 30, 465–492. <https://doi.org/10.4054/DemRes.2014.30.16>

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**Yoo, S. H.** (2014). Educational differentials in cohort fertility during the fertility transition in South Korea. *Demographic Research*, 30, 1463–1494. <https://doi.org/10.4054/DemRes.2014.30.53>

**Abel, G., Bijak, J., Forster, J. J., Raymer, J., Smith, P. W. F., & Wong, J. S. T.** (2013). Integrating uncertainty in time series population forecasts: An illustration using a simple projection model. *Demographic Research*, 29(43), 1187–1226. <https://doi.org/10.4054/DemRes.2013.29.43>

**Abel, G.** (2013). Estimating global migration flow tables using place of birth data. *Demographic Research*, 28(18), 505–546. <https://doi.org/10.4054/DemRes.2013.28.18>

**Barakat, B., & Durham, R.** (2013). Drop-out mayors and graduate farmers: Educational fertility differentials by occupational status and industry in six European countries. *Demographic Research*, 28(42), 1213–1262. <https://doi.org/10.4054/DemRes.2013.28.42>

**Basten, S., Lutz, W., & Scherbov, S.** (2013). Very long range global population scenarios to 2300 and the implications of sustained low fertility. *Demographic Research*, 28(39), 1145–1166. <https://doi.org/10.4054/DemRes.2013.28.39>

**Fent, T., Aparicio Diaz, B., & Prskawetz, A.** (2013). Family policies in the context of low fertility and social structure. *Demographic Research*, 29, 963–998. <https://doi.org/10.4054/DemRes.2013.29.37>

**Testa, M. R.** (2012). Couple disagreement about short-term fertility desires in Austria: Effects on intentions and contraceptive behaviour. *Demographic Research*, 26, 63–98. <https://doi.org/10.4054/DemRes.2012.26.3>

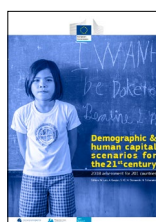
**Feichtinger, G., Kuhn, D. R., Fürnkranz-Prskawetz, A., & Wrzaczek, S.** (2011). The reproductive value as part of the shadow price of population. *Demographic Research*, 24, 709–718. <https://doi.org/10.4054/DemRes.2011.24.28>

**Scherbov, S., & Ediev, D. M.** (2011). Significance of life table estimates for small populations: Simulation-based study of estimation errors. *Demographic Research*, 24, 527–550. <https://doi.org/10.4054/DemRes.2011.24.22>



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# Most Recent Research Updates



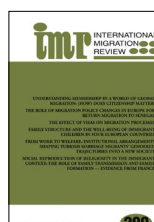
Lutz W., Goujon A., KC S., Stonawski M., Stilianakis (Eds.) (2018): **Demographic and Human Capital Scenarios for the 21st Century. 2018 Assessment for 201 Countries.** European Commission, Joint Research Centre, Publications Office of the European Union, Luxembourg. <https://doi.org/10.2760/835878>

As part of the background studies prepared by CEPAM for assessing future demographic trends in all countries of the world, an update of the scenarios presented in the Oxford University Press (OUP) book in 2014 (see page 27), which were based on 2010 baseline data, has been performed.

The 2018 update of these population and human capital scenarios uses 2015 instead of 2010 as the jump-off year. This makes it possible to include both the extensive new data sets that were provided by the 2010/11 round of censuses and the updates of recent fertility, mortality, migration and education trends. This update maintained the long-term assumptions as defined and extensively documented in the OUP book, while adjusting the assumed near-term trends in light of the new empirical information on latest trends.

Since this new volume should serve as a basis for defining a detailed set of 10–15 alternative migration scenarios in terms of demography-based pull and push factors, it only included three “naïve” migration scenarios: 1) Constant in- and out-migration rates as observed on average in the period 1960–2015, 2) double those rates, and 3) zero migration. These stylised scenarios can serve as a first basis for quantifying the potential effects of alternative migration trends. As a second step, they will be replaced with more detailed scenarios that correspond to possible alternative migration policies.

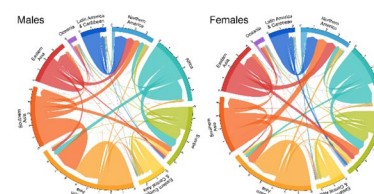
Contributors to the different chapters of the book include several WIC scholars as well as their JRC colleagues of the CEPAM project: Nikolaos Stilianakis, Marcin Stonawski, Michaela Potanckova, Erol Grapsa, Alessandra Conte and Daniela Ghio.



Abel G. (2017). **Estimates of Global Bilateral Migration Flows by Gender between 1960 and 2015.** *International Migration Review*: 1–44. <https://doi.org/10.1111/imre.12327>

Global international migration is an ever-changing process. Migrant stock data, commonly used for the analysis of migration patterns, only manage to capture part of the dynamic nature of international migration. The indirect estimation methodology developed and applied in this paper provides migration flow estimates that are demographically consistent with past population totals, births and deaths, and hence provide a more robust basis for understanding contemporary migration patterns where no comprehensive source of global migration flow data exists.

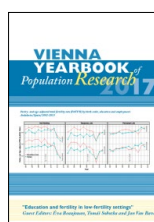
While estimated global migration flows are shown to generally increase over time, the percentage of the global population that migrates remains fairly steady at 0.65 of the global population over each five-year period. This result supports similar findings in the migration literature on the lack of empirical evidence for the acceleration in global international migration, but rather a shift in directions of flows linked to major geopolitical and economic shifts.



The bilateral estimates quantify trends in global international migration flows over the past 55 years for the first time. Traditional migration-receiving countries such as Australia, Canada, New Zealand, and the USA, have seen almost continuously increasing numbers of migrants arriving. More recent growth is evident in countries in northern-, southern-, and western Europe. A growing number of migration flows were estimated along migrant corridors between countries in South Asia (such as Bangladesh, India, and Pakistan) to West Asia (such as Qatar, Saudi Arabia, and the United Arab Emirates), and from Asia to North America. Large migrant transitions were also estimated in selected periods within Africa or eastern Europe during times of armed conflicts or political change.

# VIENNA YEARBOOK *of* *Population Research*

The Vienna Yearbook of Population Research has been published by the Vienna Institute of Demography of the Austrian Academy of Sciences since 2003. The Yearbook features peer-reviewed research articles addressing population trends as well as a broad range of theoretical and methodological issues in population research. It also provides a scientific outlet for the demographic research community in the Vienna area and aims to bring its work to the attention of the international scientific community. In addition to research articles, the journal also publishes demographic debates featuring invited contributions on topics related to the ongoing scientific debates in population research. Finally, contributions on data & trends map long-term developments as well as recent trends in various components of population change in Austria and in Europe.



**VYPR 2017 (vol. 15): Education and Fertility in Low Fertility Settings**

Guest Editors: Tomas Sobotka, Eva Beaujouan and Jan Van Bavel  
Managing Editor: Natalie Nitsche

**VYPR 2016 (vol. 14): Population Ageing**

Guest Editors: Warren Sanderson and Sergei Scherbov  
Managing Editors: Bilal Barakat, Natalie Nitsche

**VYPR 2015 (vol. 13): Demographic Differential Vulnerability to Climate-related Disasters**

Guest Editors: Raya Muttarak, Wolfgang Lutz and Leiwen Jiang  
Managing Editor: Bilal Barakat

**VYPR 2014 (vol. 12): Health, Education and Retirement over the Prolonged Life Cycle**

Guest Editors: Michael Kuhn, Alexia Fürkranz-Prskawetz and Uwe Sunde  
Managing Editor: Bilal Barakat

**VYPR 2013 (vol. 11): Determinants of Unusual and Differential Longevity**

Guest Editors: Marc Luy, Graziella Caselli and William P. Butz  
Managing Editor: Bilal Barakat

**VYPR 2012 (vol. 10): Education and the Global Fertility Transition**

Guest Editors: K.S. James, Vegard Skirbekk and Jan Van Bavel  
Managing Editor: Bilal Barakat

**VYPR 2011 (vol. 9): Reproductive-decision Making**

Guest Editors: Wolfgang Lutz, Philip S. Morgan, Tomas Sobotka and Maria Rita Testa  
Managing Editor: Bilal Barakat



Read and download all volumes online

# Summer Schools

## Demography, Human Capital, and Economic Growth, 2017

From 19–23 June 2017, the Wittgenstein Centre, in collaboration with the Asian Demographic Research Institute hosted the first Asian Summer School at Shanghai University. A total of 20 junior and mid-career scientists from around the world were acquainted with how demographic trends and improving educational attainment impact on economic growth around the Asia region. This also included discussions about the so-called first and second demographic dividends, and on the role of human capital as a determinant of economic development. Leading international scholars from Asia and Europe gave lectures providing overviews of the state of knowledge in these fields.



Photo: ADRI

## The Demography of Health and Education, 2016



Photo: Barbara Simunics (VID)

From 6–15 June 2016, the Wittgenstein Centre organised a summer school for the first time, along with the International Network on Health Expectancies and the Disablement Process (REVES) Meeting 2016, hosting internationally renowned demographers and junior scientists.

Over ten days, 21 junior and mid-career scientists from around the world were acquainted with the latest research on health and disability in the context of population ageing, and with multi-dimensional methods for modelling population and human capital dynamics from a global perspective. Lectures and discussions were led by Wittgenstein Centre senior and junior scientists and notable international population researchers, including Eileen Crimmins (Davis School of Gerontology at the University of Southern California), Carol Jagger (Newcastle University Institute for Ageing and Institute of Health & Society), Mark D. Hayward (Department of Sociology at the University of Texas at Austin), Jean-Marie Robine (Research Director at INSERM), and Yasuhiko Saito (Nihon University). The topics

ranged from redefining age and ageing to demographic methods of modelling educational attainment and human capital formation. The summer school was held around the 2016 REVES Meeting, an annual platform for the exchange of recent research on conceptual frameworks, international comparisons, methods, trends, determinants and disparities of the factors that are decisive for human health and longevity. This year's meeting was hosted and organised by the Wittgenstein Centre under the theme "Determinants of unusual and differential health expectancy".



A summary of the summer school and REVES conference is available online



## Administration and Technical Services



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