

## **Source of Human Capital Data for the *Asian Demographic and Human Capital Data Sheet 2008***

The data on human capital (as approximated by the highest level of education attained) by age and sex presented in the *Asian Demographic and Human Capital Data Sheet 2008* are based on empirical data for all countries for the period around 2000-2005 originating from census or major survey data. Based on these empirical starting data, a reconstruction effort has been carried out by IIASA's World Population Program ([link](#)) and the Vienna Institute of Demography ([link](#)) in Austria for 120 countries. The method has been extensively documented and published in peer reviewed journals and will be summarized only briefly below. The same empirical starting data base for around 2000-2005 was recently used by IIASA to project the populations by age, sex and educational attainment to 2050. Since this work has just recently been completed and only the methodology has been published in peer reviewed journals so far, the empirical work is described in somewhat more detail below.

### **Reconstruction of the educational composition by and sex: 1970-2000**

Using demographic multi-state methods for back projecting the populations of 120 countries by age, sex and level of educational attainment from 2000 to 1970 (covering 93 percent of the world population), IIASA and VID undertook this ambitious effort primarily to obtain a consistent empirical basis for studying the aggregate level returns to education. Unlike the fragmentary UNESCO data base which relies on reports by governments and earlier academic reconstruction efforts, this new data set gives the full educational attainment distributions for four categories (no education, primary, secondary and tertiary education) by five-year age groups and with definitions that are strictly comparable both across countries and across time. The general principle was the following: Based on empirical distributions of educational attainment by age and sex for the year 2000, the method moves backward along cohort lines while explicitly considering the fact that men and women with different education have different levels of mortality. The resulting data set allows new estimates on the impact of age-specific human capital growth on economic growth. Unlike earlier studies, the first results show a consistently positive effect (see Lutz et al. 2008). The detailed methodology (see Lutz et al. 2007) as well as the detailed results of the reconstruction for 120 countries can be downloaded from this address:

<http://www.iiasa.ac.at/Research/POP/edu07/index.html>

### **Projection of the educational composition by age and sex: 2000-2050**

The multi-state population projection model, developed at IIASA during the 1970s and 1980s, is particularly well suited to project the population by levels of educational attainment while explicitly considering the important fact that people with different education levels tend to have different fertility and mortality levels. Over the past decade the model has been used at IIASA in many settings for global and country-specific education projections. (<http://www.iiasa.ac.at/Research/POP/humancapital.html>).

Projections of educational attainment levels are based on two different forces: For those who have already completed their highest education, the projection simply increases their age as time passes by and exposes them to education-specific mortality, fertility and migration rates. For those who are still in the process of education, the model provides the translation of present trends in schooling achievements (transitions from one educational level to the next higher by age and sex) into future levels of educational attainment. This translation from schooling outcomes to human capital has a big momentum, since it takes many years for increased school enrollment (higher educational transition rates) to translate into higher average educational attainment of the entire work force. The projections clearly illustrate the long-term implications of near-term investments in education or, on the negative side, the consequences of the lack of such investment.

So far projections have been carried out for 120 countries according to four scenarios: Constant absolute enrollment scenario; constant enrollment rate scenario; global trend scenario; and fast-track scenario. Since the data presented in the Asian data sheet ([link](#)) are based on the results of the global trend scenario, we will only discuss this scenario here.

The global trend scenario is based on the general assumption that future trends of school enrollment (transition to higher education categories) in each country will follow the overall trajectory of historical global trends. Fertility and mortality rates in the future are both assumed to differ by level of education with the relative differentials remaining stable over time. In the aggregate, the fertility and mortality rates assumed under this scenario generally match those of the medium variant of the UN population projections which do not differentiate the population by level of education. We saw a reason to assume slightly different overall fertility levels than given by the UN only for China, Japan, Singapore, South Korea and Mongolia.

The global education trend which underlies this scenario is determined by the analysis of 120 countries since 1970 (see reconstruction discussion above). The application of the global trend scenario results in fairly optimistic trajectories of educational attainment. Specifically, the following empirical information derived from the experience of all countries over the period 1970-2000 has been applied for the future trend: The decline in the cubic root of proportions with no education (complement of at least primary) is linear with different rates of decline per year for males (-0.0054) and females (-0.0082). Similarly, for the proportion up to primary (complement of at least secondary), the rate for males is -0.0052 and for females -0.0074. For the proportion up to secondary (complement of tertiary), the rate for males is -0.0027 and for females -0.0049. In all cases, females have a higher speed of progression.

More technical details about the global trend scenario as well as about the three other scenarios and results will soon be provided under <http://www.iiasa.ac.at/Research/POP/edu07/index.html>)

## References

Lutz, W., A. Goujon, S. K.C., and W. Sanderson. 2007. Reconstruction of population by age, sex and level of educational attainment of 120 countries for 1970-2000. *Vienna Yearbook of Population Research* 2007, pp. 193-235.

Lutz, W., J. Crespo Cuaresma, and W. Sanderson. 2008. The demography of educational attainment and economic growth. *Science* 319: 1047-1048.