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# Population Geography Perspectives on the Central Asian Republics

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# Population Geography Perspectives on the Central Asian Republics

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## Acknowledgement

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## Abstract

Since the fall of the iron curtain, research on population issues in Central Asia, with the exception of migration, has lost ground in the academia, and little is known about the geographical dimensions of population issues in this region beyond the findings of the handful of studies carried out under the auspices of international organisations. Therefore, the purpose of this paper is to outline the main traits of the population geography of the Central Asian Republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The report investigates the geographical characteristics of the countries' vital statistics, as well as of other significant demographic indicators, such as the age structure, dependency ratio and infant mortality. Additionally, the report attempts to establish whether particular regional and local demographies show inter-linkages with the specific socio-economic and/or cultural settings that they are embedded in. The report uses the systematic collection and analysis of data from statistical sources as its main method. Most of the statistical materials derive from the national statistical authorities of the USSR and its successor states, although additional and complementary data was collected from the US Bureau of Census' international database web resource. The use of such data involves substantial methodological and interpretative difficulties, which this report discusses in detail.

Applying a three-scale geographical approach on the study of the Central Asian Republics' population development, this report demonstrates that there are significant variations in the territoriality of these countries' demographies. The variations are indeed striking, and suggest that the five states will face distinctly spatially differentiated challenges with regard to the volume and type of healthcare that will be required, the nature of the demand for housing, social and cultural services, and the structure of the labour market, just to name a few examples. These challenges should be taken into greater consideration by policy-makers and other stakeholders, along with matters of more immediate concern, such as the poor health infrastructure and sanitary situation, the high rate of poverty, environmental degradation, and the economic and political instability in the southern regions, most recently epitomized by the Ferghana valley-based "tulip" revolution in Kyrgyzstan and the violent riots in the Uzbek city of Andijan.

## Introduction

The analysis of population trends allows us to formulate expectations on countries' and regions' potential for future economic expansion. An increasingly lively debate has been flourishing among scholars, policy-makers and the wider public in the developed countries regarding the consequences of extended periods, perhaps even the perpetuation, of low fertility. Coupled with a longer life expectancy, low fertility implies a radical change in the age structure of a country. The older age cohorts grow larger, whereas the young ones shrink, implying increasing costs for the care of senior citizens, and decreasing costs for the care of the young (Sommestad, 2002).

Although already initiated, the process of fertility decline in most of the Former Soviet Union (FSU) accelerated conspicuously since the demise of the Soviet system (Kohler and Kohler, 2002). Unlike the case in most developed countries, this decline took place suddenly, and within a few years, the fertility rate in many republics had reached a level which may be considered as very low even by Western European standards. Modest natural population increase was soon converted into decrease. In the case of the Russian Federation, with over half of the population of the FSU, natural decrease has been somewhat compensated by a positive migration balance connected with the return migration of ethnic Russians from other post-Soviet republics, chiefly the Central Asian Republics (CARs), Ukraine, and the Baltic States (Heleniak, 1997; Heleniak, 2003; Zayonchkovskaya, 1999).

Even though the lowest and potentially most harmful fertility levels have been reached in the Slavic and Baltic republics, the most dramatic decline in fertility has actually occurred in the CARs, even when taking into account the risk for an underestimation of the actual birth rate. Furthermore, the decline seems to be more obviously connected to the economic turmoil which followed the dismantling of the USSR (see UNICEF, 2002).

Dramatic changes in fertility are quickly translated into dramatic changes in a country's age structure. An evident jump in the size of age cohorts will be registered in the FSU's population pyramids for generations to come. Within short, the last Soviet-era cohort will join the economically active population – a few decades later, it will leave it, giving rise to, *ceteris paribus*, a large population in retirement age. Between these two dates, the cohorts will subsequently pass through life stages during which their contribution to the labour market – as well as the national tax base – will have varying character. At around the age of fifty, assuming that the future labour market in the FSU will somewhat resemble that of developed countries, their contribution will reach its maximum (Malmberg and Sommestad, 2000; Bloom *et al*., 2001). The advancement of age cohorts is, perhaps, the only approximate tool to predict future economic development at our disposal.

The purpose of this paper is to outline the main traits of the population geography of the CARs. The report investigates the geographical characteristics of the countries' vital statistics, as well as of other significant demographic indicators, such as the age structure, dependency ratio and infant mortality. An additional purpose is to attempt to establish whether particular regional and local demographies show inter-linkages with the specific socio-economic and/or cultural settings that they are embedded in.

## Methods, materials and methodological problems

This report uses the systematic collection and analysis of data from statistical sources as its main method. Most of the statistical material derives from the national statistical authorities of the USSR and the successor states, although additional and complementary data was collected from the US Bureau of Census' international database web resource. The use of these materials implies a number of problems relating to data quality, as discussed below.

***Scale of analysis***

This study reports its results at the macro (republic or national), meso (*oblast'* or regional), and micro-levels (*rayon,* or district, and *auyl kenesh*, or rural district). At the macro level, demographic indicators are presented for the republics of the FSU, with special focus on the CARs, in order to frame the analysis within the context of the population geography of post-Soviet space. At the meso-level, the data refer to the first administrative sub-unit of the CARs, i.e. the *oblast'* or city of republican subordination. The meso-level includes a cartographic analysis which includes data for all of the CAR *oblasti* for which statistics are available, and a special analysis of a selection of *oblasti*, representing the different population-geographical profiles of the region. At the micro-level, an analysis of age structure and infant mortality statistics for second and third level administrative sub-units (*rayon* and *auyl kenesh*) in the Kyrgyz Republic will be carried out using data from the first national census of the republic (1999).

***Quality of Soviet and post-Soviet statistical publications***

In developed countries, the collection and analysis of demographic data is not impaired by serious shortcomings in data quality. The case is quite different in the CARs and indeed for most of the territory of the FSU. Problems pertaining to both Soviet and post-Soviet era sources exist and must be kept in mind.

The are at least seven major problems related to the usage of Soviet-era official population data. First, data are not always consistent. As an example, it is not uncommon to run into different birth rates for the same year and republic in different published sources. This is also true for publications that originate from the same authority, usually the State Statistics Committee of the USSR (the *Goskomstat*). Generally, however, the differences are quite small and do not affect the overall picture portrayed by the data. Second, the data are often not comparable, and make longitudinal analyses difficult to achieve. For example, different census publications use different cohort sizes when reporting the age structure at the *oblast'* (regional) level. In some publications, five-year cohorts are used with male and female residents reported separately, in others ten-year cohorts are provided for the combined male and female population only. This leads to the third problem, which is that data are often presented at a far too aggregated level, both geographically and topically. Few indicators are presented at a level of detail greater than the *oblast'*, and when they are presented, comparisons with previous censuses can hardly be made as a result of the aforementioned problem of poor comparability. The fourth problem is that when the data are made available, they are not necessarily reliable. The Soviet system discouraged the disclosure of negative-looking statistics at the very source of the data. Infant mortality is a case in point, as it can easily be translated into an indicator of the general socio-economic development of a country, and of the state of its health services in particular. Doctors were particularly subject to the need to report constant improvements in the services provided by the hospitals which employed them, which meant that infant deceases were often reported as still-births or child deaths, so that they would not figure in the infant mortality statistics (World Bank, 05/01/05). Figure 1 illustrates the gap between Soviet official data and American estimates with regard to this indicator for the census year of 1989.

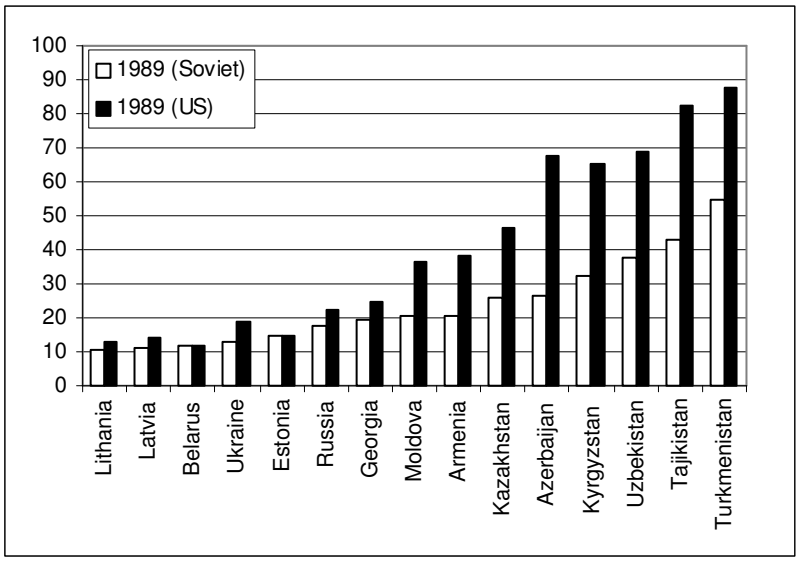



*Figure 1: Infant mortality (deaths per thsd. live births) in the Soviet republics according to the State Committee for Statistics, and the US Bureau of Census' web-based International Database. Sources: Goskomstat (1990) and US Bureau of Census (05/10/2004).*

The fifth problem regards formal definitions. Once again, infant mortality serves as a particularly problematic example. The World Health Organisation (WHO) definition is that any newborn which shows *any* sign of life is a live birth, whereas the newborn must breathe in order to be classified as a live birth according to the Soviet definition. The sixth problem is that births tended to be underreported in the CARs and parts of the Caucasus (Aleshina and Redmond, 2003), and finally, problem number seven is that many important indicators were simply not reported. In addition, it is widely regarded that the 1939 census is not a reliable source of information, probably because it had to obscure the effects of the Stalinist purges and deportations (Schwartz, 1986).

Some of the problems pertaining to Soviet statistics persist into the post-Soviet period. Specifically, official sources still rely on Soviet definitions of infant mortality, the under-reporting of births continues (UN, 06/01/2005; Aleshina and Redmond, 2003), and the data are rarely disaggregated past the *oblast'* level. On the other hand, international organisations have been producing population data for the post-Soviet states since the demise of the USSR, using standard definitions such as the ones provided by the WHO. These data are usually based on sample surveys, and are subject to the limitations that inevitably pertain to such methods: as a result, a plethora of estimates of fertility rates, infant mortality, morbidity rates etc. have appeared, and there are as many different figures as there are producers of statistical data. On at least two accounts, however, the data from the international organisations unanimously denounce a significant underestimation in the statistics produced by the official authorities. These are the total fertility rate (TFR) and infant mortality (see Aleshina and Redmond, 2003).

### *Vital statistics and fertility data*

The quality of demographic statistics published by the Soviet statistical authorities remained problematic throughout the Soviet era, especially with regard to the CARs. It is reasonable to presume that, whereas the main problems in the earlier decades concerned the reliability of mortality statistics, the recent decades are characterised by insecurity in the fertility figures. Nevertheless, the overall quality of the data improved considerably throughout the Soviet period. Since the demise of the Soviet system, Kazakhstan and Kyrgyzstan, and to a certain extent even Uzbekistan, have increased the availability and level of detail of the demographic

statistics. Turkmenistan's official demographic statistics, on the other hand, are virtually inaccessible outside the country (and probably even within it), and the collection of statistics in Tajikistan is irregular and inefficient, due to the prolonged periods of crisis which the country has been suffering from ever since the Soviet Union's demise.

The data from the censuses of 1939 and 1959 most likely underestimate mortality, and probably quite considerably. It is not clear, for instance, whether the 1930s' mass executions – or at least some of them – appear in the mortality statistics (they probably do not). Neither is it clear whether the millions of deaths of persons in prison, in the gulag system, or in "special exile" were included. What is clear, however, is that mortality for these periods was underestimated beyond any doubt (Applebaum, 2003), at least during the reign of Stalin.

It is equally unclear whether the fertility statistics may be considered as entirely reliable. Probably, under-reporting of fertility events took place throughout the Soviet period, especially in the Caucasus and the CARs, where the problem persists, most notably in Tajikistan (UN, 06/01/2005). In some regions of the latter country, in fact, it is estimated that over one third of all *registered* births in the late 1990's occurred within domestic premises (*Tajikistan Development Gateway*, 29 October 2004). In the rural areas alone, this share would be higher. More recent data suggest that a mere 40 % of the births in the country were attended by skilled medical staff in 2000, and that less than half of all newborns in the country were officially registered within six months from birth (Aleshina and Redmond, 2003). Hence, total fertility rates in Tajikistan are probably much higher than most statistics would suggest. In this report, US Bureau of Census estimates are used, as they attempt to include fertility events which are left unaccounted by official national statistics (which are scarce in the first place).

***Age structure and dependency ratios***

The earliest age data that are relatively easily available derive from the 1959 census, and are presented at the republic and *oblast'* levels and with irregularly sized age cohorts (ten-year cohorts for the inactive and five-year cohorts for the active population). Estimates of the size of five-year cohorts were created for the inactive population. The republic-level data, furthermore, provides ten-year cohort figures up to the age of 100 (and five-year cohorts for the small population aged 100-120), whereas the *oblast'*-level data combines the entire seventy plus population into one group. The age structure data for the 1970 census year represent a step backward, and are also limited to the republic and *oblast'* levels. Only ten-year cohorts up to the age of 80 are presented, and the male and female populations are not presented separately, confining the production of age structure visualisation tools to very simplified age pyramids. The results of the 1979 census, which were only published in 1989 (i.e. at the time of the subsequent census), report age structure figures more accurately by presenting data for the republics and *oblasti* using five-year cohorts, separate figures for men and women, as well as by breaking up the results by urban and rural areas. The figures from the 1989 census appeared in a more timely manner, and include a level of detail which is comparable to the one of the previous census.

The quality of age data from the post-Soviet period varies from country to country. Whereas Kazakhstan and Kyrgyzstan produce high quality age structure statistics with regular five-year cohorts and some supplemental information (even though Kazakhstan only reports one aggregate 65+ group at the *oblast'* level), Uzbekistan makes use of awkwardly-sized cohorts (0-2, 3-5, 6-7, 8-15, 16-19, 20-24 etc.), and Tajikistan and Turkmenistan have not made any useful statistics easily accessible at all. In the case of Uzbekistan, the age data were converted into five-year cohort estimates.

Population age structure statistics provide a reliable account of the past, present and foreseeable burden carried by the working-age population. The ratio between the dependent population and the working-age population is called the dependency ratio, usually expressed as the number of people aged 0-14 and 65+ per hundred of working-age (15-64)(Hobbs, 2004, p. 160). However, the poor quality of the age data for some years and countries does not allow the determination of the exact dependency ratio in some cases, implying that the dependency ratio in this report is occasionally presented as an estimate. The issue is further complicated by the fact that the Soviet statistical sources used a different definition to describe the working-age population, i.e. men aged 16-59 and women aged 16-54. In many publications, the size of the working age population is reported, even though the age structure of the total population is only reported using ten-year cohorts. This means that it is possible to calculate a particular dependency ratio according to the Soviet criteria. To a certain extent, such a definition is more realistic, as the average life expectancy in the USSR and post-Soviet republics (most of which continue to use the Soviet definition of the working-age population) is much lower than that of the high-income countries.[1] Also, the 55-64 age group is likely to require more support than it would in the developed countries, due to generally poorer health situation, a consequence of less developed healthcare, poorer nutrition habits, generally unhealthier lifestyles (smoking, high consumption of alcohol, etc., particularly among the male population), as well as environmental problems in many areas which lead to increased morbidity. In this report, both the standard and "Soviet" dependency ratios are calculated and compared wherever available.

## General economic trends in the region

Since 1991, all CARs have experienced a prolonged period of economic turmoil, resulting in a very substantial drop in the standard of living of the population of all five republics. Since the late 1990's, the economies of the region have been showing some positive signs, especially Kazakhstan's, whose recent remarkable growth can be attributed to high oil and other natural resource prices, coupled with a swift and brusque adaptation of the countries' institutions to the market (see map of CARs in appendix). The fate of Tajikistan, and to a certain extent Kyrgyzstan, has not been as positive. Lacking the resource endowments of the three other CARs, these two countries' main asset is their hydropower potential. Given their competing water claims of the downstream states of Uzbekistan, Turkmenistan and Kazakhstan, as well as the hydropower infrastructure's current state of disrepair, this potential cannot be exploited to the best of its extent (Polat, 2002). Furthermore, the economic development of Tajikistan was jeopardised by a bitter civil war between communist and Islamic factions until 1997, and the situation remains tense today. In addition to this, the political instability in Tajikistan has occasionally spread to the southern part of Kyrgyzstan and to the Ferghana valley (mostly located in Uzbekistan), exacerbating existing ethnic tensions. In general, the unstable political situation in the southern CARs inhibits the region's prospects for development.

## The population geography of the CARs: a brief research overview

Although there has been an increase in research interest regarding population issues concerning the FSU, the field is still not very well researched. Even less work has focused specifically on the CARs. Part of the explanation is, of course, the aforementioned lack of data, and the poor quality of the existent data.

[1] In fact, according to Asian Development Bank (ADB, 2004) sources, the male life expectancy in Kazakhstan in the year 2002 was 56.6 years, well below the male retirement age of 59, with a female life expectancy of 67, clearly above the female retirement age of 54, but still very low when compared to the level in developed countries.

Arguably, the main focus of population research on the FSU since the fall of the iron curtain has been on migration, especially with regard to the Russian Federation and its migratory liaisons with the former post-Soviet states (see, for instance, Heleniak, 1997, and Zayonchkovskaya, 1999). Internal migration has been subject to even less attention, which is probably due to the unfavourable level of aggregation of the available data. The Baltic States being an exception,[2] most research on internal migration necessitates the creation of primary data, which can be an expensive and time-consuming process.[3] However, as Heleniak (2003) notes, migration tends to be less important in changing a country's age structure than fertility and mortality: the age structure transformation is the factor to which the greatest number of policy implications adhere, and it deserves greater attention. Research on issues such as population fertility, the development of the age structure, and mortality have not attracted much attention within academic circles. Timothy Heleniak's (2003) recent article is one of the few exceptions. Heleniak convincingly shows that the demographic crisis in Russia is not only a mattern of concern for the country's pension scheme, which was based on an unsustainable "pay-as-you-go" system,[4] but also for the future economic prosperity of the *regions*, as his study shows that there are important regional differences in the elderly population's share of the total. Attempts at linking fertility decline and economic crisis have been carried out at the macro and micro levels. At the macro level, Kohler and Kohler (2002) have suggested that there is a paradox in that it appears that the fertility rate among those most afflicted by labour market uncertainty was higher than that of those who were less affected by the labour market crisis. At the micro-level, the Russian fertility transition has been studied by Hitztaler (2004), who suggests that there is a clear connection between ecological and economic factors on the one side, and fertility rates on the other.

Unfortunately, the studies on Russia are of little relevance to the situation as it is unfolding in the four southern CARs of Kyrgyzstan, Uzbekistan, Turkmenistan and Tajikistan, whereas they may help understand the demographic development in Russified Kazakhstan. The demography of the CARs differs from that of the Slavic republics of the ex-USSR in that the latter had already reached a more advanced stage in the demographic transition by the time of the fall of the iron curtain. The fact that detailed demographic knowledge was indispensable for central planning purposes meant that there is a good amount of research on Central Asian population issues carried out by Soviet scientists. The fertility differential between the CARs and the Slavic republics meant that the former developed a labour surplus, whereas the latter faced a growing labour shortage (Anderson, 2004). Thus, the underlying goal of Soviet population research was to create a knowledge base which would allow to formulate adequate natality and migration policies aimed at producing the optimal territorial distribution of labour. The problem is that the very researchers that were in charge of producing science for the policy-makers seldom had access to detailed data or, at least, they where not allowed to publish it. Hence, most Soviet work describes the union and republic levels, some reaches down to the *oblast'* level, and very little touches on the *rayon* level. Paradoxically, Soviet (and some post-Soviet) work on Tsarist era population geographies occasionally embraces more geographical scales and is sometimes considerably more detailed, especially with regard to the ethnic variable (for example, Bushkov, 1995;

[2] However, even in the case of the Baltics, where the access to statistical data is excellent, it has been pointed out that there are shortcomings in the quality of the migration data that may jeopardise the correct interpretation of the results (see Sjöberg and Tammaru, 1999, and Tammaru and Sjöberg, 1999).

[3] An example of research on internal migration in Kazakhstan is contained in the present author's doctoral dissertation (Gentile, 2004).

[4] Since the 1990's, a transition towards a more market-adjusted pension system has been underway in Russia. Nowadays, pension payments are collected from both employees and employers (Heleniak, 2003).

Bekmakhanova, 1980; Krongardt, 1989).[5] Nevertheless, almost all Soviet work on the population geography of the CARs is of a descriptive character.

The ethnic variable retains importance in works concerning the Soviet period as well, particularly in relation to analyses of the birth rate. A number of studies identify an important long-term fertility differential between "European" and "Asian" ethnic groups (Urlanis, 1977; Aliev and Kadyraliev, 1980; Asylbekov and Kozina, 2000; Mullyadzhanov, 1989). In a longitudinal analysis of fertility in the USSR and the Russia during the last two decades of Tsarist power, Bondarskaya (1977) illustrates this long-term gap by complementing it with a religious factor. Even before the demographic transition, religion mattered. At the time of the 1897 census, there were 144 children aged 0-9 for every 100 Russian orthodox women aged 20-49. This figure stands at 116 for Lutherans, 142 for both Muslims (which is perhaps somewhat surprising) and Roman Catholics, whereas it rises up to 183 for Armenian-Gregorians.

In Soviet demographic research, an implicit (or sometimes explicit) distinction is made between regional demographics and "general" demography, comparable to that between ethnography and sociology (Mullyadzhanov, 1983, p. 38). The purpose and nature former is closely linked to the planning necessities within the labour market, whereas the latter encompasses broader theory, such as the demographic transition. Clearly, the main distinction between regional demographics and "general" demography concerns geographical scale.

Since the fall of the iron curtain, research on population issues in Central Asia, with the exception of migration, has lost ground in the academia. Today, most work is carried out by international organisations, usually cooperating with the local authorities. A series of demographic and health surveys on the individual CARs (except Tajikistan) provide excellent detailed information, particularly on fertility and infant and child mortality (see for example Ministerstvo Zdravokhraneniia *et al*., 2000, for Turkmenistan). In particular, they uncover the significant discrepancies between official demographic statistics and the figures produced through surveys.

## The post-Soviet context: paths of demographic transition

The chronology of the Soviet republics' paths within the process of demographic transition is highly diverse. This section will focus on the republic-level differences in crude birth and death rates, natural growth, and total fertility, and will frame the demographics of the CARs within the broader context of the FSU.

### *Natural growth rates*

The natural growth histories of the post-Soviet states are outlined through the subdivision of the 15 countries into three main groups: (a) countries experiencing natural decline in the year 2003, (b) countries experiencing a modest rate of natural growth (0 to 1 %), and (c) countries with significant natural growth (more than 1 %).

Six countries experienced natural decline in the year 2003. These are the three Baltic States, Russia, Belarus and Ukraine. Applying a longitudinal perspective, we see from figure 2 that post-war period was accompanied by two decades of increased natural population growth, with Belarus and Russia standing for the highest levels. This is a tendency which echoed the ongoing baby boom in Western Europe and North America, and was similarly followed by a noteworthy decline in fertility during the 1960's, after which this

[5] The level of detail varies between studies, but it is not unusual to find works on Tsarist-epoch demography that present very specific but limited information, such as the incidence of cases of malaria in the Kuraminsk district in 1896 (Karakhanov, 1977).

group of six countries experienced stable levels of natural growth until the very end of the Soviet era. Since the demise of the USSR, growth has been replaced by decline, and the trend has been exacerbated in the Baltic States by the negative migration balance resulting from the flow of return migration towards the core Slavic states of the ex-USSR, chiefly the Russian Federation. Conversely, the population decline of the latter has been somewhat compensated by the aforementioned flow of return migrants, not only from the Baltics, but also from the CARs. Estonia constitutes an exception from the general trend in the group, as its point of departure (in 1940) was modest natural decline. Lithuania and, especially, Latvia started at relatively low levels of natural population growth as well. In addition, the Baltic States seem to have experienced a smaller second wave of baby boomers just before the Soviet collapse, whereas the three Slavic states do not report the trend. In short, it appears that the process of demographic transition was already more or less complete by the beginning of the period in consideration in the Baltic States, whereas it was concluded around the year 1970 in the three Slavic republics.

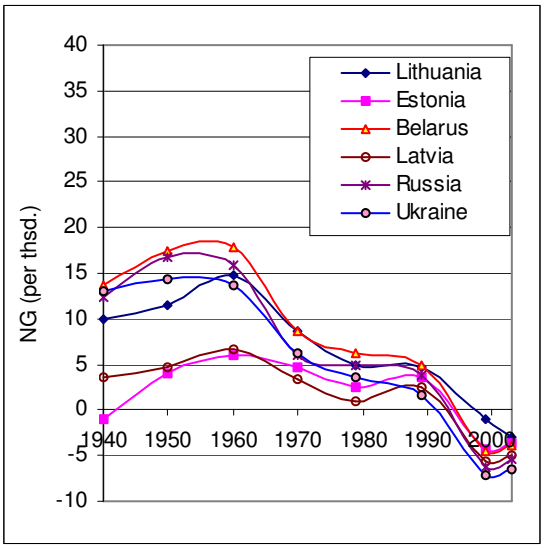



*Figure 2: Natural growth rate (per thsd.) in post-Soviet states with a natural decline in 2003. Sources: Calculated from Aliev and Kadyraliev (1980, p. 23), Goskomstat SSSR (1990), Natsional'nyi (2000), Statistics Latvia (5 October 2004), Statistics Lithuania (5 October 2004), US Bureau of Census (5 October 2004), TsSU SSSR (1971).*

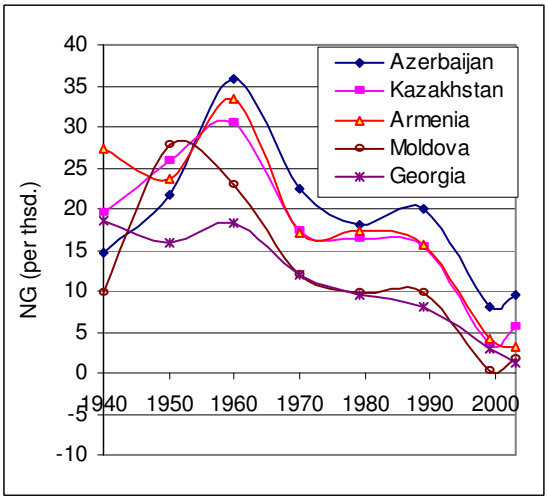



*Figure 3: Natural growth rate (per thsd.) in post-Soviet states with a natural growth of 0 to 1% in 2003. Sources: Calculated from Aliev and Kadyraliev (1980, p. 23), Goskomstat Kazakhskoi SSR (1989), Goskomstat SSSR (1990), US Bureau of Census (5 October 2004), TsSU SSSR (1971).*

The second group, which includes the five post-Soviet states with modest natural growth in 2003 (Azerbaijan, Kazakhstan, Armenia, Moldova and Georgia) is rather diverse in terms of its demographic trajectories (figure 3). In 1940, all five countries experienced natural growth, but at very different levels. With an annual growth rate of almost three percent, Armenia surpassed by far the remaining four countries. On the other hand, Moldova's annual growth rate was only one percent. During the post-war decades, Azerbaijan, Kazakhstan and Armenia experienced a period of considerable expansion which culminated in 1960, when the annual growth rates were well over three percent. In Moldova, a similar "explosion" had already occurred by 1950, owing to a remarkable upward jump in the post-war natural growth rate. Contrary to the prevailing trend, Georgia only experienced a marginal baby boom in the post-war period. The period of noteworthy natural growth during the 1950's and 1960's was quickly replaced by a period of moderate increase (between about one and two percent) from 1970 until the dismantling of the USSR. After that, the rate of natural growth declined spectacularly, nearing zero in Moldova, Georgia and Armenia. The Muslim and partly Muslim republics of Azerbaijan and Kazakhstan have seen as slight increase in natural growth during the first few years of the new millennium, but it is perhaps too early to determine whether this trend may be expected to continue. Within this second group, Georgia is the country that clearly deviates from the general trend, as it shows a much more stable downward trend in the annual growth rate throughout the period. In general, however, the group appears to have experienced a combination of advanced demographic transition and a post-war baby boom effect during the period which was analysed.

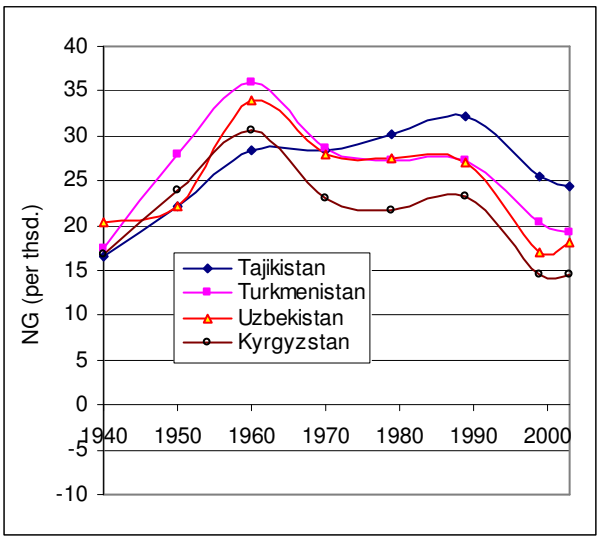
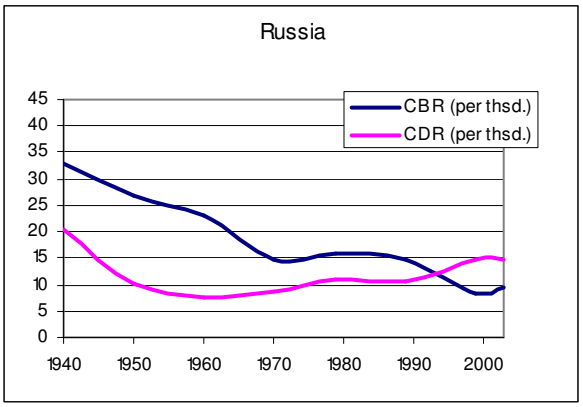



*Figure 4: Natural growth rate (per thsd.) in post-Soviet states with a natural growth of over 1 % in 2003. Sources: Calculated from Aliev and Kadyraliev (1980, p. 23), Goskomstat SSSR (1990), Natsional'nyi (2000), US Bureau of Census (5 October 2004), TsSU SSSR (1971).*

The third group of countries with a growth rate of over one percent in 2003 consists of the CARs minus Kazakhstan, which shows greater demographic affinity to the Caucasian states (figure 4). Although both the second and third groups started at similar rates of annual growth, the major distinction lies in the fact that the third group did not experience the same decline in natural growth during the decade following the peak reached in 1960. As a matter of fact, the annual growth rate continued increasing in Tajikistan until the very end of the Soviet era. The post-Soviet era brought a decrease in natural growth, although the population continues to expand at a relatively high rate.


Russia
CBR (per thsd.)
CDR (per thsd.)
45
40
35
30
25
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15
10
5
0
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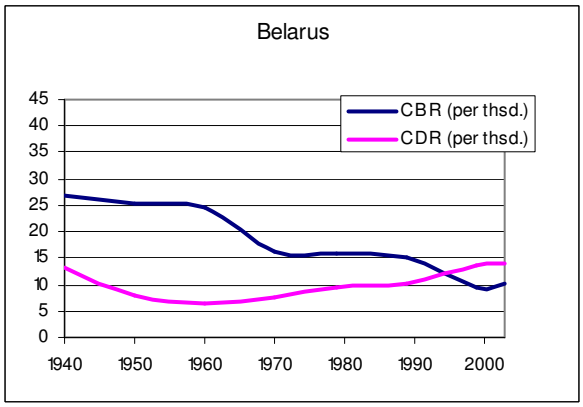
1980
1990
2000


Belarus
CBR (per thsd.)
CDR (per thsd.)
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1990
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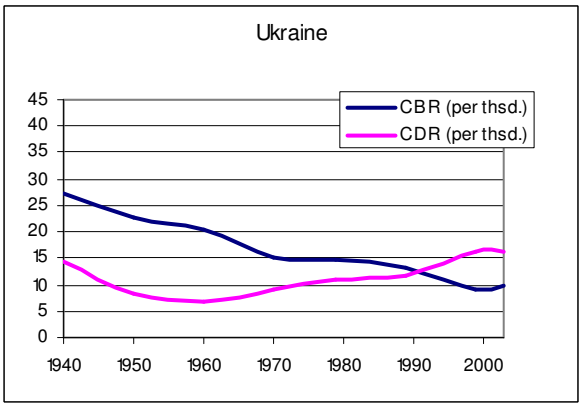
Ukraine
CBR (per thsd.)
CDR (per thsd.)
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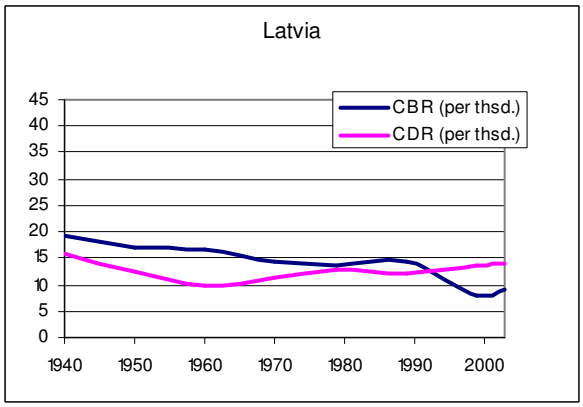
Latvia
CBR (per thsd.)
CDR (per thsd.)
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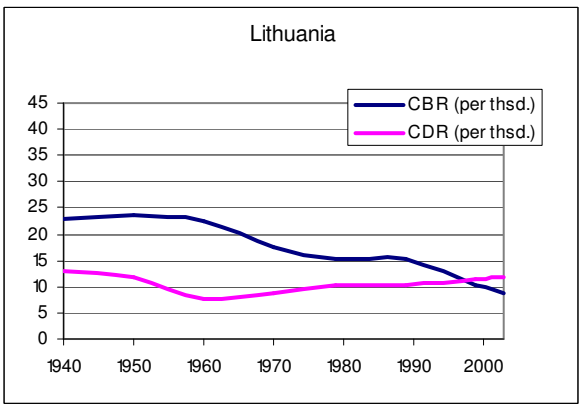
Lithuania
CBR (per thsd.)
CDR (per thsd.)
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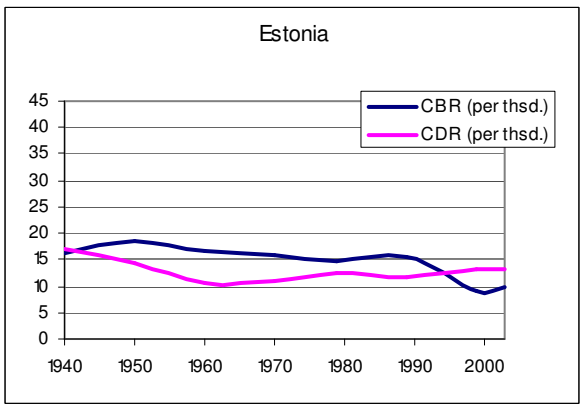
Estonia
CBR (per thsd.)
CDR (per thsd.)
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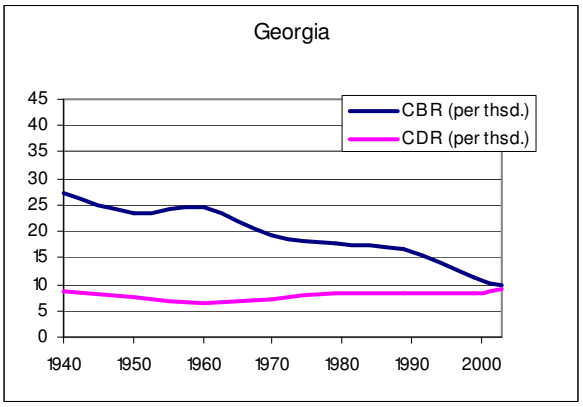
Georgia
CBR (per thsd.)
CDR (per thsd.)
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0
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1990
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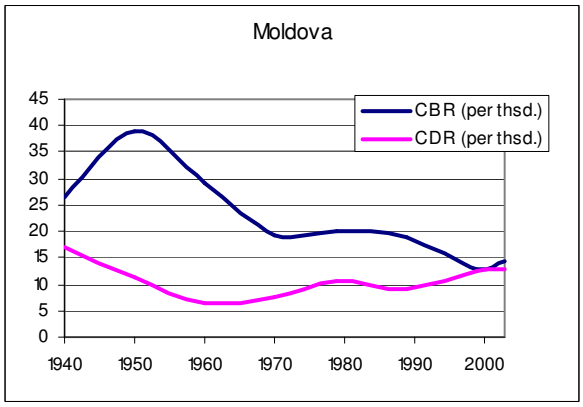
Moldova
CBR (per thsd.)
CDR (per thsd.)
45
40
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0
1940
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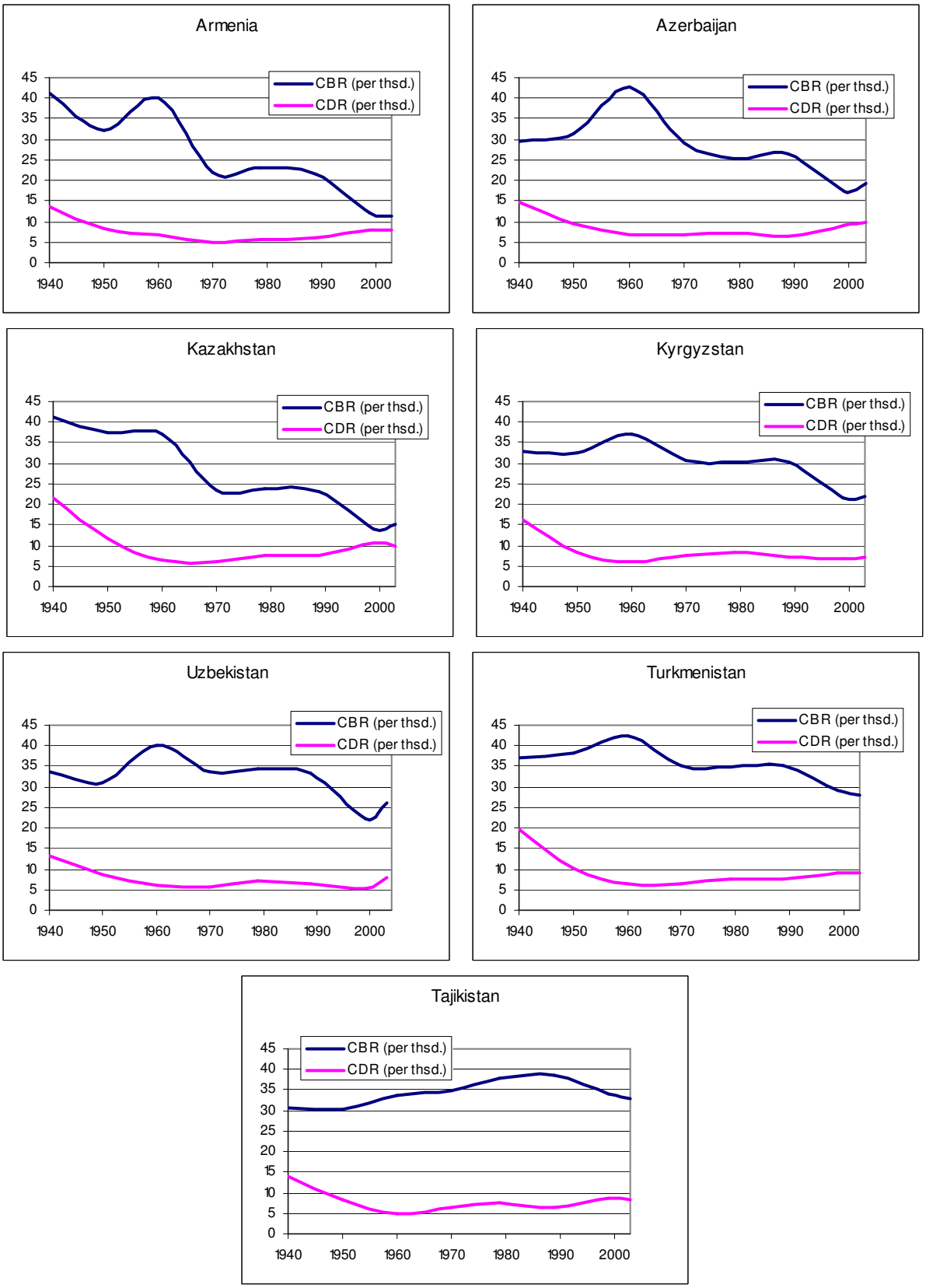



*Figures 5-19: The state of the demographic transition in the post-Soviet republics: crude birth and death rates (CBR and CDR) between 1940 and 2003s. Sources: Aliev and Kadyraliev (1980), Goskomstat Kazakhskoy SSR (1989), Goskomstat SSSR (1990), Natsional'nyi (2000), Minmakroekonomstat (2002), Statistics Latvia (5 October 2004), Statistics Lithuania (5 October 2004), US Bureau of Census (5 October 2004), TsSU SSSR (1971).*

***Demographic transition***

Figures 5 through 19 disaggregate the natural growth figures into crude birth and death rates (CBR and CDR) for each individual country. The result allows a traditional visualisation of the process of demographic transition as it is taking place at the republic level. Nevertheless, the data should be considered with some caution, especially with respect to the CDR, as the status of the victims of the Stalinist repressions in particular is not clear. The high 1940 death rate in Kazakhstan, where a significant proportion of the population consisted of "special exiles" and those serving a gulag sentence, suggests that at least some deaths were included in the mortality statistics. However, it is also possible that the CDR simply reflects the poorer state of the health care, the food shortages, and generally pauper conditions of the country at that time. Nevertheless, the 1940 CDR in most countries probably represents a very low case scenario of a rather alarming mortality situation.

Echoing the natural growth diagrams, the CDR curve decreases for most countries between 1940 and 1960. It gradually increases thereafter, as a result of the changing age composition concomitant with fertility decline. The situation regarding the CBR displays greater variation. As a rule, however, it decreased steadily throughout the period in the Slavic and Baltic States, most clearly so during the 1960's and 1990's. The countries of the Caucasus, Moldova and Kazakhstan, again, display somewhat common characteristics, sharing a CBR increase which peaked in 1960 (or 1950 as in the case of Moldova), although at different levels of intensity. Moldova, Azerbaijan and, to a certain extent, Armenia, truly report remarkable upwards jumps in CBR, representing an anomaly in demographic transition by far greater than the "usual" baby boom phenomenon. The CARs, excluding Kazakhstan, have not completed the process of demographic transition, although it appears as though it is underway, probably in the early third stage. Recent (post-Soviet) CBR declines are probably primarily attributable to the crisis of economic transition, and they are not necessarily a sign that the process of demographic transition is reaching its conclusion.

Tajikistan represents a rather unique case, as its CBR continues rising until 1990, and declines only moderately thereafter. As such, the country is still experiencing significant population expansion at the apex of demographic transition (between stages two and three). Furthermore, the under-reporting of births which likely has taken place since the Soviet collapse means that the actual CBR probably is even higher than the figures would suggest. The case of Tajikistan is more similar to that of Afghanistan than to that of any other post-Soviet republic.

***Total fertility rate***

In order to complete the picture conveyed through the presentation of the republics' vital statistics since 1940, the analysis of the post-Soviet context proceeds by discussing the development of the total fertility rate (TFR) since 1959. There are no easily accessible and reliable figures for the period prior to this date. The republics have been divided into three groups: (a) those with a low (below-replacement) level (TFR=<2.1) in the year 2000 (figure 20), (b) those with a medium (above-replacement) level (TFR = 2.1-3)(figure 21), and (c) those with a high level (TFR=>3)(figure 22).

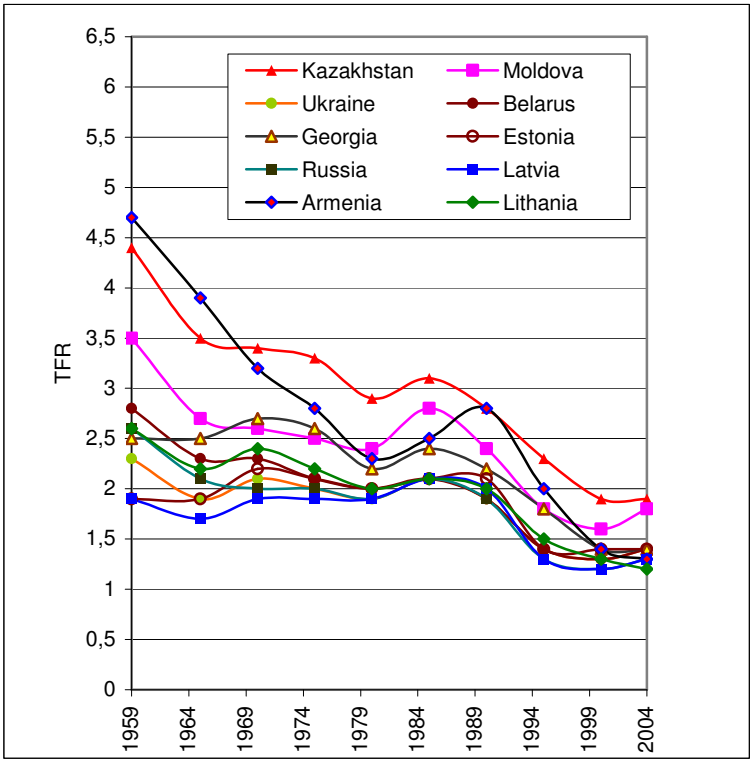



*Figure 20: Total fertility rate (1959-2004) in republics with below-replacement levels in 2000. The figure for the year 2004 is an estimate. Sources: Goskomstat SSSR (1988), US Bureau of Census (7 October 2004).*

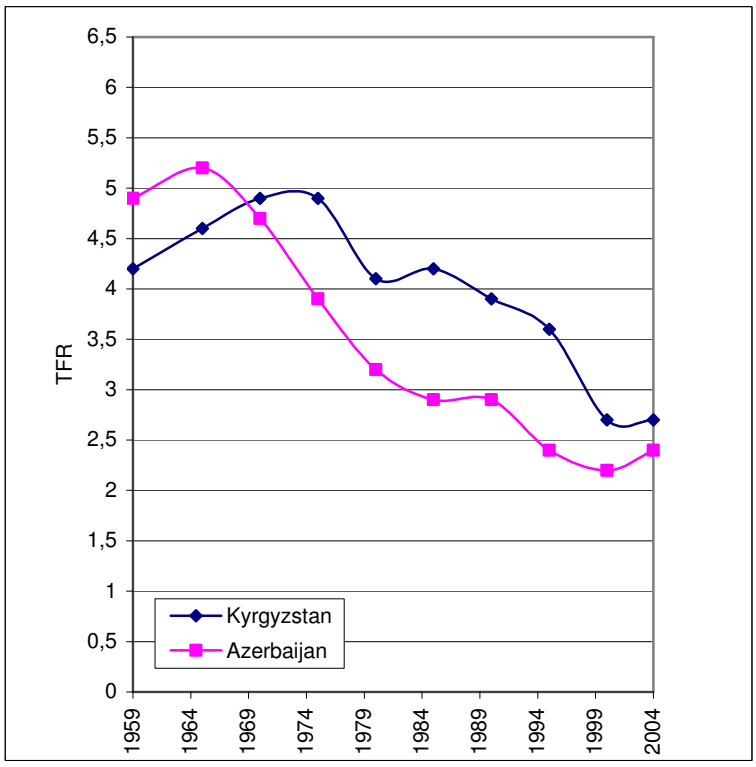



*Figure 21: Total fertility rate (1959-2004) in republics with medium (TFR = 2.1-3) levels in 2000. The figure for the year 2004 is an estimate. Sources: Goskomstat SSSR (1988), US Bureau of Census (7 October 2004).*

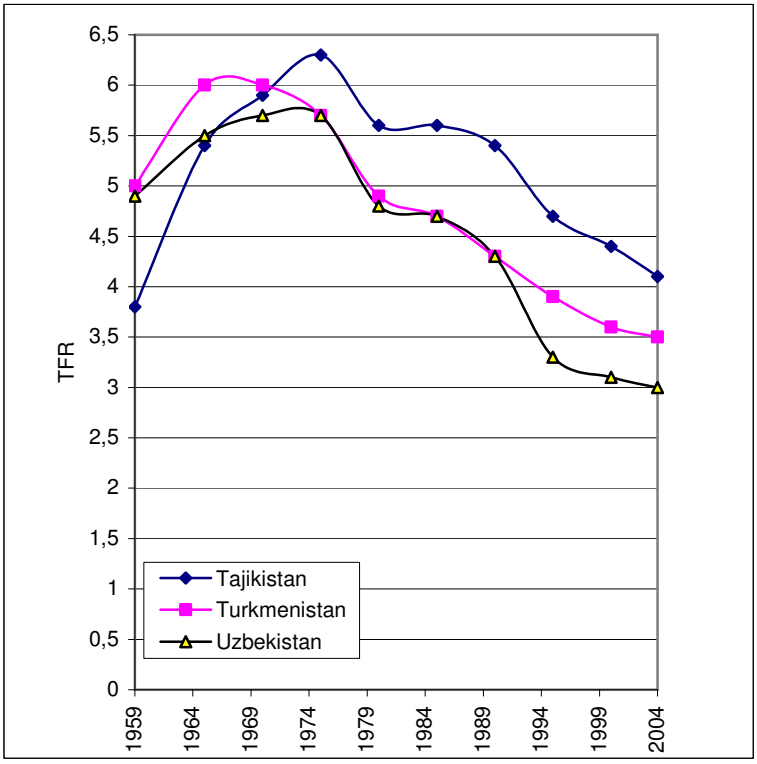



*Figure 22: Total fertility rate (1959-2004) in republics with high (TFR = 3+) levels in 2000. The figure for the year 2004 is an estimate. Sources: Goskomstat SSSR (1988), US Bureau of Census (7 October 2004).*

Ten countries belong to the below-replacement group (figure 20). These are the three Baltic States, the three Slavic republics, Georgia, Armenia, Moldova and Kazakhstan. In 1959, at the peak of the post-war population boom, most countries in this group were in the medium-fertility group, with the exception of Estonia and Latvia, which had a below-replacement TFR, and Moldova, Kazakhstan and Armenia, which had very high fertility levels of well over three children per woman in child-bearing age. As the vital statistics suggested earlier, a drop in fertility is evident for the 1960's, especially during the decade's first half. Since the late 1960's (late 1970's in the case of Armenia), the TFR of most countries remained stable at between two and three children, with a temporary moderate increase for most countries during the 1980's. In the aftermath of the dissolution of the USSR, however, all countries in this group experienced a very considerable drop in their TFR, with alarmingly low levels reached in many countries, even in those with relatively large rural population shares (for example, Georgia and Armenia).

The group of medium-fertility countries consists of only two states – Kyrgyzstan and Azerbaijan (figure 21). Although similar today, the TFR histories of these two countries differ. Azerbaijan has been experiencing a decline ever since the peak in the early and mid-1960's. Furthermore, the bulk of the decrease took place during the 1970's. By the 1980's the TFR had reached a level of stability at less than three children per woman of child-bearing age. The decrease that took place after the Soviet collapse was not as dramatic as in the countries of the below-replacement group. In Kyrgyzstan, the TFR started falling ten years after Azerbaijan, and it remained high throughout the Soviet era. The dip that took place since independence, however, was significant.

The high-fertility group (figure 22) consists of the three CARs of Uzbekistan, Turkmenistan and Tajikistan. Unlike in the low and medium-fertility groups, these three countries experience significant TFR increases before realigning to the general Soviet and post-Soviet trend of decreased fertility. The most dramatic increase – from less than four to over six children per woman – is the one reported by Tajikistan, where the TFR also

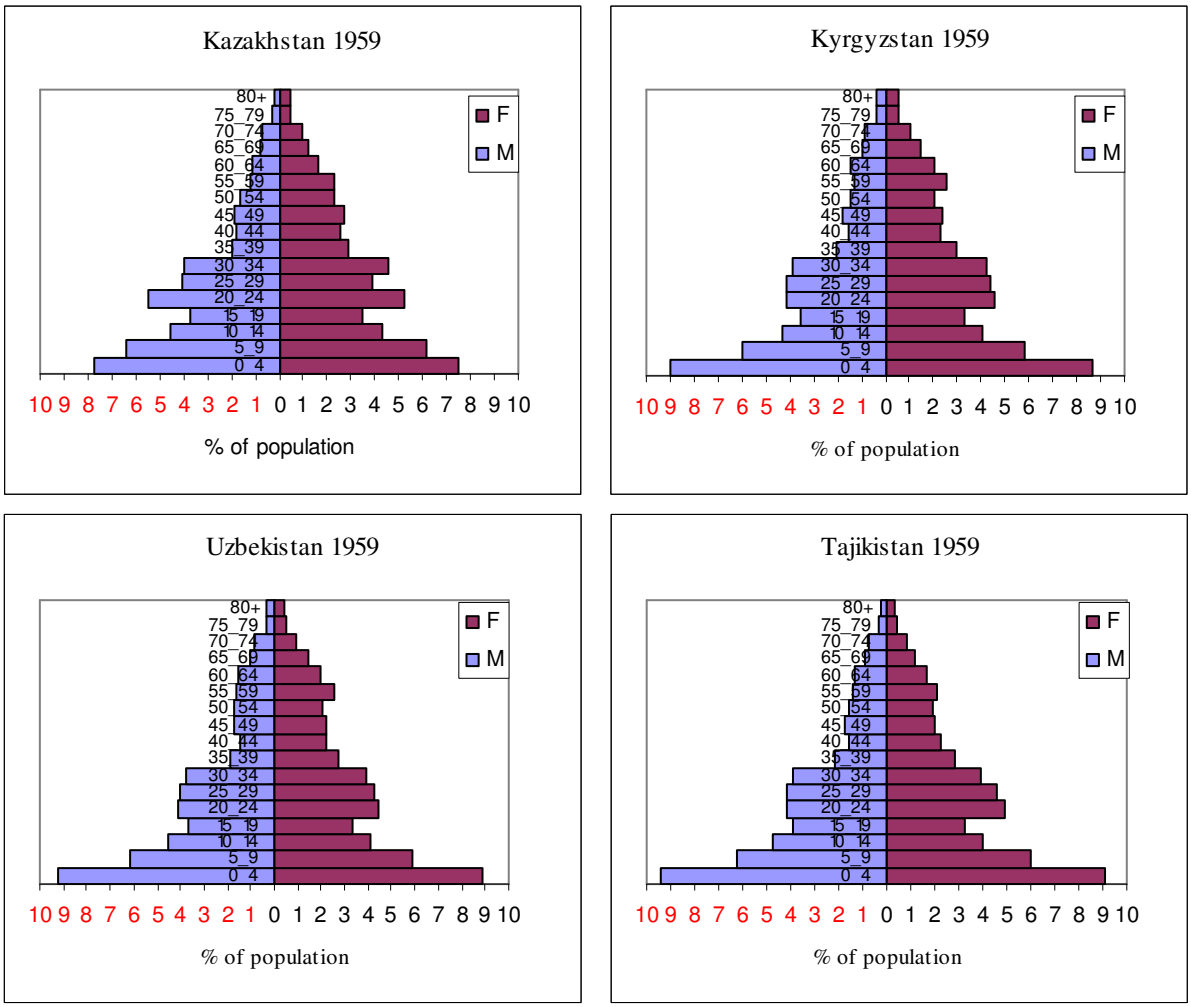
culminated later than in Uzbekistan and Turkmenistan. The late 1970's brought TFR decreases in all three countries, followed by a period of stability or slight decrease at relatively high levels in the 1980's and a period of more sustained decrease following the dismantling of the USSR. This pattern is similar to that of Kyrgyzstan in the medium-fertility group, and suggests that the TFR drop may mostly be attributed to post-Soviet economic turmoil.

This section has demonstrated that the demography of the CARs represents a specific case within the wider post-Soviet context, in light of the CARs conspicuously higher CBR and TFR, and of their unfinished (and somewhat deviating) demographic transition. The reasons can be sought within several spheres. First, the indigenous populations of the CARs have historically been characterised by a form of social organisation with the extended family at its roots, which is in part attributable to religious factors. Decades of Soviet power did not manage to dismantle this basic pillar of the Central Asian societies. Second, a large share of the population of the CARs is still rural, which created the context for the preservation of the traditional forms of social organisation. In fact, as we will see later on in this report, the TFR gap between rural and urban areas in the CARs is striking. A third explanatory framework lies in the economic structure of the region, with much focus on agricultural activities, which do not discourage fertility by structuring individuals' lives along rigid working hours.

## Macro level: The Republics

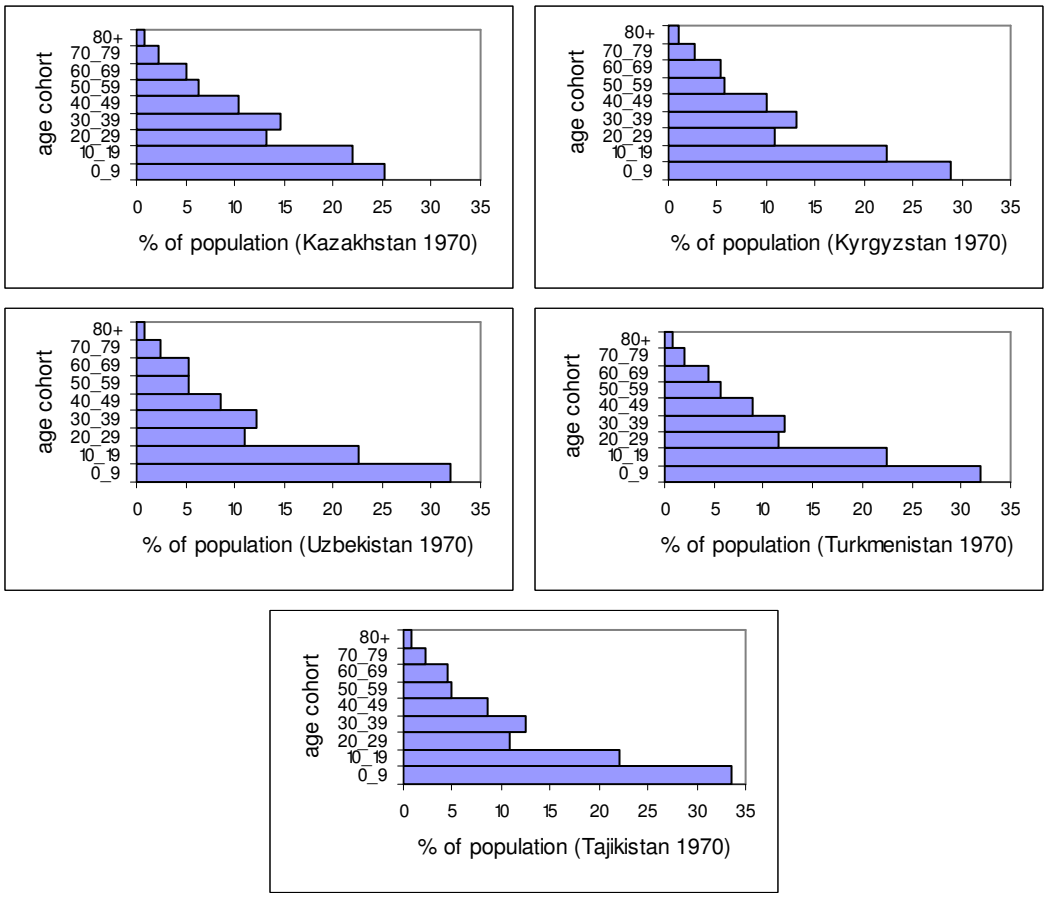
The longitudinal analysis of Soviet and post-Soviet population statistics reported above clarifies that the demographics of the CARs represent a specific case of in the population geography of the FSU. With the exception of Kazakhstan, the crude birth and total fertility rates in the CARs have been substantially higher than in the rest of former Soviet empire for a long time, in spite of the recent decrease within these indicators. This has long-term effects on the age structure of the population of the republics. The age structure is one of the most secure predictors of future economic potential, as it illustrates the relationship between the size of the working-age population and of the dependent population (i.e. the children and the elderly). Countries with relatively small shares of children and elderly in their total populations are able to commit more resources to activities that generate economic growth. The contrary is true for countries with large child or senior populations. The macro-level analysis section of this report focuses on age structure in order to evaluate, *ceteris paribus*, the individual countries' growth potential in light of their demographic characteristics. Again, a longitudinal perspective will be applied, using data from the Soviet censuses of 1959, 1970, 1979 and 1989, as well as available data for 1999 from the independent states.

Figures 23-26 display the age structures of the CARs according to the 1959 census. The data for Turkmenistan were not accessible at the time of writing. A quick glance reveals that the age structures of the CARs were similar, and clearly pyramidal. The age structure of all countries includes two major "dents", one for the 40-44 cohort, and one for 15-19 cohorts, reflecting the civil war following the October revolution and the demographic catastrophe of WWII. Kazakhstan stands out somewhat in light of its large 20-24 cohort, which reflects the significant flow of migrants (forced and voluntary) directed towards this region. The 0-4 cohort in Kazakhstan was also relatively smaller than in the three other CARs, which also reflects the significance of in-migration for the total population growth. However, the age pyramids for 1959 reveal a significant child burden on the working age population of the whole region.



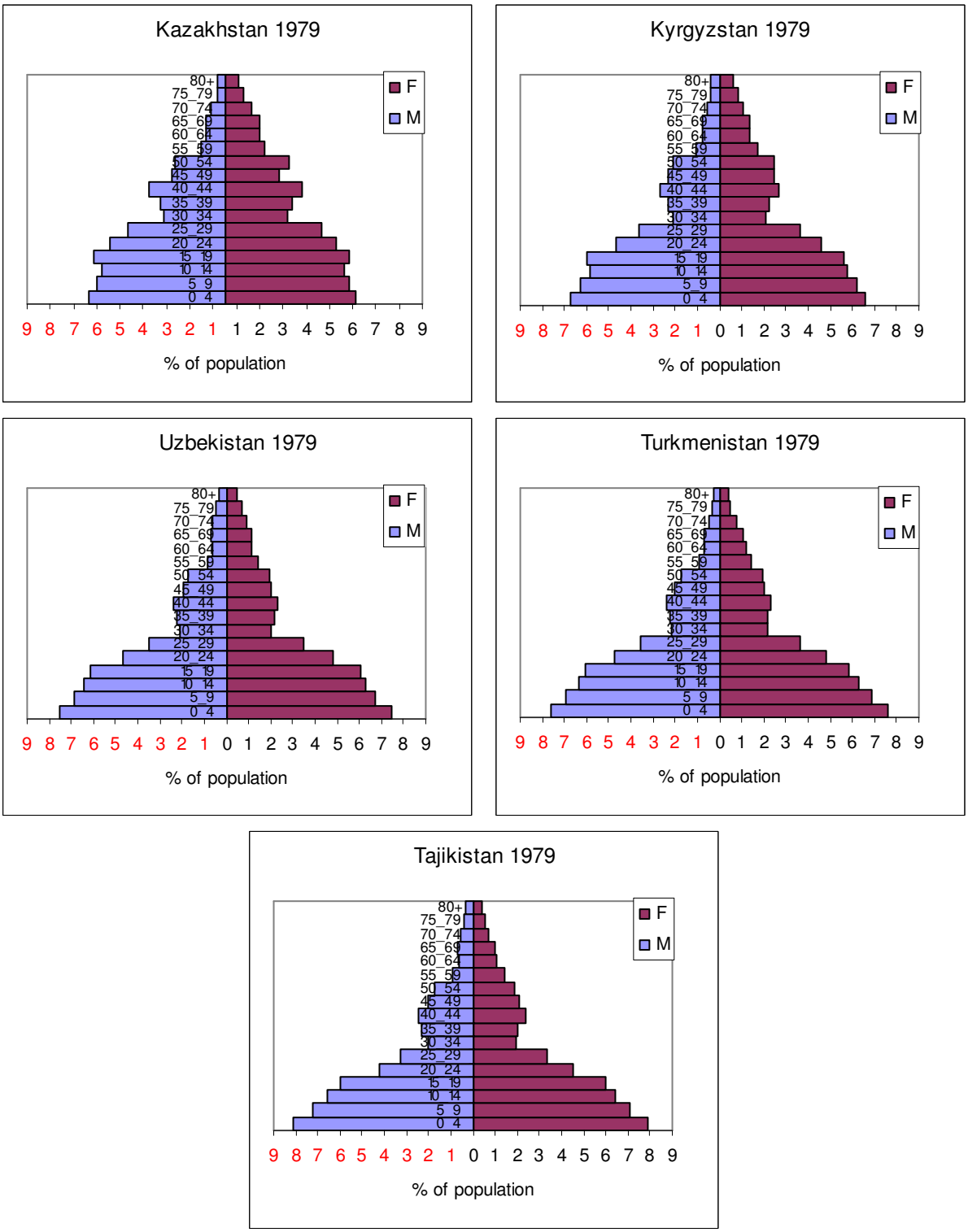

*Figures 23-26: Population pyramids of Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan as of 1959. Sources: calculated from TsSU (1962a-d).*

The data for 1970 is, unfortunately, very meagre. The figures are only presented in ten-year cohorts, and the population is not broken up by sex (figures 27-31). The general tendency that appears is that of continued population expansion, particularly in the three southernmost CARs of Uzbekistan, Tajikistan and Turkmenistan. TFR decreases in Kazakhstan during the 1960's, coupled with continued in-migration, are reflected in the country's lower 0-9 cohort share (just above 25 percent), compared to Tajikistan's very high share of almost 35 percent. Furthermore, the in-migration to Kazakhstan largely involved low-to-moderate fertility ethnic groups, chiefly Russians and Ukrainians. The same is true for Kyrgyzstan, where the share of 0-9 year-olds is also somewhat lower than in the three southernmost republics. In-migration of Slavs certainly concerned all republics, but the aggregate effect on the share of non-indigenous ethnic groups was much stronger in Kazakhstan and northern Kyrgyzstan, particularly in the urban areas of these countries.



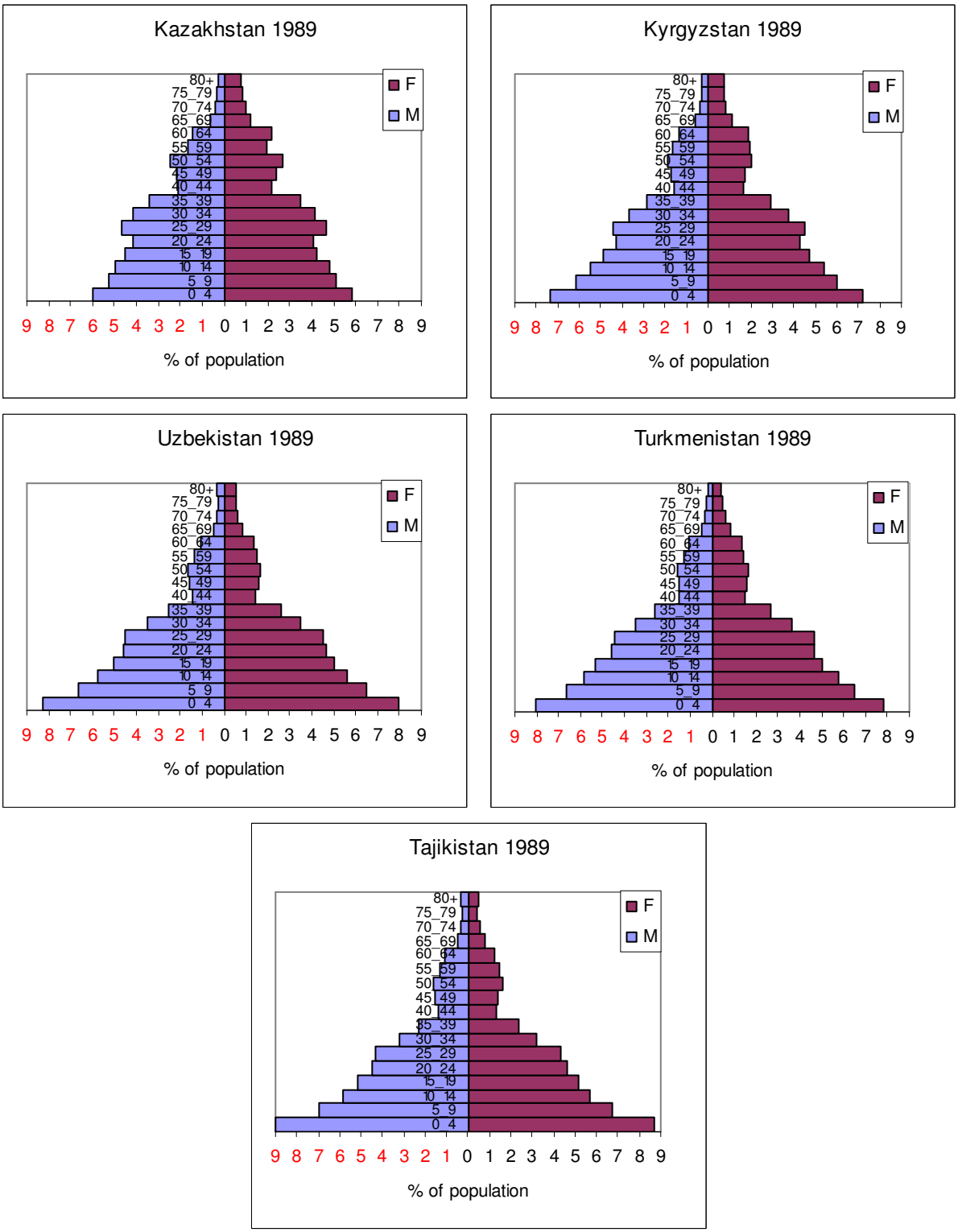

*Figures 27-31: Population pyramids of the CARs as of 1970. Source: calculated from TsSU (1972).*

The results of the 1979 census were reported in greater detail, with five-year cohorts and disaggregated by sex (figure 32-36). By around 1970, the migration balance of the CARs had turned negative (Akhmedova et al., 1976), and the labour shortage in the Western parts of the USSR was expected to be relieved through labour import from the southern CARs, where there was an over-supply of workers. The 1979 age pyramid for Kazakhstan reveals a decrease in fertility among the 20-24 year-olds, as the 0-4 cohort is only marginally bigger. A similar tendency appears to be emerging in Kyrgyzstan as well. The three southern CARs, on the other hand, continue to experience a pyramidal age structure. All in all, the burden on the working population in 1979 remained high throughout the region, although the dependency balance shows positive signs in both Kazakhstan and Kyrgyzstan. Under socialism, the high share of dependants meant that access to housing, which mostly was steered by the industrial ministries, was particularly limited. The result is that the per capita living space indicator was particularly unfavourable in the CARs (see Andrusz, 1984).




*Figures 32-36: Population pyramids of the CARs as of 1979. Source: calculated from Goskomstat (1989a-b).*

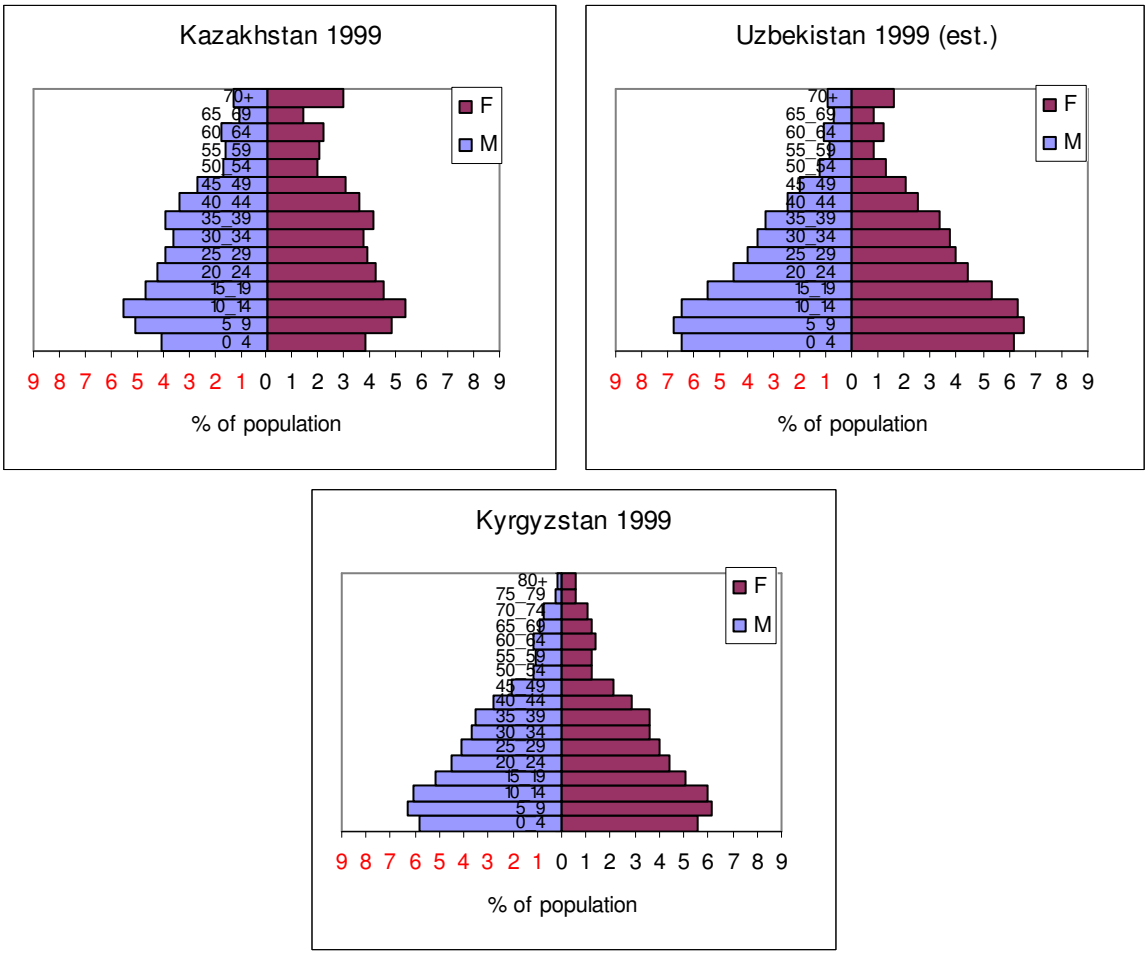
The new feature of the 1989 age pyramids (figures 37-41) is the appearance of significant cohorts past the Soviet retirement age (54 for women and 59 for men), who thus joined the dependant population which was previously overwhelmingly dominated by the children. Nevertheless, the bulk of the dependent population still consists of children, particularly in the three southernmost republics. The 1989 population pyramids still resemble those of countries that have not yet experienced the process of demographic transition.




*Figures 37-41: Population pyramids of the CARs as of 1989. Source: calculated from Goskomstat (1990).*

The changes that occurred during the decade following the last Soviet census were more dramatic than anything that had occurred since WWII. Although figures for Tajikistan and Turkmenistan are currently difficult to gain access to, the situation in Uzbekistan should serve as an example that may shed light on what is probably occurring in these two countries, given their similar demographic histories. A phenomenon which is common to all five republics is the substantial out-migration of people belonging to non-indigenous ethnic groups, chiefly the Slavs (mostly Russians, but also Ukrainians, Belarusians

and Poles) and the Germans. The majority of the Germans and Poles, nearly all of the Chechens, and a substantial share of the remaining ethnicities, were (or are descendents of) forcibly transferred to this region during the years of Stalin's reign. This flow of return migrants has had an especially strong effect on the overall population size of Kazakhstan, which dropped by 7.7 percent during the 1989-1999 inter-census decade (Agenstvo, 1999). In the remaining CARs, where the titular ethnic groups' shares of their respective republic populations is much higher than in Kazakhstan, natural growth fully compensated for the population losses caused by the negative migration balance.




*Figures 42-44: Population pyramids of the Kazakhstan, Uzbekistan (estimate) and Kyrgyzstan as of 1999. Sources: calculated from Minmakroekonomstat (2001), Agenstvo (1999), Natsional'noe (2000).*

Figures 42-44 display the age pyramids of Kazakhstan, Uzbekistan and Kyrgyzstan as of 1999. For the first time, we see that the youngest cohort is smaller than its predecessor in all three countries, yet it is only in Kazakhstan that this cohort is smaller than that of the parents' generation (20-24). Kazakhstan differs also on another account – its relatively large senior population. Nevertheless, the demographic balance of the three countries appears to be more favourable than it was at the time of the 1989 census. The child population – though still large – has decreased in size, and the senior population remains small in spite of its numeral expansion. Given the current fertility trends, according to age transition theory (Malmberg and Sommestad, 2000), Kazakhstan will probably have the most favourable foreseeable demographic basis for economic growth within about 5-10 years (10-15 from the 1999 census), when the large 35-39, now 40-44, cohort reaches its age of maximum contribution to the national economy and the large 10-14 cohort enters and establishes itself on the labour

market. Gradual improvement of the dependency ratio may be expected for Uzbekistan and Kyrgyzstan as well, although the burden of significant childcare needs will remain throughout the foreseeable future.

## Meso-level: The *Oblasti*

The republic-level analysis has shown that, with the exception of Kazakhstan, the CARs may be expected to have a relatively young population within the foreseeable future. Nevertheless, the aggregated figures at the republic level conceal quite substantial regional and even sub-regional distinctions. This section will re-analyse the patterns of natural growth in the CARs by making use of *oblast'*-level data, which will be visualised cartographically. Then, it will present the dependency ratio variations in the regions in 1970, 1979 and 1989. With the exception of the natural growth rate and the TFR, the data are presented for a selection of *oblast'*-level administrative units, which include the cities of republican subordination, i.e. the capital cities and the city of Almaty (Kazakhstan). The criteria for selection were the existence or computability of data for the administrative units which exist today, and the requirement to include areas with presumably different demographic characteristics. The first criterion derives from the fact that the administrative division of the USSR and of its successor states has been characterised by variability which makes longitudinal analyses difficult or even impossible to achieve.

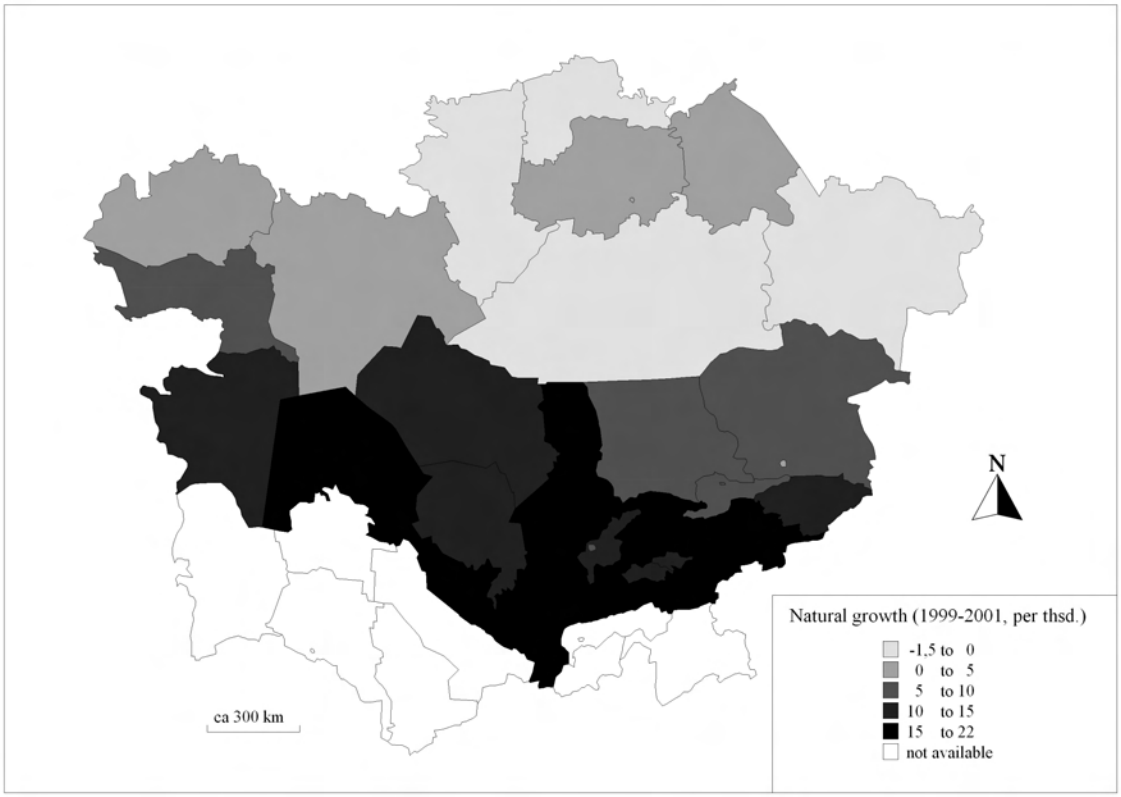



Figure 45: Rate of natural population growth at the oblast' level in the Central Asian Republics. *Sources: Minmakroekonomstat (2001), Agenstvo (2001), Natsional'nyi (2004a-h).*

### *The natural growth and total fertility rates*

Natural growth data at the *oblast'* level are available or computable for Kazakhstan, the Kyrgyz Republic, Uzbekistan and Leninabad (Sogdiiskaya) *oblast'* in Tajikistan. There are no reliable figures for the rest of Tajikistan or for Turkmenistan. However, TFR figures do exist for Turkmenistan at the *oblast'* level, but not for Leninabad *oblast'* in Tajikistan.

As figure 45 makes evident, there is a very clear distinction between the population growth rates of the northern and southern halves of the region. Another significant distinction is that between the natural growth rate of the major metropolitan areas (particularly Tashkent and Almaty) and the territories surrounding them. Both distinctions are directly attributable to the ethnic factor (due to the higher birth rate among "Asian" populations), as well as to the level of urbanisation in the regions. It is striking to notice that some *oblasti* (North Kazakhstan, East Kazakhstan, Karaganda, Kustanay, as well as the city of Almaty) are witnessing natural population decline, in spite of their increasing ethnic Kazakh population share. Figure 46 demonstrates that the TFR nearly replicates the patterns of natural growth (decline). As a rule, the southern and Caspian regions demonstrate total fertility rates which are substantially higher than in the northern and eastern regions. It is also clear that the large urban centres (Tashkent, Bishkek, Ashgabat, Almaty and the new Kazakh capital city of Astana) have a lower TFR than their immediate surroundings, by up to one child per woman.

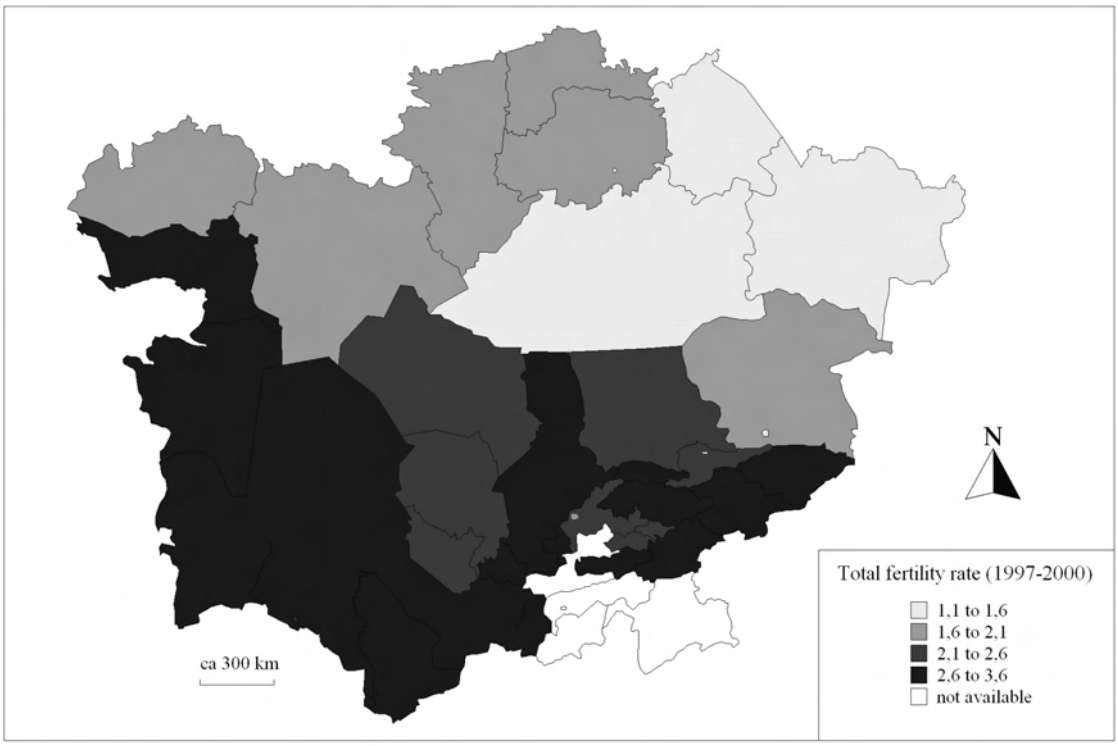
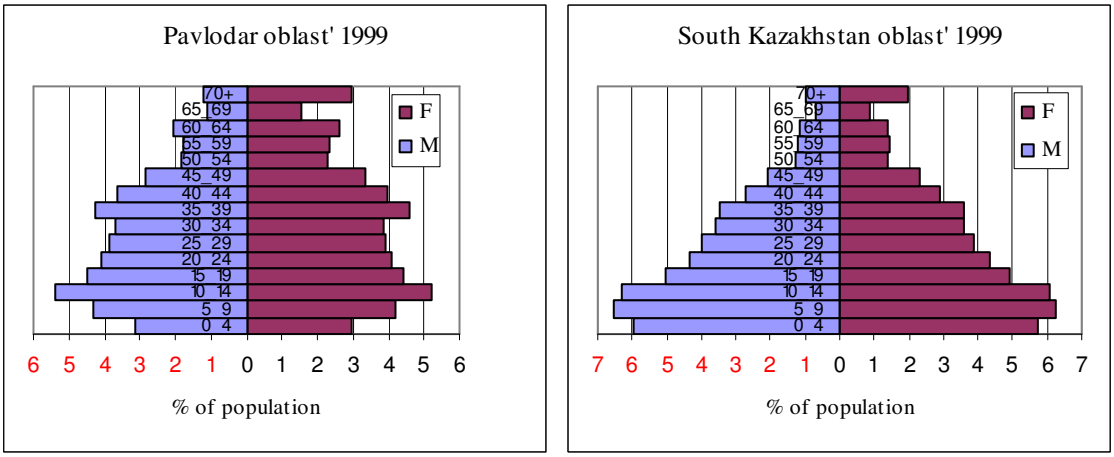



*Figure 46: Total fertility rates in the CARs (except Tajikistan) at the oblast' level. Source: Natsional'nyi (2004a-h); Agenstvo (1999), Charyeva et al. (2000), Minmakroekonomstat (2001).*

### *Age structure and dependency ratio*

The differential between the "Asian"/"European" and urban/rural (and therefore also northern/southern) fertility levels has been in place for many decades and has therefore impacted upon the regional age structures. The more "European" and urbanised the region, the higher the average age of its population. A comparison between the age pyramids of the two demographically different Pavlodar and South Kazakhstan *oblasti* illustrates this differential (figures 47 and 48). Pavlodar *oblast'*, with an urbanisation level of 63.4 percent and a Kazakh population share of 38.6 percent (Agenstvo, 1999), has an age pyramid which resembles the Michelin man, whereas the age pyramid of South Kazakhstan *oblast'*, with an urban population of 36.7 percent and a Kazakh population of 67.8 percent (Agenstvo, 1999), indeed *is* pyramidal (although the recent fertility decline is reflected in the smaller size of the 0-4 cohort as compared to the 5-9 cohort). In the medium term, Pavlodar *oblast'*, as well as the rest of the northern regions and major cities of Kazakhstan, will be faced with a

population aging problem which will pose significant challenges to their economic sustainability. In South Kazakhstan *oblast'*, on the other hand, short term demography-related growth restrictions (due to the large size of the child cohorts) may be expected to diminish in importance, as the large 5-14 cohorts approach adulthood and the productive years. Simultaneously, the relatively small size of the retirement-age and near-retirement cohorts, coupled with the region's sustained above-replacement fertility rate, guarantee that the region will not suffer from any of the symptoms that a top-heavy age pyramid carries, at least not within the foreseeable future. Given the magnitude of the current regional age structure differences with Kazakhstan alone, it is reasonable to predict that inter-regional migration may and probably will become the solution to the expected population imbalance in the northern *oblasti*. There is, so to say, a certain degree of population complementarity between the northern and southern halves of Kazakhstan, as well as between the urban and rural areas. An additional dimension to this issue is the ethnic one. In the future, there will be more Kazakhs (and other "Asian" ethnicities) and fewer Russians (and "Europeans") in working age. This will lead to a situation in which the younger Kazakh population will be feeding the aging Slavic one.




*Figures 47 and 48: Population pyramids of the Pavlodar and South Kazakhstan oblasti as of 1999. Source: Calculated from Agenstvo (2000).*

The regional population complementarities in Kazakhstan do not exist in the other CARs, except, possibly, in Kyrgyzstan, where the TFR drop in the capital city of Bishkek to well-below replacement levels will lead to a long-term aging of the population. Similar urban-rural complementarities might appear in Uzbekistan, Turkmenistan and Tajikistan in the future. However, the current TFR in Tashkent and Ashgabat is still around or above replacement level (the figure for Dushanbe is not available, but it is probably higher than for Tashkent and Ashgabat, given Tajikistan's significantly higher TFR at the republic level).

*Dependency ratio*

The dependency ratio (DR) is an indicator of the non-working *age* (dependent) population burden which has to be supported by the working population, expressed as the number of individuals aged 0-14 and 65 plus per hundred aged 15-64 ("standard" definition). As mentioned earlier, variations on this indicator may be created through the usage of a different definition of the working-age population. In the Soviet Union, for example, the latter consisted of all men aged 16-59 and all women aged 16-54. Both definitions are used in this section, although the Soviet definition, which is still used by the successor states, says more about the *de facto* burden, given the official retirement age. The DR are presented for the three census years of 1970, 1979 and 1989, and for the selection of regions mentioned in the

methods section of this report (the data for the post-Soviet period do not cover a sufficient number of regions).[6] Figure 49 presents the dependency ratio data for the selection of *oblast'*-level administrative units as of the census year of 1970. There are striking regional differences: first of all, it is clear that the capital cities' areas of administration (*gorodskaia administratsia*, abbreviated as *g.a.*, i.e. municipal administration) had the most favourable DR's, with Almaty (Alma-Ata) and Bishkek (Frunze) below 50 ("standard" definition). The russified East Kazakhstan (VKO) and Pavlodar *oblasti* are next up, echoing the average DR for Kazakhstan as a whole in 1970. At the high end of the table, with standard DR's surpassing 100 we find a variety of predominantly rural regions, with Naryn *oblast'* in Kyrgyzstan topping the list and deviating significantly from the national average. Mary and Surkhandarya *oblasti* are the southernmost regions in Turkmenistan and Uzbekistan, whereas Namangan *oblast'* is located in the Ferghana Valley. Naryn *oblast'* and Gorno-Badakhshanskii Autonomous *Oblast'* (GBAO) are entirely mountainous, and the latter region covers most of the eastern half of Tajikistan. The DR defined according to the Soviet standards indicates that there were more than 1.7 individuals for each person of working age in Naryn *oblast'*, compared to just over 0.6 in Bishkek, the capital of the republic in which it is located.

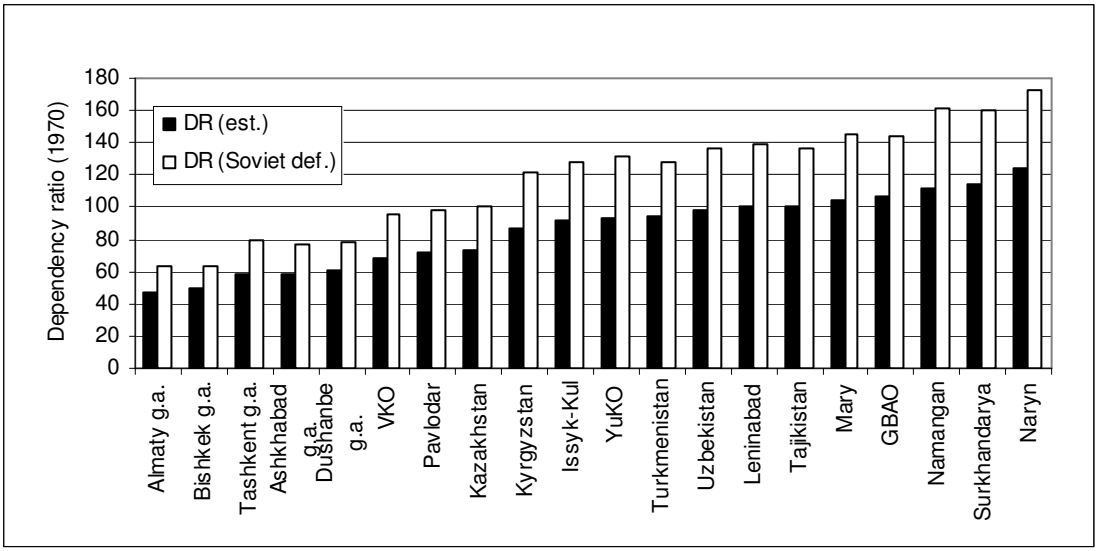



*Figure 49: Dependency ratios in 1970 in selected Central Asian oblast'-level administrative units according to the standard and Soviet definitions. Calculated from TsSU (1972).*

By the time of he 1979 census, the gradual changes in the age structures of the CARs and their regions are translated into a reduced (though still very high) gap between the areas with favourable and less favourable DR's. Figure 50 shows that the most significant DR improvements occurred in the regions with the highest DR's, whereas there were only modest improvements in the major cities (however, their DR's were already favourable). Thus, the inter-regional DR "gradient" in Central Asia appears to have become less steep during the 1970's. The data for 1979 also indicate that Khatlon *oblast'* (Tajikistan), for which there are no figures from the year 1970, ranks among the regions with the least favourable DR's, second only to Naryn *oblast'* in Kyrgyzstan. Khatlon *oblast'* is a very rural region bordering with Afghanistan.

[6] The figures for today's Khatlon *oblast'* (two separate *oblasti* during the Soviet period, Kurgan-Tiubinskaia and Kuliabskaia) in Tajikistan were not computable for 1970, and in 1989, Naryn and Issyk-Kul *oblasti* in Kyrgyzstan were merged into one administrative unit (Issyk-Kul *oblast'*).

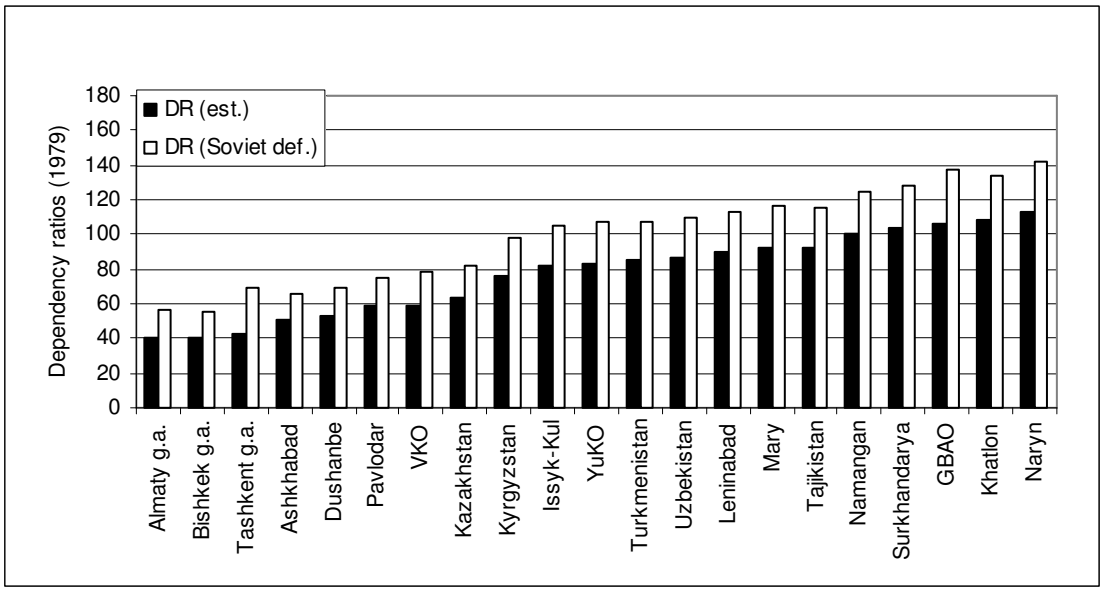



*Figure 50: Dependency ratios in 1979 in selected Central Asian oblast'-level administrative units according to the standard and Soviet definitions. Calculated from Goskomstat (1989).*

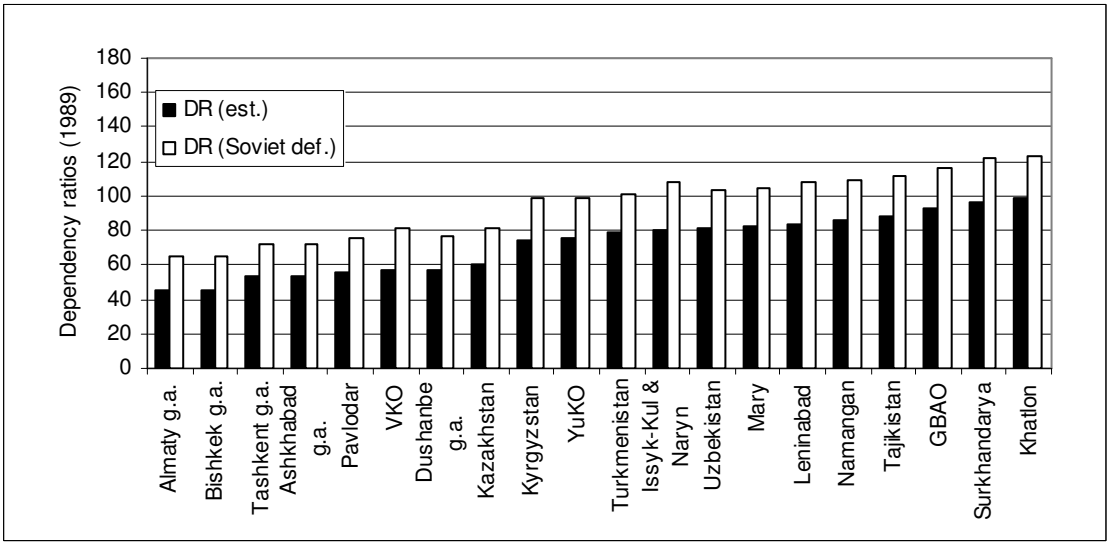



*Figure 51: Dependency ratios in 1989 in selected Central Asian oblast'-level administrative units according to the standard and Soviet definitions. Calculated from Goskomstat (1991).*

Figure 51, presenting DR figures calculated from the 1989 census data, indicates that the 1980's brought an ulterior smoothing of the inter-regional DR gradient. The novelty in this case is that this not only depends on the improvements in areas with high DR's – for the first time, the DR of the main cities becomes *less* favourable. In the case of the city of Tashkent, most of the DR gains from the 1970's are neutralised. This change is attributable to the first steps of the gradual population aging process, which is presumed to have continued and intensified during the 1990's.

The considerable TFR decreases throughout the CARs suggests DR improvements within the foreseeable future, as a result of the decreasing child burden on the adult population. These improvements are likely partially eaten up by the out-migration of segments of the working-age population from the CARs (chiefly Slavs, Germans, Jews, and Koreans). In the long term, below-replacement fertility levels, especially in Kazakhstan, will probably deteriorate the DR. However, as mentioned earlier, the existence of population

complementarities within the region signals the possibility that inter-regional migration might contribute to a future equalisation of the Central Asian regional DR's.

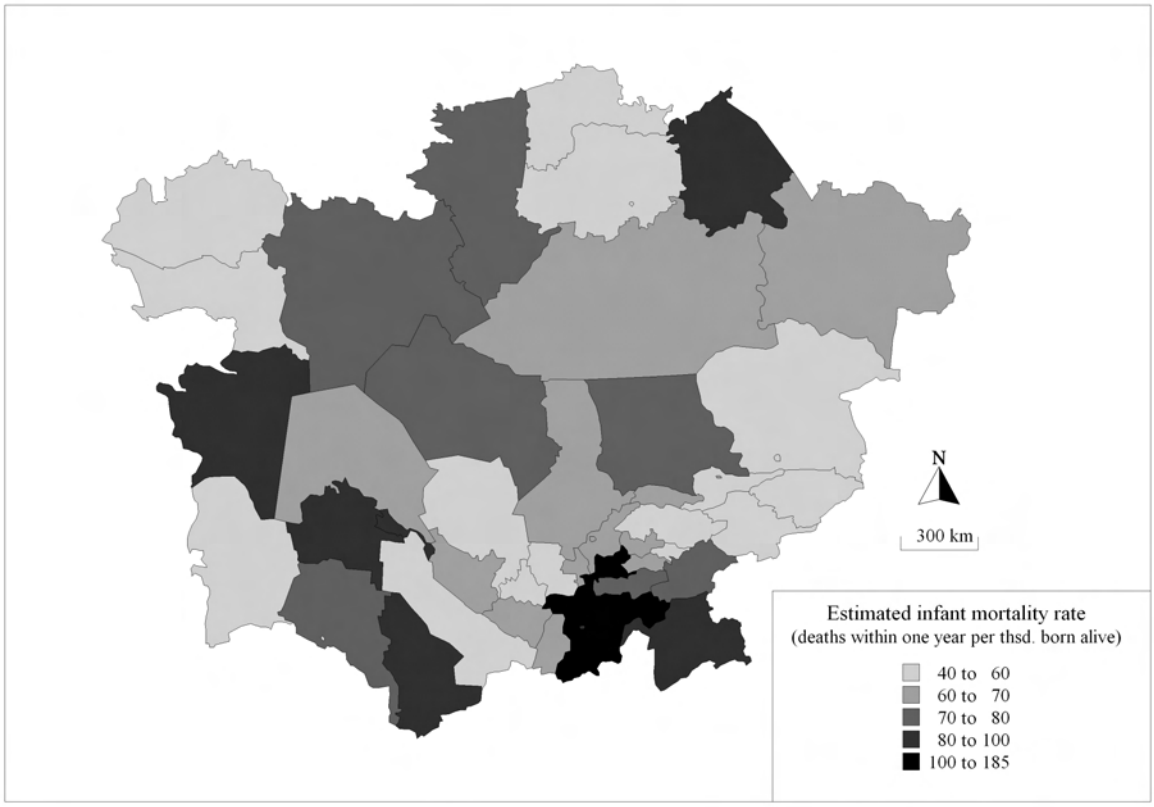



*Figure 52: Estimated infant mortality rate in the CARs at the oblast' administrative unit level in 1999. Sources: Calculated and estimated based on Minmakroekonomstat (2001), Charyeva et al. (2000), Natsional'nyi (2000), Sullivan and Themme (2003), Tajikistan Develoment Gateway (29/10/2004).*

### *Infant mortality*

As discussed in the methods section of this report, infant mortality (IMR) is an important, though highly insecure, indicator of socio-economic development in Central Asia. The meso-level cartographic analysis of the IMR is based on figures which were calculated as follows. The estimated national-level IMR for Kazakhstan, Kyrgyzstan and Uzbekistan, based on demographic and health surveys (DHS)(Sullivan and Themme, 2003) was divided by the official rate for the corresponding year (Minmakroekonomstat, 2001; Agenstvo, 2001; Natsional'nyi, 2000), resulting in a coefficient of 3.26 for Uzbekistan, 3.22 for Kazakhstan, and 2.7 for Kyrgyzstan. Thereafter, the official rates at the *oblast'* level were multiplied by this coefficient, allowing an imprecise but indicative estimation of the IMR at the meso-level. For Turkmenistan, DHS estimates already exist at the *oblast'* level (Charyeva *et al*., 2000). For Tajikistan, the process of creating IMR estimates was complex, leading to even greater potential inaccuracies. The latest available IMR data at the *oblast'* level are from 1992. Using the US bureau of census national-level estimate for the same year (81.8), a first coefficient of 1.78 may be calculated. By the year 2000, the national IMR had reached 117.4. By dividing the 2000 estimate by the estimate for 1992 we obtain a coefficient of 1.43. By multiplying these two coefficients with each other we obtain a total adjustment coefficient of 2.55. Multiplying the 1992 *oblast'* level IMR by this coefficient gives an idea of the levels of infant mortality in the regions of Tajikistan. However, in light of the considerable regional variations in the occurrence of domestic births in the country, the estimate should be corrected accordingly, using the only data available on the matter, which are from the mid-1990s

(Tajikistan Development Gateway, 29/10/2004). The IMR is therefore increased or decreased by a percentage equal to the difference between the national-level share of domestic births and the regional-level share. Specifically, the differences amount to -18.1 percent in Dushanbe, 4.4 percent in Rayony RP (i.e. the districts of republic subordination), -13.8 percent in Leninabad *oblast'*, 15.6 percent in Khatlon *oblast'*, and 12 percent in the Gorno-Badakhshan Autonomous *oblast'*.

The results of the *oblast'* level infant mortality estimations are summarised in figure 52. Only one obvious conclusion may be drawn: the IMR in Tajikistan is generally very high (it reaches past 18 *percent* in Khatlon *oblast'*). Otherwise, there is no pervasive geographical pattern. To the contrary, it appears as though infant mortality cases are distributed almost randomly. The IMR figures in this case are probably more accurate for Turkmenistan than for the other CARs; however, even in Turkmenistan, there does not seem to be any obvious pattern. Possibly, there might be a significant distinction between the somewhat wealthier northern part of Kyrgyzstan and the southern part of the country. Furthermore, an IMR gap between urban and rural areas has already been demonstrated by the Chadyeva *et al.* (2000) and Kasiev *et al.* (1998) studies on Turkmenistan and Kyrgyzstan. Furthermore, the latter also shows that the IMR in Central Asia carries a very important *ethnic* dimension which clearly stretches beyond what may be explained by differential urban-rural residence patterns. Specifically, the 1997 IMR for Kyrgyzstan was estimated at 54.3 per thousand in urban areas and 70.4 per thousand in rural areas, whereas the country's Russian population had an estimated IMR of 27.1 per thousand, which is comparable with the Kyrgyz population's IMR of 69.5 (Kasiev *et al*., 1998). The Kyrgyz Republic provides an interesting case for which there are IMR data available at the *rayon* and individual urban settlement level. These will be presented and discussed in the final micro-level section of this report.

## Micro-level: The *rayon* and rural district level based on the case of the Kyrgyz Republic

The micro-level analysis presents TFR and average household size data at the *rayon* and selected-city[7] level, as well as the average age of the population and the DR at the rural district (*auyl kenesh*) level for two regions – Osh *oblast'* and Naryn *oblast'*. The latter were chosen in order to shed more light on some of the results from the *rayon*-level analysis. The limitation on just two *oblasti* is due to the necessity to work with a manageable volume of data. Finally, official infant mortality data, multiplied by the coefficient of 2.7 as described above, are presented at the rayon and selected-city level.

Figure 53 reveals the geographical variations in TFR in the Kyrgyz Republic. There are three main, and strikingly well defined fertility "regions". First, we have a small but densely populated region in the northern part of the country, covering most of Chuy *oblast'* and the capital city of Bishkek. The TFR in this area hovers around the replacement level, with the exception of Bishkek proper, where the TFR is well below replacement. These relatively low levels may principally be attributed to the ethnic factor, coupled with the region's somewhat higher degree of urbanisation. The second region surrounds the Ferghana valley in the south-western part of the country, and is also densely populated, at least in the areas lying closest to the Uzbek border. In general, the TFR in the rural areas this region lies somewhat above three children per woman, whereas it stands at between two and three children per woman in the urban areas, with the largest cities experiencing the lowest TFR's (specifically the cities of Osh and Dzhalal-Abad). The third region consists of the almost exclusively mountainous central, south-central and north-western parts of the country, where

[7] The city-level data are only available for some cities, not necessarily in relation to the city's population size. Nevertheless, all major cities are represented.

the level of urbanisation and population density are very low. The high average elevation of this areas makes it unsuitable for most agricultural activities, making herding the main economic activity for a large segment of the population. The TFR in this region lies within the 3.5-4 children per woman range, with the few urban areas experiencing somewhat lower levels. Finally, one could add a fourth region, located in the far eastern section of the country. The topography of this area is similar to that of the third region. However, almost all of its inhabitants live along or close to the shore of lake Issyk-Kul, at relatively high elevations, but with a climate which is mitigated by the ice-free waters of the lake, thus enabling agricultural activities. The TFR of this region's only significant urban settlement (Karakol) is below replacement (1.8 children), reflecting the city's *relatively* high share of ethnic Russians (28.3 percent). Along with the broad fertility regions described above, it is clear that there is a significant division between the TFR of the rural and urban areas. In general, the value for cities is about one child less than for the areas surrounding them.

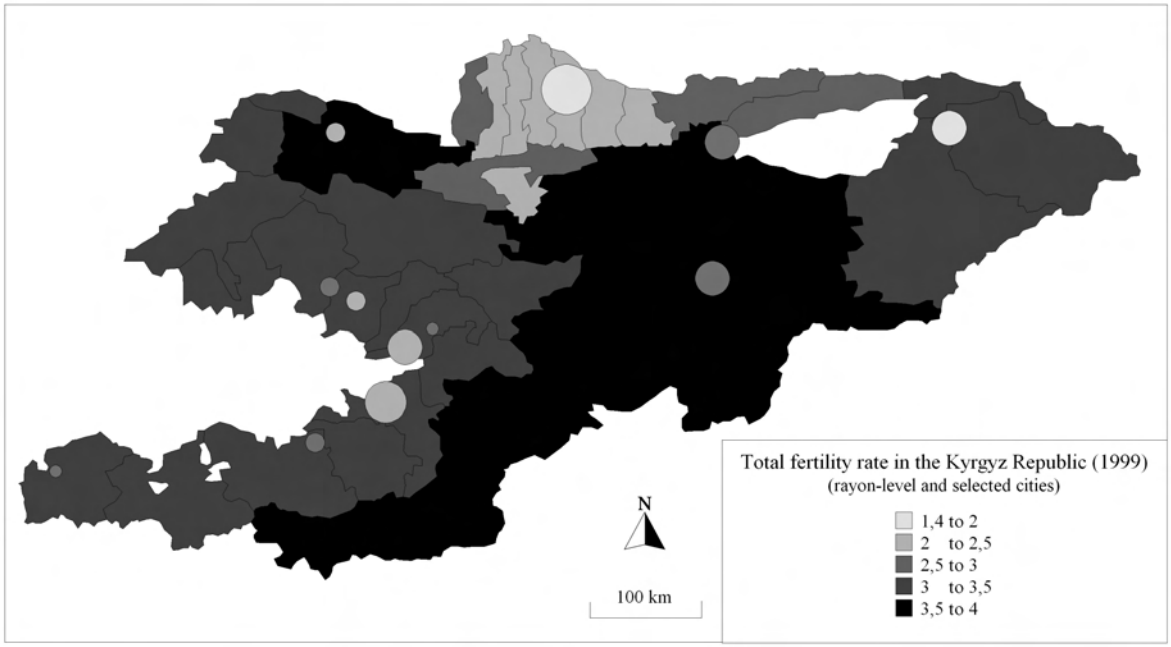



*Figure 53: Total fertility rate in the Kyrgyz Republic at the rayon and selected-city level as of 1999. Source: Natsional'nyi (2004i).*

In light of the above, the findings reported in figure 54 are somewhat surprising. Figure 54 displays the average household size, again at the *rayon* and selected-city[8] levels. Although the greatest differences in household size (i.e. those between the Russified north and the rest of the country, and between urban and rural areas) approximately correspond with TFR gap, it is interesting to note that the average household size is greater in the Ferghana valley than in the mountainous interior, where the TFR is higher. This might be related to the two regions' different intensity of land exploitation – in the densely populated and agriculturally more favourable Ferghana valley, a greater number of persons may and must live off of less land, thus contributing to the preservation of large households. In the mountainous interior, on the other hand, the land use is more extensive and probably demands a higher degree of territorial fragmentation among households.

[8] Compared to the TFR map, a few cities have been added, reflecting the better availability of household size data.

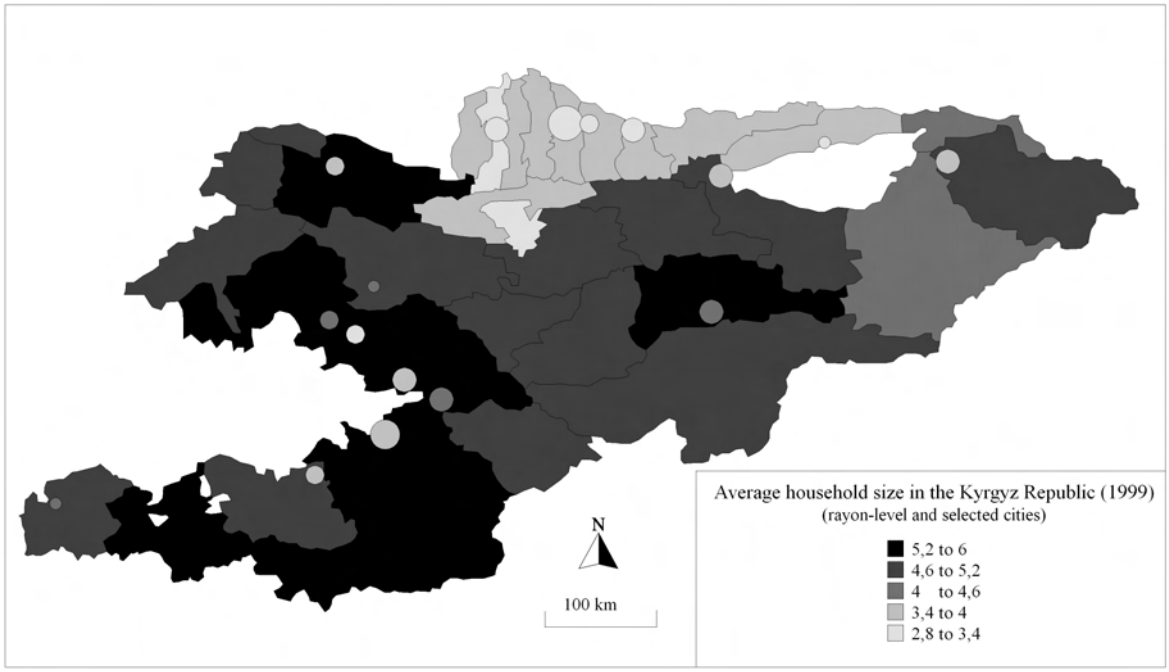



*Figure 54: Average household size in the Kyrgyz Republic at the rayon and selected-city level as of 1999. Source: Natsional'nyi (2004i).*

Let us now proceed by approaching the very detailed geographical level of the individual *auyl kenesh*, using the cases of Naryn and Osh *oblasti*, and the indicators of average age of population and DR according to the Soviet definition. Osh and Naryn *oblasti* roughly represent the high density Ferghana valley and the low density high-mountain region, with the livelihood systems embedded in them. Unfortunately, it is not possible to use the same indicators as in the previous *rayon*-level analysis, due to lack of data. In this analysis, all settlements formally classified as urban will be included separately as well. The blank areas (i.e. most of the *oblasti*'s territories) are uninhabited.

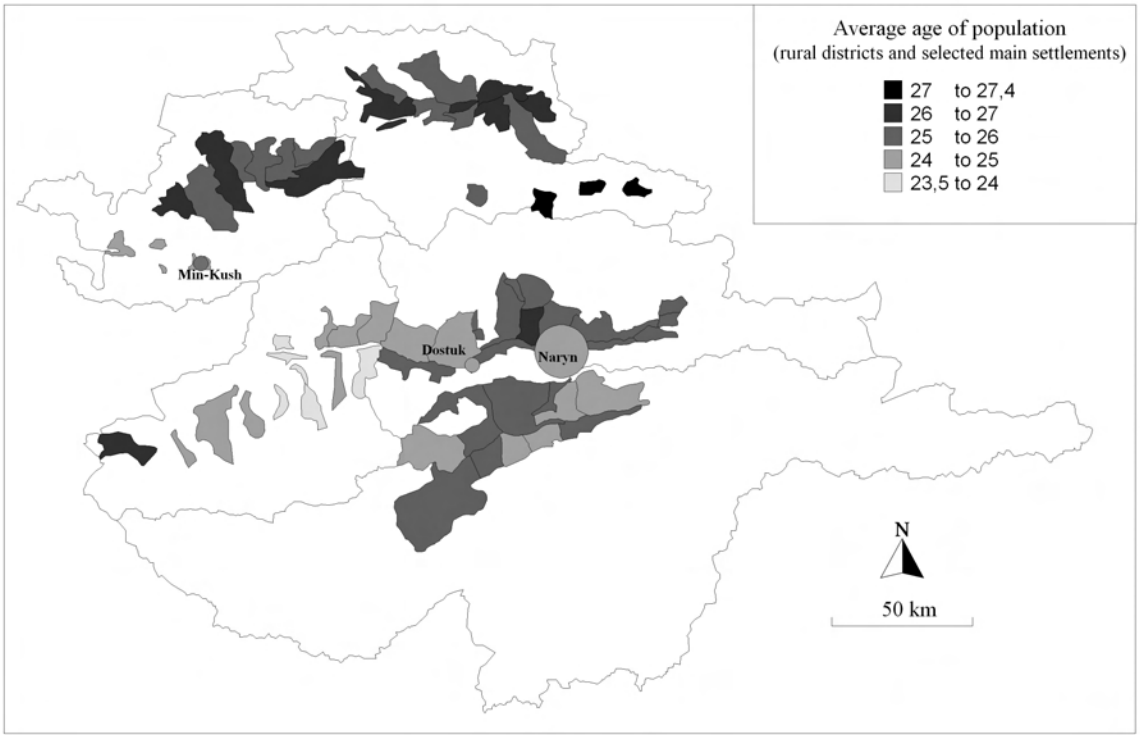



*Figure 55: Average age of the population of Naryn oblast' at the auyl kenesh level, including selected main settlements (all settlements classified as "urban"). Source: Natsional'nyi (2004i).*

Figure 55 demonstrates the existence of three "age regions" in the mountainous Naryn *oblast'*. An older "north", a somewhat younger central region, and a rather young regional capital (Naryn, population about 40,000), inhabited by about one fifth of the *oblast*'s total population. The relative youth of the main city indicates that a regional migration process towards the main city might be taking place.

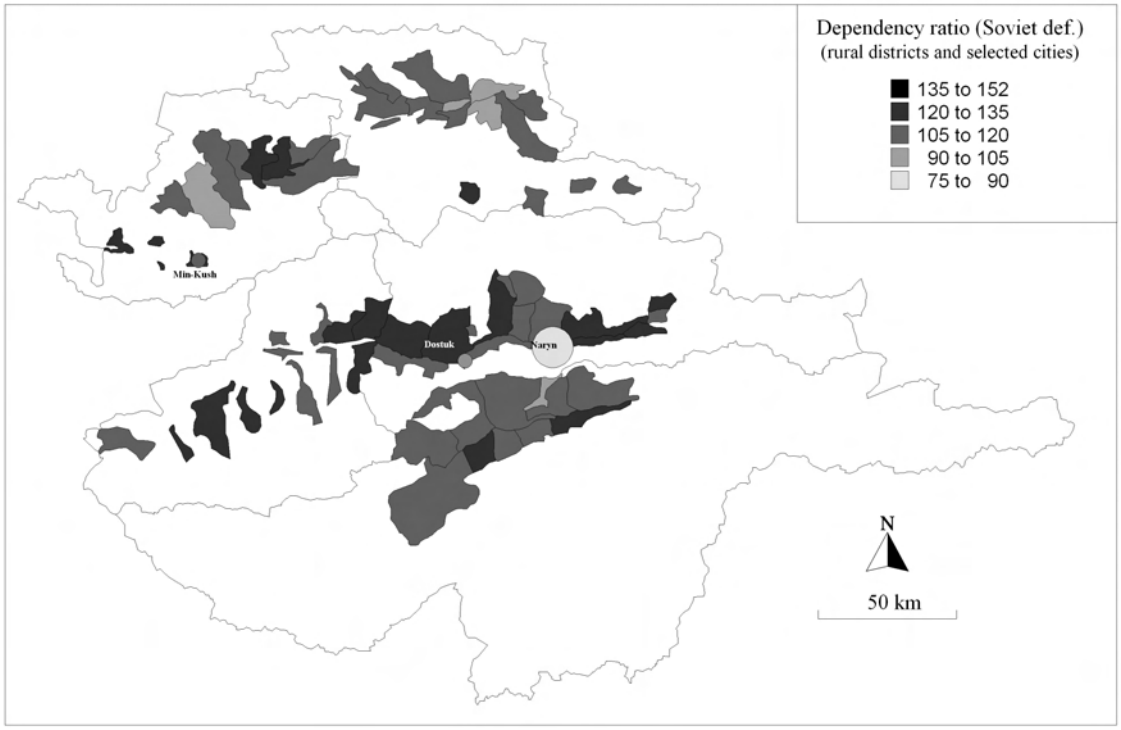



*Figure 56: Dependency ratio (Soviet definition) in Naryn oblast' at the rural district level, including selected main settlements (all settlements classified as "urban"). Source: Natsional'nyi (2004i).*

Conversely, as figure 56 demonstrates, the population burden on the working-age population is less in the somewhat older northern foci of population, whereas it is least favourable in the younger western parts of the central region. The city of Naryn also appears to have a particularly favourable DR, as least by the standards of the *oblast'*, which, as indicated in the meso-analysis section of this paper, ranks as one of the least favourable from the DR perspective. This corroborates the hypothesis that a migrant flow of working-age people is being channelled toward the city (though not necessarily resulting in the outcome desired by the migrants, as the city of Naryn has an *official* unemployment rate of 36 percent, which is significantly higher than the *oblast'* average of 16.9 percent - both figures likely underestimate the *de facto* unemployment level)(Natsional'nyi, 2004i).

The situation in Osh *oblast'* is different on several accounts. First of all, the overall average age in the *oblast'* is lower (figure 57). Furthermore, unlike the case of the city of Naryn, the city of Osh (pop. about 200,000), although still young, is older than that of the rest of the *oblast'*. Otherwise, the average age indicator does not show any clear geographical dimensions, with the exception of the remote, isolated, and high-elevation south-western part of the *oblast'*, whose population is a couple of years younger than average.

The dependency ratio (according to the Soviet definition) in Osh *oblast'* varies accordingly (figure 58), and is most favourable in the regional capital, the two other main cities, Uzgen and Kara-Suu, and in the low elevation areas. Conversely, and in line with the average age data, the indicator is least favourable in the remote south-west of the *oblast'*.

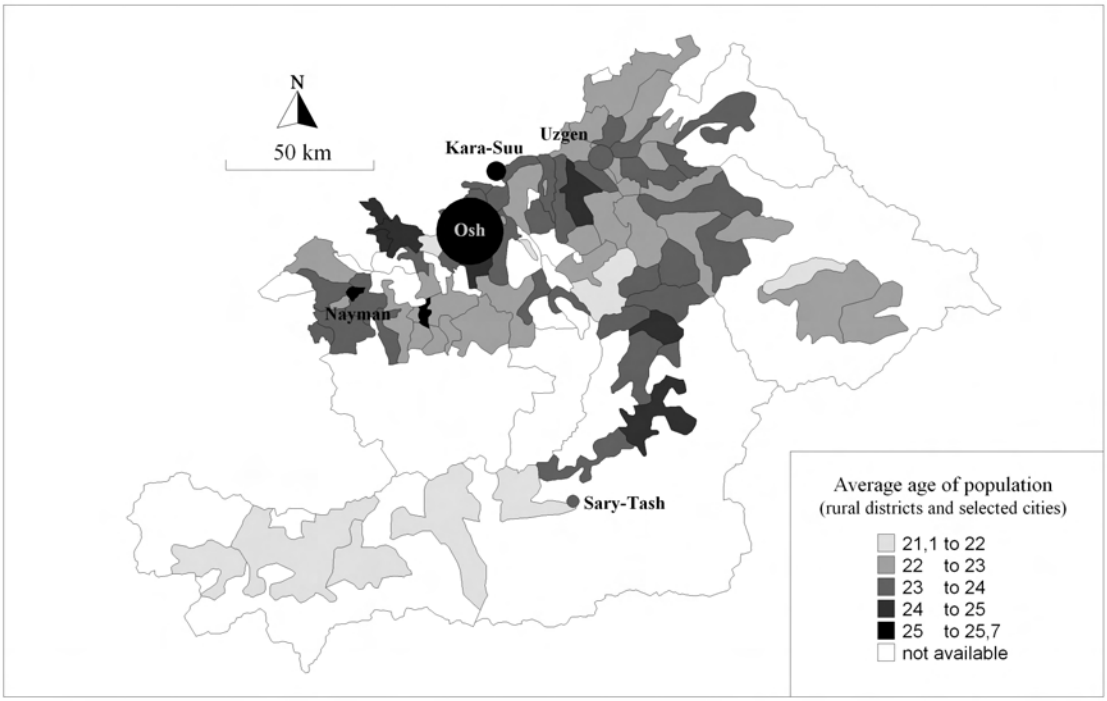



*Figure 57: Average age of the population in Osh oblast' at the auyl kenesh level, including selected main settlements (all settlements classified as "urban"). Source: Natsional'nyi (2004i).*

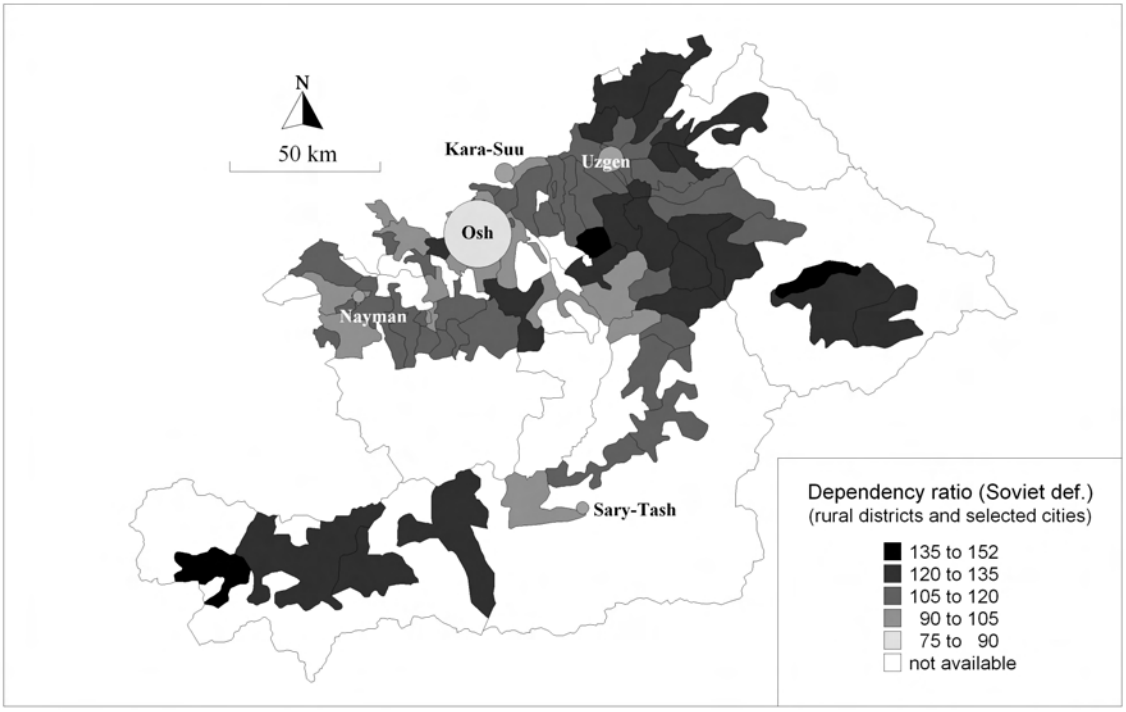



*Figure 58: Dependency ratio (Soviet definition) in Osh oblast' at the auyl kenesh level, including selected main settlements (all settlements classified as "urban"). Source: Natsional'nyi (2004i).*

The analysis of infant mortality data at the micro-level requires that we revert to the *rayon*-level. Furthermore, there are some data problems in that the correct estimation of the IMR at this level of detail would require differentiated adjustment coefficient based on settlement size and urban-rural criteria. This is because it is more likely that the official IMR is closer to reality in the major cities than in rural areas. However, a differentiation of adjustment coefficients is not possible given the current knowledge about the registration of the IMR in

the CARs. Hence, the data presented in figure 59 should be seen as inaccurate though indicative. However, the IMR for rural areas is almost certainly underestimated, whereas it is overestimated for cities. In particular, figure 59 is useful in order to compare rural *rayony* with each other. It can also help shed light on inter-urban differences, though settlement size probably has some kind of impact on the reliability of the official IMR statistics (which have been marked up by a factor of 2.7 on the map).

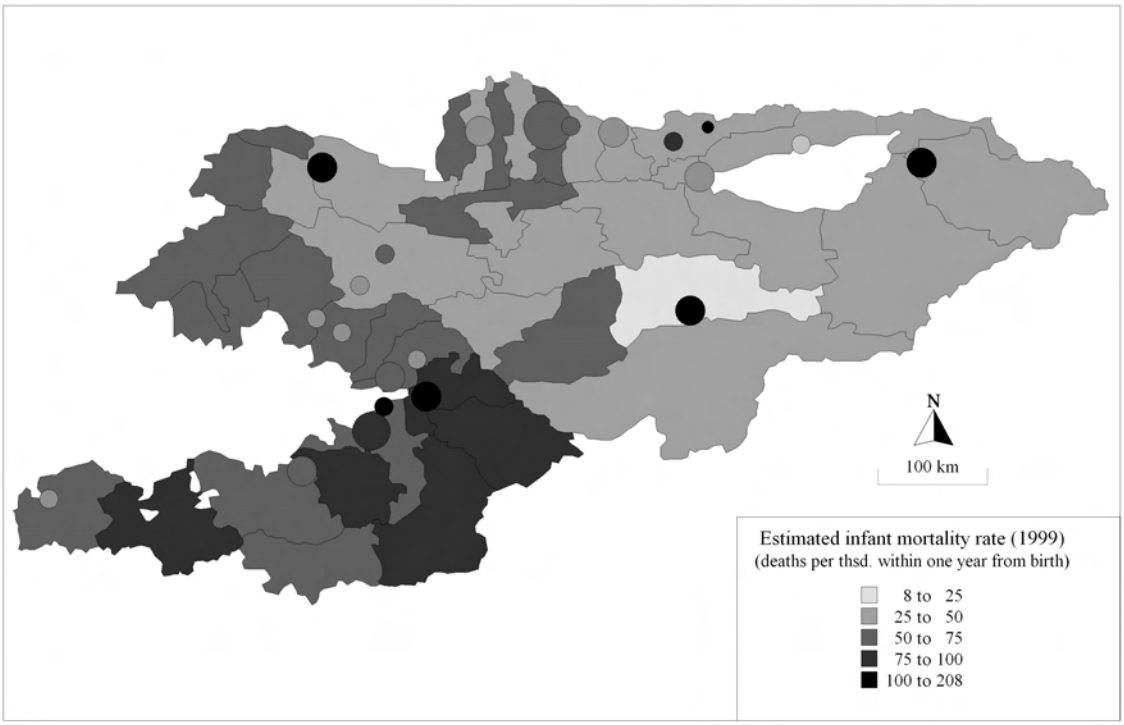



*Figure 59: Estimation of infant mortality rate (deaths per thousand within the first year of life) in the Kyrgyz Republic as of 1999 at the rayon and selected-city level. Source: Natsional'nyi (2000), with adjustments based on Kasiev et al., 1998).*

Figure 59 suggests that there are significant differences in IMR between *rayony*. Osh and Batken *oblasti* appear to have the most problematic mortality situation, although the most extreme IMR's are found in the small cities of Karakol (Issyk-Kul *oblast'*), Naryn and Talas (located in their homonymous *oblasti*), Uzgen and Kara-Suu (both Osh *oblast'*). Even though overestimation may well be significant, the fact that a certain type of cities (three out of five may be characterised as remote high-elevation regional centres) prevails in the high-IMR group is worth reflecting on, especially given the fact that the rural areas surrounding them have relatively low IMR's. It is, for instance, possible that the fact that the share of first-born children in cities is higher (due to their lower TFR) may explain some of the difference, as the IMR among the first-born is higher (see Kasiev *et al*., 1998), but the main reason is probably to be found in the poor health infrastructure of these cities, coupled with the nutritional deficiencies which likely appear among those living at higher altitudes.

## Final remarks

Applying a three-scale geographical approach on the study of the CARs' population development, this report has demonstrated that there are significant variations in the territoriality of these countries' demographies. The variations are indeed striking, and suggest that the CARs will face distinctly spatially differentiated challenges with regard to the volume and type of healthcare that will be required, the nature of the demand for housing, social and cultural services, and the structure of the labour market, just to name a few examples. These challenges should be taken into greater consideration by policy-makers and other

stakeholders, along with matters of more immediate concern, such as the poor health infrastructure and sanitary situation, the high rate of poverty, environmental degradation, and the economic and political instability in the southern regions.

## References


ADB (2004), *Central Asia Regional Economic Cooperation Member Countries: Regional Cooperation Strategy and Program (2005-2007)*, report available at the Asian Bank of Development's website <http://www.adb.org/Documents/CSPs/CAREC/2004/default.asp>, acceded 19 November 2004.

Agenstvo Respubliki Kazakhstan po Statistike (1999), *Kratkie itogi perepisi naselenia 1999 goda v Respublike Kazakhstan*, Almaty: Agenstvo Respubliki Kazakhstan po Statistike.

Agenstvo Respubliki Kazakhstan po Statistike (2000), *Naselenie Respubliki Kazakhstan po polu i vozrastu*, Almaty: Agenstvo Respubliki Kazakhstan po Statistike.

Agenstvo Respubliki Kazakhstan po Statistike (2001), *Demograficeskii ezhegodnik Kazakhstana 2000*, Almaty: Agenstvo Respubliki Kazakhstan po Statistike.

Akhmedova, K.B., B.Ya. Dvoskin, and M.I. Semenova, (1976), *Proizvoditel'nye Sily Vostochnogo Kazakhstana* [The Factors of Production of Eastern Kazakhstan], Alma-Ata: Nauka.

Aleshina, N. and G. Redmond (2003), How High is Infant Mortality in Central and Eastern Europe and the CIS?, *Innocenti Working Papers 95*, Florence: UNICEF Innocenti Research Centre.

Aliev, K. and S. Kadyraliev (1980), *Naselenie Kyrgyzskoi SSR i Razvitie Narodnogo Khoziaystvo*, Frunze: Kyrgyzstan.

Anderson, B. (2004), Unintended Population Consequences of Policies, in *Population and Environment* 25: 4, pp. 377-390.

Andrusz, G. (1984), *Housing and Urban Development in the USSR*. London: MacMillan.

Applebaum, A. (2003), *Gulag: a History*, New York: Doubleday.

Asylbekov, M.Kh. and V.V. Kozina (2000), *Kazakhi (demograficeskie tendetsii 80-90-kh godov*, Almaty: Örkeniet.

Bekmakhanova, N.E. (1980), *Formirovanie Mnogonatsional'nogo Naseleniia Kazakhstana i Severnoy Kirgizii*, Moskva: Nauka.

Bloom, D., D. Canning and J. Sevilla (2001), Economic Growth and Demographic Transition, *NBER working paper 8685*, available at < http://www.nber.org/papers/w8685.pdf> (last acceded 05/01/05), Cambridge (MA): National Bureau of Economic Research.

Bondarskaya, G.A. (1977), *Rozhdaemost' v SSSR*, Moskva: Statistika.

Bushkov, V.I. (1995), *Naselenie Severnogo Tadjikistana: Formirovanie i Rasselenie*, Moskva: RAN.

Charyeva, V.R., E. Yu. Samarkina, and J. M. Sullivan (2000), "Mladenceskaya i detskaia smertnost", in Ministerstvo Zdravokhraneniia i meditsinskoi promyshlennosti Turkmenistana, Nauchno-Kliniceskii Tsentr Okhrany Zdoroviia Materi i Rebenka, and Macro International inc., *Mediko-Demograficeskoe Issledovanie Turkmenistana 2000*, Ashgabat and Calverton (MD): Macro International inc., pp. 89-97.

Gentile, M. (2004), Studies in the Transformation of Post-Soviet Cities – Case Studies from Kazakhstan, *Geografiska Regionstudier 59*, Uppsala: Kulturgeografiska institutionen.

Goskomstat (1989a), Itogi *vsesoiuznoi perepisi naselenia 1979 goda, tom II, chast' I*, Moskva: Goskomstat.

Goskomstat (1989b), Itogi *vsesoiuznoi perepisi naselenia 1979 goda, tom II, chast' II*, Moskva: Goskomstat.

Goskomstat SSSR (1990), *Demograficheskii ezhegodnik SSSR 1990*, Moscow: Finansy i Statistika.

Heleniak, T. (1997), Internal Migration in Russia During the Economic Transition, in *Post-Soviet Geography and Economics* 38: 2, pp. 81-104.

Heleniak, T. (2003), Geographic Aspects of Population Aging in the Russian Federation, in *Eurasian Geography and Economics* 44: 5, pp. 325-347.

Hitztaler, S. (2004), Changing Human Populations in Post-Soviet Kamchatka: An Integrated Study of Shifts in Fertility and Net Population, in *Population and Environment* 25: 4, pp. 335-354.

Hobbs, F. (2004), "Age and Sex Composition", in Siegel, J. and D. Swanson (eds.), *The Methods and Materials of Demography*, San Diego and London: Elsevier Academic Press, pp. 125-173.

Karakhanov, M.K. (1977), "Demograficeskie Protsessy v Sredney Azii vo Vtoroy Polovine XIX Stoletia", in Vishnevskii, A.G. (ed.), *Brachnost', Rozhdaemost' i Smertnost' v Rossii i v SSSR*, Moskva: Statistika, pp. 191-213.

Kasiev, N.K., J. Sullivan, D.K. Kudayarov and T.S. Builashev (1998), "Infant and Child Mortality" in Ministry of Health of the Kyrgyz Republic and Macro International inc., *Kyrgyz Republic Demographic and health Survey 1997*, Bishkek and Calverton (MD): Ministry of Health of the Kyrgyz Republic and Macro International inc, pp. 93-99.

Kohler,H. and I. Kohler (2002), Fertility Decline in Russia in the Early and Mid-1990s: The Role of Economic Uncertainty and Labour Market Crises, in *European Journal of Population* 18, pp. 233-262.

Krongardt, G.K. (1989), *Naselenie Kirgizii v Posledney Treti XIX-Nachale XX Veka*, Frunze.
Malmberg, B. and L. Sommestad (2000), The Hidden Pulse of History – Age Transition and Economic Change in Sweden, 1820-2000, in *Scandinavian Journal of History* 25: 1.2, pp. 131-146.
Ministerstvo Zdravokhraneniia i meditsinskoi promyshlennosti Turkmenistana, Nauchno-Kliniceskii Tsentr Okhrany Zdoroviia Materi i Rebenka and Macro International inc. (2000), *Mediko-Demograficeskoe Issledovanie Turkmenistana 2000*, Ashgabat and Calverton (MD): Macro International inc.
Minmakroekonomstat Respubliki Uzbekistan & Gosarstvennyi Departament Statistiki (2001), *Naselenie Uzbekistana 1991-2001 gody – statisticeskii sbornik*, Tashkent: Minmakroekonomstat Respubliki Uzbekistan & Gosarstvennyi Departament Statistiki.
Mullyadzhanov, I. (1983), *Demograficeskoe Razvitie Uzbekskoi SSR*, Tashkent: Uzbekistan.
Mullyadzhanov, I. (1989), *Naselenie Uzbekskoi SSR – Spravochnik*, Tashkent: Uzbekistan.
Natsional'nyi statisticeskii komitet (2004a), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Batkenskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004b), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Chuyskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004c), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Dzhalalabadskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004d), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Gorkeshena Bishkek, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004e), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Issykkulskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004f), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Narynskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004g), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Oshskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet (2004h), *Kratkie Itogi Pervoi Natsional'noi Perepisi Naselenia Talasskoi oblasti, provedënnoi v marte 1999 goda*, internet resource available at <www.stat.kg>, last acceded 28/09/2004.
Natsional'nyi statisticeskii komitet Kyrgyzskoi Respubliki (2000), *Demograficeskii ezhegodnik Kyrgyzskoi Respubliki 1995-1999 gg*., Bishkek: Natsional'nyi statisticeskii komitet Kyrgyzskoi Respubliki.
Natsional'nyi statisticeskii komitet Kyrgyzskoi Respubliki (2004i), *Itogi pervoi natsional'noy perepisi naselenia Kyrgyzskoi Respubliki 1999 goda*, electronic census database purchasable from the Kyrgyz National Statistics Committee (www.stat.kg).
Polat, N. (2002), *Boundary Issues in Central Asia*, Ardsley (NY): Transnational Publishers.
Schwartz, L. (1986), A History of Russian and Soviet Censuses, in Clem, R. (ed.), *Research Guide to the Russian and Soviet Censuses*, Ithaca: Cornell University Press, pp. 48-69.
Sjöberg, Ö and T. Tammaru (1999), Transitional Statistics: Internal Migration and Urban Growth in Post-Soviet Estonia, in *Europe-Asia Studies* 51: 5, pp. 821-842.
Sommestad, L. (2002), "Ålderstransitionen", in Malmberg, B. and L. Sommestad (eds.), *Befolkning och Välfärd – Perspektiv på Framtidens Välfärdspolitik*, Stockholm: Institutet för Framtidsstudier and LO, pp.142-151.
Statistics Latvia (05/10/2004), *Basic Socio-Economic Indicators*, internet resource, available at <http://www.csb.lv/Satr/grada03.cfm?akurs=Ciedz>.
Statistics Lithuania (05/10/2004), *Vital Statistics*, internet resource available at <http://www.std.lt/web/main.php?parent=595>.
Sullivan, J. and A. Themme (2003), "Infant and Child Mortality", in Department of Health and Human Services (2003), *Reproductive, Maternal and Child Health in Eastern Europe and Eurasia: A Comparative Report*, Atlanta (GA) and Calverton (MD): Division of Reproductive Health and Centre for Disease Control and Prevention.
Tajikistan Development Gateway (21/12/2004), *Sogdiiskaya oblast'*, internet resource, <http://www.tajik-gateway.org/index.phtml?lang=ru&id=1801>.
Tajikistan Development Gateway (29/10/2004), *Zdravokhranenie*, internet resource, <www.tajik-gateway.org/idex.phtml?lang=ru&id=1403>.

Tammaru, T. and Ö. Sjöberg (1999), On the Move: Explaining Migration Patterns in Estonia During the Transition Period, in *International Journal of Population Geography* 1999: 5, pp. 241-260.
TsSU (1962a), *Itogi Vsesoiuznoi Perepisi Naselenia 1959 goda - Kazakhskaia SSR*, Moskva: Gosstatizdat.
TsSU (1962b), *Itogi Vsesoiuznoi Perepisi Naselenia 1959 goda - Kirgizskaia SSR*, Moskva: Gosstatizdat.
TsSU (1962c), *Itogi Vsesoiuznoi Perepisi Naselenia 1959 goda - Tadzhikskaia SSR*, Moskva: Gosstatizdat.
TsSU (1962d), *Itogi Vsesoiuznoi Perepisi Naselenia 1959 goda - Uzbekskaia SSR*, Moskva: Gosstatizdat.
TsSU (1972), *Itogi vsesoiuznoi perepisi naselenia 1970 goda tom II*, Moskva: Statistika.
UNICEF (2002), *Poverty and Welfare Trends in Kyrgyzstan over the 1990s* – Country Paper, Florence: UNICEF Innocenti Research Centre.
UN (06/01/2005), *Moving Mountains – A United Nations Assessment of Development Challenges in Tajikistan*, internet resource at <http://www.undg.org/documents/3414-Tajikistan_CCA__2004_.pdf>.
Urlanis, B.Ts. (1977), "Dinamika urovnia rozhdaemosti v SSSR za gody Sovetskoi vlasti", in Vishnevskii, A.G. (ed.), *Brachnost', Rozhdaemost' i Smertnost' v Rossii i v SSSR*, Moskva: Statistika, pp. 8-27.
World Bank (05/01/05), UNICEF Social Monitor 2003 Reveals Real Mortality Trends in the Caucasus and Central Asia, Beyond Transition, *The Newsletter about Reforming Economies*, internet resource available at <http://www.worldbank.org/transitionnewsletter/julaugsep03/pgs9-10.htm>.
Zayonchkovskaya, Zh. (1999), Recent Migration Trends in Russia, in Demko, G., G. Ioffe, and Zh. Zayonchkovskaya (eds.), *Population Under Duress – The Geodemography of Post-Soviet Russia*, Boulder: Westview Press.

# Appendix

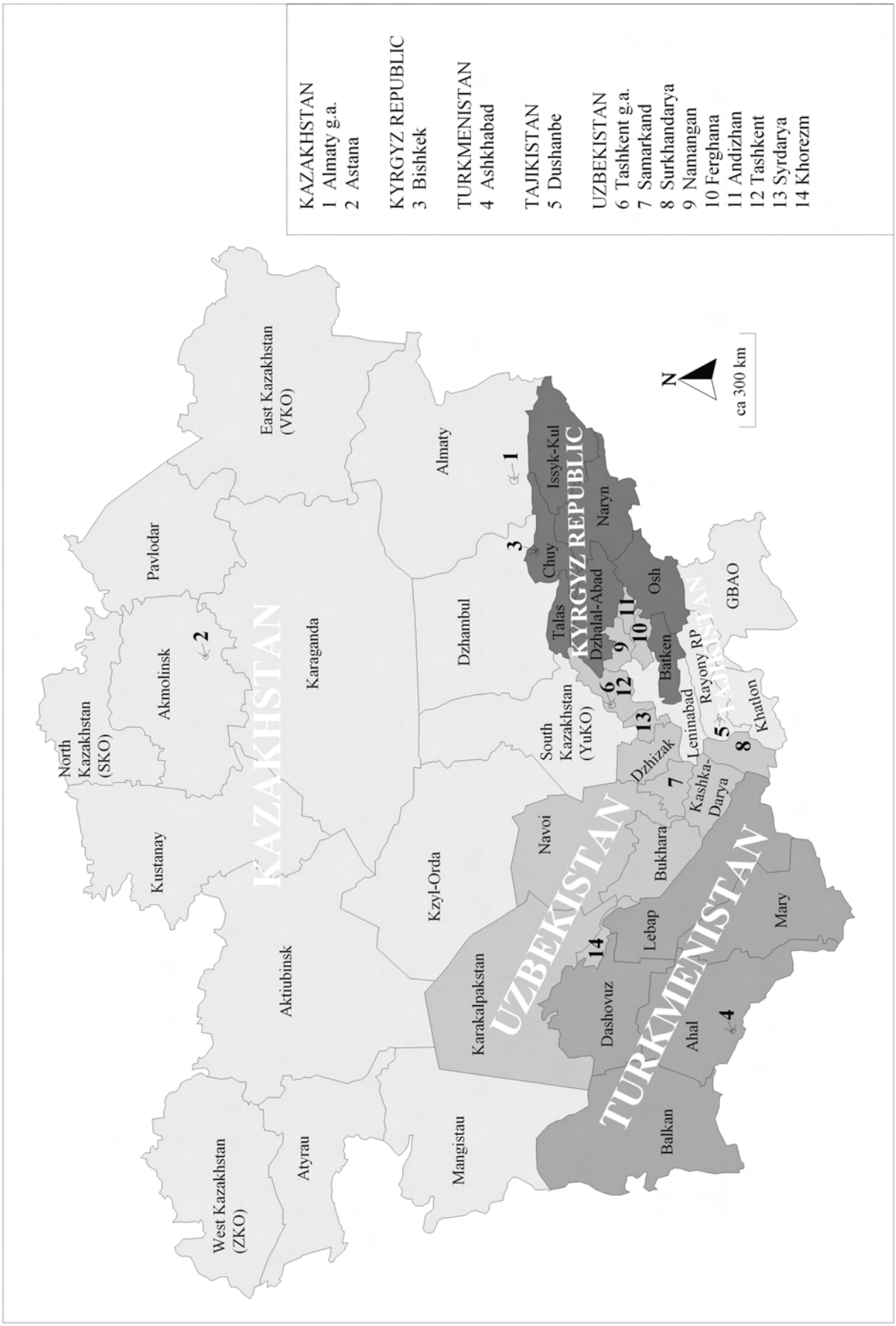



Figure 60: Map of the Central Asian Republics with *oblast'*-level administrative boundaries.

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