# Disability Risk and Miraculous Recoveries in Russia

Charles M. Becker
*Department of Economics, Duke University*
*Population Program, Institute of Behavioral Science, University of Colorado at Boulder*

Irina S. Merkuryeva
*Department of Public Administration, School of Management, St. Petersburg State University*

August 2005

**Abstract** (*JEL* classifications **J10**, J15, P36)
This paper examines determinants of being disabled in Russia, along with the probability of moving from one disability status to another, using data from 1994 through 2002 from the Russian Longitudinal Monitoring Survey. Disability risk rises with age, declines with income and self-reported good health, and is lower for women. On the other hand, neither smoking nor drinking alcohol increase either the risk of being or becoming disabled.

This study has been funded in part by National Institute of Aging grant #2P30 AG17248-02 through the Population Aging Center at the University of Colorado at Boulder. It has benefited from comments on an earlier version presented at the 2003 Population Association of America meetings.

Corresponding author: Charles Becker, Department of Economics, Duke University, Durham, NC 27708-0097 USA; cbecker@econ.duke.edu

## 1. Introduction

This paper provides estimates of the disability risk, and of the probability of moving from one disability risk category to another, using data from the Russian Longitudinal Monitoring Survey (RLMS) and the Russian National Survey on Household Welfare and Participation in Social Programs (NOBUS). The topic is critical for several reasons. First, the economically developed regions of the former USSR have extremely high disability rates, and state social allowances are a major budgetary concern. Hence, it is important to gain insight into the nature of the region's disabled population, and in particular in the extent to which it might diminish with further economic recovery. Second, insurance markets are now forging ahead in Russia, and understanding disability risk is essential to the design and pricing of insurance products. Finally, both the state and private insurers need to know the extent to which today's high disability rates reflect true ill-health, as opposed to efforts to gain additional incomes. Indeed, the patterns analyzed here may well be universal rather than unique to Russia: our focus in Russia is based on the unusually clear and simple disability categorizations in its comprehensive social security system that reveal behavioral responses to shifts in the underlying environment.

Relatively little is known about the likelihood of recovering or moving from one disability status to another, or even about the characteristics of disability in middle-income countries more generally (for two major exceptions to this statement, see Metts, 2000, and Hoopendardner, 2001). Even for developed countries, while the literature on the behavioral consequences of disability pensions and the determinants of disability status, it is far from vast.[1] We do know that disability rates vary considerably over time, and that there is even greater variation among the underlying causes. Russia offers a unique opportunity to consider the dynamics of disability in a middle-income country, enabling us to focus on the influence of factors other than health status on the individual likelihood of obtaining a state disability pension. During economic decline, many individuals at risk of losing employment or suffering income declines can be expected to seek disability support, even if the actual health condition might allow continuing labor force participation. Conversely, individuals may tend to return to labor force as conditions

[1] A good sense of both the literature and empirical results – broadly consistent with those obtained here – can be found in Maki (1993), Kreider and Riphahn (2000), and Haveman, de Jong, and Wolfe (1991).

improve, especially if the recovery leads to a real, positive influence on health (either because of improved medical care or for psychological reasons). Results from multinomial logit regressions offer mixed results. Low income does not emerge as a dominant reason for becoming disabled. On the other hand, this could reflect measurement error, as a surprisingly large proportion of "incurably" disabled Russians do in fact recover.

## 2. Disability Incidence and Pensions in Russia

The Russian social welfare system closely follows its Soviet predecessor. Government is responsible for provision of a pay-as-you-go "Solidarity" component, which among all includes payments of disability pensions.[2] The sources of funding for basic pensions are payroll taxes paid by employers and transfers from state budgets. Thus, a substantial part of expenditures continues to be a government responsibility. Private disability and health insurance also has emerged in Russia, with these risks and hence costs also closely related to official disability status. Virtually the entire population is covered by the Solidarity system: the Soviet legacy is a much more comprehensive welfare state than is normally found in upper-middle income countries. The levels of disability payments and other pensions vary according to economic conditions: the amounts cannot be described as lavish, but for a substantial portion of the population are the dominant source of income.

The Law on State Pensions in Russian Federation defines three groups of disability depending on the degree of health damage. Individuals who have completely lost regular work capacity are assigned to Group I if they require permanent care, and to Group II if they the disability is severe but not inherently permanent. Those with only partial disability, whether or not permanent, are assigned to Group III[3]. A special medical

[2] Descriptions of the system can be found in AVFS (1997 and 1999), and AFSRF (2000).

[3] The definition of disability groups used here follows the classification valid until 2002. In 2002, a bill passed by Parliament introduced a new approach embracing three disability categories, where category 3 denotes the most severe degree of disability. The 2002 Pension Reform also changed the methods for calculation of pension amounts: disability pensions can comprise basic, insurance and individual accumulative account components, defined in accordance with the Law on the Labor

commission defines disability status. It is reconsidered every two years for the first group, and annually for the second and third groups, except for those individuals who have reached official retirement age or have incurable diseases.

Disability pensions are set at 75% of earnings for Groups I and II, and at 30% of earnings for the third group. If information on earnings is not available, the recipient received a minimum disability pension, which is equal to the minimum old-age pension for those in Groups I and II, and 2/3 of the minimum old-age pension for the third group. In any case, a disability pension cannot exceed the maximum amount of old-age pension.

Minimum Russian pensions for different disability groups along with old-age pension and minimal wage size over the recent years are provided in **Table 1**. Average Russian disability pensions are about 10% lower than old-age pensions. Hence, a large proportion of disabled people at retirement age elect instead to receive old-age pensions, while still enjoying disability privileges. In both Russia and neighboring Kazakhstan, in the event of an on-the-job injury or for disabilities incurred by persons under 20 years of age, the amount of disability pension is independent of the number of years worked. In all other cases, a minimum employment qualification period is required depending on the age. There are special cases when different calculation approaches are applied, including members of the armed forces, those with incomplete work histories, and immigrants. In addition to the general pension amount, until 2005 there were supplementary non-money benefits available to disabled people. The most valuable of these "privileges" include provision of free medicines, free transportation, and discounts on utilities payments; all together these benefits nearly double pensioners' real incomes (FBEA, 1999: 28).

Although there are problems in accurate estimation, it appears that Russia's disability problem has grown dramatically since the breakup of the USSR, and continues to grow.[4] The number of disabled people is now about 4.5 million people, or roughly 3% of the total population. **Table 2** reports the number of people registered as disabled along with the average amount of pensions received in the period between 1970 and 2002.

---

Pensions and the Law on the State Pensions. As the data used here are for 2002 and earlier, we use pre-reform categorizations.

[4] Two different approaches are used to estimate disability rates in Russia. The first counts all individuals receiving a disability pension. The second includes recipients of all types of social benefits. Both methods trace the recipients of pensions, but not individuals actually suffering health deficiencies.

Virtually the entire growth of the number of disabled occurred between 1992 and 1997 (**Figure 1**), corresponding to the economic deterioration of that era. The trend then stabilized, likely reflecting the nation's rapid growth after the 1998 crisis, and declined markedly in 2002. The number recognized as disabled for the first time peaks in 1995, a year of rapid deterioration of the financial positions of Pension Fund; gradual decline is observed thereafter (**Table 3**). Because of a forecast rise in the share of middle aged and elderly in the Russian population, it seems likely that the proportion of disability pensioners in the total population will continue to rise.

The fact that the maximum both for the number of disabled people and the number of first-time disability pensioners was reached in the mid to late 1990s is consistent with the hypothesis that the observed growth is caused in large part by economic (reduced real income and employment opportunities) rather than demographic reasons. This statement is also supported by increase of proportion of Group II disabled people, which is a benchmark group for getting privileges and compensations (falsifying Group I status is more difficult, while Group III status invites careful, regular review), and seems realistic for a person with long working experience to obtain from local authorities. Table 3 documents the rise in the numbers of newly disabled, from roughly six per thousand adults in 1991, to nine in 1995, and around eight during 1996-2002. Of this huge increase between 1991 and 1995, Group II disabled accounted for 86% of the total.

A second feature emerging from Table 3 is that the overall disability incidence is quite high, and has risen from 2.3% of the adult population in 1991 to 3.1% to 3.3% in more recent years.[5] Yet even these figures, taken from reports submitted by regional government payment centers, appear to be low. **Table 4** reports disability incidence estimates taken from the NOBUS 2003 household survey: at 7.5% of the adult population, the estimate is more than twice as great as the figures generated by the Statistics Ministry (Goskomstat) on the basis of payments reports. There is no simple way to reconcile a discrepancy of this magnitude, especially as the vast NOBUS survey of 45,000 households

[5] Comparable data on patterns of disability and disability pension payments in Kazakhstan are given in Becker, Seitenova and Urzhumova (2000). Becker and Urzhumova (1998) also provide historical figures, and provide an early warning of the impending rise in disability pensions in post-Soviet societies. Briefly, the risk of becoming disabled more than doubled in the post-Soviet era relative to the 1980s, although disability rates in Kazakhstan appear to be slightly lower than those in Russia. However, this pattern most likely is driven by differences in age structures. On a more positive note, the rise in the incidence of new disabilities appears to have halted in Kazakhstan as well, and is now reversing.

also was carried out by Goskomstat: we simply note that our estimates and empirical work do not depend on either of these official data sources.[6]

A final feature of the official data is the considerable regional variation (**Table 5**). The variation is far greater for Groups II and III than for Group I (Table 4), casting further suspicion on the nature of many of these disabilities – especially as some of the highest incidence regions are relatively prosperous. In terms of overall disability risk, rates vary even more, and at the regional level generate some almost absurd results. Taken at face value, prosperous regions such as Moscow (109 disabled adults per thousand) and Nizhegorodskaia oblast (Niznhii Novgorod: 107) are in fact very risky, even by the standards of regions normally considered dangerous industrial areas or remote places where people live very tough lives. Perhaps the most outrageous contrast is St. Petersburg (159) and Murmansk (46), a military-industrial region far to the north. While it is true that major cities historically have had older populations at greater risk of being disabled, recent years have seen huge out-migrations of the able bodied population from far north and far east Russia. In short, it is difficult to imagine that disability is not endogenous – driven by a cross between individual need and a regional government's ability to deliver social payments.

## 3. Data Description and Testable Hypotheses

The data used in this research are obtained from Russia Longitudinal Monitoring Survey (RLMS).[7] The RLMS longitudinal study is designed to provide a repeated cross-sectional sampling, but can also be used in panel analysis. The data consist of two phases covering the periods 1992-1993 and 1994-2002 with different panels; in total, data have been collected 11 times.

The units of observation are households and household members residing in selected dwelling units over the period of survey. The original sample consisted of 7,200 households with a response rate of 88.8%; the number of individuals in participating

[6] This inconsistency based on household *vs.* payment reports is not a newly discovered phenomenon, but rather is widely known. The extent of the discrepancy and underlying causes are discussed in detail in FBEA (1998).
[7] Available without charge from Carolina Population Center at the University of North Carolina at Chapel Hill web site: www.cpc.unc.edu/projects/rlms.

households was 17,154, with a response rate of 97.0%. In later rounds, the sample was decreased to roughly 4,000 households, and different sampling principles were introduced. We limit our analysis to data from the second phase, and include individuals observed in Rounds 10 and 11 (2001 and 2002), as well as data on income and disability characteristics of the same individuals in the period between 1994 and 2000. The sample is further restricted to individuals aged 16+ to allow for the possibility of labor force participation. In total, this gives a sample of 9,882 individuals observed in 2002 and at different moments over a seven-year prior period.

Throughout the empirical work, our dependent variable is a dichotomous variable denoting whether an individual experienced a change in disability pension status in the month prior to the interview date (*disab*). Explanatory variables enable us to control for socio-demographic, household, health, employment and income characteristics of an individual. Variables of particular interest include the respondent's real total income at different observation periods (*inclmod*), which serves as an indicator of the effect of economic prosperity on disability risk, and lagged disability values, which enable us to assess risk of continued disability status. This is likely to be especially important if those with poor or deteriorating job prospects aggressively seek disability status.

Socio-demographic variables include age, gender, and marital status of the respondent (*age, female, married*). There are also dummies for non-marital status (*widow* and *divorced*, with never married as the residual omitted category). Two variables measure educational attainments: number of years of schooling (*grdlev*) and exposure to higher (university or technical) education (*highsc*). Relevant household characteristics include household size, income, and wealth indicators. Household income is defined as per capita real income (*incppersd*). Pension income (*ampensd*) is recorded separately. Unfortunately, no direct measurement of household wealth (for example, market value of property owned) is available. Information on proximate factors, including type of dwelling occupied, dwelling ownership, living space, size of land used by the family, and land ownership, is available – but none of these turn out to be important in (unreported) regressions. Many of these variables are highly correlated with the type of city or rural area in which the respondent lives, while living space still reflects Soviet norms, and hence varies less than in longstanding market economies. What does vary substantially – quality of housing, or local infrastructure and services – is not observed. Worse, these

omitted variables are often negatively correlated with the ones that we do observe, so that the coefficients estimated tend to be biased in absolute value toward zero.

Household size (*num*) and marital status are likely to have complex effects on disability risk. Being married and having a large family increases the likelihood that there are other family members who can work, thereby reducing the pressure on any individual to do so. These characteristics are also associated with better care of individuals, so that genuine disability is likely to be lower. On the other hand, having a stable (if paltry) disability payment, and subsidized or free communal services, may be critical to a large family. In effect, large families enable individuals to specialize, and some members may "specialize" in low but steady disability benefits.

Several variables were employed to capture respondents' health status. These include self-evaluation of respondent's health (*healthgood*, and, at the other poor health extreme, *healthpr*); alcohol-use frequency (*alco*); smoking (*smokes*); and presence of health problems in the last 30 days (*hprblm*).

Employment status is characterized by being currently working (*wrknow*), and being in the labor force (*lfp*). The decision to work is properly endogenous; rather than estimating it as well, we in effect estimate a reduced form disability equation, including explanatory variables that would affect labor force participation. These include most of the demographic and health variables mentioned above, as well as the income and education variables, the real monthly amount of old-age pension received (*ampensd*); and the amount of disability pension the respondent receives (*benefitsd*), if any. This last variable reflects the attractiveness both of formal disability rules and regional governments' effectiveness in distributing payments, as level of payment actually received should influence efforts to secure disability status. Actual disability payments will vary according to disability group, pensioner category (some individuals are eligible for higher levels based on nature of service or residence), and, conceivably, administrative and financial capacity of their regional government.

Males constitute 42% of the total sample. Average age is 43.5, due to the exclusion of individuals under than 16 years old. Married people represent 63% of the sample, and 26% have completed higher education. Some 13% of the sample is widowed and 8% is divorced; 68% live in urban areas. Somewhat more than half of the sample (52%) is

currently working, but a large majority (70%) is attached to the labor force. Depending on one's perspective, the health of Russian adults is either reasonably good (84% report being in good health) or terrible (57% report having had health problems in the past month). 65% of the adult population in the survey self-reports as smoking, a figure higher than in Kazakhstan and other southern neighbors. Recipients of disability pension constitute 4.9% of the sample; this figure is consistent with Russian national statistics provided in Section 2 – in fact, it is quite close to the midpoint between the payments and NOBUS household survey estimates. Dynamics of the sample disability ratios over the period of observation is plotted on **Figure 2**, with a trend being similar to those observed for the whole population (Figure 1), save for the marked rise between 2000 and 2001. The average size of monthly disability pension received in 2002 was 1157 rubles (about USD 38).

The average net monthly real individual income in 2002 amounted to 2750 rubles; average per capita household income is slightly lower at 2300 rubles. By 2002, individual real incomes had recovered to roughly the same level as in 1994, and almost double the amount in 1998 (**Figure 3**). The recovery observed toward the end of the surveyed period enables us to test the relationship between disability risks and economic well-being.

## 4. Transitions in Disability Status

Before turning to modeling and econometric results, we present patterns of movement from one disability status to another in the RLMS panel. Because of the small numbers in the high disability groups, Groups I and II are combined. As the RLMS does not formally ask to which disability group one belongs, this information must be inferred. There are two pieces of information that reveal disability group: whether or not the respondent worked during the past month, and the level of disability payment received. In principle, anyone who worked should be in Group III (the lightest disability category), though of course in practice it could be otherwise. There is also the risk that unemployed persons with actual Group II disability could be receiving unemployment compensation income, again causing miscategorization in our scheme. However, a disability payment cutoff also can be used to determine status, although since payments are in principle related to prior earnings, some inferential error again is inevitable. We therefore estimate transition matrices alternately based on Group I/II status determined by work status, pension level, and both work status and pension level. The tables below are based on an average of these three definitions.

Average transition probabilities are summarized in **Table 6**, which gives the distribution of outcomes at time *t+1* conditional on a given status at time *t* (so that the rows all sum to 100%). The underlying period-to-period matrices appear in **Table 7**. Because the time intervals between rounds 7 through 9 are approximately twice as great as the intervals in other rounds, transition risks in these intervals are annualized. This enhances comparability, and when one annualizes, it becomes apparent that there is virtually no systematic time trend in any of the terms. The exception to this statement is that there has been an increase in overall disability incidence from roughly 3.7% in rounds 5-7 to around 4.4% in rounds 8 and 9, and then to nearly 5% in rounds 10 and 11.[8]

While approximately 4.4% of adults in the RLMS sample are disabled, the annual risk of a healthy person becoming disabled is only about 1.5%. These two figures would imply a stable disability rate if the average disability duration were three years, implying an annual recovery rate around 30% (allowing for some mortality). This is close to what Table 6 reports, with a recovery rate (movement to non-disability status) of 29% for Group III, and a recovery rate of 24% for Groups I and II disabled. That these two recovery rates are quite close casts further doubt on the selection mechanisms used in categorization, as one would expect a considerably greater gap between the likelihood of recovering from severe and minor disabilities. Group III disabled have roughly a 14% annual risk of becoming disabled in Categories I and II (a risk some 22 times higher than for the non-disabled adult population); Categories I and II disabled have an annual likelihood of moving to Group III of just over 17% (20 times higher than for the non-disabled adult population). Overall, those in non-working disability Categories I and II have a greater than 40% likelihood of experiencing some recovery.

Looking at transition probabilities over time, the most striking pattern is a rise in the likelihood of a non-disabled adult becoming disabled. Between rounds 5-6 and 6-7, this annual risk appears to have been less than 1.2%; between 1997 and 2001 the risk increases to between 1.7% and 2.0% before falling to 1.5% in 2002. This pattern is broadly consistent with recovery rates as well. Between 1994 and 1995, some 48.0% of Group I and II disabled improved in health (and 31% lost all disability). Recovery rates fell and then stabilized between 1996 and 2000, and fell further in 2001, at which point only 37%

[8] Because of small changes in responding population, the proportions disabled in a given year *n* differ slightly, depending on whether one examines the matrix showing the disability fate of the population from year *n-1* in year *n*, or the fate of the population from year *n* to *n+1*.

improved in health, and 18% fully recovered – though 2002 did exhibit some improvement, with 42% showing some improvement and 23% experiencing full recovery. There is no clear time trend for Group III disabled.

These patterns are consistent with several events. Overall adult disability and new disability risk have risen, despite economic recovery. This is matched by at the national level in a failure of life expectancy to rise further in recent years (following some recovery between 1997 and 1999 from the 1995-1997 low point) in either Russia or neighboring states such as Kazakhstan.[9] While the economic recovery to date has been highly uneven, persistent high mortality and increased adult disability are unexpected. On the other hand, the decline in recovery from severe disability status may well reflect improved monitoring, and hence fewer miracle recoveries of those not truly disabled. But improvements in monitoring also imply an even greater rise in the underlying true disability incidence.

These RLMS data provide a unique perspective on adult disability risk in a middle-income country. The fact that Russia has clear rules governing disability status, and has maintained a functioning if not prosperous welfare state, enables us to assess the risk of an individual becoming partially or severely disabled. It is also possible to assess potential for recovery. However, the existence of high "recovery" rates for those who are apparently severely disabled also suggests that disability is rather subjective – as is likely elsewhere. Such news can only be sobering for the rapidly growing but still young insurance industries in emerging markets. We therefore now consider the extent to which such movements are systematically related to social and economic characteristics.

## 5. Determinants of Disability Transition

The following empirical analysis focuses on the risk of becoming disabled, rather than the likelihood of being disabled. Obviously, the stock of disabled persons is far greater than the number who become disabled over a short interval, making it easier to infer the characteristics of the stock. On the other hand, marginal factors may not be the same as average ones, especially in a society in which conditions (and monitoring of

[9] Excellent mortality data for former USSR nations can be found at www.demoscope.ru. For a comparative study on Kazakhstan, see Becker and Urzhumova (2005).

disability) have changed markedly over time. More critically, economic measures are flow variables, and we have some but limited information over individuals' pasts. We are also uncomfortable with limiting the sample to those for whom there is a lengthy history, as this would be a non-random group. We therefore focus on the transition to disability status, and relate this to individual demographic and current economic characteristics.

The basic disability risk model can be written in the following form:

$$P_t = \sum_i \alpha_i P_{t-i} + \sum_i \beta_i I_{t-i} + \gamma X + \varepsilon, \qquad \textbf{(1)}$$

Here, , , are estimated parameters; is a random error term with the traditional properties assumed; $P_t$ is the probability of disability at time $t$, with $t$ relating to current observations and $t$-$i$ representing lagged values; and $I_t$ is an individual's net real income at time $t$. $\boldsymbol{X}$ is a vector of personal and household characteristics, including age, gender, years of schooling, marital status, satisfaction with life, per capita household income, health problems dummy, alcohol use frequency, smoking dummy, unemployment, and years of general employment recorded. Actual variables reported below were selected after preliminary regression analysis, but results proved not sensitive to the inclusion of interchangeable variables.

The model tries to capture the effects of individual income changes on individual disability risk, which can be partly associated with conscious choice. We expect income variables to affect disability risk negatively. Those who can earn higher wages should be less willing to apply for disability benefits (which requires substantial time and effort), and will be more likely to recover. For the same reasons, unemployment is expected to increase disability risk. Presumably, current income and employment will be most influential, and the effects will dissipate as higher order lags are considered. The effect of other family members' incomes is less clear. Increased incomes of other members reduce pressure on an individual to leave a currently low-income job (and, in particular, one in which wages are paid late or sporadically). But higher incomes of other also have a leisure effect that should push an individual toward disability status, especially if being disabled is consistent with various types of home production (looking after grandchildren, maintaining a family dacha, cooking…). Higher incomes of others will further push an individual toward disability if that status carries with it various unpriced social benefits.

Health problems are expected to increase the risk of becoming disabled. Assessing the effects of smoking and alcohol consumption is complex. To the extent that smoking and excessive drinking damage health, they should increase disability risk. However, those who are severely ill or otherwise disabled may have little capacity for (or get little pleasure from) smoking and drinking. This simultaneity problem will bias the estimated coefficients downward. Disability risk also increases with age. Older people have higher probability of both being and becoming disabled, and as noted above, retired people often use disability pensioner status to increase their real incomes.

For any given disability status (not disabled; Groups I & II disabled; Group III disabled) experienced by a person at time *t*, three states of the world are possible in time *t+1*. However, only two of these states of the world are independent, since the sample includes only those who survive to period *t+1*. Therefore, for each of the initial disability states, two regressions must be estimated simultaneously.

For any state of the world *S* at time *t*, we assume that the probability of being in state *s* at time *t+1* can be depends on a vector of explanatory variable *X* and follows the cumulative logistic probability function, which ranges from 0 to 1:

$$p_s = f(Z(S) = \alpha + \beta' X) = \frac{1}{1 + e^{-(\alpha + \beta' X)}} \qquad \textbf{(2)}$$

This implies that the probabilities of any two states of the world *s1* and *s2* will be determined (as *p3 = 1 – p1 – p2*) by

$$\ln(\frac{p1}{p3}) = a_1 + b_1' X_1 \qquad \ln(\frac{p2}{p3}) = a_2 + b_2' X_2 \qquad \textbf{(3)}$$

These two equations must be estimated simultaneously, since they are not independent, for each of the three initial states. Estimation is performed using multinomial logit regressions; these are reported in **Tables 8 – 10**. These results obviously should be treated with some caution in light of the small sample size. Lags need to be investigated further, and it is also desirable to consider the endogeneity of several variables, especially smoking and alcohol consumption. Selectivity bias and multicollinearity among the economic variables also may be problematic.

The regressions in Table 8 are more plausible than those in Tables 9 and 10, mainly because the sample size is so much larger. A core finding is that the risk of moving from non-disabled to severely disabled rises strongly with age in all intervals (though specific years are not reported). Age is also positively related to moderate disability risk, except for adults under age 35. These results, while not surprising, bolster our confidence in the quality of the data. The age gradient turns out to be much stronger for men than women, both in terms of becoming moderately and severely disabled.

Somewhat curiously, the likelihood of recovery from severe disability also rises with age for pre-retirement age adults, both male and female (Table 9). This suggests that extremely severe disability may form a higher fraction of all severe disabilities among younger adults. Rising age also increases the likelihood of women recovering from partial disabilities and for middle-aged groups is associated with lower risk of becoming severely disabled.

The risk of becoming severely disabled is generally lower for women, especially in the transition from healthy to severely disabled, and for retirement-aged adults. The risk of movement from moderate to severe disability status is also lower for middle-aged women. Middle-aged women have a higher likelihood of recovering from severe disability to healthy status.

Beyond age, the strongest factor associated with maintained good health is, not surprisingly, self-reported good health status. The self-assessment is relatively less important for those above retirement age. Nor does it have a consistent effect on health transitions for those with disabilities.

The risk of becoming either moderately or severely disabled is not consistently related either to alcohol consumption or smoking; when these variables are significant, they often tend to have unexpected signs. Higher alcohol consumption is negatively associated with recovery from severe disability (while smoking mattes little); smoking appears to reduce the risk of younger and middle-aged individuals becoming disabled. While simultaneity and omitted variables' problems are likely, this finding nonetheless reduces pressure to penalize people who smoke and drink by charging higher disability insurance rates.

Urban residence does not have a consistent effect. It appears to be negatively related to the risk of middle-aged adults becoming severely disabled, but it is positively associated with this risk for the elderly, as well as for transition from healthy to moderately disabled status for women. It also appears to be negatively associated with recovery from being severely disabled. Curiously, urban residence is associated with a positive likelihood of leaving the moderately disabled status, both to non-disabled and to more severely disabled. A likely interpretation is that government monitoring of health status is more effective in urban areas.

Larger household size is associated with increased risk of becoming severely disabled. Reverse causality may be at work here, as extended families may elect to take care of disabled relatives who would not otherwise live with them. Household size is not associated with the risk of becoming moderately disabled, but is strongly positively associated with the likelihood of recovering from moderate disability and, to some extent, from severe disability.

Being married of no health value to women, but reduces risk of moving from being healthy to severe disability for men. Marital status does not appear to affect recovery rates of those already disabled. Since a household number variable is also included, the sensible interpretation is that family members other than spouses are just as effective in aiding recovery.

Educational attainment is positively associated with movement from being healthy to being severely disabled, especially for men. It is not consistently associated with recovery, beyond some indication of contributing positively from being severely to moderately disabled. This lack of association is somewhat surprising, and to some extent must reflect the high incidence of accidents outside of the work environment. However, it might also reflect greater recognition of disabilities and greater effectiveness in having them diagnosed by those with higher education.

Personal income is negatively associated with movement from being healthy to severely disabled for men, while the reverse holds for women. Income is also negatively associated with movement from partial to severe disability, especially for men, and is positively associated with recovery for some groups.

Given the very small sample sizes, and the inconclusiveness of several results, these regressions should be viewed as preliminary. However, it is worth noting that the age and income effects are consistent with Rose's (2000) analysis of determinants of self-assessed health; so, too, are the absence of education and smoking effects. The results reported here are also consistent with those obtained in the closest study we have found, namely Hoopengardner's (2001) work on Poland. The impacts of gender, income, age, marital status, and rural/urban location appear to be similar in Russia and Poland. The main discrepancy is that disability risk falls sharply with income in Poland, although it is possible that education is correlated with many of the behavioral variables included in our regressions that were not available in the Polish study.

An obvious next step is to compare these estimates of transition with those generated by the Russian Ministries of Labor and Social Security. Unfortunately, however, these official data do not contain information on individual characteristics, and the best option would be to link movements in disability status, aggregated by region and year, to regional economic characteristics.[10] Initially, though, there is little reason to distinguish disability risk by residence, income, educational attainment, or behavioral characteristics. Self-reported health and age are important, as to some extent is gender.

## 6. Disability risk analysis: implications for Russia

This study offers an initial view of disability risk using longitudinal data from the Russian Longitudinal Monitoring Survey. Despite the relatively small sample, considerable systematic behavior is uncovered. What do these patterns suggest, and can they be of any value in determining insurance rates? The point of departure is Table 6, which gives base risks. These transition risks can then be used to determine base rates. For a healthy adult, the annual risk of becoming disabled is approximately 1.5%, and the expected duration of disability (independent of disability severity) is roughly three years. Thus, a base disability insurance rate for a contract that guaranteed 50% of the insured person's salary would need to be slightly less than 2.5% of current wage, plus an additional charge for operating costs (and profit).

[10] Our regressions follow age and gender delineations as reported in Ministry of Labor and Social Security statistics, thereby enabling eventual comparability, as well as combining these results with average disability rates and movements for inferential purposes.

The transition hazard regressions provide little basis for differentiating disability insurance rates according marital or family status, education or income status, urban residence, or smoking or alcohol consumption behaviors. Risk of severe disability does increase secularly with age, and it is therefore appropriate to borrow age gradients from international actuarial tables. It also may be appropriate to borrow gender correction estimates. Disability risk is also inversely related to reported good health status. Obviously, an initial medical report would be of value in setting rates, though this might be both expensive, and unnecessary for group insurance. Despite the moral hazard contained in self-reporting, though, there is almost certainly some useful information content transmitted, especially if the self-report requires the respondent to list recent illnesses.

To get a sense of what is possible to infer, consider the transition matrices reported in **Table 11** for four individuals: a 44-year old man, a 44-year old woman, and their 50-year old counterparts. These matrices are generated by the regressions reported in Tables 8-10, and reflect coefficient estimates rather than the averages reported in Tables 6 and 7. A substantial gender difference exists, to the disadvantage of men, and it widens with age. This is true both for the risk of becoming disabled (male risk is 57% greater at age 44 and 53% greater at age 50) and for the likelihood of recovering to healthy status (for the severely disabled, women have a 72% greater chance of recovery at age 44, and a 58% greater chance at age 50.

Both Russia and Kazakhstan have begun to introduce standard insurance products. In the case of disability insurance, product design and price should depend on the nature of disability risk, which aggregate data suggest are similar in the two countries. These risks, however, are likely to be different from those in advanced market economies, both because true risks are different, and because behavior depends heavily on country-specific legislation and custom.

From a social standpoint, a number of issues also arise. The apparent increase in risk of becoming disabled is troubling, and points to a need for research using a larger database. The apparent failure of traditional support systems, as captured by marriage and household size, to reduce disability transition risks for women is also disturbing, and presumably reflects differences in social status. On the other hand, the dramatically higher male age gradients are cause for concern as well.

It is impossible to say whether the disability rates, transition risks, and regression coefficients are large or small: to our knowledge, there are virtually no comparable figures. By implication, it is important to establish a comparable database over time, at some level of age and gender disaggregation. This database ideally would be maintained for the economically more advanced regions of the former Soviet Union and Eastern Europe with good health and social data, and ideally by region (*oblast*). This information will then serve to inform policymakers as to whether the situation is improving or deteriorating – a point of social importance, and also critical in forecasting public expenditure commitments.

There is little reason to believe that Russians are more apt to take advantage of disability status than any other population. Maki (1993) surveys the considerable evidence that Canadian and US adults are likely to withdraw from the labor force if eligible for disability pensions, and attributes 35% of the decline in the 5.7 percentage point decline between 1975 and 1983 in Canadian male age 45-64 labor force participation rates to disability pensions. The application process also appears to be endogenous: Kreider and Riphahn (2000) find that Americans' efforts to secure disability benefits are positively related to expected benefit size and likelihood of success.

Rather, we anticipate (as a firm statement must await comparable analysis from panel data from other countries) that the distinctive feature of Russia and likely other transition countries is the fluidity of disability status. It is no surprise that the risk of being disabled is greater for the poor and near-elderly (as Hoopengardner, 2001, finds for Poland). Our results here show that, in addition to being at greater risk of becoming disabled, the same groups (including, notably, men) are much more likely to stay disabled. Yet these finding also give cause for optimism. If becoming and remaining disabled both are linked indirectly to prospects for finding a well-paying job, then with economic recovery Russia should experience a virtuous cycle in which average disability risk falls and recovery from being disabled rises. While recovery has been too recent to let this issue be carefully tested, doing so is clearly a priority task.

## References

1. AVFS (Analytical Vestnik of the Federated Soviet). 1997. *The Main Problems of Social Development in Russia*. – . , # 19(64), 1997. www.budgetrf.ru/Publications/Magazines/VestnikSF

2. AVFS (Analytical Vestnik of the Federated Soviet). 1999. *The Problems of Pension Legislation in Russian Federation*. – . . #14, 1999. www.budgetrf.ru/Publications/Magazines/VestnikSF

3. AFSRF (Apparat of the Federated Soviet of the Russian Federation). 2000. *Relevant Problems of Social Support for Pensioners*. – . , # 8(120). www.budgetrf.ru/Publications/Magazines/

4. Becker, Charles; Ai-Gul Seitenova; and Dina Urzhumova. 2000. "Disability provisions in the Republic of Kazakhstan." Almaty: USAID and IMCC.

5. Becker, Charles and Dina Urzhumova. 1998 (November) "Pension Burdens and Labor Force Participation in Kazakstan." *World Development* **26**(11), pp. 2087-2103.

6. Becker, Charles M., and Dina S. Urzhumova. 2005. Mortality recovery and stabilization in Kazakhstan. *Economics and Human Biology* **3**(1): 97-122.

7. FBEA (Fund of the Bureau of Economic Analysis). 1999. *Disabled in Russia: Causes and Dynamics of Disability, Contradictions and Prospects for Social Policy*. – : , . - " ". #3.

8. FBEA (Fund of the Bureau of Economic Analysis). 1998. *Disability Increase in Russia: Causes, Trends, Forecasts*. – : , , . - " ", #4.

9. Goskomstat RF. 2003. *Organizational-Methodological Presentation of tbe Operation of the National Survey on Household Welfare and Participation in Social Programs (NOBUS): foundation stage*. Moscow: Goskomstat RF.

10. Goskomstat RF. 2003a. *Russian Statistical Yearbook (Social Conditions and Living Standards in Russia)*. Moscow: Goskomstat RF.

11. Haveman, Robert; Philip de Jong; and Barbara Wolfe. "Disability transfers and the work decision of older men." *Quarterly Journal of Economics* **106**(3): 939-950.

12. Hoopengardner, Tom. 2001. "Disability and work in Poland." Washington, DC: World Bank *Social Protection discussion paper no. 0101.*

13. Kreider, Brent and Regina T. Riphahn. 2000 (Winter). "Explaining Applications to the U.S. Disability System: A Semiparametric Approach." *Journal of Human Resources* **35**(1): 82-115.

14. Maki, Dennis R. 1993 (January). "The Economic Implications of Disability Insurance in Canada." *Journal of Labor Economics* **11**(1, Part 2): 148-69.

15. Metts, Robert L. 2000. "Disability issues, trends and recommendations for the World Bank." Washington, DC: World Bank *Social Protection discussion paper no. 0007.*

16. Rose, Richard. 2000. "How much does social capital add to individual health? A survey study of Russians." *Social Science & Medicine* **51**: 1421-1435.

**Figure 1**
**Number of disability pension recipients, 1970-2002**


Source: *Russian Statistical Yearbook (Social Conditions and Living Standards in Russia)*, Goskomstat RF, 2003a.

**Figure 2**
**RLMS sample disability ratios, rounds 5-9, 1994-2002**

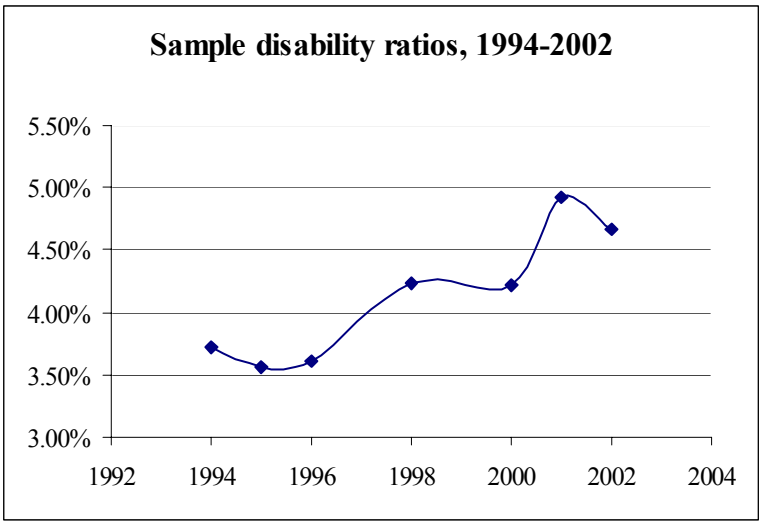


**Figure 3**
**RLMS sample monthly real income, 1994-2002**

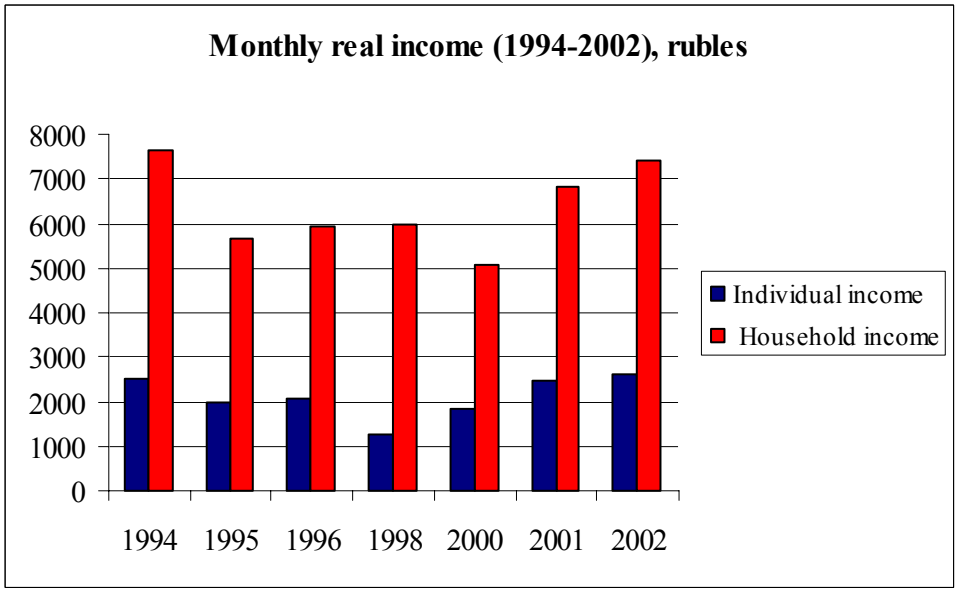

**Table 1**
**Minimum wage and monthly pension amounts, Russian Federation, 1997-2003**
(thousand rubles; after 1998: rubles)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|
| Minimum wage | 83.5 | 83.5 | 83.5 | 83.5 | 200 | 300 | 450 |
| Minimum pension amounts: | | | | | | | |
| Old-age pension | 70 | 84 | 84 | 108 | 153 | | |
| Disability pension: | | | | | | | |
| 1 group | 139 | 168 | 168 | 217 | 306 | | |
| 2 group | 70 | 84 | 84 | 108 | 153 | | |
| 3 group | 46 | 56 | 56 | 72 | 102 | | |
| Social pension to those disabled at birth: | | | | | | | |
| 1 group | 139 | 168 | 168 | 217 | 306 | | |
| 2 group | 70 | 84 | 84 | 108 | 153 | | |
| Social pension to those disabled without work experience: | | | | | | | |
| 1 group | 70 | 84 | 84 | 108 | 153 | | |
| 2 group | 46 | 56 | 56 | 72 | 102 | | |
| 3 group | 35 | 42 | 42 | 54 | 77 | | |
| Social pensions to disabled children: | 70 | 84 | 84 | 108 | 153 | | |
| Basic component of labor pension: | | | | | | | |
| Old-age | | | | | | 450 | 522 |
| Disability 1 group | | | | | | 900 | 1045 |
| Disability 2 group | | | | | | 450 | 522 |
| Disability 3 group | | | | | | 225 | 261 |

Source: *Russian Statistical Yearbook (Social Conditions and Living Standards in Russia)*, Goskomstat RF, 2003a.

**Table 2**
**Number of disability pensioners and average disability pension, Russian Federation, 1970-2002**

| | 1970 | 1975 | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of pensioners (thousands) | | | | | | | | | | | | | | | | | |
| All pensioners | 22513 | 24684 | 27417 | 30291 | 32848 | 34044 | 35273 | 36100 | 36623 | 37083 | 37827 | 38184 | 38410 | 38381 | 38411 | 38630 | 38532 |
| Disability pension recipients | 3865 | 3487 | 3469 | 3462 | 3514 | 3385 | 3363 | 3562 | 3910 | 4270 | 4542 | 4813 | 4816 | 4816 | 4822 | 4848 | 4551 |
| Receiving disability pension, percent of total | 17.2 | 14.1 | 12.7 | 11.4 | 10.7 | 9.9 | 9.5 | 9.9 | 10.7 | 11.5 | 12 | 12.6 | 12.5 | 12.5 | 12.6 | 12.5 | 11.8 |
| Average monthly pension amount, thousand rubles (after 1998: rubles) | | | | | | | | | | | | | | | | | |
| All pensioners | 0.036 | 0.049 | 0.059 | 0.076 | 0.113 | 0.419 | 3.5 | 43.1 | 120.1 | 242.6 | 320.1 | 366.4 | 402.9 | 521.5 | 823.4 | 1138 | 1462 |
| Disability pensions, rubles | 0.033 | 0.048 | 0.057 | 0.07 | 0.101 | 0.405 | 3.2 | 37.3 | 104.5 | 218 | 299.6 | 333.7 | 352.3 | 466.9 | 698.5 | 940.4 | 1157 |
| Average disability pension as a percent of average of all pensions | 92 | 98 | 97 | 92 | 89 | 97 | 91 | 87 | 87 | 90 | 94 | 91 | 87 | 90 | 85 | 83 | 79 |

Source: *Russian Statistical Yearbook (Social Conditions and Living Standards in Russia)*, Goskomstat RF, 2003a.

**Table 3**
**Adult (age 18+) Disability incidence, Russia**

| *Year* | *Newly Disabled per thousand population* | *Total Disabled per thousand population* | *Newly Disabled per thousand population, by group* | | |
|---|---|---|---|---|---|
| | | | *Group I* | *Group II* | *Group III* |
| 1991 | 6.15 | 22.85 | 0.81 | 4.22 | 1.13 |
| 1992 | 7.57 | 22.87 | 1.08 | 5.34 | 1.14 |
| 1993 | 7.77 | 24.21 | 0.98 | 5.59 | 1.20 |
| 1994 | 7.65 | 26.61 | 0.92 | 5.49 | 1.24 |
| 1995 | 9.11 | 28.88 | 1.03 | 6.76 | 1.32 |
| 1996 | 7.99 | 31.02 | 0.96 | 5.66 | 1.37 |
| 1997 | 7.77 | 32.75 | 0.92 | 5.31 | 1.55 |
| 1998 | 7.76 | 33.04 | 0.95 | 5.09 | 1.72 |
| 1999 | 7.23 | 33.16 | 0.95 | 4.51 | 1.77 |
| 2000 | 7.67 | 33.35 | 0.97 | 4.86 | 1.85 |
| 2001 | 8.29 | 33.49 | 0.99 | 5.30 | 2.01 |
| 2002 | 8.25 | 31.71 | 1.06 | 5.19 | 2.00 |

Source: *Russian Statistical Yearbook (Health Care in Russia)*, Goskomstat RF, 2003.

**Table 4**

**Adult (age 18+) Disability incidence, Russia 2003**

| *Region* | *Total Disabled per thousand population* | *Disabled per thousand population, by group* | | |
|---|---|---|---|---|
| | | *Group I* | *Group II* | *Group III* |
| Central Federal Area | 88.68 | 10.68 | 59.20 | 15.34 |
| North-Western Federal Area | 88.92 | 9.28 | 60.90 | 15.29 |
| Southern Federal Area | 72.46 | 8.76 | 46.53 | 13.34 |
| Volga Basin (Privolzhskiy) Federal Area | 79.95 | 11.24 | 49.01 | 16.45 |
| Ural Federal Area | 57.87 | 9.43 | 34.15 | 11.57 |
| Siberian Federal Area | 67.87 | 11.20 | 41.22 | 12.81 |
| Far Eastern Federal Area | 56.67 | 11.41 | 35.60 | 8.46 |
| **Russian Federation** | **75.64** | **10.35** | **48.51** | **13.73** |

Source: *NOBUS survey*, Goskomstat RF, 2003.

**Table 5**

**Adult (age 18+) Disability incidence, Russia, 2003**

| *Region* | *Total Disabled per thousand population* | *Region* | *Total Disabled per thousand population* |
|---|---|---|---|
| **Russian Federation** | **75.64** | | |
| **Central Federal Area** | **88.68** | **Volga Basin Federal Area** | **79.95** |
| Belgorodskaya oblast | 154.34 | Bashkorstan republic | 53.91 |
| Brianskaya oblast | 99.15 | Mariy El republic | 80.72 |
| Vladimirskaya oblast | 106.53 | Mordovia republic | 99.21 |
| Voronejskaya oblast | 85.47 | Tatarstan republic | 60.12 |
| Ivanovskaia oblast | 66.30 | Udmurtskaya republic | 61.62 |
| Kalujskaya oblast | 67.62 | Chuvashskaya republic | 93.43 |
| Kostromskaya oblast | 89.71 | Kirovskaya oblast | 84.34 |
| Kurskaya oblast | 74.38 | Nijegorodskaya oblast | 107.23 |
| Lipeckaya oblast | 96.98 | Orenburgskaya oblast | 99.67 |
| Moskovskaya oblast | 69.10 | Penzenskaya oblast | 66.46 |
| Orlovskaya oblast | 74.88 | Permskaya oblast | 91.11 |
| Riazanskaya oblast | 95.59 | Samarskaya oblast | 97.92 |
| Smolenskaya oblast | 61.98 | Saratovskaya oblast | 44.30 |
| Tambovskaya oblast | 111.83 | Ulianovskaya oblast | 88.44 |
| Tverskaya oblast | 56.02 | **Ural Federal Area** | **57.87** |
| Tulskaya oblast | 60.50 | Kurganskaya oblast | 58.47 |
| Iaroslavskaya oblast | 101.16 | Sverdlovskaya oblast | 76.97 |
| Moscow | 108.83 | Tumenskaya oblast | 42.22 |
| **North-Western Federal Area** | **88.92** | Cheliabinskaya oblast | 53.76 |
| Karelia republic | 93.02 | **Siberian Federal Area** | **67.87** |
| Komi republic | 62.36 | Altai republic | 69.89 |
| Arkhangelskaya oblast | 71.77 | Buriatia republic | 65.69 |
| Vologodskaya oblast | 59.38 | Altaiskiy krai | 83.11 |
| Kaliningradskaya oblast | 44.78 | Krasnoiarskiy krai | 66.29 |
| Leningradskaya oblast | 98.36 | Irkutskaya oblast | 73.42 |
| Murmanskaya oblast | 46.10 | Kemerovskaya oblast | 58.66 |

| | |
|---|---|
| Novgorodskaya oblast | 103.80 |
| Pskovskaya oblast | 94.81 |
| St.Petersburg | 158.98 |
| **Southern Federal Area** | **72.46** |
| Adygeia republic | 105.47 |
| Dagestan republic | 78.13 |
| Ingushetia republic | 40.13 |
| Kabardino-Balkarskaia republic | 60.46 |
| Kalmykia republic | 45.87 |
| Karachaevo-Cherkesskaia Rep. | 98.29 |
| Severnaia Osetia-Alania Rep. | 66.35 |
| Krasnodarskiy krai | 69.34 |
| Stavropolskiy krai | 102.15 |
| Astrakhanskaia oblast | 42.03 |
| Volgogradskaya oblast | 64.96 |
| Rostovskaya oblast | 88.22 |
| Novosibirskaya oblast | 56.87 |
| Omskaya oblast | 80.57 |
| Tomskaya oblast | 51.16 |
| Chitinskaya oblast | 81.49 |
| **Far Eastern Federal Area** | **56.67** |
| Sakha (Iakutia) Republic | 58.23 |
| Primorskiy krai | 68.00 |
| Khabarovskiy krai | 51.15 |
| Amurskaya **oblast** | 81.43 |
| Kamchatskaia oblast | 34.64 |
| Magadanskaya oblast | 24.39 |
| Sakhalinskaya oblast | 53.23 |
| Evreiskaya avtonomnaya oblast | 70.92 |
| Chukotskiy avtonomnyi okrug | 6.33 |

Source: *NOBUS survey*, Goskomstat RF, 2003.

**Table 6**
**Disability category annual transition probability, RLMS average**

| | | **Disability status at time *t+1*** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Disability status at time *t*** | *Not Disabled* | 98.47 | 0.65 | 0.88 | 100 |
| | *Categories I & II* | 23.70 | 59.02 | 17.28 | 100 |
| | *Category III* | 28.87 | 14.11 | 57.02 | 100 |
| | Total | 95.60 | 1.98 | 2.42 | 100 |

**Table 7**
**Disability category transition matrices, RLMS rounds 5-11, 1994-2002**

| | | **Round 11 (2002)** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Round 10 (2001)** | *Not Disabled* | 93.94 | 0.53 | 0.86 | 95.33 |
| | *Categories I & II* | 0.43 | 1.10 | 0.37 | 1.90 |
| | *Category III* | 0.82 | 0.37 | 1.58 | 2.77 |
| | Total | 95.19 | 2.00 | 2.81 | 100.0 |

| | | **Round 10 (2001)** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Round 9 (2000)** | *Not Disabled* | 94.08 | 0.81 | 1.06 | 95.95 |
| | *Categories I & II* | 0.31 | 1.12 | 0.34 | 1.77 |
| | *Category III* | 0.53 | 0.32 | 1.44 | 2.29 |
| | Total | 94.92 | 2.25 | 2.84 | 100.0 |

| | | **Round 9 (2000)** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Round 8 (1998)** | *Not Disabled* | 94.31 | 0.67 | 0.96 | 95.95 |
| | *Categories I & II* | 0.51 | 1.14 | 0.30 | 1.95 |
| | *Category III* | 0.71 | 0.27 | 1.12 | 2.11 |
| | Total | 95.53 | 2.09 | 2.39 | 100.0 |

| | | **Round 8 (1998)** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Round 7 (1996)** | *Not Disabled* | 94.64 | 0.85 | 0.84 | 96.32 |
| | *Categories I & II* | 0.38 | 1.05 | 0.24 | 1.68 |
| | *Category III* | 0.63 | 0.28 | 1.09 | 2.00 |
| | Total | 95.65 | 2.18 | 2.17 | 100.0 |

| | | **Round 7 (1996)** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Round 6 (1995)** | *Not Disabled* | 95.25 | 0.47 | 0.69 | 96.40 |
| | *Categories I & II* | 0.36 | 0.95 | 0.28 | 1.59 |
| | *Category III* | 0.64 | 0.27 | 1.09 | 2.00 |
| | Total | 96.25 | 1.68 | 2.06 | 100.0 |

| | | **Round 6 (1995)** | | | |
|---|---|---|---|---|---|
| | | *Not Disabled* | *Categories I & II* | *Category III* | Total |
| **Round 5 (1994)** | *Not Disabled* | 95.21 | 0.43 | 0.65 | 96.30 |
| | *Categories I & II* | 0.55 | 0.91 | 0.29 | 1.75 |
| | *Category III* | 0.46 | 0.35 | 1.15 | 1.95 |
| | Total | 96.23 | 1.69 | 2.09 | 100.0 |

**Table 8**
**Disability transition from healthy to disabled status**
**Multinomial logit estimation results**

| | Regression (1) | Regression (2 | Regression (3) | Regression (4) | Regression (5) | Regression (6) |
|---|---|---|---|---|---|---|
| Interval | All sample | Men | Women | LogAge under 35 | LogAge 35 to 55(60) | LogAge over 55(60) |
| | **Movement from healthy to disability Categories I & II** | | | | | |
| *Inclmod* | 0.00003 | -0.001*** | 0.00005*** | -0.0004 | -0.00001 | -0.0001 |
| *LogAge* | 1.479*** | 1.956*** | 1.362*** | 2.575* | 2.698*** | 2.964 |
| *Female* | -0.645** | | | -0.028 | -0.517 | -1.295** |
| *Grdlev* | 0.124 | 0.175*** | 0.031* | 0.485* | -0.089 | -0.005 |
| *Married* | -0.266 | -0.664** | 0.798 | -0.129 | -0.489 | -0.386 |
| *Num* | 0.165** | 0.186** | 0.119 | 0.315** | 0.048 | 0.321*** |
| *Healthgood* | -2.134*** | -2.173*** | -1.842 | -3.413*** | -2.488*** | -0.816* |
| *Alco* | -0.092 | -0.145 | -0.015 | 0.085 | -0.070 | -0.320 |
| *Smokes* | -0.636*** | -0.569** | -0.673 | -1.324* | -0.603** | 0.361 |
| *urban* | -0.318 | -0.020 | -0.604 | 0.213 | -0.715** | 1.125* |
| | | | | | | |
| | **Movement from healthy to disability Category III** | | | | | |
| *Inclmod* | 0.00001 | 0.00001 | -0.00001 | -0.00004 | -0.00003 | 0.0001*** |
| *LogAge* | 2.327*** | 3.366*** | 1.431*** | -1.193 | 2.212** | 7.491*** |
| *Female* | -0.330 | | | 0.535 | 0.268 | -0.835*** |
| *Grdlev* | 0.053 | 0.034 | 0.099 | 0.268 | 0.068 | 0.060 |
| *Married* | 0.094 | 0.105 | -0.122 | 0.308 | -0.099 | 0.521 |
| *Num* | 0.053 | 0.069 | 0.064 | 0.245 | -0.026 | 0.096 |
| *Healthgood* | -1.588*** | -1.591*** | -1.555 | -1.490 | -2.014 | -1.085*** |
| *Alco* | -0.141 | -0.098 | -0.354 | -0.775 | -0.009 | -0.176 |
| *Smokes* | -0.238 | -0.162 | -0.419 | -0.610 | -0.399 | -0.241 |
| *urban* | 0.095 | -0.232 | 0.691** | 0.016 | 0.468 | -0.244 |
| | | | | | | |
| Number of observations | 22051 | 11422 | 10629 | 7796 | 10033 | 4222 |
| Likelihood Ratio $X^2_{12}$ | 410.56 | 309.41 | 134.09 | 265.13 | 265.80 | 86.22 |
| Probability $> X^2$ | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Pseudo $R^2$ | 0.11 | 0.16 | 0.08 | 0.12 | 0.12 | 0.10 |

*** – Significant at 1%, ** – significant at 5%, * – significant at 10% *Note: Disability status defined by main occupation.*

**Table 9**
**Disability transition from severely disabled to non-disabled and partially disabled statuses**
**Multinomial logit estimation results**

| | Regression (7) | Regression (8) | Regression (9) | Regression (10) | Regression (11) |
|---|---|---|---|---|---|
| Interval | All sample | Men | Women | LogAge 35 to 55(60) | LogAge over 55(60) |
| | **Movement from Categories I & II to healthy** | | | | |
| *Inclmod* | 0.0001 | -0.0002 | 0.0003 | -0.00004 | 0.001** |
| *LogAge* | 2.735*** | 3.552*** | 2.920** | 0.347 | -10.900** |
| *Female* | 0.614 | | | 0.964* | -0.556 |
| *Grdlev* | 0.033 | 0.007 | 0.060 | 0.136 | -0.140 |
| *Married* | -0.089 | -0.209 | -0.004 | 0.237 | 0.668 |
| *Num* | 0.074 | 0.240* | -0.411** | -0.035 | -0.166 |
| *Healthgood* | 0.831*** | 0.790* | 1.123* | 0.792* | -1.307* |
| *Alco* | -0.326 | 0.138 | -39.121*** | -0.684 | -0.660 |
| *Smokes* | -0.450 | -0.419 | -0.590 | -0.441 | 1.795 |
| *urban* | -0.496 | -0.047 | -0.727 | -0.885* | -1.207 |
| | | | | | |
| | **Movement from Categories I & II to disability Category III** | | | | |
| *Inclmod* | 0.0001 | 0.0003 | 0.0002 | | -0.0001 |
| *LogAge* | 1.208* | 0.264 | 3.414* | 2.122* | 6.030 |
| *Female* | -0.215 | | | -0.258 | 1.051 |
| *Grdlev* | 0.156* | 0.116 | 0.229 | 0.262** | 0.081 |
| *Married* | 0.312 | 0.652 | -0.237 | 0.180 | 1.194 |
| *Num* | -0.072 | -0.096 | -0.184 | -0.024 | -0.241 |
| *Healthgood* | 0.269 | 0.522 | -0.362 | 0.083 | 0.286 |
| *Alco* | -1.057** | -0.860 | -38.580*** | -0.794 | -1.566 |
| *Smokes* | 0.050 | -0.201 | 0.640 | 0.254 | 0.043 |
| *urban* | 0.068 | 0.189 | -0.690 | -0.333 | 0.266 |
| | | | | | |
| Number of observations | 328 | 221 | 107 | 219 | 64 |
| Likelihood Ratio $X^2_{12}$ | 43.51 | 27.8 | 1970.18 | 35.98 | 39.43 |
| Probability $> X^2$ | 0.0017 | 0.0652 | 0.0000 | 0.0155 | 0.0059 |
| Pseudo $R^2$ | 0.07 | 0.08 | 0.20 | 0.08 | 0.22 |

*** – Significant at 1%, ** – significant at 5%, * – significant at 10%
*Notes: Disability status defined by main occupation; regressions did not converge for under 35 age group..*