Infant Mortality in Eastern Europe and the Former Soviet Union Before and After the Breakup

by

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Prepared for presentation at the 2001 Meetings of the International Union for the Scientific Study of Population, Salvador de Bahia, Brazil, August 19-24.

Introduction

The infant mortality rate (IMR) is widely regarded as a sensitive measure of the quality of life experienced by a population. This statistic is often employed, alone or in combination with other indicators, in cross-national comparisons of levels of well-being. For this reason, it is highly desirable that the rates being compared are computed according to similar standards and definitions. Regrettably, such is not the case with respect to IMRs for developed countries. The departure from international standards and consequent understatement of IMRs for the former Soviet Union has been noted by numerous authors (Anderson and Silver, 1986; Baranov et al., 1990; Davis and Feshbach, 1980). Widespread discrepancies in definitions and reporting procedures for live births and infant deaths have also been documented in a survey of European countries, including a number of former socialist East European countries as well as the Baltic republics of the former Soviet Union (Gourbin and Masuy-Stroobant, 1993), and to a more limited extent in earlier work by the United Nations (1985). Of course, the artifacts affecting cross-national differences in reported IMRs are not limited to matters of definition, but include as well differential completeness and accuracy of registration of live births and infant deaths. In any case, there is clearly a need for the development and application of methodologies to enhance the international comparability of reported infant mortality rates. One such effort is hazarded in the analysis below.

Data and Methods

The present analysis makes use of a methodology previously employed to adjust reported infant mortality rates for former Soviet Union Republics to obtain international comparability (Kingkade and Arriaga, 1997). This methodology relies on age detail

within infancy. Specifically, mortality at ages 4-9 months is used to predict mortality in the earlier months of infancy. Such an approach appears reasonably grounded, in that most cross-national differences in definitions of infant mortality concern the early months of infancy, and most infant deaths that go unreported occur at these ages as well.[1] Care must be taken, because the precise correlation between mortality in months 4 to 9 of life and mortality in earlier infancy depends on the overall level of infant mortality. The historical decline in infant mortality levels, owing to improvements in prevention and treatment of infectious disease, reduced mortality in later months of infancy relative to earlier months (Masuy-Stroobant and Gourbin, 1995). Recent advances which have improved the viability of premature and low-birthweight babies may also impinge on the statistical relationships in question. As a result, a simple relational model in which a standard schedule of probabilities of dying from ages 4 to 9 is fit to observed data will not serve. Instead, historical life tables by month of age in infancy were examined in terms of the relationships between the logits of the probability of dying from exact age 4 to exact age 10 months and the monthly probabilities of dying in earlier months of age. It emerged that these relationships were best described by cubic polynomials (Kingkade and Arriaga, 1997), as illustrated for the first monthly probability of dying in Figure 1.

Whenever sufficient age detail on infant mortality is available, as is the case for many countries of Eastern Europe as well as all for Soviet countries, the relationships described can be used to predict the probabilities of dying in the first months of infancy. The predicted values replace those obtained from the reported data whenever the former exceed the latter, yielding an estimate of the overall IMR (i.e. probability of dying within

[1] This is precisely the rationale advanced by the leading mortality experts of the former Soviet Central Statistical Administration for an approach partly related to our methodology, which they employed to correct infant mortality data in former Soviet Central Asia (Andreyev and Ksenofontova, 1991).

the first year of life) that is usually higher and is never lower than the value calculated from the reported data.

The countries investigated in the present study are listed in Table 1. Figures 2-5 illustrate the necessity of adjusting the infant mortality rates for a number of the countries listed, especially East European countries for which the "conventional wisdom" has been that because they are European it goes without saying that all demographic data reported by their official statistical agencies must be of the most impeccable quality and require no correction. As figure 2 reveals, this was hardly the case in Macedonia in 1992. The 1992 Macedonian monthly probabilities of dying in infancy align remarkably well with the (West) German 1957 life table at all ages past the first month. However, the probability of dying in the first month of life in the 1957 German infant life table is roughly double that implied by the Macedonian 1992 data. Figure 3 compares the probabilities of dying in the Albanian 1990 and German 1953 infant life tables. Here the probability of dying in the first month of life in the German infant life table exceeds the corresponding Albanian value by a factor close to 4. A noteworthy feature of the age-pattern of probabilities of dying in the first few months of infancy in the Albanian 1990 infant life table is the rise with age from months 2 thru 4. This pattern, which is entirely contrary to our understanding of human mortality patterns, is frequently encountered in data reported for the Central Asian and Transcaucasian former Soviet countries. Tajikistan in 1990 illustrates perhaps the most flawed data that have thus far come into our possession (Figure 4). It is necessary to go as far back as 1934 to find a German infant life table with similar mortality from ages 4 to 9 months, the correction to the Tajik probability of dying in the first month implied by the comparison amounts to a factor over 4, and the factors applying to the Tajik probabilities of dying for the next two months are

approximately 3 and 1.5, respectively. The rise in the Tajik monthly probabilities of dying from ages 1 to 4 months resembles the pattern just noted for Albania in Figure 3. The Hungarian case, illustrated in Figure 5, demonstrates that a country with relatively sound statistics at present may harbor deficient data in its demographic history. The relation between the Hungarian and German probabilities of dying in the first month of life in Figure 5 is reminiscent of the correction that obtains at present for Russia (cf. Kingkade and Arriaga, 1997). The rise in the Hungarian probabilities of dying from the first to the second month of life is unlike anything observed for Russia as a whole. Of course, conditions in Hungary in 1953 were perhaps not the most conducive to precise and timely registration of vital statistics.

Results

We turn now to the results obtained by applying the methodology described above to the reported data at our disposal. Table 2 presents "adjustment factors", which are the ratios of the adjusted overall IMRs (probabilities of dying in the first year of life) to those obtained from the unadjusted data. Upon inspection, the countries in the analysis can be sorted into groups according to the magnitude of the adjustment factor. For the purpose of this classification, we employ for each country the average of the adjustment factors for the years for which we possess the necessary data to perform the calculation, beginning from 1987. The resultant groupings typically cut across the boundary dividing the former USSR from the countries of Eastern Europe. In particular, one can distinguish a "low group" of countries with adjustment factors under 1.1, including in its membership Slovenia, Hungary, the Czech Republic, Lithuania, Slovenia, and Estonia. To this group one might append Latvia and Belarus, whose adjustment factors are over

1.1 but under 1.2. An "intermediate group" can be delineated, comprising Russia, Georgia, Serbia and Macedonia, whose adjustment factors exceed 1.2 but fall below 1.32. To this group we append Ukraine and Bulgaria, with adjustment factors in the 1.5-1.59 range, and finally Moldova, which has an adjustment factor of 1.65. Next, a "high group" can be formed from Turkmenistan, Armenia, Romania, and Kazakhstan, having adjustment factor in the 1.695 –1.89 range. Appended to this follow the countries with the highest adjustment factors, around 2 or greater, including Uzbekistan, Kyrgyzstan, Tajikistan, Albania, and Azerbaijan.

Across this entire spectrum, it might be noted that the former Soviet countries fail to delineate themselves into a distinct group, but rather align themselves with various East European counterparts as constituents of the empirical groupings. In terms of Geography, the East European countries tend to follow a North-South gradient from lower to higher adjustment factors. The former Soviet countries follow a Northwest to Southeast gradient.

A question of considerable interest concerns the temporal trends in adjustment factors, insofar as these factors are indicative of the degrees to which comparisons of reported IMRs may be confounded by measurement artifacts. Unfortunately, our data too often afford only scanty temporal depth with regard to directly calculated adjustment factors. For several former Soviet countries, namely Azerbaijan, Georgia, Tajikistan, and Turkmenistan, our data for calculation of adjustment factors are limited to the year 1990. With regard to those countries for which adjustment factors are available for more than one date, only a few cases exhibit sustained and substantial improvement over time, as represented by reductions in their adjustment factors. These comprise Hungary, Slovenia, Lithuania, Latvia, Macedonia, and Romania. By 1994 the Baltic countries of

the former USSR were known to have shifted from the Soviet to the World Health Organization standards for defining live births and infant deaths (Gourbin and Masuy-Stroobant, 1993), and all of these countries exhibit declines to this date. However, Estonia represents an outlier in that her adjustment factors for subsequent dates exhibit dramatic increases.

In general, many countries seem to feature IMR adjustment factors which fluctuate around a given country-specific level. This holds for a number of countries with very low adjustment factors, including Slovakia, Hungary (recently), the Czech Republic, and Croatia. The same can be said for countries with higher adjustment factors, such as Russia (around 1.25), Bulgaria (1.6), and Kyrgyzstan (2). Certain countries, including Serbia and Albania (since 1987), exhibit a rise and then decline in their adjustment factors, such that one hesitates to put much confidence in the latest decline.

Another group of countries exhibits an overall increase in the IMR adjustment factor, including Ukraine and Bulgaria. In the Bulgarian case, this may be related to the efforts of the national statistical agencies to abandon former practices and conform to Soviet definitions (Carlson and Tsvestarsky, 1996).

Adjusted IMRs

Table 3 presents overall adjusted infant mortality rates for the countries in the analysis. Overall infant mortality rates are reported for a vastly greater range of dates than are the age detail data from which we may derive adjustment factors. Given the apparent stability of the adjustment factor in many instances as well as the availability of interpolation formulas to fill in gaps in the time series, we have the means to estimate

adjusted IMRs at dates for which we have not directly calculated adjustment factors. In implementing the extension process, at either end of the span of years over which adjustment factors have been calculated, we have either taken the average of the available factors or extended (forward or backward in time) the latest (earliest) available factor, as seemed appropriate judging from the available data. Between time points for which adjustment factors are available, the series of factors has been filled in by linear interpolation.

Because the adjustments developed in this analysis entail substantial changes to the reported infant mortality rates, the question of categorizing the resultant adjusted rates naturally arises. As a criterion, we employ the average adjusted infant mortality rate over the period since 1987 in order to take account of country trends in the level of infant mortality. The countries arrange themselves into meaningful groupings according to their adjusted IMRs, beginning with a "low group" containing Slovenia, the Czech Republic, and Croatia, whose average adjusted IMRs since 1987 are each under 10 per thousand. Also relatively low (under 15 per thousand) on this average adjusted IMR criterion are Slovakia, Lithuania, Hungary, Belarus, and Estonia. Latvia, with an average adjusted IMR since 1987 of 16.7 per thousand may be placed in the "low group" as well. The "middle group" of countries begins with Georgia, with a 1987+ average adjusted IMR of 19.7 per thousand, followed by Ukraine, Russia, Bulgaria, and Serbia, whose 1987+ average adjusted IMRs fell between 20 and 29.9 per thousand. Armenia, with a 1987+ average adjusted infant mortality rate of 29.9 per thousand also belongs in this category, along with Moldova and Macedonia, whose averages fell between 30 and 40 per thousand. Rounding out the "middle group" of countries are Romania and Kazakhstan, whose 1987+ adjusted IMRs fell between 40 and 50 per thousand. At the high end of the

spectrum, the "high group" of countries begins with Uzbekistan and Albania, which averaged between 58 and 60 per thousand in their adjusted IMRs since 1987. Azerbaijan and Kyrgyzstan feature 1987+ average adjusted IMRs between 60 and 70 per thousand. Above the 70 per thousand level one finds the 1987+ average adjusted IMRs for Turkmenistan and, finally, Tajikistan (78.4 per thousand).

Inspecting the temporal trends in adjusted IMRs, one observes clearcut declines in the East European countries, as well as the newly independent countries of former Soviet Central Asia. Three other former Soviet countries, namely Armenia, Lithuania, and Azerbaijan also exhibit declines in their adjusted IMRs. It is arguable whether the barely discernable trend in Russia's adjusted IMR warrants classification as a "real decline". In any case, the remainder of the former Soviet countries (Ukraine, Moldova, Estonia, Georgia, Latvia, Belarus) feature no clear decline in their adjusted IMRs. With respect to the latter countries and those of Eastern Europe these findings are comparable to those of Gardos and Rychtarikova (1994).

Discussion

The recognized lack of comparability in countries' reported infant mortality rates can potentially confound cross-national comparisons of levels of well-being. In the analysis presented above, we have demonstrated a methodology for adjusting national infant mortality rates to improve their international comparability. In most instances the adjustment factors derived by this methodology are stable, or at least exhibit no obvious trends in direction, except over very lengthy time spans (i.e. decades). The adjustments often entail substantial increases in the magnitudes of the rates in question, and sometimes go so far as to alter apparent trends in levels of infant mortality.

A principal substantive finding emerging from the above analysis is that the distinction between the countries of Eastern Europe and those of the former Soviet Union is largely artificial in relation to levels of infant mortality. The Northwestern countries of the former USSR, namely Belarus, Lithuania, Latvia, and Estonia resemble the Northern group of East European countries in their infant mortality levels. Similarly, Bulgaria, known to employ the Soviet standard for definition and measurement of infant mortality, closely resembles Ukraine in its infant mortality level. Finally, the "Southern Tier" of Eastern Europe includes several countries (Albania, Macedonia, and Romania) whose infant mortality levels are similar to those of Transcaucasian and Central Asian former Soviet countries.

In terms of recent infant mortality trends, the East Europe/former USSR distinction appears better grounded, in that most East European countries have experienced sustained declines in infant mortality over the past decade, while a number of former Soviet countries exhibit stagnating tendencies. On the other hand, Lithuania, Azerbaijan, and the countries of former Soviet Central Asia are characterized by clear declines in their adjusted IMRs. It could well be that the East European countries entered the transition to the market economy better equipped to handle the shocks it entailed than many former Soviet countries. However, it seems questionable that the former Soviet Central Asian countries entered the transition in better condition to handle its shocks than other member republics of the former USSR. Perhaps the factors associated with the fertility decline that the former Soviet Central Asian countries are currently sustaining, including medical assistance received from various international sources, have contributed to a reduction in risks of infant death in these countries. Alternatively, one may question whether the completeness and accuracy of vital registration has not

deteriorated in the former Soviet Central Asian countries in the face of their internal turmoil and the emigration of highly qualified statistical personnel of European ethnic origin.

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Table 1. Countries Analyzed

Region/Subregion	Country
Eastern Europe	
	Albania
	Bulgaria
	Croatia
	Czech
	Hungary
	Macedonia
	Romania
	Serbia
	Slovakia
	Slovenia
Former USSR	
European Region	
	Belarus
	Estonia
	Latvia
	Lithuania
	Moldova
	Russia
	Ukraine
Transcaucasus	
	Armenia
	Azerbaijan
	Georgia
Central Asia	
	Kazakhstan
	Kyrgyzstan
	Tajikistan
	Turkmenistan
	Uzbekistan

Table 2. Adjustment factors for Infant Mortality Rates

Year	Albania	Armenia	Azerbaijan	Belarus	Bulgaria	Croatia	Czech	Estonia	Georgia	Hungary	Kazakhstan	Kyrgyzstan	Latvia
1950													
1951					1.12865								
1952					1.17828								
1953					1.25104								
1954					1.20157								
1955					1.25136								
1956					1.30136					1.16463			
1957					1.38883					1.17406			
1958					1.89454					1.21191			
1959					1.49698					1.18197			
1960	1.49113									1.57617			
1961										1.03488			
1962										1.16065			
1963										1.08789			
1964										1.01265			
1965										1.00000			
1966										1.00000			
1967										1.00045			
1968										1.00000			
1969										1.00044			
1970					1.79598					1.00003			
1971					1.69417					1.00248			
1972					1.65522					1.00000			
1973					1.66361					1.00000			
1974					1.57784					1.00086			
1975										1.00174			
1976										1.00174			

Table 2. Adjustment factors for Infant Mortality Rates (continued)

Year	Albania	Armenia	Azerbaijan	Belarus	Bulgaria	Croatia	Czech	Estonia	Georgia	Hungary	Kazakhstan	Kyrgyzstan	Latvia
1977										1.00246			
1978					1.56487					1.00182			
1979					1.60297					1.00000			
1980					1.75025					1.00012			
1981										1.00264			
1982										1.00358			
1983					1.65180					1.00072			
1984					1.47469					1.00266			
1985					1.69950					1.00333			
1986										1.00280			
1987	2.09594									1.00176			
1988	2.17689				1.56725					1.00370			
1989	2.15732	1.89265					1.00755	1.01855		1.00487	1.93072	1.95437	1.36849
1990	2.00726	1.76931	2.67320	1.00294		1.00584	1.00612	1.01444	1.27016	1.00820	1.79237	2.02515	1.27652
1991		1.62687		1.08977		1.00918	1.00708	1.01398		1.00258	1.82783	1.93527	1.07197
1992		1.83684		1.15586		1.00569	1.00593	1.00287		1.00939	1.81890	1.96267	1.12134
1993		1.80465		1.23040	1.32991	1.00883	1.00164	1.14372		1.00285	1.82982	1.96715	1.00373
1994		1.80627		1.22622	1.67030	1.01394	1.00628	1.00071		1.00232		2.04379	1.01112
1995				1.07714	1.64627	1.00680		1.01092		1.00714		2.13222	1.09770
1996					1.61743			1.00439		1.00387			
1997								1.28142		1.00000			
1998								1.48040		1.00781			
1999													
2000													
Average 1987+	2.10935	1.78943	2.67320	1.13039	1.56623	1.00838	1.00576	1.09714	1.27016	1.00454	1.83993	2.00295	1.13584

Table 2. Adjustment factors for Infant Mortality Rates (continued)

Year	Lithuania	Macedonia	Moldova	Romania	Russia	Serbia	Slovakia	Slovenia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
1950												
1951												
1952												
1953												
1954												
1955												
1956												
1957												
1958												
1959												
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1961												
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1971												
1972												
1973												
1974												
1975												
1976												

Table 2. Adjustment factors for Infant Mortality Rates (continued)

Year	Lithuania	Macedonia	Moldova	Romania	Russia	Serbia	Slovakia	Slovenia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
1977												
1978												
1979												
1980												
1981												
1982												
1983												
1984												
1985												
1986												
1987		1.41377		1.93374				1.27277				
1988		1.47360		1.96182				1.16970				
1989	1.22114	1.35394	1.64021	2.03901	1.37595	1.28509		1.01015				
1990	1.14159	1.31092	1.67289	1.90801	1.26698	1.48280		1.17219	2.02635	1.69529	1.42625	1.92146
1991	1.00782	1.25917	1.66352	1.68914	1.29335	1.37058		1.02771			1.46612	
1992	1.00165	1.40947	1.62334	1.65916	1.23041	1.23319	1.00000	1.01102			1.43388	
1993	1.03625	1.16893		1.70018	1.28924	1.00934	1.00000	1.02097			1.59988	2.04668
1994	1.02064	1.23957		1.79463	1.15757		1.00327	1.01034			1.69504	
1995	1.00504			1.62181	1.31079		1.00726	1.00762			1.65008	
1996					1.24691			1.02672			1.54047	
1997					1.24539							
1998					1.23273							
1999												
2000												
Average 1987+	1.06202	1.32867	1.64999	1.81194	1.26493	1.27620	1.00263	1.07292	2.02635	1.69529	1.54453	1.98407

Table 3. Adjusted Infant Morality Rates
(per thousand live births)

Year	Albania	Armenia	Azerbaijan	Belarus	Bulgaria	Croatia	Czech	Estonia	Georgia	Hungary	Kazakhstan	Kyrgyzstan	Latvia
1950					83.86					102.76			
1951					95.94					100.60			
1952					91.91					83.81			
1953					84.45					84.89			
1954					85.07					72.78			
1955					76.08					71.94			
1956					71.70					70.50			
1957					67.08					75.66			
1958					73.13					69.66			
1959					60.93					62.83			
1960	123.76				52.74					57.07			
1961	120.33				48.40					52.88			
1962	141.46				46.41					57.43			
1963	141.18				57.32					46.67			
1964	128.83				53.72					40.51			
1965	139.15				51.13					38.80			
1966	144.90				54.33					38.40			
1967	150.66				56.75					37.02			
1968	156.41				49.29					35.80			
1969	162.16				53.95					35.72			
1970	167.91				49.03					35.90			
1971	162.98				42.18					35.19			
1972	143.61				43.37					33.20			
1973	138.62				43.59					33.80			
1974	133.62				40.23					34.33			
1975	128.63				36.37					32.86			
1976	131.69				36.93					29.85			

Table 3. Adjusted Infant Morality Rates (continued)
(per thousand live births)

Year	Albania	Armenia	Azerbaijan	Belarus	Bulgaria	Croatia	Czech	Estonia	Georgia	Hungary	Kazakhstan	Kyrgyzstan	Latvia
1977	126.54				37.63					26.26			
1978	113.66				34.74					24.44			
1979	120.18				31.74					24.00			
1980	100.64				35.35					23.20			
1981	99.25				32.46					20.85			
1982	82.13				30.66					20.07			
1983	82.66				27.25					19.01			
1984	65.73				23.74					20.45			
1985	61.74				26.17					20.47			
1986	66.56				24.17					19.05			
1987	59.11				23.69					17.33		73.29	
1988	54.86				21.31		11.06			15.86		72.31	
1989	66.45	38.61	70.04	12.86	21.88		10.08	15.07		15.78	49.95	63.32	15.19
1990	56.81	32.91	61.48	11.93	21.79	10.76	10.87	12.58	20.20	14.92	47.32	61.16	17.49
1991	69.40	29.12	67.63	13.19	24.08	11.20	10.47	13.59	17.40	15.64	50.08	57.48	16.72
1992	65.18	33.98	68.17	14.22	21.90	11.67	9.96	15.85	15.75	14.23	47.47	62.02	19.51
1993	70.03	30.86	75.38	15.38	20.61	9.99	8.51	18.07	23.24	12.54	51.97	64.72	15.96
1994	75.30	26.55	67.36	16.19	27.23	10.34	7.95	14.51	23.24	11.53	50.41	60.50	15.67
1995	71.72	25.41	62.29	14.33	24.36	8.96	7.74	14.96	16.64	10.78	50.23	59.06	20.31
1996	54.42	27.74	53.20	13.62	25.23	8.05	6.03	10.45	22.10	10.94	46.73	55.22	17.34
1997	43.03	27.56	52.39	13.51	28.31	8.26	5.93	12.94	19.43	9.90	45.81	60.13	16.69
1998	31.64	26.30	44.38	12.31	23.29		5.23	13.77	19.31	9.78	39.74	55.86	16.36
1999			43.31				4.63			8.97	38.27		12.51
2000													
Average 1987+	59.83	29.90	60.51	13.75	23.64	9.90	8.21	14.18	19.70	12.94	47.09	62.09	16.70

Table 3. Adjusted Infant Morality Rates (continued)
(per thousand live births)

Year	Lithuania	Macedonia	Moldova	Romania	Russia	Serbia	Slovakia	Slovenia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
1950				237.95								
1951				222.25								
1952				206.55								
1953				190.85								
1954				175.15								
1955				159.45								
1956				157.98								
1957				156.51								
1958				155.05								
1959				153.58								
1960				152.11								
1961				141.51								
1962				119.89								
1963				112.55								
1964				99.10								
1965				89.92								
1966				95.02								
1967				95.02								
1968				121.32								
1969				111.94								
1970				100.73								
1971				86.45								
1972				81.56								
1973				77.69								
1974				71.37								
1975				70.75								
1976				64.03								

Table 3. Adjusted Infant Morality Rates (continued)
(per thousand live births)

Year	Lithuania	Macedonia	Moldova	Romania	Russia	Serbia	Slovakia	Slovenia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
1977				63.62								
1978				61.78								
1979				64.43								
1980				59.74								
1981				58.32								
1982				57.09								
1983				48.73								
1984				47.71								
1985				52.20								
1986				47.31								
1987		59.24		55.88		37.67	14.14	14.13				
1988		58.65		49.83		37.95	13.34	11.70				
1989	13.07	49.69	33.46	54.85	24.49	37.59	13.54	8.18	87.54	92.73	20.07	74.80
1990	11.76	41.43	31.78	51.33	22.05	33.81	12.03	9.85	82.47	69.00	18.40	66.48
1991	14.45	35.51	32.94	38.34	23.02	26.67	13.23	8.43	82.27	79.68	20.38	69.69
1992	16.53	43.13	29.87	38.66	22.15	27.69	12.60	9.00	93.01	73.91	20.07	74.98
1993	16.17	28.17	35.47	39.61	25.66	27.95	10.60	6.94	95.24	77.81	23.84	65.49
1994	14.19	27.89	37.29	42.89	21.53	23.48	11.14	6.57	82.27	78.66	24.58	55.95
1995	12.46	26.49	34.98	34.38	23.73	21.44	10.98	5.54	62.61	71.54	24.26	51.59
1996	10.05	19.27	33.33	36.17	21.70	19.14	10.23	4.83	63.42	68.66	22.34	48.01
1997	10.45	18.06	32.67	35.68	21.42	16.21	8.72	5.34	56.54	64.08	21.57	45.24
1998	9.25		28.87	33.25	20.34	16.08	8.82	5.34		55.77	19.72	43.45
1999	8.74											44.24
2000												
Average 1987+	12.46	37.05	33.07	42.57	22.61	27.14	11.61	7.99	78.37	73.19	21.52	58.18

Figure 1. Relationship between probabilities of dying in first year of life: US and Germany 1891-1990

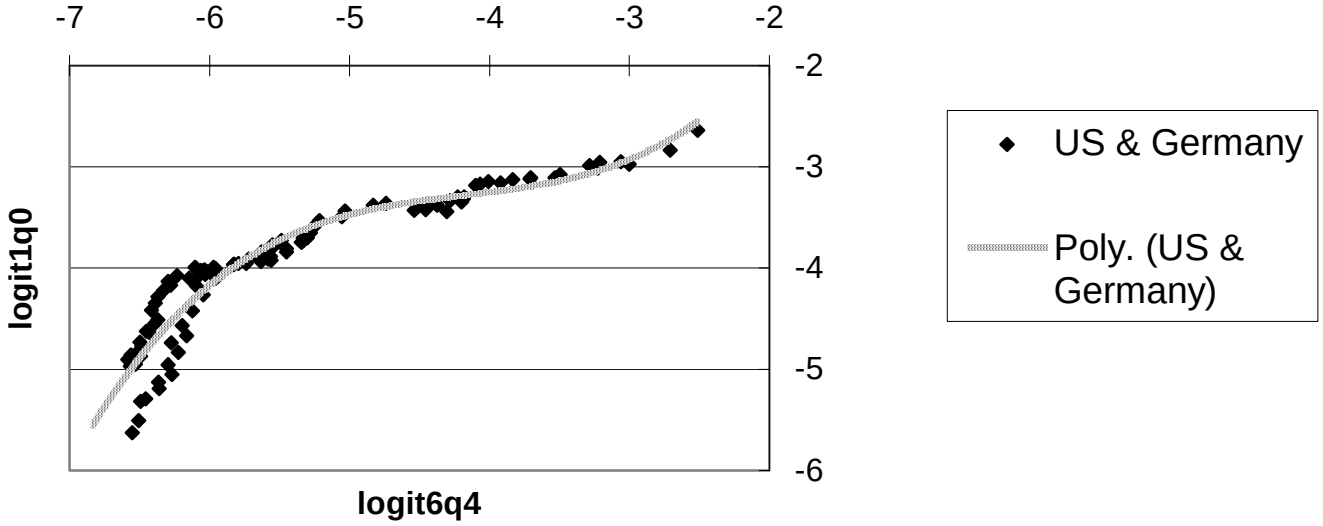

Figure 2. Monthly Probabilities of Dying in First Year of Life Macedonia vs Germany

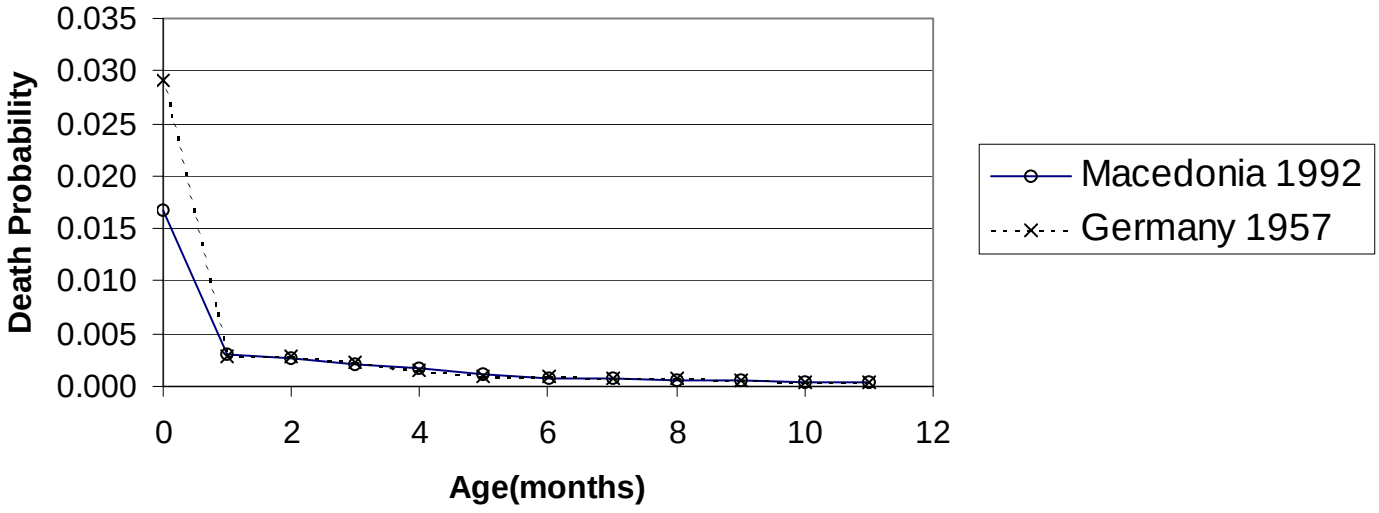

Figure 3. Monthly Probabilities of Dying in First Year of Life
Albania vs Germany

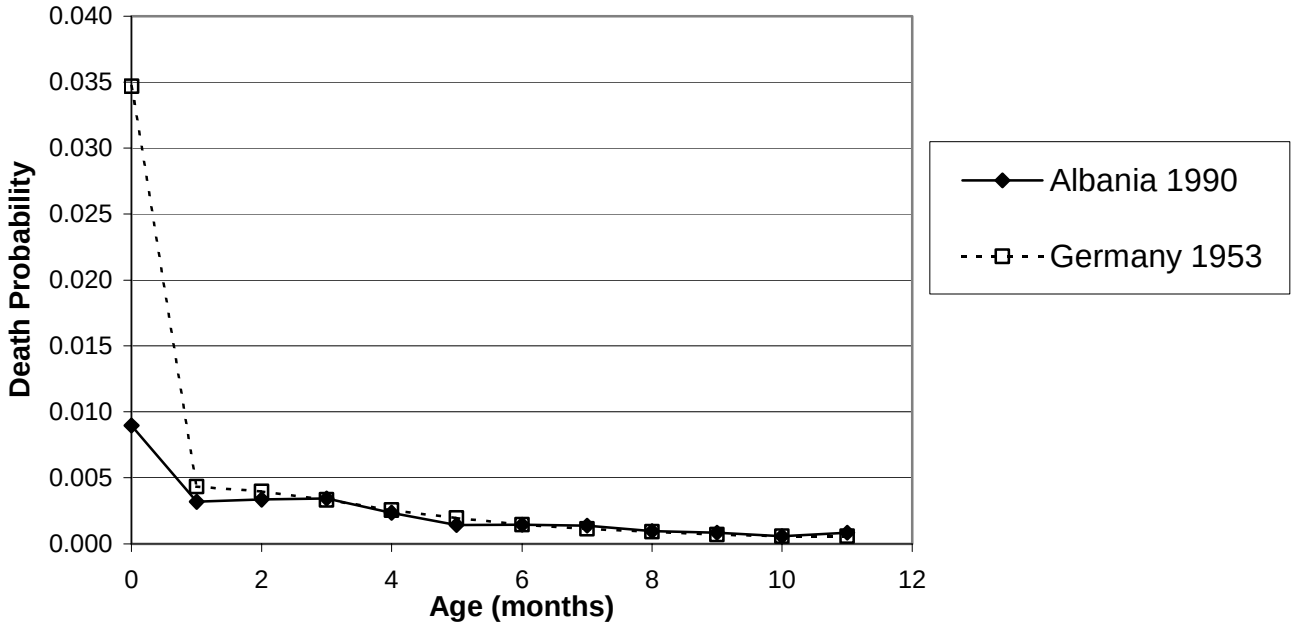

Figure 4. Monthly Probabilities of Dying in First Year of Life
Tajikistan vs Germany

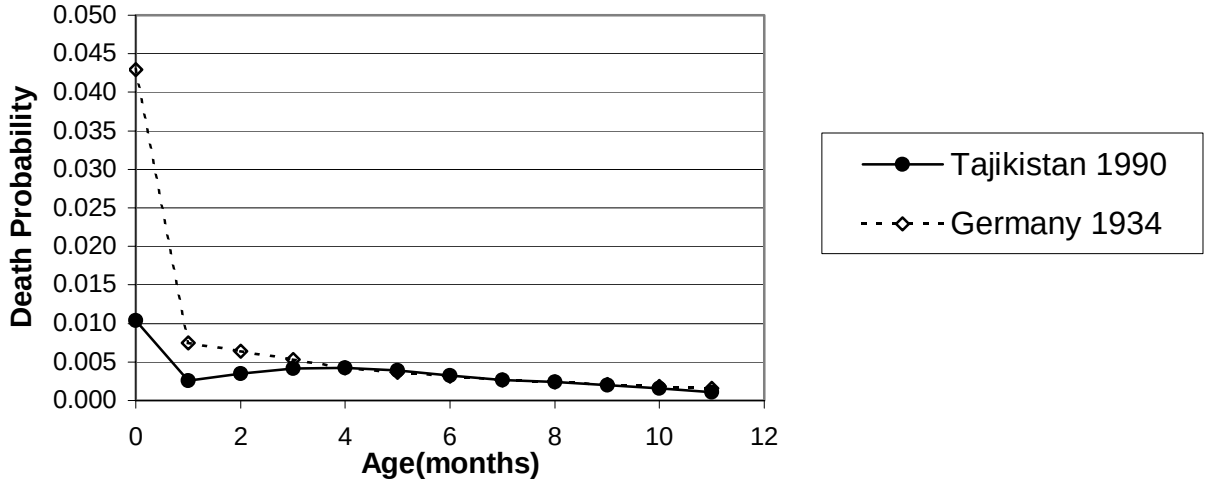

Figure 5. Monthly Probabilities of Dying in First Year of Life
Hungary vs Germany