AGE STRUCTURE AND FERTILITY ACROSS *EU- 27* DURING THE PERIOD 2005 TO 2007

KUNDRÁTOVÁ IVANA

Abstract
The goal of this paper is to find out, whether it is possible to explain the age specific fertility within the current (2009) member states of the European Union (thereinafter "EU-27") by general demographic and socio-economic indicators: old age dependency ratio, young age dependency ratio, birth rate and human development index. The general idea was, that while controlling for general socio-economic differences across countries, measured by HDI, we assumed that older populations should also have lower fertility rates in younger age groups, and higher in older age groups. The logic behind this expectation is, that older populations are often considered as more developed, where couples focus rather on their professional growth than on family issues. However, we were unable to confirm our expectations. However, we have found some support for a claim, that birth rates are driven by older women. Age dependency ratios and birth rate are used as proxies for population`s age structure. Thus if the age structure of the population is the results of longer-range demographic and socio-economic processes, one might perceive our research task as explaining age specific fertilities by the means of population`s age structure.

Abstrakt
Cieľom príspevku je zistiť, či je možné vysvetliť vekovo špecifickú plodnosť žien v súčasných (2009) členských štátoch Európskej Únie (ďalej "EU-27") prostredníctvom všeobecných demografických a socioekonomických ukazovateľov: index ekonomickej závislosti starých ľudí, index ekonomickej závislosti mladých ľudí, hrubá miera pôrodnosti a index ľudského rozvoja. Našou základnou myšlienkou bolo, že v prípade ak sú socioekonomické rozdiely v rámci krajín kontrolované, (merané prostredníctvom HDI) populácie s prevahou starších ľudí by mali mať nižšie miery plodnosti v mladších vekových skupinách, a vyššie miery plodnosti v starších vekových kategóriách. Možným zdôvodnením tohto očakávania je, že populácie s prevahou starších osôb sú často považované za rozvinutejšie, v ktorých sa partneri orientujú skôr na svoj profesionálny rast ako na záležitosti týkajúce sa rodiny. Avšak tento predpoklad sme neboli schopní potvrdiť. Získali sme však podporu pre tvrdenie, že miery pôrodnosti sú stimulované staršími ženami. Indexy ekonomickej závislosti a hrubá miera pôrodnosti sú použité ako reprezentanti vekovej štruktúry populácie. Ak je veková štruktúra populácie výsledkom dlhodobých demografických a socioekonomických procesov, tak našu výskumnú úlohu možno vnímať ako vysvetlenie vekovo špecifických plodností prostredníctvom vekového zloženia populácie.

Key words
Old age dependency ratio. Young age dependency ratio. Human Development Index. Birth rate. Fertility of age specific groups of women.

Kľúčové slová
Index ekonomickej závislosti starých ľudí. Index ekonomickej závislosti mladých ľudí. Index ľudského rozvoja. Hrubá miera pôrodnosti. Plodnosť vekovo špecifických skupín žien.

Introduction

In first chapter of paper we specify individual indicators that we use to present demographic and socio-economic background of EU´s member states. There is pointed to their relation to the age specific fertilities and changing population´s age structure within Europe. The second chapter presents results from an exploratory cluster analysis, where we clustered member states according to the selected variables: human development index, birth rate, death rate, age

dependency ratios. The way of verification of our main idea, as well as its results are presented in chapter 3.

1 General demographic and socio-economic indicators

There are at least three key factors of the ageing process of Europe's society: „...persistently low fertility rates, high life expectancy, and baby-boom generations that reach higher ages" (Ivan et al., 2009, p. 127). Within EU-*27* during the period 1997 to 2007 we can observe a fall in the *young age dependency ratio*[1] (*YDR*) and the increase in *old age dependency ratio*[2] (*ODR*) (Figure 3.3, Ivan et al., 2009). This decrease of the *YDR* in the *EU´*s population may be perceived as a consequence of the decreasing *fertility rates*[3]. Postponing childbirth or having fewer children are facts related to the trends of the fertility within *EU-27*. "*In the EU, fertility rates of women aged younger than 30 years have declined since 1970s, while the fertility rates of women over 30 have risen since the 1980s, which is a clear indication of postponement... In some countries, the rise in fertility at older ages has slow down, suggesting that in these countries the "catching-up phase" is near its end, but in most countries a strong increase in fertility at ages 30 or more is still going on...*" (*Commission of the European Communities*, 2007, p. 20). *Commission of the European Communities* (2007) induct that there are two different approaches for explaining the decline in fertility: the rational choice approach (of economist) and the approach concentrated on changes in cultural and individual values (of sociologist).

Births represent one component of the change in the age structure of population. The *birth rate*[4] *(BR)* provides certain information related to the *fertility* as a "...product or output of reproduction, rather than the ability to have children[5]" (Frank, 2008). Another significant factor

[1] *Young age dependency ratio* (also called *child dependency ratio)* is demographic indicator related to the ratio of the population aged 0 – 14 years to the population of 15 – 64 years (Ivan et al., 2009).
[2] *Old age dependency ratio* is demographic indicator that relates the old age population to the population of working age; i. e. the proportion of population aged 65 years and over to the population aged 15 - 64 years (Ivan et al., 2009).
[3] *Fertility rate* or *total fertility rate* (*Eurostat*, 2002) means*: "The mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the fertility rates by age of a given year. It is therefore the completed fertility of a hypothetical generation, computed by adding the fertility rates by age for women in a given year (the number of women at each age is assumed to be the same).*"
[4] "The *birth rate* (also called the *crude birth rate*) indicates the number of live births per 1,000 population in given year" (Haupt, Kane, 2000, p. 13).
[5] "The physiological ability to have children...is termed the fecundity" (Frank, 2008).

of changing population´s age structure is *death rate*[6] *(DR)* relevant to the mortality. Births and deaths are together with *net migration* used in calculating the population`s *growth rate:*

$$\frac{B_t - D_t \pm NM_t}{P_t} = GR_t \qquad (1)$$

where *t* is some stated interval of time, *GR* is *growth rate*, *P* is total population, *B* are births, *D* are deaths and *NM* is net migration i. e. "The net effect of immigration and emigration on an area's population..." (Haupt, Kane, 2000, p. 60). Effects of *birth rates* and *death rates* may be observed on the so called *population pyramid* (known as *age-sex structure*). The *population pyramid* mirrors: "*The composition of a population as determined by the number or proportion of males and females in each age category. The age-sex structure of a population is the cumulative result of past trends in fertility, mortality, and migration... potential for future growth of specific age groups, as well as the total population*" (*Population Reference Bureau*).

The continued growing of *life expectancy* (*age-specific probabilities of dying)* may be perceived as another factor of changing age structure of *EU´*s member states. This demographic indicator *"...can be given for any age. It relates to the mean number of years still to be lived by person who has reached a certain age, if subjected throughout the rest of his or her life to the current mortality conditions*" (Ivan et al., 2009, p. 158). In our analyses the values of *life expectancy at the birth*[7] within *EU-27* are included in the values of *HDI*.

We expected that the socio-economic environment influences the age specific fertility rates in decisive way. However, explaining the remaining variability was our central focus. The reason for the domination of these demographic and socio-economic factors is simple: they form the environment in which potential couples (females) decide whether to bear child. We have restricted our sample to the *EU-27* countries, therefore we have not considered any other general factors, e.g. cultural, religious factors, etc.

For measuring socio-economic influences, we choose the *Human Development Index* (*HDI*), with regard to its nature: "...is a summary composite index that measures a country`s average achievements in three basic aspects of human development: health, knowledge, and a decent standard of living" (*United Nations Development Program*). This index, facilitates us to

[6] *Death rate* (known as the *crude death rate*) means "...the number of deaths per 1,000 population in a given year" (Haupt, Kane, 2000, p. 25).

[7] *Life expectancy at the birth* presents "The average number of years a group of people born in the same year can be expected to live if mortality at each age remains constant in the future" (*U. S. Census Bureau*, *Population Division,* 2009).

see differences between states within world, it is measured by following formula (Cleveland, 2008):

$$HDI = \frac{1}{3}(LEI + EI + GDP) \qquad (2)$$

where *LEI* is index of *life expectancy at birth*, *EI* is education index „...measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrollment ratio (with one-third weight)...“ and *GDP per capita* is measured “...in purchasing power parity (PPP) terms in US dollars.“

We think that upper mentioned factors mirror the demographic background as well as living conditions within *EU- 27* and therefore we employed it for our models.

2 The demographic and socio-economic background of *EU- 27*

Before we present our results about relation between age specific fertilities and age structure in the next section, we describe the chosen clusters of member states with regard to the before mentioned indicators. The demographic data we obtained from the *International Data Base* (*IDB*). It is a database of the *U. S. Census Bureau* which offers data of “...variety demographic indicators for countries and areas of the world with a population of 5,000 and more...” (*U. S. Census Bureau, Population Division*, 2009). In the case of *HDI* we obtained data per 2005 – 2007 from the publication “Human development indices”.

To compare various groups of countries, with less within group variability of the observed variables then between group variability, we have used the cluster analysis. It is an exploratory statistical and mathematical method, often used for classification or descriptive purposes. In our case, we have chosen to compare 5 clusters (the number is optional). For this purpose, we first standardized all the variables as follows (this is a common procedure, because we want to have all the data in the same non-dimensional measure):

$$d_{i,j} = \frac{x_{i,j} - \bar{x}_j}{s_j} \qquad (3)$$

Where, *j* is an index for specific variable, *i* is an index for specific observation (each country), *x* is an observation, *d* is the standardized observation and *s* is the standard deviation of observations for the *j*-th variable and $\bar{x}$ is the mean of these observations. We analyzed only data for the 2007. In the following table (Table 1) there are five clusters and descriptive characteristics of our variables (socioeconomic and demographic indicators) for *EU-27.*

Table 1: **Means values of indicators for each cluster**

Clusters	*HDI*	*BR*	*DR*	*YDR*	*ODR*
Cluster 1 Belgium, Denmark, Netherlands, Portugal, Finland, Sweden, United Kingdom	0,9513	10,5400	10,0229	0,2569	0,2464
Cluster 2 Germany, Greece, Spain, Italy, Austria, Slovenia	0,9465	9,005	10,2667	0,2106	0,2721
Cluster 3 Cyprus, Malta, Poland, Slovakia	0,894	10,51	8,4975	0,2341	0,1718
Cluster 4 Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Romania	0,8683	9,6257	12,5386	0,2111	0,2316
Cluster 5 Ireland, France, Luxembourg	0,962	13,05	8,21	0,2918	0,2138

The overall highest *HDI*, *BR, YDR* and at the same time the lowest *DR* within *EU- 27* can be seen in the results for Ireland, France and Luxembourg that create Cluster 5. In these countries there was higher *YDR* than *ODR*. Therefore we can suppose that people in their productive age are under higher socio-economic pressure from young people[8]. This is particularly interesting when comparing with the post-socialist countries in Cluster 4.

In the case of countries with the lowest *HDI* (Cluster 4) we can observe the highest *DR* also. In these countries despite higher *DR, ODR* was higher than YDR (except Romania). Cluster 3 is somewhat odd, because countries like Cyprus and Malta may be considered as very small countries, Slovakia a small country and Poland as a big country (in terms of population and area). But altogether, they had the lowest *ODR* and the second lowest *DR* within *EU- 27* per year 2007. In these countries there was higher *YDR* than *ODR*. It appears that, in spite of the somewhat average *BR* in 2007, these results reflect trends which are no more present.

The overall lowest *BR*, *YDR* and the highest *ODR* within *EU- 27* per year 2007 were measured for Cluster 2: Germany, Greece, Spain, Italy, Austria and Slovenia. There was markedly higher *ODR* than *YDR*. That is the opposite situation to the situation in countries creating Cluster 3.

[8] We defined young people (young population) as people aged 0 – 14 years, old people (old population) as people aged 65 and over years, people in working (productive) age as people of years between 15 – 64. Young and old population together present the dependent population, while people in productive age represent the independent population.

The second highest value of *HDI* and *BR* within *EU- 27* per year 2007 was in countries of Cluster 1: Belgium, Denmark, Netherlands, Portugal, Finland, Sweden and United Kingdom. In four cases (Denmark, Netherlands, Finland and UK) *YDR* is higher than *ODR* and in three cases the opposite is true (Belgium, Portugal and Sweden). Age dependency ratios were clearly not the factors, which make these countries a cluster. This cluster seems not that unique as others. Altogether, we consider the age structure of *EU-27* as surprisingly heterogeneous. The proportions of dependent and independent populations within single clusters as well as for *EU-27* are in Table 2.

Table 2: **Age structure of each cluster and *EU-27* per 2007**

	0-14	**15-64**	**65+**
Cluster 1	17%	67%	16%
Cluster 2	14%	67%	18%
Cluster 3	17%	71%	12%
Cluster 4	15%	69%	16%
Cluster 5	19%	66%	14%
EU- 27	16%	68%	16%

3 Age specific fertility of EU´s member states

As we mentioned at the beginning of this paper, in some countries of *EU-27* there is a decline of fertility of women aged less than 30 and an increase of fertility of women aged 30 and more. That is called as the postponement of childbearing. Further it can happen that women achieve the end of their reproductive life with fewer children than wished (Leridon, Slama, 2008). As we before mentioned the number of births is one component affected on the population structure. Another aspect is the growth of old population (Figure 3.3, Ivan et al., 2009).

We were interested whether age specific fertility[9] is linked by age structure (proportion of independent to dependent populations) of *EU* member states. Is that relationship the same across age specific groups? Are these results robust across the three year period?

So we were interested in relationships between age specific fertilities (AGI_i, $AGII_i$ and $AGIII_i$) and:

[9] We have three age specific fertilities: *AGI* aged 15 – 24 years to whom we will refer as young women, *AGII* aged 25 – 34 years that we will call middle-aged women and *AGIII* aged 35 – 49 years that we will mark as older women. We defined the *general fertility* as the sum of age specific fertility rates for women aged 15 - 49 years. Years 15 – 49 are generally considered like childbearing years of women (Eurostat, 2002).

a) the *ratios* of young and old people to the population in productive ages (YDR_i, ODR_i),

b) the average annual number of births during a year per 1,000 population (BR_i),

c) the human development index (HDI_i).

We acquired particular values for *AGI, AGII* and *AGIII* by the following way:

$$AGI_i = \frac{\left(F_i^{15-19} + F_i^{20-24}\right)/2}{\left(F_i^{15-19} + F_i^{20-24}\right)/2 + \left(F_i^{25-29} + F_i^{30-34}\right)/2 + \left(F_i^{35-39} + F_i^{40-44} + F_i^{45-49}\right)/3} \quad (4)$$

$$AGI_i = \frac{\left(F_i^{25-29} + F_i^{30-34}\right)/2}{\left(F_i^{15-19} + F_i^{20-24}\right)/2 + \left(F_i^{25-29} + F_i^{30-34}\right)/2 + \left(F_i^{35-39} + F_i^{40-44} + F_i^{45-49}\right)/3} \quad (5)$$

$$AGI_i = \frac{\left(F_i^{35-39} + F_i^{40-44} + F_i^{45-49}\right)/3}{\left(F_i^{15-19} + F_i^{20-24}\right)/2 + \left(F_i^{25-29} + F_i^{30-34}\right)/2 + \left(F_i^{35-39} + F_i^{40-44} + F_i^{45-49}\right)/3} \quad (6)$$

where F is *age specific fertility rate*, for example F_i^{15-19} stands for the fertility rate (as acquired from *IDB*) of women aged 15 to 19 years in a specific country.

Age specific fertilities for each cluster and *EU* during years 2005 - 2007 are presented on Table 3.

Table 3: **Age specific fertilities for each cluster and *EU-27* for 2005 - 2007**

	AGI			***AGII***			***AGIII***		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Cluster 1	20%	20%	21%	64%	64%	68%	15%	15%	11%
Cluster 2	22%	22%	23%	64%	64%	67%	14%	14%	10%
Cluster 3	29%	30%	31%	59%	59%	61%	12%	11%	8%
Cluster 4	40%	39%	40%	51%	52%	53%	9%	9%	6%
Cluster 5	19%	19%	20%	63%	63%	67%	18%	18%	12%
EU-27	26%	26%	27%	60%	60%	63%	13%	13%	9%

We decided investigate mentioned indicators within countries of *EU- 27*, as Slovakia is member state of this community since 1th, May 2004. We have tested the following regressions using simple OLS estimation techniques:

$$AGI_i = \beta_0 + \beta_1 HDI_i + \beta_2 BR_i + \beta_3 YDR_i + \beta_4 ODR_i + u_i \quad (7)$$

$$AGII_i = \beta_0 + \beta_1 HDI_i + \beta_2 BR_i + \beta_3 YDR_i + \beta_4 ODR_i + u_i \quad (8)$$

$$AGIII_i = \beta_0 + \beta_1 HDI_i + \beta_2 BR_i + \beta_3 YDR_i + \beta_4 ODR_i + u_i \quad (9)$$

Table 4 summarizes main results for each model. In our models we used standardized variables in order to remove the influence of scaling. All the results were tested for following standard regression assumptions:

- normal distribution of residuals,
- heteroscedasticity by *White´s test* for heteroscedasticity,

- multicolinearity by variance inflation factor (*VIF*),
- model specification by *Ramsey RESET test*.

All these conditions for each model during the period 2005 - 2007 were satisfied.

Table 4: **Results of models for *AGI – AGIII***

	AGI			***AGII***			***AGIII***		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
HDI	-0,0926***	-0,0891***	-0,0895***	0,0670***	0,06406***	0,0628***	0,0256***	0,0250***	0,0267***
	(-7,074)	(-7,104)	(-6,855)	(6,760)	(6,525)	(6,169)	(4,091)	(4,306)	(4,571)
BR	-0,0044	-0,0071	-0,0059	-0,0101	-0,0124	-0,0174	0,0145	0,0195**	0,0233**
	(-0,230)	(-0,368)	(-0,281)	(-0,699)	(-0,819)	(-1,056)	(1,590)	(2,181)	(2,469)
YDR	0,0021	0,0020	0,0039	-5,0 e-05	0,0035	0,0066	-0,0021	-0,0056	-0,0104
	(0,098)	(0,097)	(0,165)	(-0,003)	(0,205)	(0,362)	(-0,200)	(-0,556)	(0,329)
ODR	0,0104	0,0049	0,0064	-0,0133	-0,0119	-0,0141	0,0029	0,0070	0,0077
	(0,865)	(0,439)	(0,575)	(-1,459)	(1,373)	(-1,616)	(0,502)	(1,373)	(1,531)
$\mathbf{Adj}R^2$	**0,77**	**0,79**	**0,79**	**0,72**	**0,73**	**0,73**	**0,64**	**0,70**	**0,71**

In all our models (for all age specific fertilities and in all years) the *HDI* was significant factor (on $\alpha = 0{,}01$). Although we expected this significance, it might be interesting to see, that in only one case (*AGI)* the value of the b_1 is negative (see Table 4). And so higher values of *HDI* within countries of *EU* are joined with higher AG II and *AGIII*, but it isn´t valid in the case of young women´s fertility. We suppose that it can be caused by the fact, that women in member states of *EU-27* become more educated and more engaged in the labour market. They have more potential opportunities for their self-realization but on the other hand there is the difficulty of reconciling professional and private live for them. We think that negative relation between *HDI* and *AGI* (higher *HDI* is associated with lower *AGI*) confirms larger participation of women in education and labour market in more developed countries. Mentioned facts can lead to the postponement of childbearing and to the higher *AGII* and *AGIII* within countries with higher *HDI*. However, one interesting point is that the effect size is highest for *AGI* regressions. The country development seems to be more related to the fertility of young women, than for middle-aged women and lower (although still strongly significant) for fertility of older women.

From the other explanatory indicators only one was significant in clarifying age specific fertilities, it was the *BR*. As we can see in Table 4 there is a positive relationship between *BR* and *AGIII* for 2006 and 2007 (on $\alpha = 0{,}05$). Higher *BR* within *EU-27* is linked with higher fertility of older women. It seems that older women are responsible for higher *BR* within *EU-27* per given

period, and not young or middle-aged women. For example, if we look at the sign of b_2 coefficients (although they are not always significant) we can see, that higher values of *BR* are joined with lower values of *AGI* and *AGII*. This supports this finding. Another supporting fact is, that the absolute b_2 coefficients are higher for *AGII* regression compared to *AGI* and also higher for *AGIII* than for *AGII* (we have used standardized data).

Results in Table 4 indicate that other two factors *YDR* and *ODR* are not significant factors in the explanation of acquired age specific fertilities within *EU-27* in 2005 – 2007. The reason for this may be, that age structure is the result of long term trends, probably spanning through decades, while age specific fertility has probably much shorter "*memory*". It more reflects the current socio-economic situation than the overall age structure. However, to be sure, one would need a time series analysis, which may be our goal for future research.

Conclusion

In this paper we were interested in the age specific fertilities and their relationships to the general socio-economic and demographic indicators as: aged dependency ratios, rates of live births and deaths, index of human development. In our opinion mentioned indicators describe the environment in which couples (women) are making a decision to become or not to become parent(s). In chapter 1 we specified the upper mentioned indicators, than in chapter 2, we presented the member states of *EU-27* through the analysis of those indicators. In chapter 3 we conducted regression analysis to verify, whether age dependency ratios can explain some significant variability of age specific fertilities across *EU-27`s* countries.

According to the acquired results there are only two significant factors in the explanation of age specific fertility within *EU-27* during given period (in case of *BR* only for *AGIII* for 2006, 2007). We expected that in the populations with higher *ODR* we would also have higher fertility of middle-aged or older women. Our expectation is based on the idea that these countries are consider as more developed countries in which couples (women) are more often directed first at their professional growth and later on issues associated with the foundation of a family. However, this was not confirmed. One interesting result of our research was, that birth rates in *EU-27`s* countries seem to be driven by older women, rather than young or middle-aged women.

References

BALNAVES, Mark, CAPUTI, Peter: *Introduction to quantitative research methods. An investigative approach*. London: SAGE Publications Ltd., 2001, 247 p. ISBN 0-7619-6803-2.

CLEVELAND, Cutler J. 2008. Human Development Index [online]. In *Eoearth.org*. Date of last updated: 2008-10-10. [quote 2009-12-27]. Available from: <http://www.www.eoearth.org/article/Human_Development_Index>.

Commission of the European Communities. 2007. Europe´s demographic future: facts and figures. [online]. In *Ec.europa.eu* Date of publication: 2007-11-05. [quote 2010-01-03]. Available from: <http://ec.europa.eu/employment_social/social_situation/docs/sec_2007_638_en.pdf>.

Creating a Population Pyramid with Excel [online]. In *Aede.osu.ede*. Date of last revision: 2002. [quote 2009-12-30]. Available from: < http://aede.osu.edu/class/AEDE597.01/Gonzalez/pyramid/index.html>.

Eurostat. 2002. Domain: Demography, Glossary [online]. In *Epp.eurostat.ec.europa.eu*. Date of update: 2002-04-03. [quote 2009-12-29]. Available from: <http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/demo_pop_esms_an2.htm>.

FRANK, O. 2008. The demography of fertility and infertility [online]. In *Gfmer.ch*. Date of last revision: 2008-09-04. [quote 2010-01-03]. Available from: <http://www.gfmer.ch/Books/Reproductive_health/The_demography_of_fertility_and_infertility.html>.

HAUPT, Arthur, KANE T., Thomas: *Population Reference Bureau´s Population Handbook, 4th International Edition* [online]. In *Rmportal.net* / Library [quote 2009-12-28]. Available from: <http://rmportal.net/library/content/tools/biodiversity-conservation-tools/putting-conservation-in-context-cd/population-and-environment-dynamics-resource/2-1-a.pdf/view?searchterm=Population%20Handbook>.

Human Development Indices. [online]. In *Hdr.undp.org* [quote 2009-12-28]. Available from: <http://hdr.undp.org/en/media/HDI_2008_EN_Tables.pdf>.

IVAN, Diana et al. (eds.) 2009. Population [online]. In *Epp.eurostat.ec.europa.eu* / Publications [quote 2009-12-28]. Available from: <http://hdr.undp.org/en/statistics/indices/hdi/question,68,en.html>.

LERIDON, H., SLAMA, R. 2008. The impact of a decline in fecundity and of pregnancy postponement on final number of children and demand for assisted reproduction technology [online]. In *Humrep.oxfordjournals.org* [quote 2010-01-10]. Available from: < http://humrep.oxfordjournals.org/cgi/reprint/den106v1.pdf>.

Population Reference Bureau. Human Population: Population Change [online]. In *Prb.org* / Educators. [quote 2009-01-03]. Available from: <http://www.prb.org/Educators/TeachersGuides/HumanPopulation/Change.aspx>.

United Nations Development Program. The Human Development Index (HDI) [online]. In *Hdr.undp.org* [quote 2009-12-28]. Available from: <http://hdr.undp.org/en/statistics/indices/hdi/#d.en.68>.

United Nations Development Program. What is the human development index (HDI)? [online]. In *Hdr.undp.org* [quote 2009-12-28]. Available from: <http://hdr.undp.org/en/statistics/indices/hdi/question,68,en.html>.

U. S. Census Bureau, Population Division. 2009. FAQ [online]. In *Census.gov* / Frequently Asked Questions. Date of last modified: 2009-12-15. [quote 2009-12-28]. Available from: <http://www.census.gov/ipc/www/idb/faq.php>.

U. S. Census Bureau, Population Division. 2009. Glossary [online]. In *Census.gov* / Glossary. Date of last modified: 2009-12-15. [quote 2009-12-28]. Available from: <http://www.census.gov/ipc/www/idb/glossary.php>.

Address of author

Mgr. Ivana Kundrátová
Katedra sociálnej práce
Inštitút edukológie a sociálnej práce
Filozofická fakulta, Prešovská univerzita v Prešove
ul. 17. Novembra č. 1, 080 78 Prešov
E-mail: ivana.kundratova@gmail.com