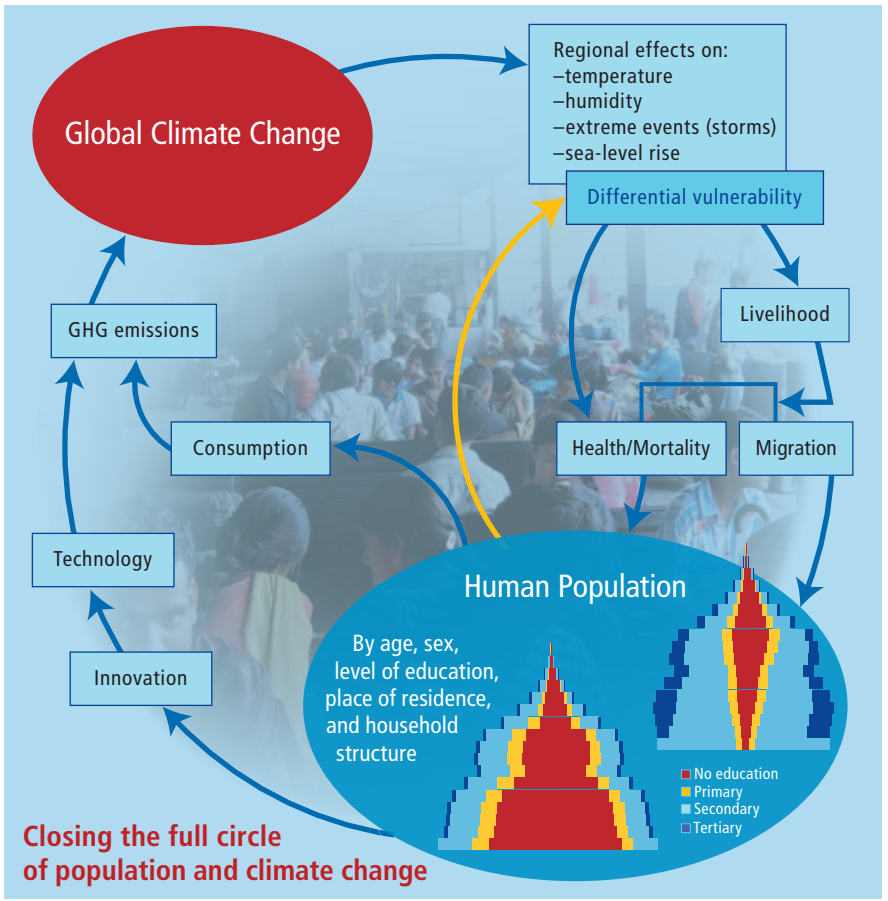
What can demographers contribute to understanding the link between

Population and Climate Change

Human population enters our concerns about climate change at both the beginning and the end of the causal chain: humans have produced the emissions that trigger climate change; consequently the potentially dangerous impact of this change on human wellbeing is our main cause for concern.

While in the past much of the focus has been on mitigating greenhouse gas emissions, this presentation mainly focuses on strategies for strengthening adaptive capacities for coping with unavoidable climate change. This shift in the research question also opens up important new areas of analysis for demographers. While efforts to quantify the contribution of population changes in addition to and in interaction with other important factors, such as technology and consumption levels, have been difficult and largely beyond the realm of demography, efforts to address adaptive capacity through studying differential vulnerability and forecasting such differentials into the future are right at the heart of what our powerful demographic toolbox has to offer. Demographers should be better at doing this than scientists from any other discipline. In the following I will try to explain why.

Substantively, the central hypothesis discussed in this presentation* is that strengthening human capacity primarily through education which, in consequence, also reduces population growth and enhances economic growth, is the most promising investment for adaptation in view of uncertain but potentially dangerous climate change impacts.



Closing the full circle of population and climate change

How dangerous is climate change for human wellbeing?

We worry about climate change because we think it is dangerous. The notion "dangerous" has a specific importance with respect to climate change because the only globally binding agreement, the 1992 Framework Convention on Climate Change, calls in its core sentence for avoidance of "dangerous interference with the climate system." Since then every international effort has made reference to this.

In principle every assessment of the dangers associated with alternative emission trajectories must try to anticipate the consequences of the resulting climate change for human wellbeing. In practice, this is impossible because simply not enough is known about what exactly will happen in terms of changing biophysical conditions and how the populations of the future will be able to cope with these changes.

For this reason the European Union and the Copenhagen Climate Summit have operationalized climate goals in terms of a change of not more than 2 °C in the global mean temperature. This pragmatic definition of dangerous climate change, however, completely leaves out the possible role of adaptation as a way of moderating the impact on human wellbeing. This path of causation is depicted on the right-hand side of the chart at the bottom of page 1.

Population as a driver

On the left side of the chart, population is viewed as a driver of the emissions of greenhouse gases (GHG) which is in line with the more conventional view. The I = PAT model tried to distinguish between the supposedly separate effects of population size (P), consumption associated with affluence (A), and technological efficiency (T). Recent analyses have considered more complex effects and the possibility of interactions. The PCC (Population and Climate Change) Project carried out at IIASA over the past five years under the leadership of Brian O'Neill produced a comprehensive model which includes the effects of changing household size, age structure, and urbanization on energy use. The findings show that population aging and urbanization can have significant effects in addition to population size but that the size of the effect greatly depends on how the question is posed.

In the same chart, the changing structure of the human population by age, sex, education, place of residence, and household size (just to list some of the key properties of people) is also seen as a direct driver of consumption levels and of technological innovation. After all, it is the people with their specific properties who carry out these activities in ways that depend on their properties.

Populations being affected

What are the dangers for human wellbeing that can result from climate change? People will likely be exposed to increasing hazards resulting from more frequent and more intensive extreme events such as storms and floods, sea-level rise, and a changing regional and temporal pattern of temperature and humidity, which may impact agricultural production and the spread of certain diseases. Whether and to what extent these hazards will result in human fatalities depends on the vulnerability of the people affected or, positively put, on their robustness and resiliency. This assessment of likely future vulnerability is very difficult and probably presents the biggest research gap for assessing the dangers associated with climate change.

Many published estimates of likely climate induced fatalities—for instance, calculations of additional malaria deaths due to climate change—assume that future climate conditions (e.g., in 2050) will affect populations that will be at a similar stage of socioeconomic development and hence have similar public health capabilities as societies on the same territory have today. But, as demographers, we know that societies are not stationary and in all likelihood will be quite different. In particular, the fact that in almost all countries the young generations are on average better educated than the older ones will result in improvements in the average education of the future adults which will likely have positive consequences for economic growth and public health governance. The WHO Report on Climate Change and Human Health explicitly states: "In general, countries with more 'human capital' or knowledge have greater adaptive capacity. Illiteracy increases a population's vulnerability to many problems."

In addition to mortality and morbidity directly inflicted by such hazards, many of the assumed dangerous consequences of climate change work through threats to traditional livelihoods. Loss of livelihood may constitute a push factor for migration or, in the worst case, lead to mortality, both of which are demographic factors changing the population structures.

What can demographers contribute?

As demographers we not only know that societies change over time as a function of changing age, sex, education, and other structures, but we also have a unique tool kit (multi-state cohort component methods) to model and project these changing structures with only small uncertainties over several decades.

If we know how many girls aged 15 today have completed primary education, we have a very good basis for estimating how many women aged 55 in 2050 will have at least primary education. The only errors come from future trends in mortality and migration—which should be considered as being education-specific—and from some late transitions to primary education. No other discipline offers better long-term projections of social structure than demography.

Furthermore, demographers have a long tradition of studying all kinds of differentials and, in particular, differential vulnerability to threats such as infant mortality, adult mortality, morbidity, and disability. But we can also study differentials in education and other factors of empowerment that enhance the adaptive capacity of individuals, households, and communities.

Here, demographers can make a unique and crucial contribution to the global discussion on global change. We are better at studying differentials and doing projections than any other social science—and we should use this strength to help the world to assess what is likely to happen in future societies and what are the most effective policies to mitigate GHG emissions and reduce vulnerability to climate change. ■

* This is the summary of a plenary address delivered by Wolfgang Lutz at the XXVI. General Conference of the IUSSP in Marrakech on 1 October 2009 in the context of receiving the 2009 Mattei Dogan Award of the IUSSP.