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Abstract

The Russian Federation, like most industrial and post-industrial countries, is currently in the midst of a great discussion about how to meet the challenges of population ageing. Again, in common with many other countries, a discussion is taking place regarding both the parameters and, indeed, the very nature of the pension system and the relationship between work and retirement. In this paper, we have sought to present a more systematic representation of ageing in Russia. We have done so by presenting a series of standard and alternative measurements. By doing so, it is possible to suggest that the scale of ageing in Russia is arguably exaggerated precisely by the low pensionable ages. The second contribution of this paper is to explicitly bring in the concept of inequality regarding pension entitlement. Noting that these dimensions of inequality include gender, geography and socioeconomic differentials, we found that the current heterogeneity of conditions of wellbeing in Russia are such that very high degrees of inequality can be detected.

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Russia's broken pension system

The Russian Federation, like most industrial and post-industrial countries, is currently in the midst of a great discussion about how to meet the challenges of population ageing. Again, in common with many other countries, a discussion is taking place regarding both the parameters and, indeed, the very nature of the pension system and the relationship between work and retirement.

Various paradigmatic reforms have been implemented since a partial privatisation and a general switch from a pay-as-you-go type system towards a mixed system with individual accounts was introduced in 2002. However, there has been little clear direction, with what Aasland and Cook refer to as 'zig-zagging pension reform' (Aasland and Cook 2016). Indeed, the partial privatisation was largely reversed in 2013. In recent years, it has been reported that the Pension Fund, already estimated to have a deficit of around two trillion roubles (or around 30 billion USD) (Reuters 2016), has been 'raided' to make up for other budget shortfalls, not least as a consequence of the decline in oil prices (Smith 2015).

Parametric reforms have also been haphazard and often *ad hoc*. These have often been in response to particular economic needs, or related to the electoral cycle. For example, prior to the 2016 parliamentary elections, it was announced that there would be a one-off payment of 5,000RUB (around 88USD) to all pensioners in January 2017. Parametric reforms include the freezing of pension savings and restrictions for working pensioners as well as a de-indexation of the link to inflation. Indeed, this de-indexation was the subject of a recent stir on social media.

The most widely discussed parameter concerns the changing of the age at which one is entitled to receive a pension. Currently Russia has one of the lowest ages of pension eligibility in the world: 60 years for men, and 55 years for women. These ages, broadly in place since 1932, can also be even lower for those working in certain occupations. This discussion has generated some controversy, with politicians, union leaders, and the general public having highly variant perspectives. Indeed, both current Finance Minister Anton Siluanov and his predecessor Aleksey Kudrin have advocated the increase of retirement age in recent years – generally up to an equalised age of 65 (Levine 2015). Indeed, Kudrin gave a clear signal that the retirement age would increase as far back as 2010, but with no change since then (Sputnik International 2010).

An IMF report from 2008 concluded that 'the only realistic alternative to increased pension funding from the federal budget is an increase in the retirement age' (Hauner 2008, 8). While the pension age for civil servants has increased (INTERFAX 2016) there appears to be little appetite among politicians to force through what would be a highly unpopular reform. In his discussion of the October 2016 Budget, Medvedev stated that the government 'would have to address the retirement age issue sooner or later' (INTERFAX 2015). He addressed the issue of the retirement age in an interview with *Rossiiskaya Gazeta* in 2015: 'life expectancy increases throughout the world and so does the retirement age. This is an objective process.' However, he continues that 'we should not jump the gun. This is why we have not taken decisions yet' (INTERFAX 2015). He then suggested that 'we should start with those who are morally prepared' (i.e. the civil servants). Even so, and with the implementation of the reforms, Medvedev stated that many people 'want to retire at 55 or 60, spend quality time with the grandchildren and go to the *datcha*…This position should be respected' (The Russian Government 2015).

Inequality and pensions reform

In common with other countries, there is a fundamental issue of inequality inherent in any legislation which changes access to state pensions. Such inequality is derived from core differences in life expectancy and survivorship. These inequalities have been identified elsewhere as running along at least three different dimensions: class (or occupation), gender and geography (TUC 2013).

Occupational differences in life expectancy have been observed in countries throughout the world. In the UK, for example, the absolute inequality between the highest and lowest occupational classes ('Higher Managerial and Professional' versus 'Routine') in 2007-11 was 5.9 years for males (ONS 2015). In Germany, meanwhile, life expectancy at age 40 differed by more than five years between the lowest and highest income quartiles; by more than six years between those with the highest and least educational attainment, around ten years by work status groups and by almost 15 years according to vocational class (Luy et al. 2015).

Furthermore, it appears that dynamic changes in health and life expectancy are also strongly correlated to socioeconomic position. A recent study of Finnish register data, for example, identified a strong inverse correlation between socioeconomic position and lifespan variation, suggesting that mortality compression is being achieved only by higher occupational classes (van Raalte, Martikainen, and Myrskylä 2014). Indeed, in the UK despite increases in life expectancy over the past three decades, males and females in the 'Routine' class in 2007-10 posted the same life expectancy as those in the 'Higher Managerial and Professional' class in 1982-86 (ONS 2015).

While some of these differences in life expectancy will inevitably be shaped by patterns of mortality at older ages – which will affect the number of people eligible to receive a pension – there is also diversity in life expectancy at older ages – which will affect the *length* of time which someone would receive a pension for. In the UK, for example, the largest gains in terms of life expectancy at age 65 for males were among the highest occupational class who gained five years between 1982-86 and 2007-11, compared to 3.1 years for the 'Routine' class (ONS 2015). Again, in Germany, life expectancy at age 65 ranges from 12.8 to 16.5 in terms of education and from 12.8 to 15.6 in terms of household net income. With regard to vocational class, unskilled workers aged 65 might expect to live for a further 11.5 years, while those working in education can expect to live for a further 18.0 years (Luy et al. 2015).

While some occupation-specific public pension and retirement systems exist (most notably in France although many countries have differential ages for civil servants), taken together, it is easy to see why uniform changes in state pension ages are often seen as a punitive, retrograde tax on those on lower incomes in terms of *access* to benefits (survivorship) and *duration* of payments (longevity at pension age).

A second key dimension in terms of inequalities which can be reinforced upon a universal change in age of access to pension entitlement is gender. Historically, the majority of pensions systems have implemented a *lower* pension age for females – often at age 60 compared to 65 for males. It is well known, of course, that female life expectancy tends to be higher than male (University of California Berkeley (USA) and Max Planck Institute for Demographic Research (Germany) 2013). This might represent something of a paradox then. However, there are in fact a number of valid reasons for earlier pensions systems to deliver such an age discrepancy relating to age at marriage, number of years paying in to social security schemes (with

childbearing impacting upon ability to make equal contributions) and lobbying from various organizations.

In recent years, there has been a general trend towards equalization of age at which entitlement to pensions begin. This equalization, however, has often gone hand in hand with increases in the overall age of entitlement. As such, the increase for women has been particularly steep. In the UK, for example, while women's age of entitlement to state pension was formerly age 60 (compared to 65 for males), it rose to 63 and nine months from April 2017 and 64.5 by April 2018. However, the age for both men and women will increase to 66 by 2020 and to 67 by 2026-28 (ageUK 2017).

The main focus of the discussion relating to inequality has been related to the disproportional effect of these changes on women who not only see the steepest increase in age of access to state pensions, but also suffer a wage penalty over the life course anyway. However, from a demographic perspective, the equalisation of age of entitlement of state pensions (and its continued divorce from differential life expectancy) actually shows an entrenched inequality penalising *males*. Again, in the UK, upon equalization of pension ages at 65, females are projected to receive some GBP20,000 more in lifetime state pension compared to males (TUC 2013). Indeed, once differential survivorship to the pension age is taken into account, this figure will only increase.

Finally, a geographical inequality has been observed in terms of the impact of universal changes in pension systems. These differentials have been generally considered less; not least because they largely reflect in-built inequalities which are prevalent by geography, such as life expectancy and socioeconomic characteristics. However, for policy planning purposes it is important to understand how reforms might disproportionately affect certain regions more so than others. In Germany, for example, important differences in wealth levels have been detected between East and West (Bönke et al. 2016).

Of course, these inequalities can serve to compound each other. Returning to England, a female in the part of the country with the highest life expectancy (East Dorset) can expect to live for 25 years at age 65 in 2016. Meanwhile, a male in Manchester or Glasgow can expect to live for just 15.9 years or 15.2 years respectively (National Records of Scotland 2013; TUC 2013). When translated into lifetime state pension receipts, this means that a 65-year old woman in East Dorset will receive GBP187,200 while a 65-year old male in Manchester will receive GBP119,059. Once socioeconomic differentials are taken into account, these differences can only serve to increase. Of course, these will also reflect differentials in the *contribution* made to the pension system. But here, we are considering inequality as an *outcome*.

Inequalities in Russia

So far, we have identified a number of dimensions by which further pension reform in Russia might not only be politically unpalatable in the domestic context, but also – if the changes seen in other countries are to be replicated – how other inequalities could be entrenched. In this paper, therefore, we seek to further explore the extent to which such inequalities might occur under conditions of pension age reform in the Russian context. In doing so, we hope to be able to present a stronger evidence-base which could underpin any future reforms in terms of the potential impact on inequalities.

Perhaps the most obvious inequality that any further pension reform will entrench is that relating to gendered patterns in mortality and life expectance. Many readers will no doubt be familiar with the sizeable canon of literature regarding the generally parlous state of mortality among males in Russia and some other post-Soviet societies. In the early 1990s, for example, life expectancy at birth fell by some 6.1 years for males and 3.3. years for women (Shkolnikov et al. 1998). Again, the reasons for this mortality 'crisis' have been discussed at length elsewhere: with a contested view between the predominant role of environmental pollution, the collapse of the health system and absolute deprivation versus the model which posits that psychological stress caused by severe economic transition may have been the key driver (Shkolnikov et al. 1998; Stuckler, King, and McKee 2009). Among men, it is generally considered that alcohol abuse has played a key contributory factor in shaping differentials in life expectancy (Zaridze et al. 2009; Carlson 2009). In recent years, however, life expectancy has seen a notable increase; however, male life expectancy is still low by comparative international standards. According to the UN World Population Prospects 2017 , for example, Russian male life expectancy stood at 65.9 – almost 10 years lower than China and two years lower than Iraq (UNPD 2017).

There is a double burden in terms of life expectancy as regards to inequalities relating to pension provision. This is due to a combination of higher mortality both at working ages – largely attributable to accidents, violence, alcohol-related causes and premature cardiovascular mortality (Leon et al. 2010) – coupled with excess mortality at older ages – primarily driven by cardiovascular disease (Meslé 2004; Powles et al. 2005).

A second inequality which is immediately apparent relates to occupation. As part of the so-called 'State Socialist Mortality Syndrome', Carlson and Hoffmann (Carlson and Hoffmann 2011) it has been suggested that a particular style of industrialisation predominant in the USSR in the 1970s and 1980s played a key role not only in shaping mortality, but also contributed to inequalities within the country. This economic shift was characterised by heavy industry, military production, a high prevalence of hard manual labour coupled with very high levels of rural to urban migration and poor living conditions. As well as direct causes of mortality though industrial accidents and so on, the indirect effect of growing psychosocial stress and high prevalence of adverse health behaviours were sizable (Andreev et al. 2009). Various studies have identified a larger socioeconomic differential in mortality in former communist countries than in western Europe, both in the past (see (Kunst et al. 1998)for the 1980s) and more recently (Shkolnikov et al. 2004).

Education level has been used in a variety of studies to identify socioeconomic differentials in mortality outcomes. Studying St Petersburg in the late Soviet period, for example, (Plavinski, Plavinskaya, and Klimov 2003) found that there was, in fact, no recorded increase in mortality among men with university degrees. Among men with the lowest levels of education, however, the increase in mortality was very sharp. Meanwhile, over the course of the 1990s, (Shkolnikov et al. 2006) found that while life expectancy at age 30 *increased* for the highest education group, a significant deterioration occurred among the lowest groups. By 2001, it was estimated that the life expectancy gap in terms of education was 11 years for men and 8-9 years for women. Furthermore, these differentials were found to be widening over the course of the decade (Perlman and Bobak 2008). These differentials have been confirmed in more recent studies. (Todd, Shkolnikov, and Goldman 2016), for example, have found that an additional year of education is associated with a five per cent lower risk of age-specific all-cause and cardiovascular mortality. In particular, they suggest that inflammation biomarkers are best able to account for this relationship.

Elsewhere, other studies have sought to move beyond simply considering education, and exploring other socioeconomic variables. This might be especially important, given the rather weaker relationship between education and income under the Soviet regime. (Bessudnov, McKee, and Stuckler 2012), for example, identified a gap in life expectancy at age 21 of ten years between male managers and professional compared with manual workers, leading them to conclude that 'occupational class position is a powerful determinant of inequalities in mortality among Russian men' (p.336).

Again, these inequalities often act to compound each other. As (Haynes 2013) suggests, 'inequality is both multi-dimensional and cumulative over time'; with it being possible to begin tracking these socioeconomic differentials from birth weight through to death (Grjibovski et al. 2003). As (Vågerö and Kislitsyna 2005) remark, 'if the accumulated experience of economic hardship over the life course can increase heart disease risk, this is certainly relevant for Russia' (p.422).

Moving on: A regional approach?

In the previous section, we outlined how some of the dimensions of inequality seen in other countries can – and have been – applied to the Russian case. Indeed, the particular conditions relating to differential survival and longevity at age 65 mean that pension reforms will only entrench especially deeply engrained inequalities by gender and socioeconomic circumstance. With these prevailing differentials in life expectancy at the national level, it is clear that any change in the pension age will have profound unequal impacts upon different parts of society.

However, one dimension of inequality is much less visible in the literature extant. While local studies of mortality have been performed in Russia (see, for example, (Zaridze et al. 2014; Todd, Shkolnikov, and Goldman 2016; Leon et al. 2010; Plavinski, Plavinskaya, and Klimov 2003), systematic analyses of regional inequalities in terms of mortality are rather rarer (see (Grigoriev, Lapteva, and Lynn 2016) for an historical example). Earlier studies from the transition period identify regional variation in patterns of mortality, but tend to emphasise 'standard' correlates already discussed above, such as urban living, high rates of labour turnover, higher crime levels and so on (Walberg et al. 1998). Regional analyses have identified that the pace of privatisation may have had an impact upon mortality (Azarova et al. 2017). IN their study on mortality at the turn of the twenty-first century, however, (Men et al. 2003) suggested that the *pace* of change in mortality was similar across regions.

Yet, despite the relatively small number of systematic comparative analyses of regional studies of Russian demographic change, the topic is important in terms of both policy formulation and, indeed, on the management and identity of such a diverse country. Indeed, the very nature of defining regional typologies has been discussed.

Russia is a federation with the largest number of federal units in the world, many of which are significantly different in economic and social terms (Klimanov 2007). Russia is a very diversified country, but mostly in economic terms. (Cultural or ethnical difference is mostly concentrated in Muslim republics of North Caucuses and Arctic areas). This diversification substantially increased during post-communist transition of the 1990s. Existing analysis proves that regional polarization was mostly determined by structural differences between regions rather than geographic, political or cultural factors (Fedorov 2002). Then during the economic boom and reconstruction of 2000-2008 polarisation was not reduced: economic growth

concentrated in the capital cities, central Russia and oil and natural gas reach regions of Volga and Siberia. There are also some special features of Russian federalism to consider: federal government concentrated more the 50% of budget revenue and redistributed money among regions. This policy resulted in situation when less than ten of Russian regions were self-sustainable and could rely on the revenue generated within their borders – the rest became recipients of federal aid. It strengthened political unity of the country but cut of regional incentives for investment.

Of course, this situation had clear consequences in regard to social and welfare results including life expectancy and aging. By the mid-2010s one can observe a sharp differentiation in basic demographic indicators in Russian regions.

By taking a regional approach, then, we are able to plug a significant gap in understanding the ageing situation in Russia. The goals, therefore, are two-fold. The first is to better understand the differential extent of population ageing across the regions Russia. This, then, considers, the 'bottom up' approach to policy provision as regards to the challenges of population ageing for regional government.

The second goal, however, is to explore inequalities in ageing at the regional level, with the intention of uncovering the differential regional impact of 'top-down' policy change, especially in terms of a universal reform to pensionable ages.

In order to do so, we will utilise data collected from the database of Federal State Statistics Service (http://cbsd.gks.ru/) and Russian Demographic Data Sheet 2016.

Measuring ageing in Russia

The median age is forecast to rise across the Russian Federation from 36.8 to 44.3 between 2016 and 2035. The old age dependency ratio [OADR] is usually calculated as the relationship between the population aged 65 and over compared those aged 15-64 (or 20-64). In this paper, given our primary interest lies in the potential impact of changing (or not) the Russian pension system, we have calculated the OADR by taking the current differential pensionable age. In other words, the 'boundary to old age' is here set at 60 for males and 55 for females. The lower limit is aged 20. According to these measurements, the OADR would rise from 45.6 in 2015 to 61.8 by 2035.

If we accept that an ageing population has policy impacts above and beyond pension provision, it is important to be have a stronger awareness of regional patterns of ageing. This can allow local authorities to gain a better appreciation of the future challenges which might lie ahead in terms of working population, health and social care provision and so on. Indeed, population ageing is an important question for regional economic and social development at least for two, quite opposite reasons. On the one hand, it may become important source of demand for local output, and on the other hand, it creates pressure on budget systems in this regions and thus determines the prospects of regional growth. Regional governments are responsible for providing support for aging population, and while doing this they often make an 'including error', that is increasing number of the pensioners who get this support without means testing. Support of elderly people in Russian regions is usually 'categorical' and not

targeted to those who really needs this support. (Maleva et al. 2016)[1]. Although basic pension system in Russia is universal and does not depend on region, governments of regions can provide some additional funding to the people who reached pension age. Of course, the level of this support depends on financial prosperity of particular region.

Regions may be divided into four groups depending on their legislation on the social support of older citizens. The first group includes 15 regions, characterized by the introduction of additional "categorical support measures" – measures to support different categories of older citizens, provided without taking into account the income of the applicants. The second group includes 7 regions which have canceled or suspended certain categorical support measures for older citizens in the period from 2014 to 2016. The third group includes 13 regions which have introduced the legislation establishing the thresholds of the applicants' income, limiting their eligibility to claim the social support. The fourth group includes the regions that have introduced some additional non-income based requirements for receiving the social support for the elderly.

The increasing share of aging population is also important for the prospects of regional development. Modern economic growth does need population growth which only partially may be compensated by migration. Moreover, migration in post-communist Russia often results in deterioration in the quality of working age people; Russian population moves primarily westward, to the biggest capital cities while external migration brings to Russia lower quality labour force.

In the previous section, we observed how the median age in Russia is forecast to increase from 36.8 in 2016 to 44.3 by 2035. However, as Figure 1-2 demonstrates, this change is in fact very uneven when considered across the provinces (see Appendix Table A1 for the full list of provinces). Indeed, the figures tell us something rather interesting about the unique nature of Russian provincial demography. In 2016, for example, the two of the three provinces with the *lowest* median age were the Republics of Tuva and Ingushetia. Note from Table 1 above that these are the two provinces with both the highest and the lowest life expectancy respectively. By 2035, however, Tuva is projected to have a median age of just 28.0 – equivalent to Pakistan [26.8]. This is due to a combination of high mortality and high fertility, with Tuva currently having a Total Fertility Rate of 3.4, the highest in the country. As Figure 6 demonstrates, the projected median ages range from the late twenties through to above 48 in Mordovia and the Penza oblast. Compared internationally, forecast median ages above 48 in 2035 would be similar to Singapore, Germany, Greece and Taiwan.

Figure 1: Median age (years), 2016

Figure 2: Projected median age, 2035

[1] The analysis of the contradictory changes in the regional legislation on social support of the senior citizens from 2014 to 2016 has allowed to specify the errors of inclusion and exclusion which increased or decreased in different regions. Approximately half of the regions have introduced new categorical measures of social support for older citizens (growth of inclusion errors, reduction of exclusion errors). Another half have abolished the categorical measures or tightened the rules for assigning measures of social support to the elderly without introduction of checking of the applicants' income (growth of exclusion errors, reduction of inclusion errors). (Maleva et al., 2016).

As already discussed, across the country, the OADR calculated by this means is forecast to rise from 45.6 to 61.8. However, as Figures 3-4 demonstrate, this national figure masks enormous regional variation (see Appendix A1 for the full list of provinces). The country appears to be divided between a 'older' west and a much 'younger' east and south. These forecasts assume steady declines in fertility which is generally higher in these 'younger' areas.

Figure 3: Old Age Dependency Ratio, 2016

Figure 4: Old Age Dependency Ratio, forecast for 2035

Finally, the feminization of older age gas been identified as an important priority for policy in terms of determining the particular gendered needs of citizens in older age (Davidson, DiGiacomo, and McGrath 2011). Such feminization comes about through differential mortality. This is especially the case with regard to Russia. Nationally, the total sex ratio at all ages is 116.0 females per 1000 males – comparative to many countries in the world. At older ages, however, the difference become pronounced. At age 60 at the national level, there are 184 females per 100 males; at age 70, 244 females per 100 males, and at age 80, 310 females per 100 males.

Figures 5-7 present the ratio of females to males at ages 60, 70 and 80 respectively [see Appendix A2 for full table]. At age 60, there are more than 2 females per male in ten provinces, mainly located in the western provinces. At age 70, there are three oblasts where there will be at, or more than three women per man (Murmansk in the far north-east [338 females per 100 males], Ivanovo near Moscow [308] and Karelia in the far west on the Finnish border [297]. At age 80 – albeit with small number caveats – there are more than five women for every man in Magadan oblast in the far north-east, and more than four women per man in six provinces located in both the west and east of the country.

Figure 5: Females per 100 males, 60 and above
Figure 6: Females per 100 males, 70 and above
Figure 7: Females per 100 males, 80 and above

Taken together, then, we can see how the challenges of ageing for Russia are sizable not only at the local level, but are likely to be differentiated strongly at the regional level.

Inequalities in life expectancy

One of the rationales for this paper is to explore in more depth the particular inequalities in older age which characterise the Russian population at the national and regional level. This is important because of the potential implications of future changes to the pension system outlined above. The foregoing section exploring the pace of population ageing across the regions hints at such inequalities; but given that the measurements are based upon a combination of demographic variables (fertility, mortality and migration), determining inequalities – especially as related to mortality – is not possible. In this section, then, we explore various features of change, each time considering the potential role of inequality, especially as considered by gender and geography as reflected in life expectancy.

Figures 8-11 indicate that, in common with other countries, there is a wide range in terms of life expectancy between Russian regions (see Appendix, Table A2 for full list of regions and

their life expectancy at birth and at age 60). For both men and women, there is a considerable range. While there are some regional patterns, these are far from clear cut. For women aged 60, for example, the highest life expectancies are to be found in both the southern republics and the two biggest cities of Moscow and St. Petersburg. Meanwhile, the lowest life expectancies can be found in provinces on the southern border with Mongolia and China and in the far north-east. The entire range between highest and lowest for females (i.e. between the Republic of Ingushetia and the Chukchi Autonomous Area) is 8.4 years.

For males, again, higher life expectancy is concentrated in the southern republic, Moscow and St. Petersburg. Lower life expectancy, meanwhile, is slightly more geographically diverse. While Tuva and the Jewish autonomous republic are on the southern border with Mongolia and China respectively, and Magadan and Amur are in the far north-east, Pskov oblast is actually in the far west of the country, lying on the border with Latvia and Estonia. Even within the Northwestern Federal District, then, there is a life expectancy gap at age 60 of 4.1 years between Pskov and St. Petersburg. As Table 1 shows, the range of life expectancy at age 60 in Russia is almost as great as the range of life expectancy across the entire world. To add further context, there are three provinces where current male life expectancy at birth is lower than the present pensionable age (Tuva [58.1], the Jewish autonomous oblast [59.1]; and Chukchi [59.4]). These three areas have male life expectancies which are roughly comparable with countries such as Burkina Faso [58.0], Malawi [58.2] and Benin [58.5] and are lower than in Least Developed Countries such as Afghanistan [61.1] and Haiti [60.2] (UNPD 2017).

Figure 8: Female life expectancy at birth

Figure 9: Male life expectancy at birth

Figure 10: Female life expectancy at age 60

Figure 11: Male life expectancy at age 60

Table 1: Provinces with the highest and lowest life expectancy at age 60

The foregoing discussion on life expectancy in Russia is salient to the discussion regarding the *length* of time which men and women in differnet regions will likely receive their pension under current and reformed condition. However, as noted earlier, an equally important consideration relates to the extent to which citizens will survive to an age where they will receive any pension at all.

In most industrialised and post-industrial economies characterised by very low level of mid-life mortality this is often taken as a given. However, this is not the case in Russia. Table 2 shows the probability for males and females aged currently aged 40 to survive (under prevailing mortality conditions) until the current pension age, nationally and for the top and bottom five provinces. (The full rankings can be found in Table A5 in the Appendix).

Table 2: Probability of survival of 40 year old males and females to current pension age and possible reformed pensionable age of 65, Russian provinces

Under the current conditions of pensionable age, the probability of a 40-year old woman in the Caucasus republics to survive long enough to receive her pension is almost 100%. In Tuva and the Jewish Autonomous Oblast, the probability is somewhat lower at 0.86 and 0.89 respectively. Under conditions of reform to 65, however, the probability in the Caucuses republic falls somewhat, but still remains above 0.9; compared to 0.86 for the country as a whole. In Tuva, meanwhile, the probability of survival is just 0.71; and 0.76 for the Jewish Autonomous Oblast. In other words, under these reform conditions, and if mortality is held constant, the percentage of current 40-year old women who would survive to receive their pension would decline by up to 15%.

For men, meanwhile, the situation is far starker. At the national level, only some 76% of males aged 40 are anticipated to survive until the current retirement age of 60 if current mortality provisions prevail. If this was raised to 65, this national figure would fall to 65%. In some of the Caucasus republics and in Moscow, the probability is notably higher; in one case more than 0.9. While this declines under our reform scenario, and the figures are still noticeably lower than for females, some provinces see probabilities above 0.8, with Moscow at 0.76.

In the poorest performing provinces, though, survival to pensionable age is very low. In Tuva and the Jewish Autonomous Oblast, less than two-thirds of males aged 40 are expected to survive to the current pensionable age. On the other side of the country, in Karelia (on the Finnish border) the figure is barely higher. However, under our reform scenario, the probability of survival to a pensionable age of 65 is just 0.5 in the Jewish Autonomous Oblast, 0.54 in Tuva and 0.55 in Karelia.

Towards an alternative view of ageing in Russia

What does it mean to be 'old'?

In recent years, there have been numerous studies which have argued that viewing ageing *prospectively* can be just as valuable as considering it *chronologically* (Sanderson and Scherbov 2007, 2010). In other words, a consideration of the age which a person has remaining to live can allow us a to better consider changes in life expectancy, which in turn might provide for better comparisons across time and space. It also helps us to create a more dynamic interpretation of what it means to be 'old' and where the threshold to old age might lie.

Prospective measures of ageing have sought to reappraise what it means to be characterised as 'old' under different circumstances. This is based on the principle that the 'characteristics' of people of the same chronological age will be very different both over time and space (Sanderson and Scherbov 2013). Rather, it might be argued that when viewed *prospectively*, more similar characteristics might be shared. An extreme example of this, is that people with one year of remaining life expectancy fifty years ago are likely to have very much in common with people with one years' remaining life expectancy today; even if their *chronological* ages may well be very different.

A number of studies have sought to try to determine what may be a more helpful 'boundary' to older age based upon remaining life expectancy. Something of a consensus has arisen around determining remaining average life expectancy (RLE) of 15 years as being a

reasonable boundary to old age (Scherbov, Sanderson, and Gietel-Basten 2016; Sanderson and Scherbov 2007; Fuchs 1984). As such, this can prove to be a useful comparison over time. Finally, this is based upon the assumption that the final period of life is the one where the largest expenditures are likely to be made in terms of health and social care and so on (Geue et al. 2014).

In the case of Russia at the national level, RLE at the current pension age is 16.0 for males (at age 60) and 25.6 for females (at age 55). In 1980, the equivalent RLE was 14.3 for males and 23.2 for females. Straightaway, these figures show that not only a large gendered inequality in terms of RLE and pension provision, but also show how – for females especially – the Russian current Russian pension system is out of sync with international comparison. For example, the RLE in the UK for females at the current pensionable age is 19.2.

This approach has been identified and used as a justification for changing the age of pension entitlement, working on the assumption that maintaining pension provision at RLE=15 to track life expectancy would be viable. Indeed, if we explore the *prospective* dependency ratio for Russia as a whole – i.e. placing the 'boundary' to old age at RLE=15 rather than aged 65, the future looks altogether better. Rather than an OADR of 45.6 rising to 61.8 by 2035 based upon current pensionable ages, the national POADR based on RLE=15 is just 18.8 today, forecast to rise to 26.2 by 2035.

As Figures 12-13 show, especially when compared to the OADRs in Figures 3-4, the *POADR*s by region are much lower. Regionally, though, there are clearly similarities to the OADR in terms of broad patterns: of a 'younger' East and South compared to an 'older' West. This shows how a prospective view of population ageing can serve to present perhaps a more 'realistic' view of the scale of ageing when looking more broadly than simply pension provision.

Figure 12: Prospective old age dependency ratio by region, 2015

Figure 13: Prospective old age dependency ratio by region, 2035

Taken together, then, we can arguably use POADR data to clearly show how the current pension system in Russia has become increasingly divorced from changing notions of what it means to be 'old', at least as judged through shifts in life expectancy. As such, we might be able to better justify a national shift in pensionable ages – possibly by rather a high margin.

However, by exploring in further depth what it means to be 'old' in Russia's regions, we can actually get a clearer picture of inherent inequalities and the extent to which nationally imposed policy changes would impact upon people in different regions.

Figures 14-15 presents the ages at which RLE=15 across the regions of Russia (see Appendix Table A4 for the data for all provinces). The maps show a very wide differentiation in the ages at which we might consider to be 'old' across Russia. For female, much of the west and the Caucasus regions are characterised by ages where RLE=15 at around 70. However, in the far north-east and in some southern border provinces, this age is in the low 60s. The difference is perhaps more remarkable for men. In Moscow and Ingushetia, the age at which RLE=15 is 70. In the Jewish autonomous oblast, Tuva and Amur oblast – all in the far east – it is 56.6, 56.9 and 58.0 respectively. Indeed, there are also western provinces such as Pskov with similarly low ages at which male RLE=15.

Figure 14: Age at which RLE=15, females

Figure 15: Age at which RLE=15, males

Discussion and conclusion

The data presented in the previous section demonstrates a number of important characteristics regarding the regional population of Russia. To recap:

- The gap in life expectancy between the regions of Russia is almost as large as it is for the whole world. This is especially the case for males, who in the 'worst' provinces share mortality characteristics with some of the poorest countries on Earth.
- Because of these mortality differentials, older age populations in Russia will be disproportionately female. In some regions, at older ages, female will outnumber males by up to 5-to-1.
- Russia is ageing rapidly by standard measurements. A regional perspective, however, shows us that the country is ageing very *unevenly*, with a 'younger' south and east compared to an 'older' west.
- Applying a *prospective* view of measuring ageing yields a more 'optimistic' view of the total scale of population ageing by redefining what it means to be 'old'. However, because of the high degree of regional differentials in mortality, the 'boundary to old age' is very different across the country.

The implications of our study are two-fold.

From a geographical perspective, our study concurs with some earlier studies of Russian regions (Grigoriev, Lapteva, and Lynn 2016; Fedorov 2002) which suggests that clean-cut distinctions between north, east and west often obscure more than they reveal. While there are certainly concentrations of poorer mortality and differentials in measures of older age, there are also high degrees in intra-regional heterogeneity.

From a policy perspective, we have identified the extent to which regional inequalities are prevalent throughout Russia to a very high degree. The evidence presented here, then, suggests that while reform to the pension system (and other age-related policies) are surely needed in Russia, care must be taken not to further entrench regional and gendered inequalities. It may be possible to reduce regional inequalities by using the formulation in (Sanderson and Scherbov 2015). The formulae in that paper show that holding the pension age constant, in places where life expectancy is lower, the ratio of monthly pension payouts to the accumulated amount paid into the pension plan should be higher. In Russia, as elsewhere, average incomes and longevity are positively correlated across regions of the country. So it is possible that adjusting pension payout ratios based on accumulated pension contributions could improve equality between regions. The details of this, however, remain to be worked out.

There are clearly many obstacles to reform. As in most democratic nations, there is little political appetite in driving through reforms which potentially alienate voters. However, it is not a political cycle problem as it is customary to think. The Russian regime rests upon a broad social base, which is unlikely to be significantly diluted due to the increase in retirement age.

The problem is that there is no clear understanding of the goal that pension reform should achieve. There can be three such goals. First, fiscal - how to save money and reduce the deficit of the pension fund. Secondly, social - how to make the system fairer, not allowing a sharp decline in income of those who retire. Finally, economic (and even structural) goal is to form a modern sustainable model of the pension system.

The first problem is quite simple. The pension fund in its present form is technically separated from the federal budget. However, it makes sense to consider it as a part of the budget and in this perspective its expenses should (or can) be covered by the tax revenues instead of the pension deductions. Anywhere, this should be true in so far as our pension system is based on the solidarity of generations when the working people pay for the retired.

Raising the retirement age to 63-65 years is more a social issue then just a fiscal one. This decision would increase the working-age population by approximately 9 million people (the population of Sweden) and strengthen the target benefit part of the current pension system. All these would allow to steer the payments towards the older retired people whose need for money is more desperate. This is reasonable from both social and macroeconomic perspectives since the pensioners prefer to buy domestically produced goods. The low-income group may stimulate the demand for the domestic products by choosing the cheapest goods.

However, if we look at the pension system in terms of its long-term economic (institutional, structural) challenges, the situation looks different. The modern "working pays of the not working" pension system arose in Germany under Chancellor Otto von Bismarck who back in 1889 introduced an old-age pension program to deter the growth of socialist sentiments. The program applied to the workers who reached the age of 70 while the average life expectancy was 45. Likewise, when the retirement insurance was introduced by Lloyd George in Great Britain in 1908, these figures were respectively 70 and 50. The same "rules of the game" worked for the USSR in the 1930s: the retirement age was adjusted when the life expectancy did not exceed 45 years.

In fact, it was a small bonus for a small group of people who survived up to the retirement age. In addition, the pension did not apply to rural residents, who constituted the majority - it was believed that the peasants are fed from the land and live in large families where the able-bodied generations support the elderly. In short, this pension system could not be a big problem for the budget.

The situation changed significantly during the second half of the twentieth century. The life expectancy grew, and the retirement age was lowering until they crossed at some point. The urban population increased and so did the number of those who could apply for pensions. Then in the 1960s the Soviet peasants were included into the pension system. Then there was a turn of the demographic pyramid. As a result, the older people gradually grew to dominate the younger generations as the number of workers decreased, and the number of pensioners increased. In general, the demographic, social and economic processes have drove the crisis of the traditional 20th century pension system.

Another feature of modern society is the ambiguous attitude of citizens themselves to the prospect of retirement. In the past most people looked forward to retire, but nowadays more and more people want to continue working while for many the very issue of retirement is often viewed as irrelevant. The first include civil servants, judges, professors and academicians who are constantly fighting for the right to work beyond the established limit. Under their pressure, the government periodically makes appropriate changes to the legislation. The free professionals, who work as much as they can and do not expect to live on a state pension in their old age grows in number. These people form their own individual pension strategies.

All these changes make the current debate on the retirement age to look somewhat far-fetched. After all, if we stay in the logic of the founding fathers of the modern pension system, the retirement age in Russia should be adjusted about 80 and for the countries with a longer

life expectancy – about 90. Politically, it looks absurd, although from the financial point of view it may seem justifiable.

The modern society including Russia has outgrown the pension model, developed in the situation of an emerging industrial economy. The search for a modern pension system should go beyond the discussion about age and propose the fundamentally different solutions where the retirement age problem is totally insignificant.

In other words, the future of the pension system mostly depends on the long-term challenges and intellectual readiness of the society (especially the elite) to find the adequate solutions with only minor influence of the short-term political conjuncture.

Considering these inequalities, however, a more holistic policy approach would be to work on reducing the overall net inequalities across the country. In other words, viewing the inequalities in older age that we present here as the *outcome* of other problems in society which need to be better addressed. This requires a deeper understanding of the *drivers* of the inequalities we have presented here.

As Figures 16-17 demonstrate, there are no easy answers, at least in terms of the relationship between life expectancy at birth and the Human Development Index. For females and, especially, males, there is a broadly weak correlation between the two. As such, simply focusing in on general development and hoping for beta-convergence may not be sufficient in itself to close the inequalities.

Figure 16: Scatterplot of relationship between HDI (2010) and life expectancy at birth (2015), females

Figure 17: Scatterplot of relationship between HDI (2010) and life expectancy at birth (2015), males

In the introduction, we identified education level as being a potentially important feature in terms of shaping health outcomes and future trends of mortality in Russia as well as potentially being linked to the capacity of individuals to better financially provide for themselves in the post-work life. In particular, we suggested that differential educational levels could serve to compound regional and gender inequalities which could then be exaggerated as a consequence of further pension reform.

Figures 18-19 show the level of tertiary education among women and men aged 40-45. This age range was used in order to explore the likely educational status of the pensionable population in twenty years' time. The figures again show high levels of inequality and differentiation across the country. In the Caucasus, for example, female tertiary education levels are very low while male attainment is rather high by national standards. In the west, there is something of a divide between provinces with very high tertiary attainment levels, especially for men (such as Moscow (45.5%) and St. Petersburg (35.8%)) compared to rates as low as 13.3% in Kurgan oblast. The lowest tertiary attainment levels for males can be found in Tuva (12.5%). Again, while we some overall patterns, there is not so much of a uniform relationship.

Figure 18: Proportion of population aged 40—45 with tertiary education, females, 2010

Figure 19: Proportion of population aged 40—45 with tertiary education, males, 2010

Of course, continued investment to bridge the gap in education may have some impact on closing the overall gaps in equalities in terms of life expectancy and so on. However, this unidimensional approach not only ignores those who have completed schooling but also overlooks the significance other health-affecting behaviours.

There is a large literature which has sought to determine the primary drivers in shaping national trends in Russian mortality. Numerous studies have identified alcohol as a key contributing factor (Popova et al. 2007; D. Zaridze et al. 2009; Leon et al. 2010). While regional data on alcohol consumption was collected under Soviet rule (Treml 1997), there have been little or no recent systematic comparisons of alcohol consumption at the regional level in Russia. This clearly presents an important avenue for further research. Indeed, a 2002 study identified a positive and significant relationship between alcohol consumption and homicide across Russian regions, with a 1% increase in regional consumption of alcohol associated with an approximately 0.25% increase in homicide rates (Pridemore 2002) – although in this study, rate of deaths due to alcohol poisoning were used as a proxy for the regional aggregate level of alcohol consumption.

Finally, the regional differentiation presented in this paper presents a potentially moral dilemma. There is an argument to be made that the very low survival rates seen in certain parts of Russia, particularly for men, are a result of what might be termed 'self-destructive behaviour' linked to alcohol consumption and violence. Of course, the extent to which this 'self-destructive' behaviour is linked to a lack of social and economic opportunity, poor education, and so on is critical. However, just as there is a danger that polices to increase the pension age will likely have a negative *economic* impact upon Russian women and, especially men, there is also the possible argument that keeping the pensionable age low removes a further incentive to developing health-seeking behaviour among citizens.

Conclusion

Russia is currently facing a series of challenges related to population ageing. Perhaps the most pressing, in terms of policy debate, relates to changes to the age at which citizens are entitled to receive their pensions. While there is a recognition among senior politicians that reform needs to be made, there is little appetite for driving through what would undoubtedly be an unpopular policy.

In this paper, we have sought to present a more systematic representation of ageing in Russia. We have done so by presenting a series of standard and alternative measurements. By doing so, it is possible to suggest that the *scale* of ageing in Russia is arguably exaggerated precisely by the low pensionable ages. By not reforming such pensionable ages over the course of the twentieth- and early twenty-first centuries, the concept of ageing in Russia as based upon pensionable age, as in many other developed countries, has become ever more divorced from the biological reality based on life expectancy. As such, it is possible to use the prospective approach to justify significant reforms to pensionable ages as we seek to reconceptualise the concept of 'old age' and, in turn, justify the support which can be expected from the state.

The second contribution of this paper is to explicitly bring in the concept of inequality regarding pension entitlement. Noting that these dimensions of inequality include gender, geography and socioeconomic differentials, we found that the current heterogeneity of conditions of wellbeing in Russia are such that very high degrees of inequality can be detected.

Aasland, Aadne, and Linda Cook. 2016. “EUROPP – Russia Is Facing a Pension Dilemma as the Country Goes to the Polls.” *LSE EUROPP*. http://blogs.lse.ac.uk/europpblog/2016/09/08/russia-pension-dilemma/.

ageUK. 2017. “Changes to State Pension Age.” *Ageuk.org.uk*. http://www.ageuk.org.uk/money-matters/pensions/changes-to-state-pension-age/.

Andreev, Evgueni, Rasmus Hoffmann, Elwood Carlson, Vladimir Shkolnikov, and Tatiana L. Kharkova. 2009. “CONCENTRATION OF WORKING-AGE MALE MORTALITY AMONG MANUAL WORKERS IN URBAN LATVIA AND RUSSIA, 1970–1989.” *European Societies* 11 (1). Taylor & Francis Group : 161–85. doi:10.1080/14616690802054358.

Azarova, Aytalina, Darja Irdam, Alexi Gugushvili, Mihaly Fazekas, Gábor Scheiring, Pia Horvat, Denes Stefler, et al. 2017. “The Effect of Rapid Privatisation on Mortality in Mono-Industrial Towns in Post-Soviet Russia: A Retrospective Cohort Study.” *The Lancet Public Health* 2 (5): e231–38. doi:10.1016/S2468-2667(17)30072-5.

Bessudnov, Alexey, Martin McKee, and David Stuckler. 2012. “Inequalities in Male Mortality by Occupational Class, Perceived Status and Education in Russia, 1994–2006.” *European Journal of Public Health* 22 (3): 332–37. doi:10.1093/eurpub/ckr130.

Bönke, Timm, Markus M Grabka, Carsten Schröder, Edward N Wolff, and Lennard Zyska. 2016. “The Joint Distribution of Net Worth and Pension Wealth in Germany.” 853. SOEPpapers on Multidisciplinary Panel Data Research . Berlin. https://www.diw.de/documents/publikationen/73/diw_01.c.538110.de/diw_sp0853.pdf.

Carlson, Elwood, and Rasmus Hoffmann. 2011. “The State Socialist Mortality Syndrome.” *Population Research and Policy Review* 30 (3): 355–79. doi:10.1007/s11113-010-9192-z.

Carlson, P. 2009. “Commentary: Russia’s Mortality Crisis, Alcohol and Social Transformation.” *International Journal of Epidemiology* 38 (1). Rutgers Centre of Alcohol Studies, New Brunswick, NJ: 156–57. doi:10.1093/ije/dyn202.

Davidson, Patricia M., Michelle DiGiacomo, and Sarah J. McGrath. 2011. “The Feminization of Aging: How Will This Impact on Health Outcomes and Services?” *Health Care for Women International* 32 (12). Taylor & Francis Group : 1031–45. doi:10.1080/07399332.2011.610539.

Fedorov, Leonid. 2002. “Regional Inequality and Regional Polarization in Russia, 1990–99.” *World Development* 30 (3): 443–56. doi:10.1016/S0305-750X(01)00124-3.

Fuchs, V R. 1984. “Though Much Is Taken: Reflections on Aging, Health, and Medical Care.” *Milbank Memorial Fund Quarterly: Health and Society* 62 (2): 142–66.

Geue, Claudia, Andrew Briggs, James Lewsey, and Paula Lorgelly. 2014. “Population Ageing and Healthcare Expenditure Projections: New Evidence from a Time to Death Approach.” *The European Journal of Health Economics* 15 (8): 885–96. doi:10.1007/s10198-013-0543-7.

Grigoriev, Andrei, Ekaterina Lapteva, and Richard Lynn. 2016. “Regional Differences in Intelligence, Infant Mortality, Stature and Fertility in European Russia in the Late Nineteenth Century.” *Intelligence* 55 (March): 34–37. doi:10.1016/j.intell.2016.01.003.

Grjibovski, Andrej M, Lars O Bygren, Boo Svartbo, and Per Magnus. 2003. “Social Variations in Fetal Growth in a Russian Setting: An Analysis of Medical Records.” *Annals of Epidemiology* 13 (9): 599–605. doi:10.1016/S1047-2797(03)00052-8.

Hauner, David. 2008. “Macroeconomic Effects of Pension Reform in Russia.” Washington DC. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Macroeconomic-Effects-of-Pension-Reform-in-Russia-22297.

Haynes, Mike. 2013. “Social Inequality and the Continuing Russian Mortality Crisis.” *Debatte: Journal of Contemporary Central and Eastern Europe* 21 (1). Routledge: 25–

49. doi:10.1080/0965156X.2013.812312.
INTERFAX. 2015. “Medvedev: Retirement Age Has to Be Raised Sooner or Later.” *Russia Beyond The Headlines*. https://www.rbth.com/politics_and_society/2015/11/11/medvedev-retirement-age-has-to-be-raised-sooner-or-later_539211.
———. 2016. “Putin Signs Law Increasing Pension Age for State Officials |.” *Russia Beyond The Headlines*. https://www.rbth.com/news/2016/05/23/putin-signs-law-increasing-pension-age-for-state-officials_596685.
Kunst, A E, F Groenhof, J P Mackenbach, and E W Health. 1998. “Occupational Class and Cause Specific Mortality in Middle Aged Men in 11 European Countries: Comparison of Population Based Studies. EU Working Group on Socioeconomic Inequalities in Health.” *BMJ (Clinical Research Ed.)* 316 (7145). BMJ Publishing Group: 1636–42. http://www.ncbi.nlm.nih.gov/pubmed/9603745.
Leon, D. A., V. M. Shkolnikov, M. McKee, N. Kiryanov, and E. Andreev. 2010. “Alcohol Increases Circulatory Disease Mortality in Russia: Acute and Chronic Effects or Misattribution of Cause?” *International Journal of Epidemiology* 39 (5): 1279–90. doi:10.1093/ije/dyq102.
Levine, David. 2015. “Russian Finance Minister Proposes Raising Retirement Age: ‘The Faster, the Better.’” *Wsws.org*. https://www.wsws.org/en/articles/2015/05/15/russ-m15.html.
Luy, Marc, Christian Wegner-Siegmundt, Angela Wiedemann, and Jeroen Spijker. 2015. “Life Expectancy by Education, Income and Occupation in Germany: Estimations Using the Longitudinal Survival Method.” *Comparative Population Studies* 40 (4): 399–436. doi:10.12765/CPoS-2015-16en.
Men, Tamara, Paul Brennan, Paolo Boffetta, and David Zaridze. 2003. “Russian Mortality Trends for 1991-2001: Analysis by Cause and Region.” *BMJ (Clinical Research Ed.)* 327 (7421). BMJ Publishing Group: 964. doi:10.1136/bmj.327.7421.964.
Meslé, France. 2004. “Mortality in Central and Eastern Europe.” *Demographic Research* Special 2 (April): 45–70. doi:10.4054/DemRes.2004.S2.3.
National Records of Scotland. 2013. “Life Expectancy for Areas within Scotland.” Edinburgh. https://www.nrscotland.gov.uk/files//statistics/life-expectancy-areas-in-scotland/2013-2015/1315le.pdf.
ONS. 2015. “Trend in Life Expectancy at Birth and at Age 65 by Socio-Economic Position Based on the National Statistics Socio-Economic Classification, England and Wales.” *Statistical Bulletin*. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/trendinlifeexpectancyatbirthandatage65bysocioeconomicpositionbasedonthenationalstatisticssocioeconomicclassificationenglandandwales/2015-10-21#the-soci.
Perlman, Francesca, and Martin Bobak. 2008. “Determinants of Self Rated Health and Mortality in Russia – Are They the Same?” *International Journal for Equity in Health* 7 (1): 19. doi:10.1186/1475-9276-7-19.
Plavinski, S L, S I Plavinskaya, and A N Klimov. 2003. “Social Factors and Increase in Mortality in Russia in the 1990s: Prospective Cohort Study.” *BMJ* 326 (7401): 1240–42. doi:10.1136/bmj.326.7401.1240.
Popova, Svetlana, Jürgen Rehm, Jayadeep Patra, and Witold Zatonski. 2007. “Comparing Alcohol Consumption in Central and Eastern Europe to Other European Countries.” *Alcohol and Alcoholism (Oxford, Oxfordshire)* 42 (5): 465–73. doi:10.1093/alcalc/agl124.
Powles, John W, Witold Zatonski, Stephen Vander Hoorn, and Majid Ezzati. 2005. “The

Contribution of Leading Diseases and Risk Factors to Excess Losses of Healthy Life in Eastern Europe: Burden of Disease Study." *BMC Public Health* 5 (1): 116. doi:10.1186/1471-2458-5-116.

Pridemore, William Alex. 2002. "Vodka and Violence: Alcohol Consumption and Homicide Rates in Russia." *American Journal of Public Health* 92 (12). American Public Health Association: 1921–30. http://www.ncbi.nlm.nih.gov/pubmed/12453810.

Raalte, Alyson A. van, Pekka Martikainen, and Mikko Myrskylä. 2014. "Lifespan Variation by Occupational Class: Compression or Stagnation Over Time?" *Demography* 51 (1): 73–95. doi:10.1007/s13524-013-0253-x.

Reuters. 2016. "Russia Will Not Raise the Retirement Age...Yet | Fortune.com." *Fortune.com*. http://fortune.com/2016/05/28/russia-retirement-age/.

Sanderson, Warren C., and Sergei Scherbov. 2013. "The Characteristics Approach to the Measurement of Population Aging." *Population and Development Review* 39 (4): 673–85. doi:10.1111/j.1728-4457.2013.00633.x.

———. 2015. "An Easily Understood and Intergenerationally Equitable Normal Pension Age." In *The Future of Welfare in a Global Europe*, edited by Bernd Marin, 193–220. Farnham, UK: Ashgate Publishing, Ltd.

Sanderson, Warren C, and Sergei Scherbov. 2007. "A New Perspective on Population Aging." *Demographic Research* 16 (2): 27–58. http://books.google.co.uk/books?hl=en%7B&%7Dlr=%7B&%7Did=LIuKTZQKCSUC%7B&%7Doi=fnd%7B&%7Dpg=PA27%7B&%7Ddq=sanderson+and+scherbov%7B&%7Dots=LlFewhsFue%7B&%7Dsig=L3OMqHe0-mfplCAqj6xKwbtHtUE.

———. 2010. "Remeasuring Aging." *Science* 329: 1287–88. http://www.demographic-challenge.com/files/downloads/9ed31aa1067a5d6a50c644c46812c0fa/dc%7B_%7Dremeasuring%7B_%7Daging%7B_%7Dsanderson%7B_%7Dscherbov%7B_%7Dscience%7B_%7D2010.pdf.

Scherbov, S., W.C. Sanderson, and S. Gietel-Basten. 2016. "Better Way to Measure Ageing in East Asia That Takes Life Expectancy into Account." *Australasian Journal on Ageing*. doi:10.1111/ajag.12267.

Shkolnikov, V. M, Evgueni M Andreev, Domantas Jasilionis, Mall Leinsalu, Olga I Antonova, and Martin McKee. 2006. "The Changing Relation between Education and Life Expectancy in Central and Eastern Europe in the 1990s." *Journal of Epidemiology & Community Health* 60 (10): 875–81. doi:10.1136/jech.2005.044719.

Shkolnikov, Vladimir, Øystein Kravdal, Tapani Valkonen, and Alexander D. Deev. 2004. "Educational Differentials in Male Mortality in Russia and Northern Europe." *Demographic Research* 10 (January): 1–26. doi:10.4054/DemRes.2004.10.1.

Shkolnikov, Vladimir M., Giovanni A. Cornia, David A. Leon, and France Meslé. 1998. "Causes of the Russian Mortality Crisis: Evidence and Interpretations." *World Development* 26 (11): 1995–2011. doi:10.1016/S0305-750X(98)00102-8.

Smith, Geoffrey. 2015. "Here's Another Devastating Raid Russia Is Planning." *Fortune.com*. http://fortune.com/2015/09/30/heres-another-devastating-raid-russia-is-planning/?iid=sr-link1.

Sputnik International. 2010. "Russia's Retirement Age to Be Raised in next Few Years." *Sputnik International*. https://sputniknews.com/russia/20100621159511466/.

Stuckler, David, Lawrence King, and Martin McKee. 2009. "Mass Privatisation and the Post-Communist Mortality Crisis: A Cross-National Analysis." *The Lancet* 373 (9661): 399–407. doi:10.1016/S0140-6736(09)60005-2.

The Russian Government. 2015. "Dmitry Medvedev Is Interviewed by Rossiiskaya Gazeta on the Paper's 25th Anniversary." *Government.ru*. http://government.ru/en/news/20488/#20488=26:1:X2x,27:123:1k2.

Todd, Megan A, Vladimir M Shkolnikov, and Noreen Goldman. 2016. “Why Are Well-Educated Muscovites More Likely to Survive? Understanding the Biological Pathways.” *Social Science & Medicine (1982)* 157 (May). NIH Public Access: 138–47. doi:10.1016/j.socscimed.2016.02.041.

Treml, Vladimir. 1997. “Soviet and Russian Statistics on Alcohol Consumption and Abuse.” In *Premature Death in the New Independent States*. Washington DC: National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK233387/.

TUC. 2013. “Life Expectancy Inequalities and State Pension Outcomes.” London. https://www.tuc.org.uk/sites/default/files/tucfiles/State Pension Age.pdf.

University of California Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). 2013. “Human Mortality Database.” In . www.mortality.org.

UNPD. 2017. “World Population Prospects: The 2017 Revision.” *World Population Prospects: The 2017 Revision*.

Vågerö, Denny, and Olga Kislitsyna. 2005. “Self-Reported Heart Symptoms Are Strongly Linked to Past and Present Poverty in Russia: Evidence from the 1998 Taganrog Interview Survey.” *European Journal of Public Health* 15 (4): 418–23. doi:10.1093/eurpub/cki009.

Walberg, Peder, Martin McKee, Vladimir Shkolnikov, Laurent Chenet, and David A Leon. 1998. “Economic Change, Crime, and Mortality Crisis in Russia: Regional Analysis.” *BMJ* 317 (7154). http://www.bmj.com/content/317/7154/312.

Zaridze, D., D. Maximovitch, A. Lazarev, V. Igitov, A. Boroda, J. Boreham, P. Boyle, R. Peto, and P. Boffetta. 2009. “Alcohol Poisoning Is a Main Determinant of Recent Mortality Trends in Russia: Evidence from a Detailed Analysis of Mortality Statistics and Autopsies.” *International Journal of Epidemiology* 38 (1): 143–53. doi:10.1093/ije/dyn160.

Zaridze, David, Sarah Lewington, Alexander Boroda, Ghislaine Scélo, Rostislav Karpov, Alexander Lazarev, Irina Konobeevskaya, et al. 2014. “Alcohol and Mortality in Russia: Prospective Observational Study of 151 000 Adults.” *The Lancet* 383 (9927): 1465–73. doi:10.1016/S0140-6736(13)62247-3.

TABLES AND FIGURES

Table 1: Provinces with the highest and lowest life expectancy at age 60

	Females, age 60		***Equivalent country***		**Males, age 60**		***Equivalent country***
Highest life expectancy	Republic of Ingushetia	25.7	Sweden (25.7)		Rep. of Ingushetia	22.1	Ireland (22.1)
	Moscow	23.9	Malta (23.9)		Moscow	20.7	Honduras (20.7)
	Rep. of Dagestan	22.8	Croatia (22.7)		Rep. of Dagestan	19.6	UAE (19.5)
	Rep. of North Ossetia - Alania	22.8	Croatia (22.7)		Karachaev-Chercassian Rep.	18.2	Croatia (18.2)
	Sankt-Petersburg	22.7	Turkey (22.7)		Sankt-Petersburg	18.1	Croatia (18.2)
	RUSSIAN FEDERATION	21.5 (S.D. 1.1)			***RUSSIAN FEDERATION***	16.0 (S.D. 1.4)	
Lowest life expectancy	Jewish autonomous oblast	19.6	Libya (19.6)		Magadan oblast	14.1	Lesotho (14.3)
	Zabaikalsk kray	19.5	Cape Verde (19.4)		Pskov oblast	14.0	Ivory Coast (13.8)
	Magadan oblast	18.6	Congo (18.6)		Amur oblast	13.9	Ivory Coast (13.8)
	Rep. of Tuva	17.7	Timor Leste (17.7)		Rep. of Tuva	13.2	Nigeria (13.4)
	Chukchi autonomous area	17.3	Equatorial Guinea (17.3)		Jewish autonomous oblast	13.1	Sierra Leone (13.0, lowest in world)

Table 2: Probability of survival of 40 year old males and females to current pension age and possible reformed pensionable age of 65, Russian provinces

Current pension system				**Possible reformed pension system**			
Males: 40 to 60		***Females: 40 to 55***		***Males: 40 to 65***		***Females: 40 to 65***	
Jewish A.O.	0.64	Rep. of Tuva	0.86	Jewish A.O.	0.50	Rep. of Tuva	0.71
Rep. of Tuva	0.66	Jewish A.O	0.89	Rep. of Tuva	0.54	Jewish A.O.	0.76
Rep. of Karelia	0.68	Amur oblast	0.91	Rep. of Karelia	0.55	Zabaikalsk kray	0.80
Sakhalin oblast	0.68	Irkutsk oblast	0.91	Sakhalin oblast	0.56	Amur oblast	0.80
Amur oblast	0.68	Zabaikalsk kray	0.91	Pskov oblast	0.56	Rep. of Buryatia	0.81
Russia	*0.76*	*Russia*	*0.94*	*Russia*	*0.65*	*Russia*	*0.86*
Kabardian-Balkar Rep.	0.82	Rep. of North Ossetia - Alania	0.96	Kabardian Balkar Rep	0.73	Rep. of North Ossetia - Alania	0.90
Chechen Rep.	0.85	Karachaev-Chercassian Rep.	0.97	Chechen Rep.	0.75	Moscow	0.90
Moscow	0.85	Kabardian-Balkar Rep.	0.97	Moscow	0.76	Kabardian-Balkar Rep.	0.91
Rep. of Dagestan	0.88	Rep. of Dagestan	0.97	Rep. of Dagestan	0.80	Rep. of Dagestan	0.92
Rep. of Ingushetia	0.91	Rep. of Ingushetia	0.98	Rep. of Ingushetia	0.85	Rep. of Ingushetia	0.93

Figure 1: Median age (years), 2016

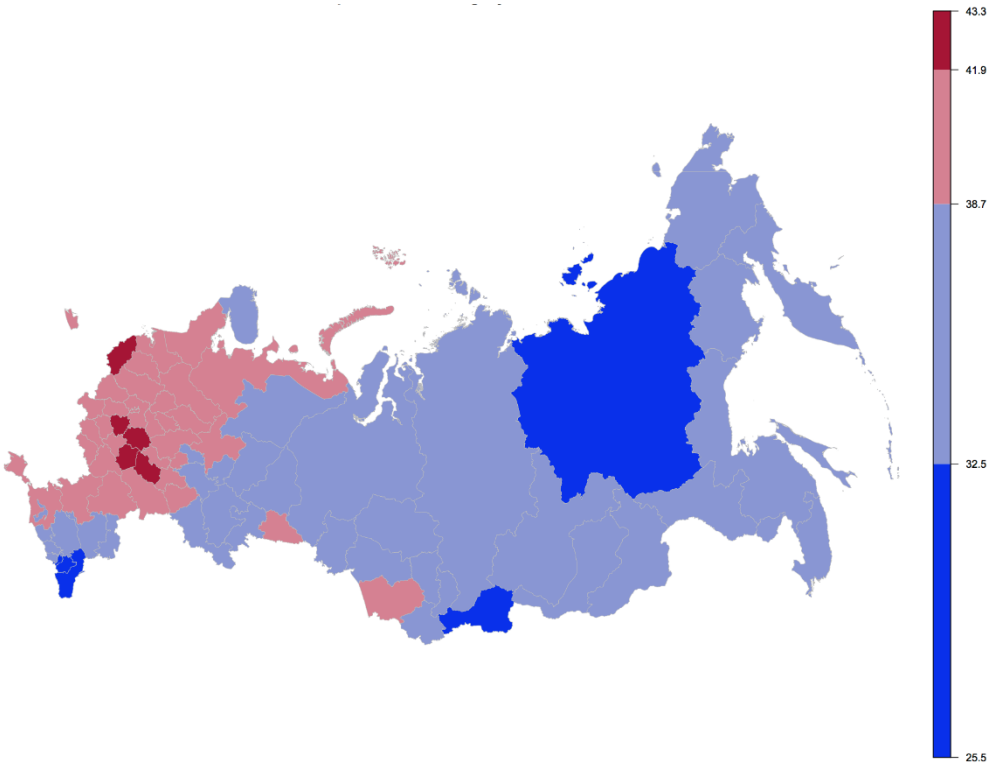


Figure 2: Projected median age, 2035

Figure 3: Old Age Dependency Ratio, 2016

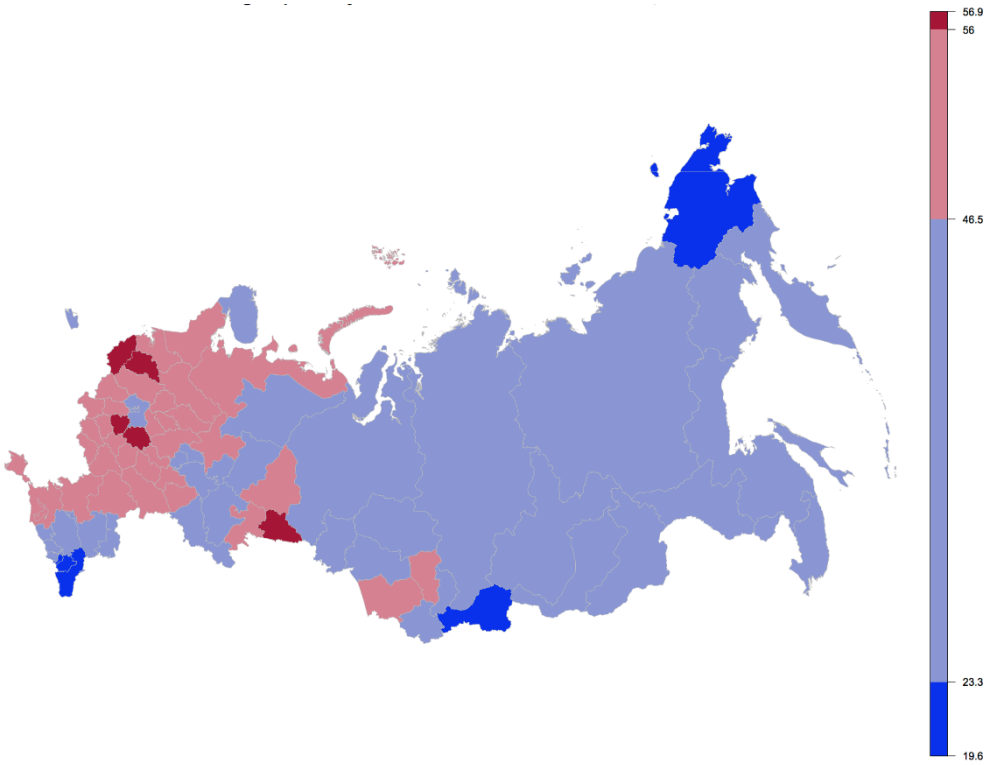


Figure 4: Old Age Dependency Ratio, forecast for 2035

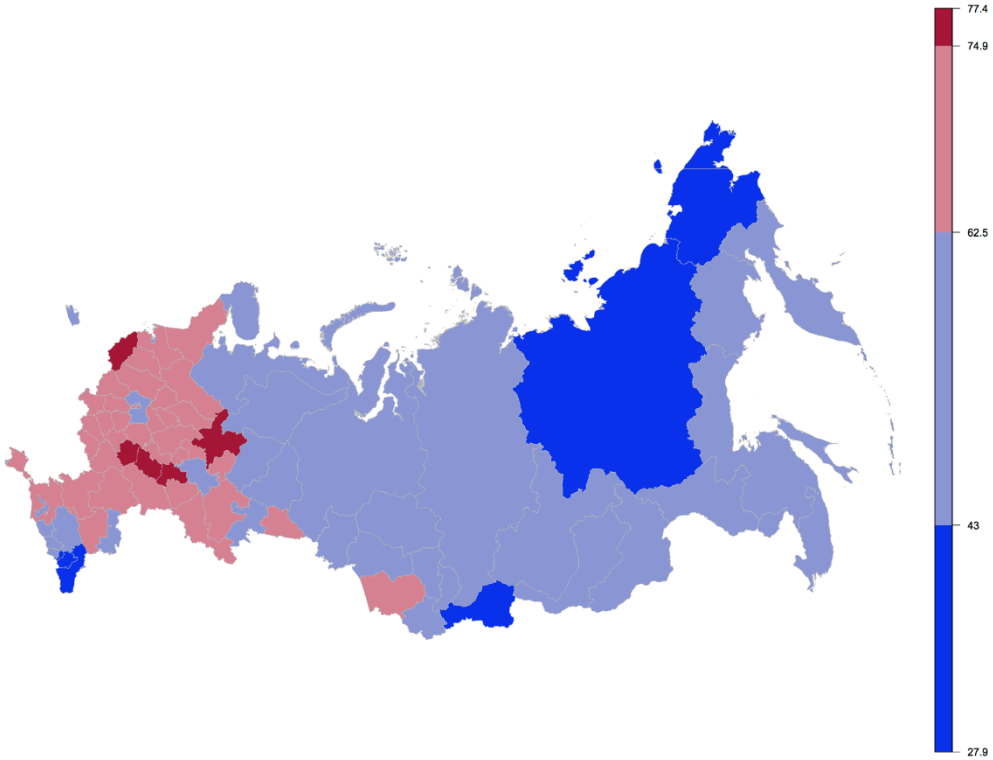


Figure 5: Females per 100 males, 60 and above

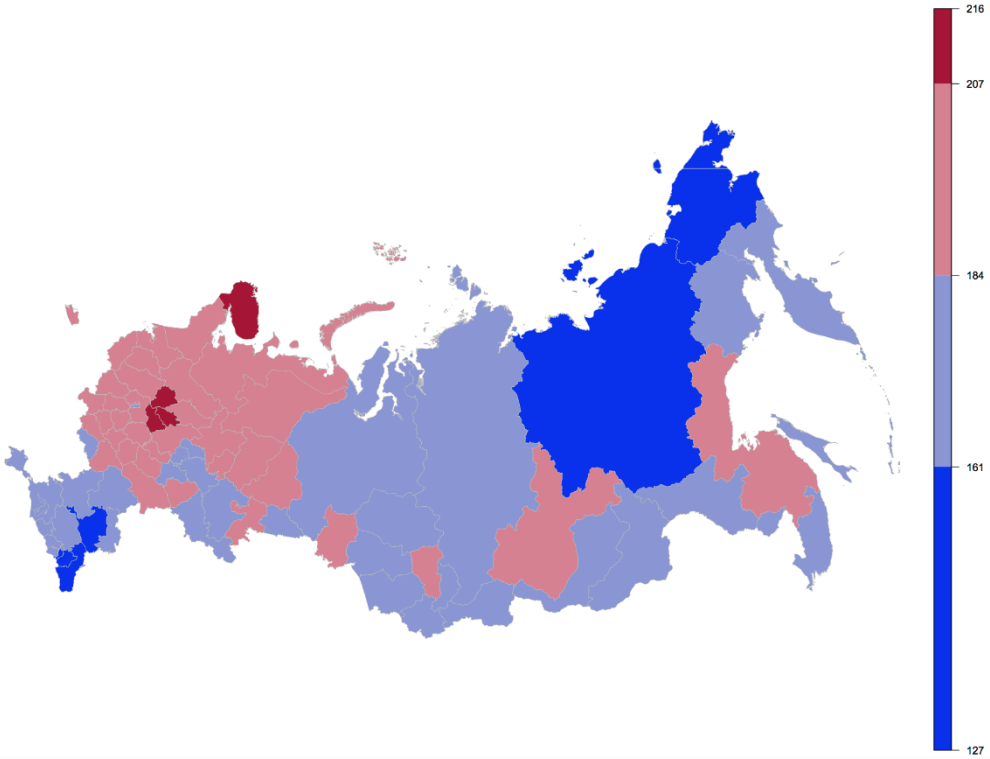


Figure 6: Females per 100 males, 70 and above

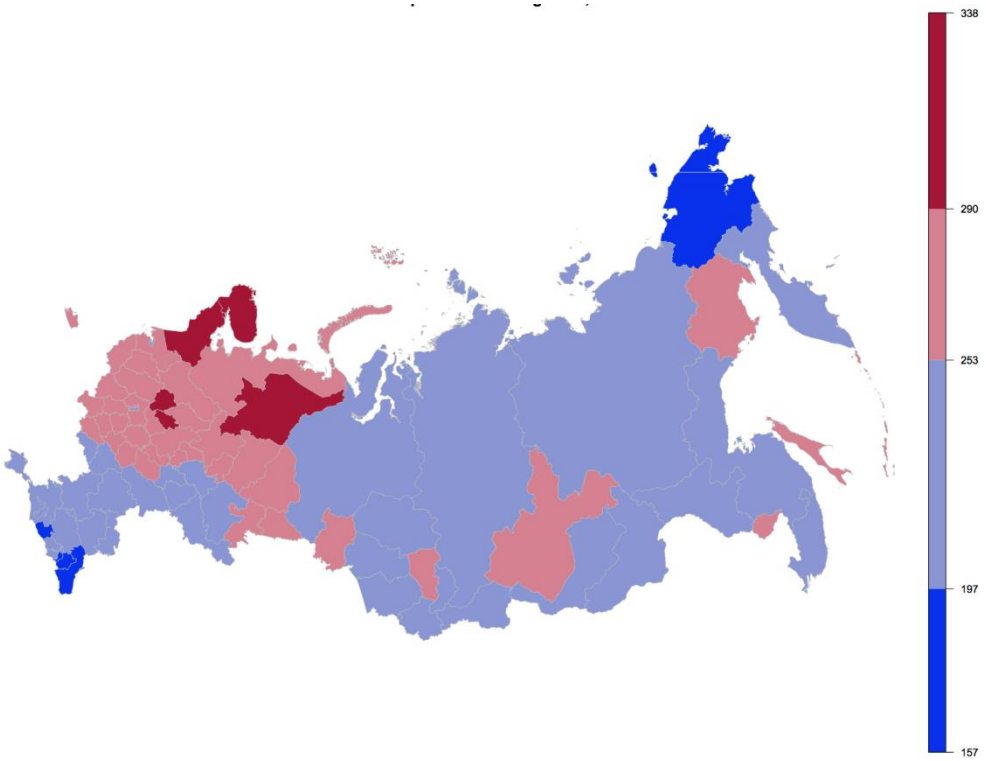


Figure 7: Females per 100 males, 80 and above

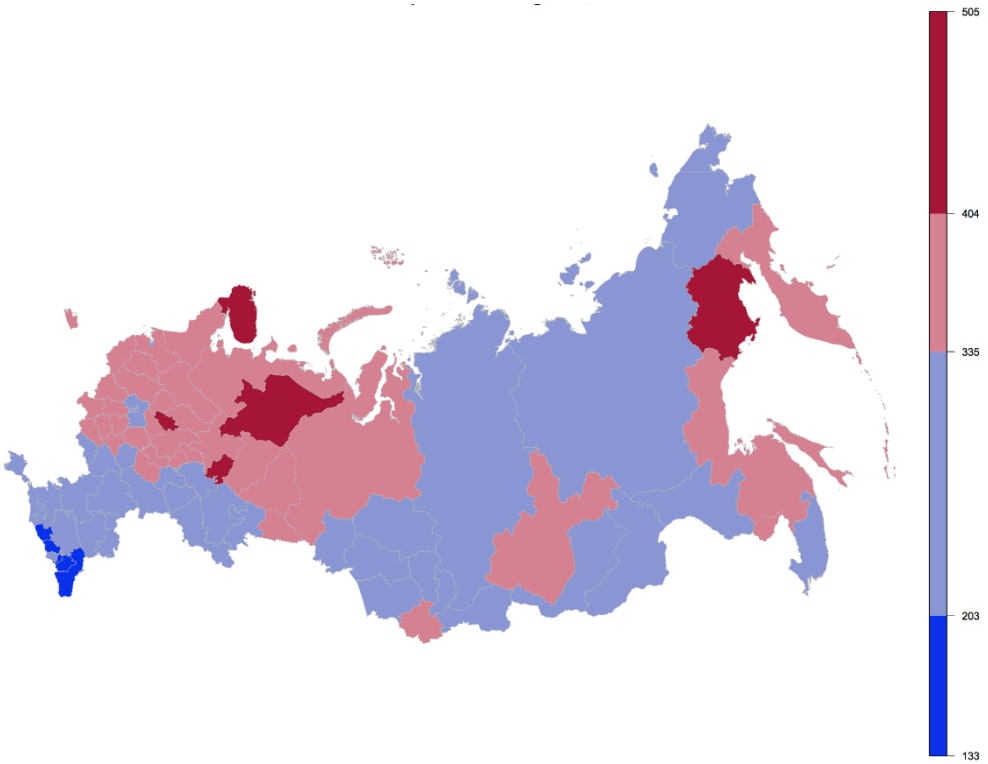


Figure 8. Female life expectancy at birth

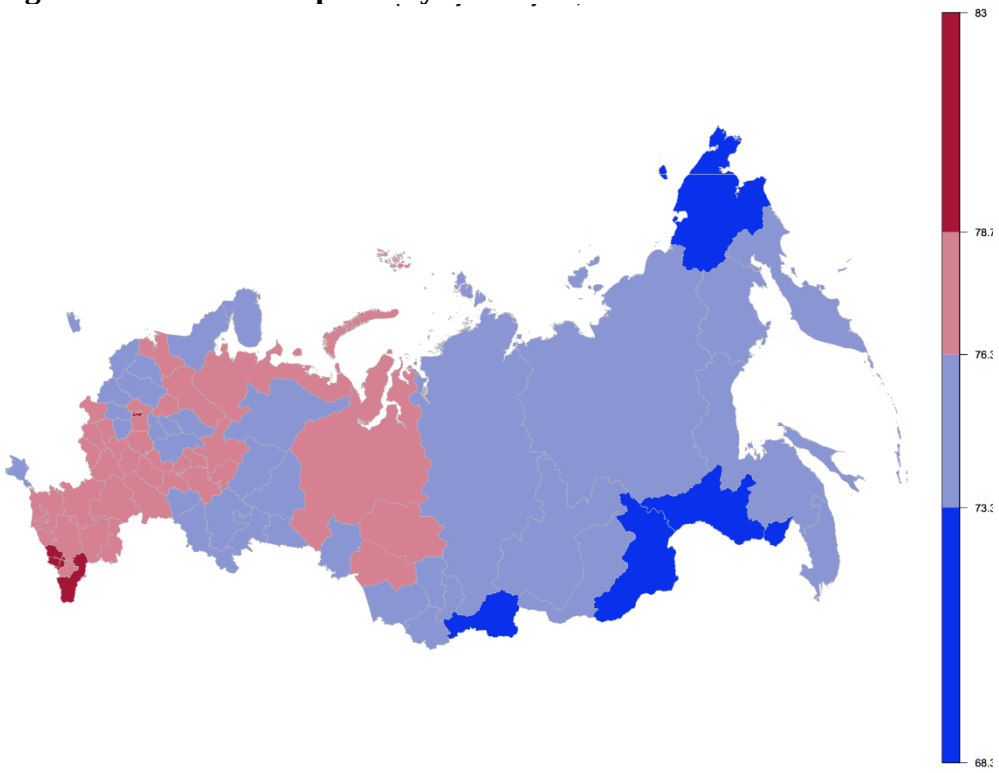


Figure 9. Male life expectancy at birth

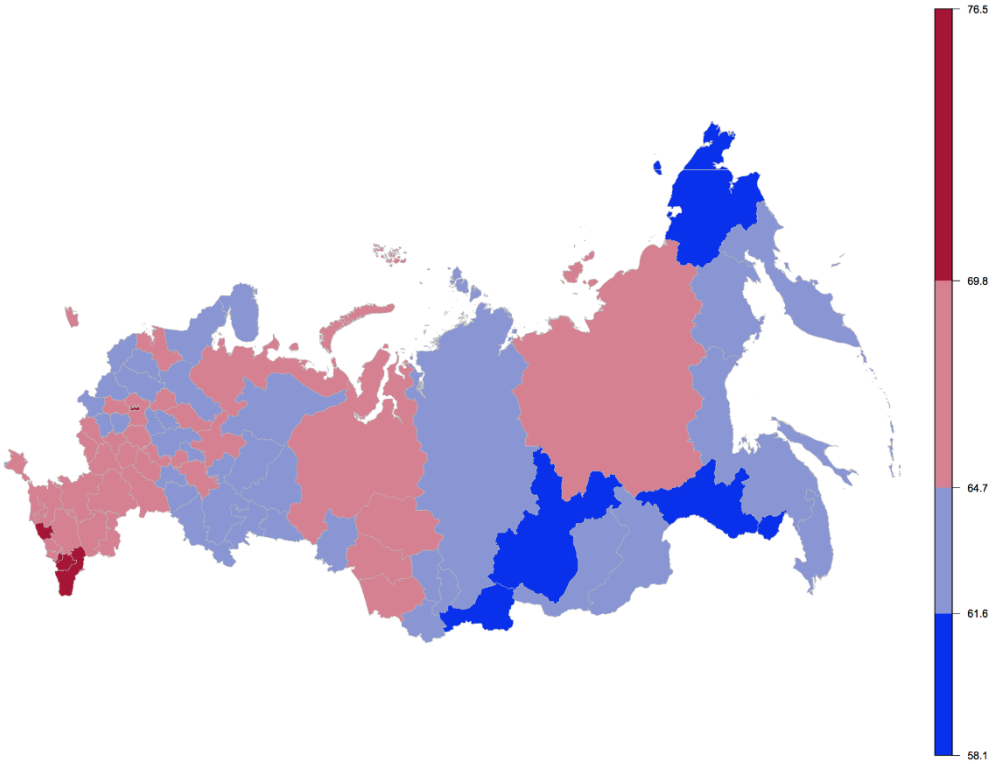


Figure 10. Female life expectancy at age 60

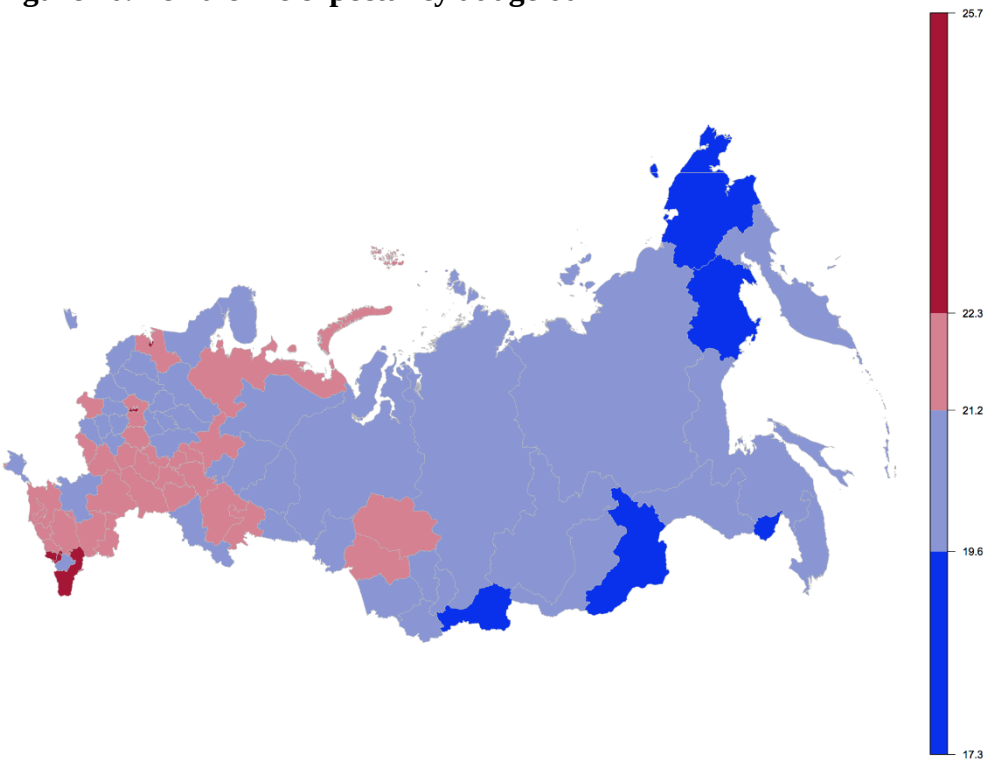


Figure 11. Male life expectancy at age 60

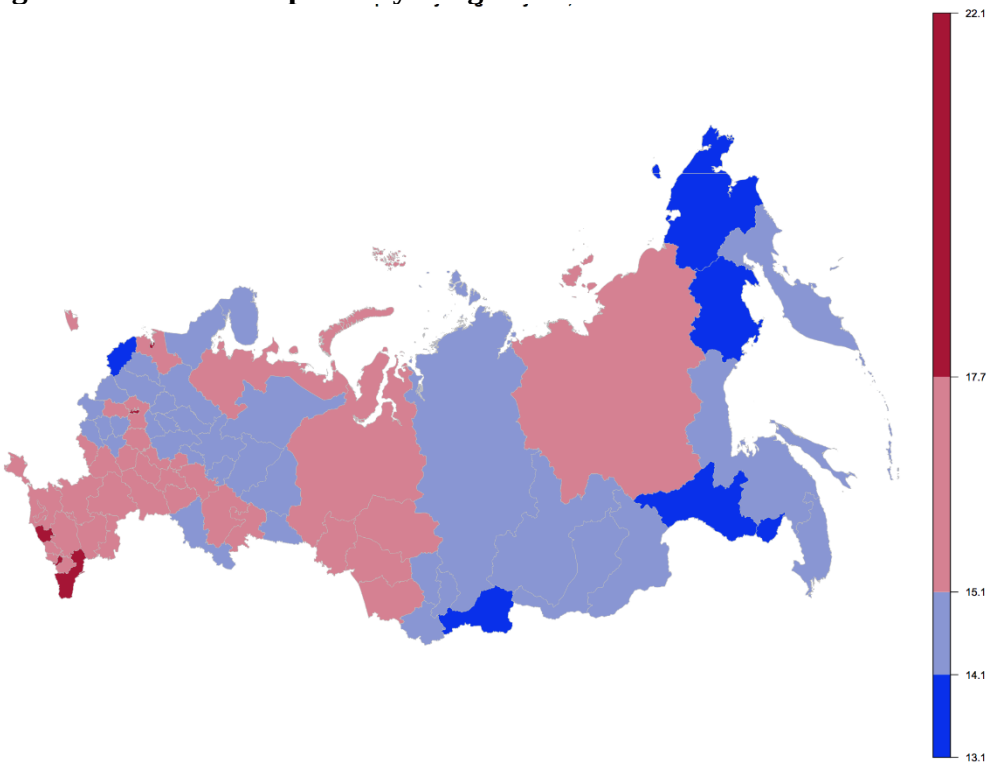


Figure 12: Prospective old age dependency ratio by region, 2015

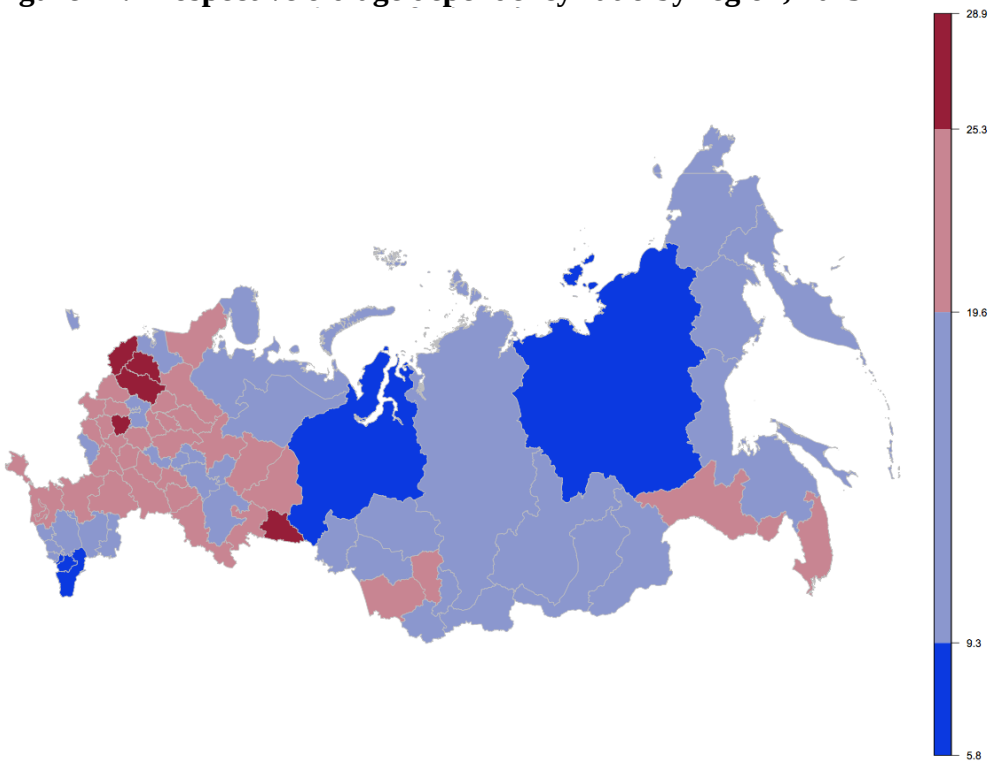


Figure 13: Prospective old age dependency ratio by region, 2035

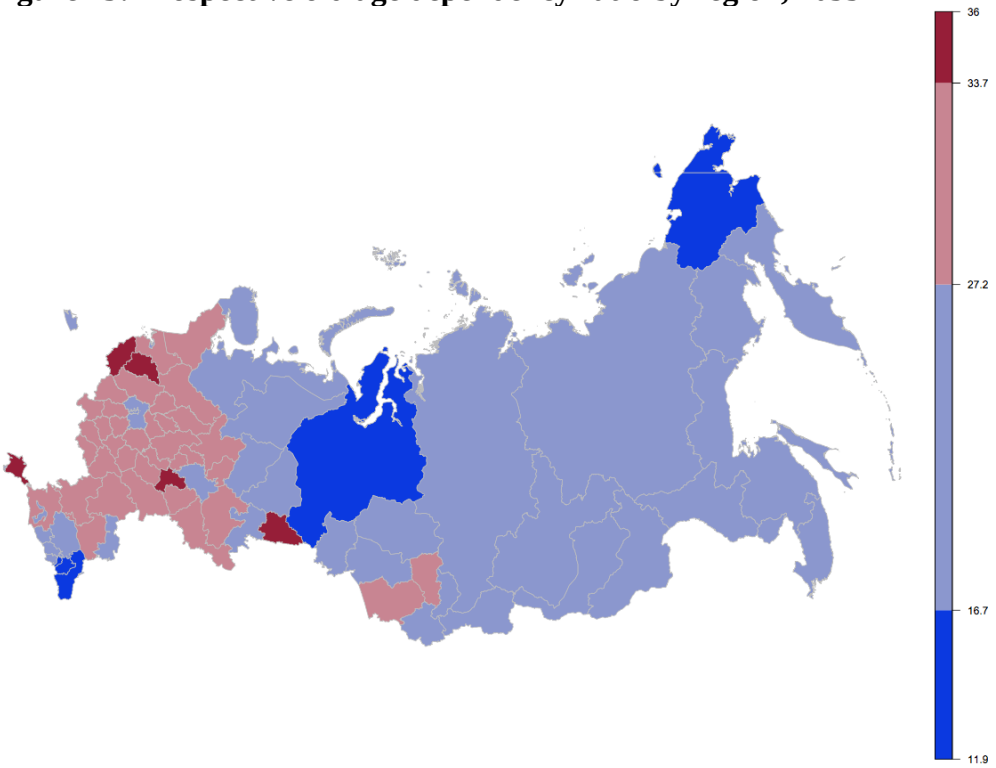


Figure 14: Age at which RLE=15, females

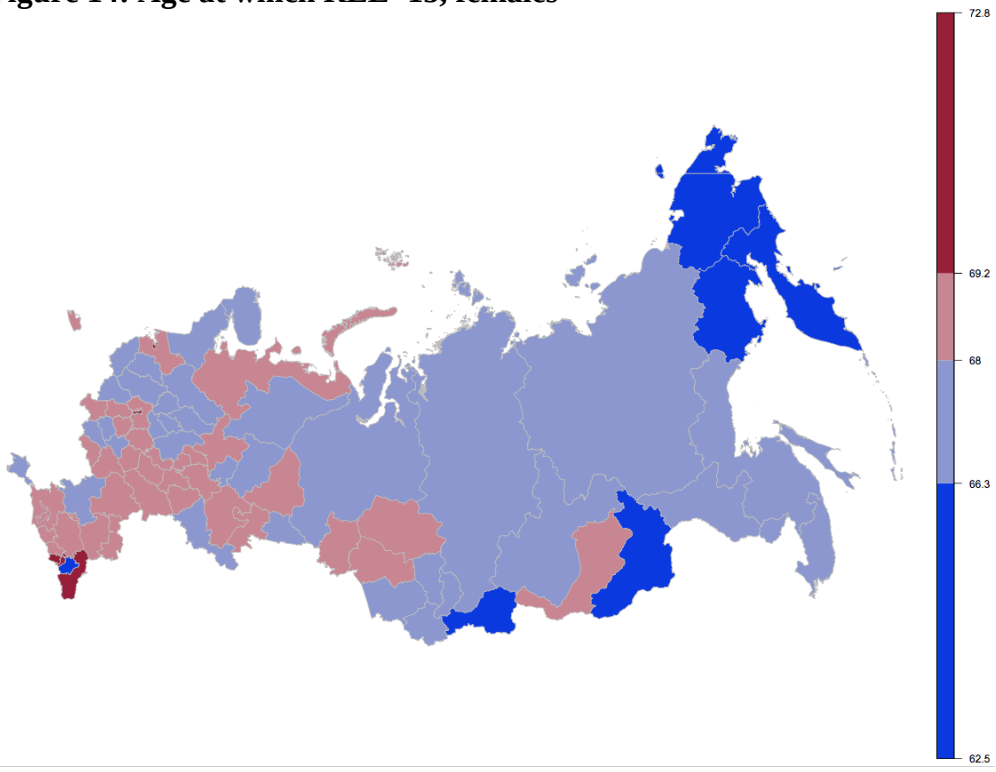


Figure 15: Age at which RLE=15, males

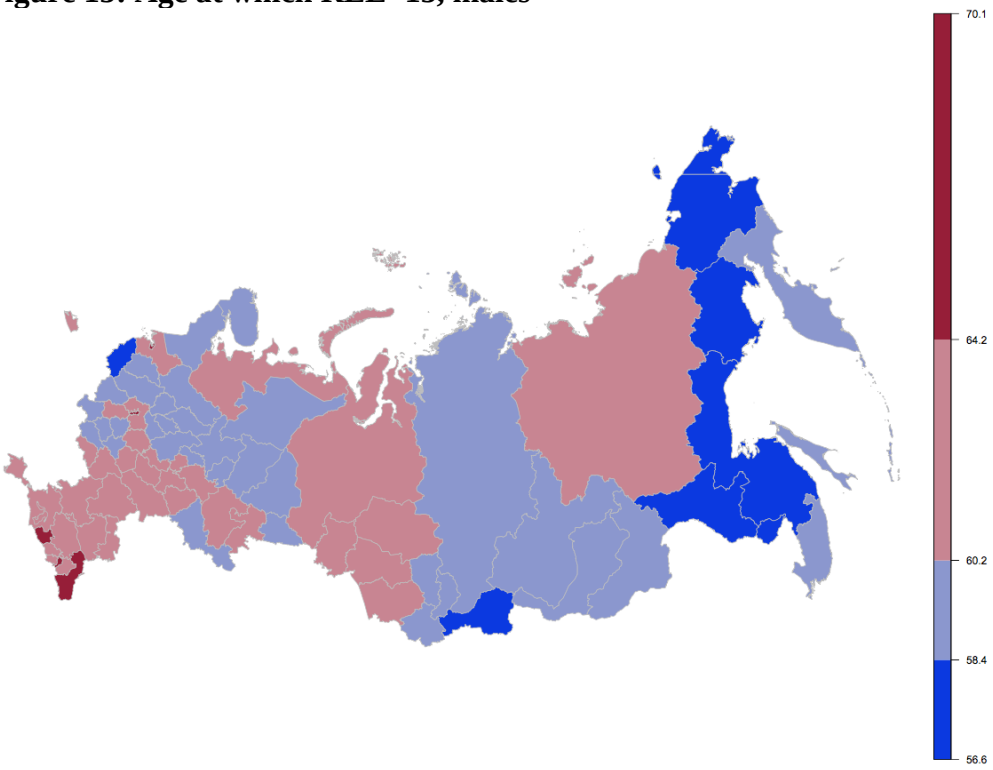


Figure 16: Scatterplot of relationship between HDI (2010) and life expectancy at birth (2015), females

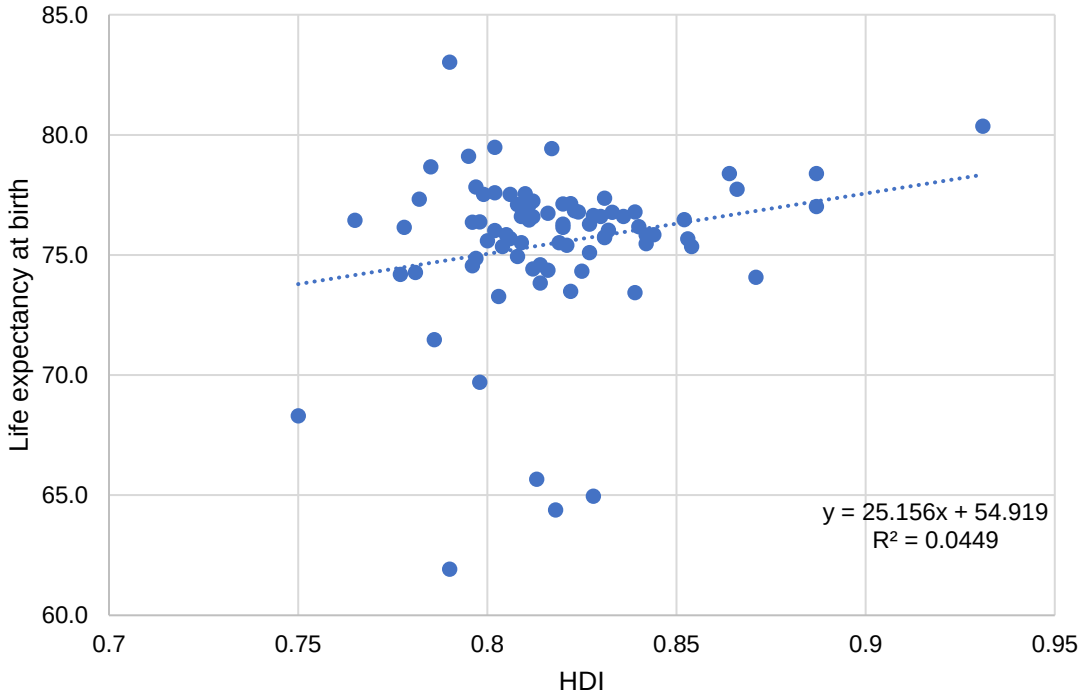


Figure 17: Scatterplot of relationship between HDI (2010) and life expectancy at birth (2015), males

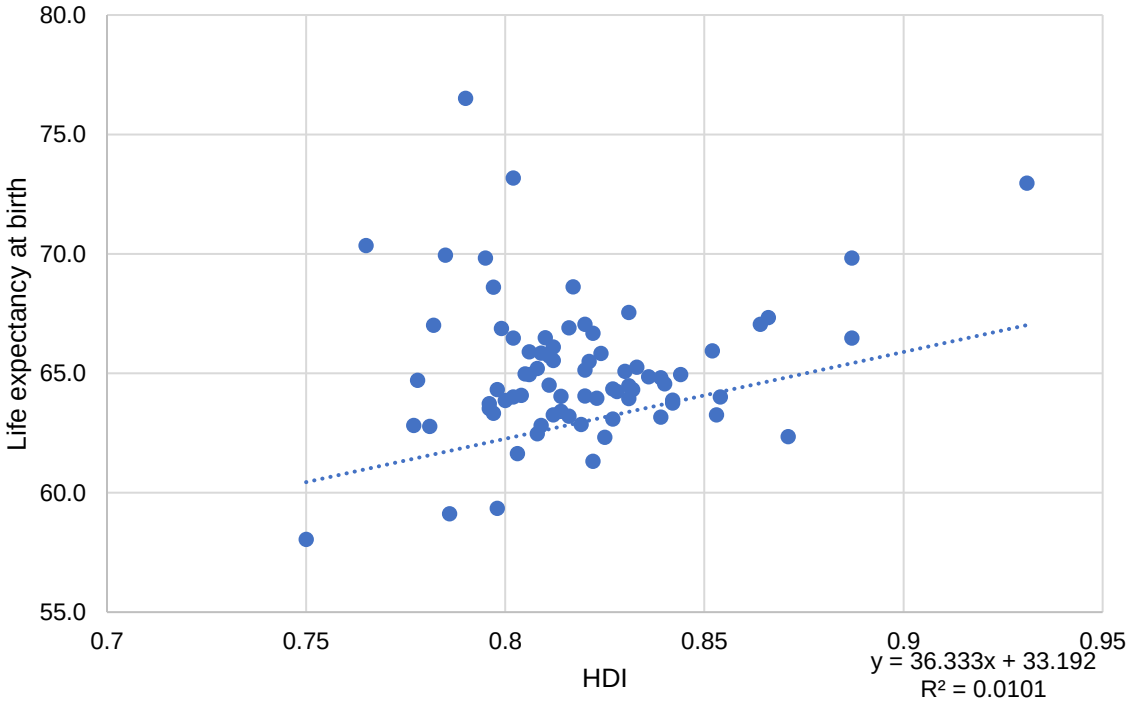


Figure 18: Proportion of population aged 40—45 with tertiary education, females, 2010

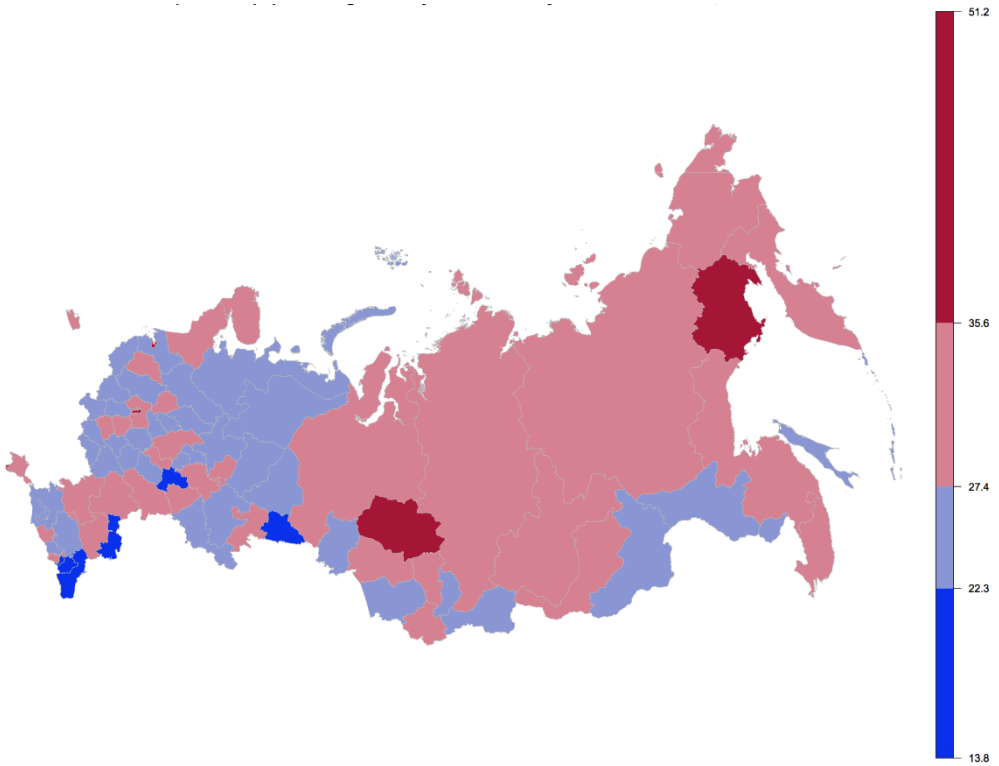
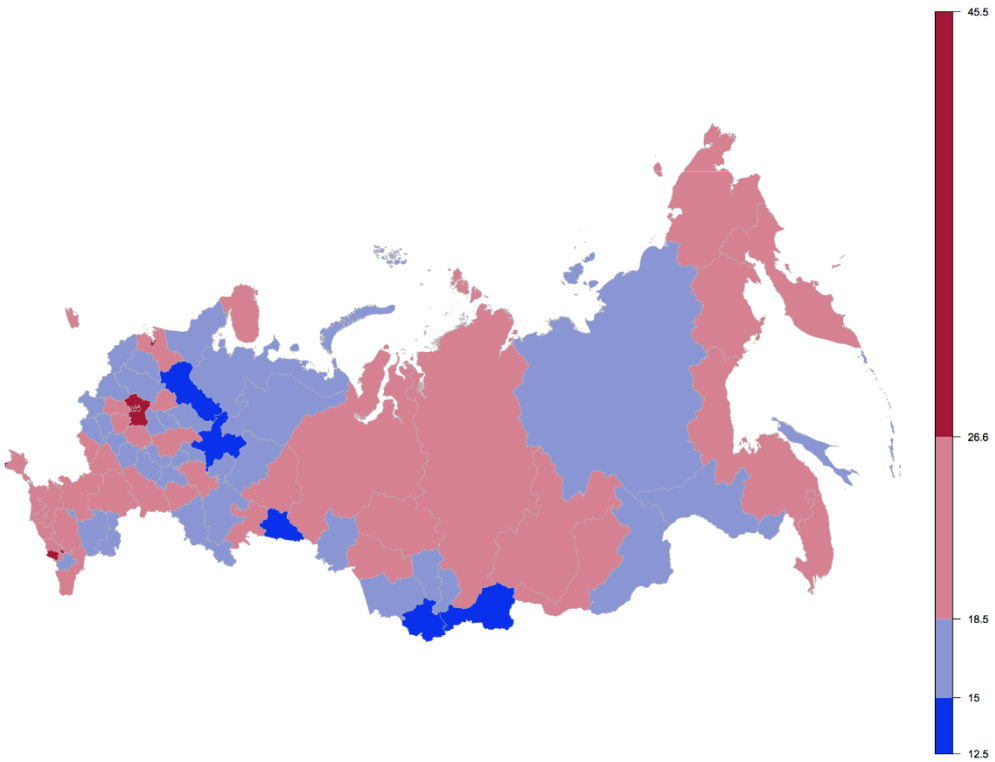


Figure 19: Proportion of population aged 40—45 with tertiary education, males, 2010



APPENDICES

Table A1: Standard measures of ageing, Russian Regions

	Population median age (years)	**Projected population median age** (years)	**Projected population median age, standardized** (years)	**Old-age dependency ratio, women 55+/20-54, men 60+/20-59** (%)	**Projected old-age dependency ratio, women 55+/20-54, men 60+/20-59** (%)
Reference period	**2016**	**2035**	**2035**	**2016**	**2035**
The Russian Federation	**38.8**	**44.3**	**40.9**	**45.6**	**61.8**
Central Federal District					
Belgorod oblast	40.7	46.9	43.7	49.8	71.3
Bryansk oblast	41.2	47.2	43.5	50.8	71.5
Vladimir oblast	41.7	47.1	43.4	54.6	72.5
Voronezh oblast	41.5	46.1	43.0	52.8	66.2
Ivanovo oblast	41.4	46.7	43.6	53.3	70.2
Kaluga oblast	41.2	46.8	43.2	51.2	68.9
Kostroma oblast	41.0	45.6	41.7	52.6	70.7
Kursk oblast	41.8	46.0	42.5	53.3	70.3
Lipetzk oblast	41.6	47.8	44.6	52.2	74.9
Moscow oblast	39.2	44.6	41.2	44.1	55.6
Oryol oblast	41.9	46.9	43.4	54.2	72.7
Ryazan oblast	42.6	46.5	43.0	56.8	72.3
Smolensk oblast	41.5	47.0	43.4	50.8	68.6
Tambov oblast	43.3	47.2	44.0	56.0	75.8
Tver oblast	41.9	46.6	42.5	55.3	72.5
Tula oblast	42.8	47.7	44.1	56.9	71.4
Yaroslavl oblast	41.2	45.5	41.8	53.7	68.1

Moscow	40.9	47.4	45.6	46.5	68.2
Northwestern Federal District					
Rep. of Karelia	40.3	46.1	42.0	49.6	68.3
Rep. of Komi	38.0	41.6	37.5	38.4	53.4
Arkhangelsk oblast	39.5	44.3	40.5	48.0	62.2
Vologda oblast	39.3	45.2	41.2	48.4	66.7
Kaliningrad oblast	39.0	45.2	42.1	44.9	62.5
Leningrad oblast	40.9	46.9	43.3	49.7	70.7
Murmansk oblast	38.1	42.7	38.7	37.3	49.9
Novgorod oblast	41.6	46.8	42.8	56.2	73.5
Pskov oblast	42.2	47.1	42.8	56.2	75.1
Sankt-Petersburg	40.0	43.9	41.2	47.2	62.2
Southern Federal District					
Rep. of Adygeya	38.5	43.7	40.5	47.9	62.5
Rep. of Kalmykia	35.7	44.0	40.8	37.8	66.0
Rep. of Crimea	40.4	47.0	44.2	52.6	70.4
Krasnodar kray	39.2	45.0	42.0	48.3	66.2
Astrakhan oblast	37.2	40.9	37.5	43.7	57.3
Volgograd oblast	40.1	46.2	43.0	49.9	69.3
Rostov oblast	39.9	45.7	42.6	49.1	65.9
Sevastopol	39.7	45.7	42.7	50.9	59.9
North Caucasian Federal District					
Rep. of Dagestan	29.5	36.6	34.5	23.3	43.0

Rep. of Ingushetia	27.7	33.6	32.3	21.7	43.0
Kabardian-Balkar Rep.	34.3	41.1	38.5	35.0	55.7
Karachaev-Chercassian Rep.	35.9	43.8	41.1	38.8	59.5
Rep. of North Ossetia - Alania	36.2	41.3	38.6	43.1	60.8
Chechen Rep.	25.5	28.4	25.7	19.6	28.9
Stavropol kray	37.4	44.2	41.3	43.7	60.6
Volga Federal District					
Rep. of Bashkortostan	37.5	43.1	39.7	42.8	63.8
Rep. of Mariy El	38.5	43.7	39.6	45.4	65.7
Rep. of Mordovia	41.6	48.1	45.2	48.6	71.3
Rep. of Tatarstan	38.0	43.8	40.7	44.4	62.5
Udmurt Rep.	38.1	44.0	40.3	44.8	63.6
Chuvash Rep.	39.1	44.0	40.5	44.6	66.3
Perm kray	38.1	42.5	38.3	45.7	60.4
Kirov oblast	41.5	47.2	42.9	54.7	75.3
Nizhny Novgorod oblast	40.5	45.7	41.8	51.2	66.9
Orenburg oblast	38.5	44.0	40.3	45.7	65.5
Penza oblast	42.2	48.1	44.7	54.3	77.4
Samara oblast	40.1	45.3	42.1	48.9	66.2
Saratov oblast	40.6	46.2	42.9	50.2	68.4
Ulyanovsk oblast	41.9	47.6	44.1	51.7	77.4
Ural federal district					
Kurgan oblast	41.2	45.5	42.1	56.3	74.4
Sverdlovsk oblast	38.7	43.7	40.1	47.5	61.8

Tyumen oblast	34.8	39.5	36.0	28.1	43.4
Chelyabinsk oblast	38.4	43.4	39.9	47.3	60.2
Siberian Federal District					
Rep. of Altai	33.0	41.0	36.7	34.5	54.5
Rep. of Buryatia	33.7	36.6	31.9	36.4	47.7
Rep. of Tuva	28.2	28.0	21.1	21.7	33.5
Rep. of Khakasia	36.6	41.8	37.8	42.8	56.5
Altai kray	39.5	45.8	42.5	50.2	69.5
Zabaikalsk kray	34.2	38.1	33.7	36.7	46.8
Krasnoyarsk kray	37.0	41.7	37.8	40.3	52.6
Irkutsk oblast	36.0	39.7	35.3	41.7	53.4
Kemerovo oblast	38.3	44.3	40.5	46.7	62.1
Novosibirsk oblast	38.1	42.8	39.2	44.7	56.5
Omsk oblast	38.1	43.5	39.8	44.2	62.0
Tomsk oblast	35.9	40.4	37.1	39.7	50.5
Far Eastern Federal District					
Rep. of Sakha (Yakutia)	32.5	34.3	30.9	28.8	40.9
Kamchatka kray	37.4	41.3	37.1	34.0	45.4
Primorsky kray	38.7	43.7	39.5	43.3	56.3
Khabarovsk kray	36.9	41.2	36.9	40.2	48.9
Amur oblast	37.0	42.6	38.5	41.2	51.3
Magadan oblast	38.4	42.9	38.4	35.3	43.2
Sakhalin oblast	38.4	43.8	39.5	41.3	55.7
Jewish autonomous oblast	36.5	38.8	33.6	41.2	50.4

Chukchi autonomous area	35.6	39.1	32.4	22.2	27.9
Reference period	**2016**	**2035**	**2035**	**2016**	**2035**

Table A2: Females per 100 males, Russian provinces

	Number of women per 100 men	**Number of women per 100 men at ages 60+**	**Number of women per 100 men at ages 80+**	**Number of women per 100 men at ages 70+**
Reference period	**2016**	**2016**	**2016**	**2016**
The Russian Federation	**116**	**184**	**310**	**244**
Central Federal District				
Belgorod oblast	117	176	310	239
Bryansk oblast	119	199	358	278
Vladimir oblast	121	209	379	290
Voronezh oblast	118	187	317	252
Ivanovo oblast	122	216	416	308
Kaluga oblast	117	193	349	264
Kostroma oblast	118	195	381	287
Kursk oblast	120	193	342	269
Lipetzk oblast	119	192	345	267
Moscow oblast	116	191	325	254
Oryol oblast	122	197	365	278
Ryazan oblast	119	197	336	268
Smolensk oblast	117	199	383	285
Tambov oblast	117	192	335	269
Tver oblast	120	202	384	290
Tula oblast	122	207	368	288
Yaroslavl oblast	123	209	396	292
Moscow	117	168	242	199
Northwestern Federal District				
Rep. of Karelia	119	205	398	297
Rep. of Komi	112	195	410	291
Arkhangelsk oblast	114	193	368	274
Vologda oblast	117	192	372	276
Kaliningrad oblast	113	190	345	265
Leningrad oblast	114	190	342	261
Murmansk oblast	109	214	489	338
Novgorod oblast	122	207	400	289
Pskov oblast	117	201	386	282

Sankt-Petersburg	121	197	309	243
Southern Federal District				
Rep. of Adygeya	114	173	250	218
Rep. of Kalmykia	108	161	221	209
Rep. of Crimea	117	182	285	229
Krasnodar kray	116	171	258	216
Astrakhan oblast	112	179	283	237
Volgograd oblast	116	182	285	233
Rostov oblast	116	175	260	223
Sevastopol	114	183	301	225
North Caucasian Federal District				
Rep. of Dagestan	108	138	167	157
Rep. of Ingushetia	121	137	133	161
Kabardian-Balkar Rep.	114	163	203	200
Karachaev-Chercassian Rep.	116	162	189	197
Rep. of North Ossetia - Alania	116	177	226	209
Chechen Rep.	103	135	155	166
Stavropol kray	115	175	261	224
Volga Federal District				
Rep. of Bashkortostan	113	176	294	236
Rep. of Mariy El	115	184	376	275
Rep. of Mordovia	115	190	383	273
Rep. of Tatarstan	116	183	314	241
Udmurt Rep.	117	191	408	281
Chuvash Rep.	114	183	341	254
Perm kray	118	194	379	276
Kirov oblast	117	186	392	284
Nizhny Novgorod oblast	121	205	370	287
Orenburg oblast	115	182	327	250
Penza oblast	119	190	354	259
Samara oblast	119	189	317	244
Saratov oblast	119	187	301	240
Ulyanovsk oblast	118	184	335	251
Ural federal district				
Kurgan oblast	118	184	342	257
Sverdlovsk oblast	118	194	359	270
Tyumen oblast	107	164	356	251
Chelyabinsk oblast	118	189	334	255
Siberian Federal District				

Rep. of Altai	111	170	336	253
Rep. of Buryatia	110	177	300	246
Rep. of Tuva	109	169	280	206
Rep. of Khakasia	115	180	325	248
Altai kray	116	177	313	245
Zabaikalsk kray	109	174	298	243
Krasnoyarsk kray	114	184	331	250
Irkutsk oblast	116	192	350	268
Kemerovo oblast	118	188	328	258
Novosibirsk oblast	115	184	319	248
Omsk oblast	116	185	329	255
Tomsk oblast	113	175	304	232
Far Eastern Federal District				
Rep. of Sakha (Yakutia)	106	161	254	211
Kamchatka kray	100	170	404	240
Primorsky kray	109	176	310	233
Khabarovsk kray	110	185	344	249
Amur oblast	111	175	322	245
Magadan oblast	107	167	505	267
Sakhalin oblast	108	176	378	258
Jewish autonomous oblast	111	183	340	255
Chukchi autonomous area	97	127	242	175
Reference period	**2016**	**2016**	**2016**	**2016**

Table A3: Measures of life expectancy, Russian provinces

	Female life expectancy at birth (years)	**Male life expectancy at birth** (years)	**Female life expectancy at age 60** (years)	**Male life expectancy at age 60** (years)	**Population median age** (years)
The Russian Federation	**76.7**	**65.9**	**21.5**	**16.0**	**38.8**
Central Federal District					
Belgorod oblast	77.7	67.3	21.6	15.7	40.7
Bryansk oblast	76.4	64.3	21.3	14.9	41.2
Vladimir oblast	75.6	63.9	20.9	14.5	41.7
Voronezh oblast	77.7	65.7	21.9	15.7	41.5

Ivanovo oblast	76.1	64.7	21.1	14.7	41.4
Kaluga oblast	76.3	65.1	21.2	15.7	41.2
Kostroma oblast	75.7	64.9	20.5	14.6	41.0
Kursk oblast	76.8	64.8	20.8	14.7	41.8
Lipetzk oblast	76.8	65.3	21.2	14.9	41.6
Moscow oblast	77.1	67.1	21.4	16.1	39.2
Oryol oblast	76.8	64.0	21.2	14.7	41.9
Ryazan oblast	77.1	65.7	21.6	15.5	42.6
Smolensk oblast	75.3	64.1	20.9	14.5	41.5
Tambov oblast	77.5	65.9	21.6	15.2	43.3
Tver oblast	74.9	63.3	20.7	14.5	41.9
Tula oblast	76.0	64.0	21.2	14.9	42.8
Yaroslavl oblast	76.7	65.0	21.2	15.1	41.2
Moscow	80.4	73.0	23.9	20.7	40.9
North western Federal District					
Rep. of Karelia	75.5	62.9	20.9	14.5	40.3
Rep. of Komi	75.7	63.3	20.7	14.3	38.0
Arkhangelsk oblast	76.6	64.9	21.5	15.3	39.5
Vologda oblast	76.5	64.4	21.1	14.6	39.3
Kaliningrad oblast	75.4	65.5	21.1	15.7	39.0
Leningrad oblast	76.6	65.8	21.6	16.1	40.9
Murmansk oblast	75.7	64.5	20.7	14.8	38.1
Novgorod oblast	74.9	62.5	20.7	14.6	41.6

Pskov oblast	74.3	62.8	20.4	14.0	42.2
Sankt-Petersburg	78.4	69.8	22.7	18.1	40.0
Southern Federal District					
Rep. of Adygeya	77.5	66.9	21.4	16.3	38.5
Rep. of Kalmykia	77.3	67.0	21.9	16.4	35.7
Rep. of Crimea	75.6	65.3	20.6	15.4	40.4
Krasnodar kray	77.4	67.6	21.5	16.6	39.2
Astrakhan oblast	76.6	66.1	21.6	16.4	37.2
Volgograd oblast	77.1	66.7	21.6	16.1	40.1
Rostov oblast	76.7	66.9	21.1	16.2	39.9
Sevastopol	76.2	64.7	21.3	15.8	39.7
North Caucasian Federal District					
Rep. of Dagestan	79.5	73.2	22.8	19.6	29.5
Rep. of Ingushetia	83.0	76.5	25.7	22.1	27.7
Kabardian-Balkar Rep.	79.1	69.8	22.2	17.7	34.3
Karachaev-Chercassian Rep.	78.7	69.9	22.0	18.2	35.9
Rep. of North Ossetia - Alania	79.4	68.6	22.8	17.6	36.2
Chechen Rep.	76.4	70.4	19.9	16.6	25.5
Stavropol kray	77.8	68.6	21.6	16.8	37.4
Volga Federal District					

Rep. of Bashkortostan	76.0	64.3	21.5	15.5	37.5
Rep. of Mariy El	76.4	63.5	21.4	14.8	38.5
Rep. of Mordovia	77.5	66.5	21.5	15.2	41.6
Rep. of Tatarstan	78.4	67.1	22.3	16.2	38.0
Udmurt Rep.	76.6	64.2	21.1	14.9	38.1
Chuvash Rep.	77.2	65.5	21.8	15.8	39.1
Perm kray	75.1	63.1	20.8	14.4	38.1
Kirov oblast	77.1	65.2	21.4	14.9	41.5
Nizhny Novgorod oblast	76.1	64.1	21.1	14.9	40.5
Orenburg oblast	75.5	63.9	21.0	15.1	38.5
Penza oblast	77.6	66.5	21.5	15.4	42.2
Samara oblast	76.3	64.3	21.4	15.7	40.1
Saratov oblast	76.8	65.8	21.3	15.8	40.6
Ulyanovsk oblast	76.5	64.5	21.4	15.4	41.9
Ural federal district					
Kurgan oblast	75.5	62.8	21.0	14.9	41.2
Sverdlovsk oblast	75.8	63.8	21.2	15.1	38.7
Tyumen oblast	77.0	66.5	21.2	15.6	34.8
Chelyabinsk oblast	75.8	63.9	21.3	15.4	38.4
Siberian Federal District					
Rep. of Altai	74.2	62.8	20.6	14.5	33.0
Rep. of Buryatia	74.5	63.7	21.0	14.9	33.7

Rep. of Tuva	68.3	58.1	17.7	13.2	28.2
Rep. of Khakasia	73.8	63.4	20.1	14.7	36.6
Altai kray	75.8	65.0	21.0	15.5	39.5
Zabaikalsk kray	73.0	61.9	19.5	14.2	34.2
Krasnoyarsk kray	75.3	64.0	20.8	15.0	37.0
Irkutsk oblast	73.5	61.3	20.5	14.7	36.0
Kemerovo oblast	74.3	62.3	20.9	14.9	38.3
Novosibirsk oblast	76.6	65.1	21.6	15.6	38.1
Omsk oblast	76.2	64.6	21.2	15.2	38.1
Tomsk oblast	76.5	65.9	21.4	16.1	35.9
Far Eastern Federal District					
Rep. of Sakha (Yakutia)	75.8	64.9	20.8	15.9	32.5
Kamchatka kray	74.4	63.3	19.7	14.2	37.4
Primorsky kray	74.6	64.0	20.5	14.8	38.7
Khabarovsk kray	74.4	63.2	20.3	14.2	36.9
Amur oblast	73.3	61.6	19.8	13.9	37.0
Magadan oblast	73.4	63.2	18.6	14.1	38.4
Sakhalin oblast	74.1	62.4	19.9	14.2	38.4
Jewish autonomous oblast	71.5	59.1	19.6	13.1	36.5
Chukchi autonomous area	69.7	59.4	17.3	14.1	35.6
Reference period	*2015*	*2015*	*2015*	*2015*	*2016*

Table A4: Age at which remaining life expectancy = 15 years ('boundary to old age')

	Female old-age threshold (years)	**Male old-age threshold** (years)
Reference period	**2015**	**2015**
The Russian Federation	**68.4**	**61.7**
Central Federal District		
Belgorod oblast	68.2	61.2
Bryansk oblast	68.1	59.9
Vladimir oblast	67.6	59.2
Voronezh oblast	68.6	61.3
Ivanovo oblast	68.0	59.4
Kaluga oblast	68.1	61.2
Kostroma oblast	67.2	59.1
Kursk oblast	67.5	59.5
Lipetzk oblast	68.0	59.8
Moscow oblast	68.1	62.0
Oryol oblast	67.8	59.4
Ryazan oblast	68.4	60.9
Smolensk oblast	67.7	59.1
Tambov oblast	68.4	60.4
Tver oblast	67.5	59.1
Tula oblast	68.1	59.9
Yaroslavl oblast	68.0	60.1
Moscow	71.3	69.7
Northwestern Federal District		
Rep. of Karelia	67.8	59.0
Rep. of Komi	67.6	58.6
Arkhangelsk oblast	68.5	60.5
Vologda oblast	68.0	59.3
Kaliningrad oblast	68.1	61.3
Leningrad oblast	68.7	62.1
Murmansk oblast	67.5	59.7
Novgorod oblast	67.7	59.3
Pskov oblast	67.3	58.4
Sankt-Petersburg	70.1	65.4
Southern Federal District		

Rep. of Adygeya	68.2	62.2
Rep. of Kalmykia	68.5	62.4
Rep. of Crimea	67.3	60.6
Krasnodar kray	68.2	62.7
Astrakhan oblast	68.5	62.6
Volgograd oblast	68.6	62.0
Rostov oblast	67.9	62.1
Sevastopol	68.3	61.4
North Caucasian Federal District		
Rep. of Dagestan	69.4	66.9
Rep. of Ingushetia	72.8	70.1
Kabardian-Balkar Rep.	68.8	64.2
Karachaev-Chercassian Rep.	68.6	65.2
Rep. of North Ossetia - Alania	69.6	64.1
Chechen Rep.	66.3	62.4
Stavropol kray	68.2	63.1
Volga Federal District		
Rep. of Bashkortostan	68.5	61.0
Rep. of Mariy El	68.4	59.6
Rep. of Mordovia	68.2	60.4
Rep. of Tatarstan	69.2	62.2
Udmurt Rep.	68.0	59.8
Chuvash Rep.	68.7	61.5
Perm kray	67.8	59.0
Kirov oblast	68.4	59.8
Nizhny Novgorod oblast	67.9	59.9
Orenburg oblast	67.8	60.2
Penza oblast	68.3	60.7
Samara oblast	68.1	61.3
Saratov oblast	68.2	61.5
Ulyanovsk oblast	68.2	60.6
Ural federal district		
Kurgan oblast	67.8	59.8
Sverdlovsk oblast	68.2	60.1
Tyumen oblast	68.0	61.0
Chelyabinsk oblast	68.3	60.8
Siberian Federal District		
Rep. of Altai	67.4	59.2
Rep. of Buryatia	68.3	59.9
Rep. of Tuva	64.5	56.9
Rep. of Khakasia	67.3	59.5

Altai kray	67.9	60.9
Zabaikalsk kray	66.3	58.5
Krasnoyarsk kray	67.9	60.0
Irkutsk oblast	67.6	59.5
Kemerovo oblast	67.9	59.8
Novosibirsk oblast	68.8	61.2
Omsk oblast	68.1	60.3
Tomsk oblast	68.7	62.0
Far Eastern Federal District		
Rep. of Sakha (Yakutia)	67.6	61.6
Kamchatka kray	66.1	58.7
Primorsky kray	67.3	59.7
Khabarovsk kray	67.1	58.4
Amur oblast	66.7	58.0
Magadan oblast	64.9	58.3
Sakhalin oblast	66.6	58.5
Jewish autonomous oblast	66.5	56.6
Chukchi autonomous area	62.5	58.4
Reference period	**2015**	**2015**

Table A5: Probability to survive from 40 to 60 or 55 and from 40 to 65

	Current pension system		**Possible reformed system**	
	Males : 40 to 60	**Females 40 to 55**	**Males : 40 to 65**	**Females 40 to 65**
The Russian Federation	0.76	0.94	0.65	0.86
Central Federal District	0.78	0.95	0.67	0.87
Belgorod oblast	0.78	0.96	0.67	0.88
Bryansk oblast	0.72	0.94	0.61	0.86
Vladimir oblast	0.72	0.93	0.60	0.85
Voronezh oblast	0.75	0.95	0.65	0.88
Ivanovo oblast	0.72	0.94	0.60	0.85
Kaluga oblast	0.74	0.94	0.63	0.86
Kostroma oblast	0.74	0.94	0.62	0.85
Kursk oblast	0.73	0.95	0.61	0.86
Lipetzk oblast	0.76	0.95	0.63	0.87
Moscow oblast	0.77	0.95	0.67	0.87
Oryol oblast	0.72	0.95	0.60	0.87
Ryazan oblast	0.76	0.94	0.64	0.87
Smolensk oblast	0.72	0.93	0.60	0.84
Tambov oblast	0.76	0.95	0.64	0.87
Tver oblast	0.70	0.92	0.58	0.83

Tula oblast	0.72	0.94	0.61	0.85
Yaroslavl oblast	0.73	0.94	0.61	0.86
Moscow	0.85	0.96	0.76	0.90
Northwestern Federal District	0.75	0.94	0.64	0.85
Rep. of Karelia	0.68	0.93	0.55	0.83
Rep. of Komi	0.70	0.93	0.57	0.83
Arkhangelsk oblast	0.72	0.94	0.61	0.85
Vologda oblast	0.71	0.94	0.59	0.85
Kaliningrad oblast	0.75	0.93	0.63	0.84
Leningrad oblast	0.75	0.94	0.64	0.85
Murmansk oblast	0.72	0.93	0.60	0.84
Novgorod oblast	0.69	0.93	0.57	0.83
Pskov oblast	0.70	0.93	0.56	0.82
Sankt-Petersburg	0.81	0.95	0.71	0.87
Southern Federal District	0.77	0.95	0.66	0.87
Rep. of Adygeya	0.77	0.95	0.67	0.88
Rep. of Kalmykia	0.78	0.95	0.68	0.88
Rep. of Crimea	0.73	0.94	0.62	0.84
Krasnodar kray	0.78	0.95	0.67	0.87
Astrakhan oblast	0.75	0.94	0.64	0.86
Volgograd oblast	0.76	0.95	0.65	0.87
Rostov oblast	0.77	0.94	0.67	0.86
Sevastopol	0.71	0.94	0.61	0.85
North Caucasian Federal District	0.83	0.97	0.74	0.90
Rep. of Dagestan	0.88	0.97	0.80	0.92
Rep. of Ingushetia	0.91	0.98	0.85	0.93
Kabardian-Balkar Rep.	0.82	0.97	0.73	0.91
Karachaev-Chercassian Rep.	0.82	0.97	0.72	0.90
Rep. of North Ossetia - Alania	0.79	0.96	0.71	0.90
Chechen Rep.	0.85	0.96	0.75	0.88
Stavropol kray	0.80	0.96	0.69	0.89
Volga Federal District	0.74	0.94	0.62	0.86
Rep. of Bashkortostan	0.73	0.94	0.62	0.85
Rep. of Mariy El	0.70	0.94	0.59	0.85
Rep. of Mordovia	0.76	0.95	0.65	0.88
Rep. of Tatarstan	0.77	0.95	0.66	0.88
Udmurt Rep.	0.73	0.95	0.61	0.86
Chuvash Rep.	0.74	0.95	0.63	0.87

Perm kray	0.71	0.93	0.59	0.83
Kirov oblast	0.74	0.95	0.62	0.86
Nizhny Novgorod oblast	0.72	0.94	0.60	0.86
Orenburg oblast	0.73	0.93	0.61	0.85
Penza oblast	0.76	0.95	0.65	0.87
Samara oblast	0.74	0.94	0.64	0.86
Saratov oblast	0.75	0.95	0.64	0.86
Ulyanovsk oblast	0.74	0.95	0.63	0.87
Ural federal district	0.75	0.94	0.63	0.86
Kurgan oblast	0.72	0.94	0.61	0.85
Sverdlovsk oblast	0.73	0.94	0.61	0.85
Tyumen oblast	0.79	0.95	0.68	0.87
Chelyabinsk oblast	0.73	0.94	0.62	0.85
Siberian Federal District	0.73	0.93	0.61	0.83
Rep. of Altai	0.73	0.93	0.61	0.84
Rep. of Buryatia	0.72	0.92	0.60	0.81
Rep. of Tuva	0.66	0.86	0.54	0.71
Rep. of Khakasia	0.72	0.92	0.60	0.81
Altai kray	0.76	0.94	0.65	0.85
Zabaikalsk kray	0.69	0.91	0.57	0.80
Krasnoyarsk kray	0.73	0.94	0.61	0.84
Irkutsk oblast	0.69	0.91	0.58	0.81
Kemerovo oblast	0.71	0.92	0.60	0.83
Novosibirsk oblast	0.76	0.94	0.64	0.85
Omsk oblast	0.75	0.94	0.63	0.85
Tomsk oblast	0.75	0.94	0.63	0.84
Far Eastern Federal District	0.71	0.92	0.59	0.82
Rep. of Sakha (Yakutia)	0.74	0.94	0.63	0.85
Kamchatka kray	0.72	0.93	0.59	0.83
Primorsky kray	0.72	0.92	0.60	0.83
Khabarovsk kray	0.69	0.92	0.57	0.82
Amur oblast	0.68	0.91	0.57	0.80
Magadan oblast	0.69	0.93	0.57	0.82
Sakhalin oblast	0.68	0.92	0.56	0.82
Jewish autonomous oblast	0.64	0.89	0.50	0.76
Chukchi autonomous area	0.70	0.92	0.59	0.84