

THE MOTHERS' INDEX AS AN INDICATOR OF DEMOGRAPHIC SECURITY

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ABSTRACT

The Mothers' Index was developed in 1998 and has been in use for ranking countries since 2000. The author advocates that this indicator should not only be used for cross-country analysis of maternal and child health but also as be part of the demographic indicators of national security in Belarus. A grouping of more developed countries in terms of the Mothers' Index is proposed. The Mothers', the Women's and the Children's Indices from 2007 to 2009 are calculated for Belarus, the post-Soviet countries and some EU countries.

Key words: demographic security, depopulation, the Mothers' Index, the Women's Index, the Children's Index.

1. Introduction

The Mothers' Index is annually calculated by the international humanitarian organization "Save the Children" (2003-2011) in order to compare the conditions of motherhood in different countries and to identify countries where mothers face the greatest problems. The quality of children's life depends on the health, safety and welfare of their mothers, as it is primarily the mother who cares for her child. The countries are divided into three groups after their degree of development. Belarus is included in the group of more developed countries, and the Mothers' Index is calculated for it since 2003.

In Belarus' socio-demographic situation, the issue of reproductive health has become most important. The situation is characterized by depopulation, aging population, low birth rates, high mortality rates and the degradation of the family institution. Maternal health, child health and social status of the mother are today considered only in general terms but the age-specific fertility and mortality should be analyzed in some detail.

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In this paper the author discusses the Mothers' Index in more detail and also proposes to include the Mothers' Index into the National System of Demographic Indicators.

2. The methods for the Mothers' Index calculation

The Mothers' Index was developed in 1998. It has been used since 2000 with some changes in 2006. In turn, the Mothers' Index includes two sub-indices – the Women's Index and the Children's Index (Tables 1 and 2). Before 2006 the Women's Index was calculated in the same way for all countries but not exactly the same indicators.

For calculation of the Mothers' Index each indicator is standardized in the group. The standardized indicators with negative impact are multiplied by minus one. i.e. the lifetime risk of maternal mortality, child mortality rate, ratio of underweight children under 5. In the author's opinion the percent of women using modern contraception ought also to have negative impact. On the one hand, the use of contraceptives can be considered as a positive indicator (preventing the spread of sexually transmitted infections. On the other hand, the most common contraceptives in the more developed countries are hormonal contraceptives which in the future may lead to a violation of women's health.(see also Anokhin, 1995, Barabanov, 2004)

Table 1. The list of indicators in the Women's Index for 2007-2009 and country groups

Country group	The list of indicators								
	Health status				Educational status	Economic status			Political status
	Lifetime maternal mortality	Women using modern contraception %	Female life expectancy at birth	Births attended by health personnel %	Number of years of formal female schooling	Maternity leave length	Maternity leave benefit %	Ratio of female to male income	Participation of women (% seats)
More developed	+	+	+	-	+	+	+	+	+
less developed	+	+	+	+	+	-	-	+	+
Least developed	+	+	+	+	+	-	-	+	+

To avoid distortion of data by school systems where pupils do not start training on time or fail to achieve certain educational standards some adjustments are made. For example if the gross pre-primary enrollment ratio and gross primary enrollment ratio lies between 100 and 105 percent, they are discounted to 100 percent. Any value over 105 percent is decreased by 5%.

The standardized indicators are weighted together to determine the different indices. For the women's economic status, the weights are: ratio of estimated

female to male earned income – 75.0%; duration of maternity leave – 12.5%; size of the payment – 12.5%.

The Women's Index is calculated with the weights: indicator of women's health –30%; indicator of educational status –30%; indicator economic status – 30%; indicator of political status –10%. The Children's Index is calculated as simple arithmetic mean.

The Mothers' Index is finally calculated with the following weights: indicator of children's status – 30%; indicator of women's health – 20%; indicator of educational status – 20%; indicator economic status – 20%; indicator of political status – 10%.

For a more thorough description see Save the Children (2003-2011).

Table 2. The list of indicators included into the Children's Index for various periods and country groups

Country group	The list of indicators						
	Under-5 mortality rate (per 1,000 live births)	Gross pre-primary enrollment ratio %	Gross primary enrollment ratio (% of total)	Gross secondary enrollment ratio (% of total)	children under 5 moderately or severely underweight for age %	Percent of population with access to safe water	Ratio girls/boys enrolled in primary school
More developed	+	+	-	+	-	-	-
less developed	+	-	+	+	+	+	-
Least developed	+	-	+	-	+	+	+

3. The Women's Index, the Children's Index and the Mothers' Index calculation for the Republic of Belarus

3.1. More developed countries according to Save the Children

In the period from 2007 to 2009 the list of more developed countries included 41 countries (Table 5). The means and standard deviations of the indicators are calculated in Table 3

Table 3. Mean and standard deviation calculated by the group of more developed countries, and standardized values of indicators for Belarus in 2007

Indicators included into the Index	Block	Mean	Standard deviation	z-value of Belarus
Lifetime risk of maternal mortality	Health status	$3.259 \cdot 10^{-4}$	$3.164 \cdot 10^{-4}$	-0.7258
Percent of women using modern contraception		53.27	18.56	0.2839
Female life expectancy at birth		79.98	3.25	-1.8388
Expected number of years of formal female schooling	Educational status	15.76	1.97	-0.3833

Table 3. Mean and standard deviation calculated by the group of more developed countries, and standardized values of indicators for Belarus in 2007

Indicators included into the Index	Block	Mean	Standard deviation	z-value of Belarus
Maternity leave benefit (length)	Economical status	148.51	77.73	-0.2896
Maternity leave benefit (% wages paid)		85.27	23.70	0.6216
Ratio of estimated female to male earned income		0.61	0.09	0.3809
Participation of women in national government	Political status	22.50	10.00	0.6501
Under-5 mortality rate	Children's Index	7.76	4.64	-0.9142
Gross pre-primary enrollment ratio		79.27	16.93	1.2243
Gross primary enrollment ratio		91.83	8.73	0.1342

Based on Table 3 and the weights given above, the indicator of women's economic status in Belarus in 2007 is 0.327 and the indicator of women's health state is: -0.6030. In the same way the Women's Index becomes -0.1327 and the Children's Index is 0.1481. Finally the Mothers' Index is equal to -0.0224. Similar calculations were made for 2008 and 2009. Interim data and the results of the calculations are presented in Table 4.

In Table 5 the 41 more developed countries are divided into three groups depending on their Mothers' Index (high over 0.2, middle -0.6-0.2 - and low below -0.6). The composition of each group varies between the years, albeit marginally. Belarus is in the middle level of the Mothers' Index group (without changing its position), while Latvia, Russia, Ukraine and some other countries change their positions.

3.2. Two special subgroups: former Soviet Union countries and some EU countries

The author computed the Mothers' Index for two separate subgroups: the post-Soviet countries in the European region, and a group of some EU countries. Seven countries in EU (the most and least developed) were selected for comparison with the seven post-Soviet countries in Europe. Using the formulas 1-3 the author has

Table 4. Mean and standard deviation, calculated by the group of more developed countries, and standardized values of indicators for Belarus in 2008-2009

Indicators included into the Index	2008			2009		
	Mean ($\bar{x}$)	Standard dev	<i>z-value</i>	Mean ($\bar{x}$)	Standard dev	<i>z-value</i>
Lifetime risk of maternal mortality	$1.676 \cdot 10^{-4}$	$3.073 \cdot 10^{-4}$	0.3254	$1.676 \cdot 10^{-4}$	$1,337 \cdot 10^{-4}$	-0,0735
Percent of women using modern contraception	55.27	17.56	0.7558	57.07	16.35	0.0656
Female life expectancy at birth	80.12	3.28	-1.8637	80.83	3.22	-1.4985
Expected number of years of formal female schooling	16.00	2.04	-0.4911	15.95	2.04	-0.4673
Maternity leave benefit (length)	134.63	63.22	-0.1366	170.46	103.73	-0.4286
Maternity leave benefit (% wages paid)	83.27	24.35	0.6870	81.85	24.37	0.7445
Ratio of estimated female to male earned income	0.61	0.09	0.2322	0.62	0.09	0.1483
Participation of women in national government	23.27	10.16	0.5639	24.34	10.24	0.7481
Under-5 mortality rate	7.61	5.14	-1.0494	6.78	3.74	-1.6608
Gross pre-primary enrollment ratio	81.17	16.72	1.1261	83.76	15.91	1.0210
Gross primary enrollment ratio	91.39	9.18	0.3932	91.85	8.74	0.3599
Women's Index (I_W)	-0.0963			-0.1309		
Children's Index (I_C)	0.1566			-0.0933		
Mothers' Index (I_M)	0.0016			-0.0903		

Table 5. Country groups with high, medium and low Mothers' Index among more developed countries 2007-2009

Countries with high Mothers' Index	
2007	Australia, Belgium, Denmark, Finland, Germany, Iceland, Spain, Lithuania, New Zealand, Norway, Portugal, Spain, Sweden
2008	Australia, Denmark, Estonia, Finland, Germany, Iceland, Italy, Latvia, Lithuania, Netherlands, New Zealand, Norway, Portugal, Slovenia, Sweden, Switzerland
2009	Australia, Denmark, Estonia, Finland, Germany, Iceland, Italy, Lithuania, Netherlands, New Zealand, Norway, Sweden
Countries with middle level of Mothers' Index	
2007	Austria, Belarus, Bulgaria, Canada, Croatia, Czech Republic, Estonia, France, Greece, Hungary, Ireland, Italy, Japan, Latvia, Luxembourg, Malta, Netherlands, Poland, Slovakia, Slovenia, Switzerland, United Kingdom, United States
2008	Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, France, Greece, Hungary, Ireland, Japan, Luxembourg, Malta, Poland, Romania, Russian Federation, Slovakia, Spain, United Kingdom, United States
2009	Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, France, Greece, Hungary, Ireland, Japan, Latvia, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Switzerland, Ukraine, United Kingdom, United States
Countries with low Mothers' Index	
2007	Albania, Macedonia, Moldova, Romania, Russian Federation, Ukraine
2008	Albania, Macedonia, Moldova, Ukraine
2009	Albania, Macedonia, Moldova, Russian Federation

determined the countries ranking on three indices: Mothers', Women's and Children's for 2007-2009 (Tables 6 and 7). The leading positions for the three indices in the former Soviet Union group are held by the three Baltic countries: Latvia, Lithuania and Estonia, which in 2004 joined the European Union. Belarus ranked second among post-Soviet countries on the Children's Index during 2007-2008. But in 2009 it lost to fourth position. The situation deteriorated also for the Russian Federation.

In the EU-group the leading position was held by Finland and Sweden. In these countries favorable conditions for mothers and children have been created. In addition, these countries have the highest female life expectancy in Europe. The last position in the ranking occupies Poland, due to the relatively high lifetime risk of maternal mortality and under-5 mortality rate in the country, as well as low gross pre-primary enrollment ratio.

Table 6. Mothers' Index, Women's Index and the Children's Index in European countries for the period 2007-2009

Country	2007			2008			2009		
	Women's Index	Children's Index	Mothers' Index	Women's Index	Children's Index	Mothers' Index	Women's Index	Children's Index	Mothers' Index
Post-Soviet countries									
Belarus	0.169	0.487	0.308	0.119	0.648	0.324	-0.086	0.275	0.078
Estonia	0.144	1.475	0.539	0.130	1.498	0.544	0.281	0.879	0.462
Latvia	0.505	0.239	0.408	0.652	0.488	0.583	0.467	1.166	0.667
Lithuania	1.194	0.378	0.939	1.126	0.059	0.787	0.799	0.516	0.693
Moldova	-0.619	-1.642	-0.891	-0.609	-1.599	-0.873	-0.183	-1.853	-0.662
Russian Federation	-0.639	-0.476	-0.613	-0.605	-0.259	-0.511	-0.661	-0.782	-0.707
Ukraine	-0.754	-0.461	-0.690	-0.811	-0.835	-0.853	-0.617	-0.200	-0.531
EU countries									
Czech Republic	-0.883	0.455	-0.479	-0.907	0.508	-0.484	-0.607	0.765	-0.211
Germany	-0.141	0.619	0.108	-0.202	0.652	0.074	-0.166	0.856	0.162
Finland	0.851	1.753	1.126	0.564	0.884	0.682	0.854	1.282	0.991
France	-0.330	2.788	0.578	-0.027	2.448	0.690	-0.430	2.271	0.367
Italy	-0.236	0.886	0.084	0.096	0.678	0.238	0.020	0.599	0.172
Poland	-0.203	-1.350	-0.557	-0.253	-1.134	-0.530	-0.339	-1.072	-0.572
Sweden	0.942	1.225	1.053	0.731	1.034	0.852	0.668	1.194	0.859

4. Preconditions for inclusion the Mothers' Index into the Indicators of Demographic Security

In accordance with the Law of the Republic of Belarus "On the demographic security of Belarus" (2010) the indicators of demographic threats are: net reproduction rate; the coefficient of depopulation; the total fertility rate; death rate of working age population, including mortality rates for men and women of working age; life expectancy; rate of population aging; balances of migration exchange between rural and urban areas, including by gender and age; education level; number of illegal migrants; marriage rates and divorce rates.

Table 7. Ranking of European countries on the Mothers' Index, Women's Index and the Children's Index for 2007-2009

Country	2007			2008			2009		
	Women's Index	Children's Index	Mothers' Index	Women's Index	Children's Index	Mothers' Index	Women's Index	Children's Index	Mothers' Index
Post-Soviet countries									
Belarus	4	2	4	4	2	4	4	4	4
Estonia	3	1	2	3	1	3	3	2	3
Latvia	2	4	3	2	3	2	2	1	2
Lithuania	1	3	1	1	4	1	1	3	1
Moldova	5	7	7	6	7	7	5	7	6
Russian Federation	6	6	5	5	5	5	7	6	7
Ukraine	7	5	6	7	6	6	6	5	5
EU countries									
Czech Republic	7	6	6	7	6	6	7	5	6
Germany	3	5	4	5	5	5	4	4	5
Finland	2	2	1	2	3	3	1	2	1
France	6	1	3	4	1	2	6	1	3
Italy	5	4	5	3	4	4	3	6	4
Poland	4	7	7	6	7	7	5	7	7
Sweden	1	3	2	1	2	1	2	3	2

There is no Mothers' Index in this list. However, these indicators include demographic, social, and economic characteristics of the mothers' and children's states which, in the author's opinion, motivate their inclusion among the indicators characterizing demographic situation and, in particular the demographic security. We argue that the following two indicators of women's health Mothers' Index should also be included in Belarus with negative influence: The ratio of abortion for 1000 live birth and The level of women's infertility (the percentage of women between 15 and 49 who from medical, biological or social reasons do not get pregnant (Anokhin, 1995).

The level of the indicators is rather high for Belarus (in 2009 ratio of abortion for 1000 live birth was 281.94; the level of women's infertility in 2009 – 63.5 per 100 000 persons of relevant sex). Here is the official data obtained from reports of the state medical institutions. The Mothers' Index calculated for Belarus with the proposed indicators will reflect the mothers' real health status.

Most medical services in Belarus are free of charge. This fact significantly affects their quality. To improve the quality of health services a compulsory health insurance would be appropriate, as well as the training of medical personnel abroad.

The Mothers' Index for Belarus should be computed in two ways: in relation to the other post-Soviet countries and also in relation to other more developed countries. It should also be included in the "Women and men in the Republic of Belarus: statistical book" (last issue, 2010):

5. Concluding remarks

The proposed introduction of the Women's Index, the Children's Index and the Mothers' Index would make it possible to determine the level of the mothers' and children's health in the Republic of Belarus. This would help the government in obtaining a good and fair health system. These approaches also allow Belarus to carry out cross-country assessments, having selected among the European countries the group of post-Soviet countries, as well as to assess the rank of Belarus on the indicators for children and mothers.

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