

Assessing the Contribution of Unstable Employment to Mortality in Posttransition Russia: Prospective Individual-Level Analyses From the Russian Longitudinal Monitoring Survey

Francesca Perlman, MBBS, PhD, and Martin Bobak, MD, PhD

The fall of communism in the Soviet Union in 1991 was followed by an unprecedented increase and fluctuations in mortality in Russia. Between 1991 and 1994, life expectancy declined by 6.2 years among men and 2.5 years among women.¹ After a short-term improvement in 1995 through 1998, mortality rose again and has remained high. Cardiovascular disease and external causes accounted for the bulk of the fluctuations.² Heavy alcohol consumption^{3,4} and stressful socioeconomic conditions^{5,6} are thought to provide the most likely underlying explanations for the “mortality crisis.”

The societal transition affected most aspects of people’s lives, but perhaps the most profound changes related to the labor market. Before 1991, employment was guaranteed by the state. However, after the break-up of the Soviet Union, unemployment increased rapidly in Russia, reaching a peak of 10.8% in November 1998, although declining to 7.3% by 2001.⁷ Although these figures do not appear excessively high, wage arrears and compulsory unpaid leave were also widespread,⁷ so that the true percentage of people outside paid employment was probably much higher. Unstable employment, particularly wage arrears, contributed to short-term fluctuations in income⁸ and, therefore, on the material well-being of households.

A recent extensive econometric analysis of aggregate data reported an association between mass privatization and mortality in the postcommunist countries that was particularly strong in the former Soviet Union. This association was independent from other macroeconomic variables, and it appeared to be at least partly mediated by unemployment.⁹

The proposition that unemployment made an important contribution to the Russian mortality crisis is indirectly supported by the

Objectives. We used the Russia Longitudinal Monitoring Survey (RLMS) to investigate associations between employment, socioeconomic position, and mortality.

Methods. Data were from working-age respondents in 8 rounds (1994–2003) of the RLMS. We measured associations between education, occupation, unemployment, and insecure employment and mortality with Cox proportional hazards analyses.

Results. Of 4465 men and 4158 women who were currently employed, 251 men and 34 women died. A third of employed respondents experienced wage arrears, and 10% experienced compulsory leave and payment in consumer goods. Insecure employment, more common among the less-educated and manual workers, fluctuated with macroeconomic measures. Mortality was significantly associated with payment in consumer goods among men (hazard ratio [HR]=1.46; 95% confidence interval [CI]=1.03, 2.07), compulsory unpaid leave among women (HR=3.79; 95% CI=1.82, 7.88), and male unemployment (HR=1.88; 95% CI=1.38, 2.55). Associations with death within 1 year of entry were generally somewhat stronger than the association with mortality over the whole study period.

Conclusions. Unemployment and job insecurity predicted mortality, suggesting that they contributed to Russia’s high mortality during the transition from communism. (*Am J Public Health.* 2009;99:1818–1825. doi:10.2105/AJPH.2008.154815)

observation that the increase in Russian mortality during the transition was greatest in the least educated^{10–12} and among men of working age.³ Clearly, these are groups most prone to unemployment and insecure employment, both of which were widespread in posttransition Russia.⁷ Studies elsewhere have suggested that unemployment and job insecurity are both known to affect health adversely^{13–16}; it is therefore plausible that unemployment could have played a role in the mortality crisis.

However, we are not aware of any survey of health effects of unemployment during the Russian transition. Therefore, we used data from a large panel survey to achieve 4 objectives: (1) to assess the levels and trends in unemployment and insecure employment in

Russia during the transition, (2) to establish whether these experiences varied according to socioeconomic position, (3) to assess whether unemployment and insecure employment predicted mortality, and (4) if such effects exist, to determine whether they were mediated by material circumstances and health behaviors.

METHODS

We used data from 8 study rounds (1994–2003) of the second phase of a large panel study, the Russia Longitudinal Monitoring Survey (RLMS). The details of the study are available elsewhere¹⁷; a brief summary is provided here.

The study sample was selected from 38 population centers across the Russian

Federation. Moscow and St Petersburg were selected automatically, and the remaining districts, or primary sampling units, were sampled by stratifying districts according to socioeconomic criteria, and selecting from each stratum by using a probability proportional to size sampling method, where the likelihood of a district being selected was proportional to its population size. Within the selected primary sampling units, urban and rural secondary sampling units were selected from census enumeration districts and villages, respectively, again by using a probability proportional to size sampling method. Ten households were selected from each secondary sampling unit from housing lists developed by the investigators in urban areas and village housing lists in rural areas. The first dwelling was chosen randomly, and the remainder at regular intervals. The average response rate was 84% in the first round of phase 2 (1994) and 80% in the second round (1995); it was somewhat lower in Moscow and St Petersburg (67%).

New households were recruited during the RLMS to replace those that dropped out of the study. Individuals therefore entered the study in different years, and measurements taken in the round of entry were used as baseline data. Respondents were included in the analyses if they were older than 18 years and younger than the retirement age (60 years for men and 55 years for women), they had an occupational classification at the time of entry, they lived in a household of 2 or more people, and their gender and date of birth in each individual year of data matched that of previous years. For the analyses of unemployment and mortality, respondents who reported themselves as unemployed (see definition in “Endpoint-Related Measures”) were also included.

Mortality

At each study round, respondents were asked about household members from the previous round who were absent, and whether those absent relatives had moved away or died. Deaths in this study were thus identified by other household members. As noted previously, people living alone were excluded.

Employment-Related Measures

Unemployment was based on self-report. Unemployed individuals were those who

answered the question “What is your primary occupation at the present time,” by giving the answer “Temporarily not employed, for . . . reasons [other than sickness, childcare, retirement, poor health, etc.], and looking for a job.”

Wage arrears were assessed by the question “At the present time does your place of work owe you any money, which for some reason they didn’t pay you on time?” and “For how many months has the enterprise not paid this money to you?” The responses were collapsed into 3 categories: no arrears, less than 3 months, and 3 months or more.

Payment in consumer goods was measured by the question “Have you received in the past 30 days goods from this or goods from another enterprise in lieu of payment for your labor?” Responses were given as yes or no.

Compulsory leave was determined by questions “In the past 12 months has the administration sent you on compulsory unpaid leave?” and “How many calendar days, without a break, did this leave last or has it lasted?” Responses were grouped into 3 categories: no compulsory leave, 30 days or less, and more than 30 days.

Perceived job insecurity was measured with the question “How concerned are you that you might lose your job?” Responses were graded on a 5-point scale: very concerned, a little concerned, yes and no, not very concerned, and not at all concerned.

Measures of Socioeconomic Position

Education was divided into complete higher education (received a diploma from a university or other tertiary education institute), complete secondary (technical, general, or combined) education, and incomplete secondary or less.

Occupation was coded by the investigators with the 4-digit *Revised International Standard Classification of Occupations*.¹⁸ We collapsed these into 5 categories: higher professionals or managers (legislators, officials, or senior managers), technicians or associate professionals, clerical or service workers, skilled manual workers (skilled agricultural workers, craftsmen, or skilled tradesmen), and semi- or unskilled manual workers. For individuals with more than 1 job (5%), the higher of their 2 occupational

classes was used. Individuals in the armed forces were omitted.

Other Covariates

For geographical area, location of residence was divided into 5 broad regions of Russia: (1) Central, Ural, North; (2) Northwest (3) Metropolitan (Moscow, St Petersburg); (4) Volga and the North Caucasus; and (5) Siberia and the Far East.

Alcohol consumption was divided into 5 categories, based on amount per occasion and frequency: (1) no alcohol in past month, (2) less than 80 g pure alcohol once per week or less, (3) 80 g or more pure alcohol once per week or less, (4) less than 80 g pure alcohol per occasion more than once per week, or (5) 80 g or more pure alcohol more than once per week.

Current smoking was measured with the standard question, “Do you now smoke?” Responses were given as yes or no.

Household material goods (i.e., color television, video recorder, car, washing machine, dacha [country cottage]) were each scored as 1 and were combined into an asset score of 0 to 5 (factor analysis had previously shown these to load onto the same factor).¹⁹

Data Analysis

We first assessed the distribution of the labor market variables, occupation, and education in the working-age study population (men aged 18–59 years and women aged 18–54 years) who were currently employed, and examined trends between individual years. Second, we measured the relationships between insecure employment and becoming unemployed and occupation and education (because these variables were likely to be associated) by using logistic regression analysis.

Third, we measured the associations between the measures of insecure employment (i.e., wage arrears, compulsory leave, payment in goods, and job insecurity) and mortality in the working-age population by using Cox proportional hazards analysis. Hazard ratios were estimated at several levels of adjustment: (1) for age; (2) for age and socioeconomic position; (3) for age, socioeconomic position, and health behaviors (alcohol consumption and smoking); and (4) for age, socioeconomic position, health behaviors, and material circumstances. All

analyses were conducted separately by age and separately for the whole duration of the study and for the period within 1 year of entry (to assess short-term effects on mortality). We repeated these analyses, comparing a group of self-reported unemployed individuals with this employed population.

RESULTS

The employed working-age respondents at baseline consisted of 4565 men (aged 18–59 years) and 4158 women (aged 18–54 years), of whom 251 men and 34 women died during the study.

Table 1 shows the characteristics of the sample. Among the employed, more than a third had experienced wage arrears during the previous year (usually less than 3 months), and about one tenth had been sent on compulsory unpaid leave or had been paid in consumer goods. Overall, 45% of respondents had experienced wage arrears, compulsory leave, or payment in goods (full data not shown), and more than half were concerned or very concerned that they might lose their job. The prevalence of the different measures of insecure employment varied substantially between years (Figure 1), reaching a peak in 1998, shortly following the “ruble crisis” of that same year.

Table 2 shows the associations between insecure employment and socioeconomic position. Wage arrears, payment in goods, compulsory leave, and concern about job loss were most common among skilled and unskilled manual workers, even after we adjusted for education. Payment in goods and perceived job insecurity were predicted by low education, independently of occupation.

Table 3 shows the association between unstable employment and mortality among employed respondents. Men who had been paid in goods experienced significantly higher mortality, which was partly explained by socioeconomic position. Compulsory leave for less than 3 months was also associated with a weak increase in mortality. In contrast, compulsory unpaid leave of any duration was strongly and significantly associated with mortality in women, unexplained by socioeconomic position. Significantly higher mortality with

TABLE 1—Distribution of Variables in the Working-Age Population at Entry, by Employment Status and Gender: Russia Longitudinal Monitoring Survey, 1994–2003

	Men Aged 18–60 Years	Women Aged 18–54 Years
Employed		
Employed, no.	4565	4158
Deaths, no.	251	34
Deaths within 1 y, no.	26	3
Any compulsory leave in past 12 mo, no. (%)		
>30 d	107 (2.5)	103 (2.6)
≤30 d	207 (4.9)	239 (6.1)
None	3926 (92.6)	3559 (91.2)
Any wage arrears, no. (%)		
>3 mo	152 (3.3)	144 (3.5)
≤3 mo	1530 (33.6)	1214 (29.3)
None	2866 (63.0)	2786 (67.2)
Paid in goods in past 30 d, no. (%)		
Yes	437 (10.3)	278 (7.1)
No	3807 (89.7)	3623 (92.9)
Concerned about job loss, no. (%)		
Very concerned	1310 (28.8)	1573 (38.1)
A little concerned	1068 (23.5)	845 (20.5)
Yes and no	484 (10.7)	372 (9.0)
Not very concerned	844 (18.6)	672 (16.3)
Not at all concerned	838 (18.4)	671 (16.2)
Occupational class, no. (%)		
Higher professional or managerial	740 (16.2)	1039 (25.0)
Technician or associate professional	365 (8.0)	991 (23.8)
Clerical or service	323 (7.1)	1111 (26.7)
Skilled agricultural, crafts, or trades	1375 (30.1)	261 (6.3)
Semi- and unskilled manual	1762 (38.6)	756 (18.2)
Education, no. (%)		
Incomplete secondary or less	629 (13.8)	324 (7.8)
Complete secondary	2034 (44.6)	1298 (31.2)
Complete tertiary	1899 (41.6)	2535 (61.0)
Alcohol consumption, no. (%)		
<80 g, 1/wk or less	772 (17.2)	1800 (43.6)
≥80 g, 1/wk or less	1786 (39.8)	543 (13.1)
<80 g, 1/wk or more	209 (4.7)	102 (2.5)
≤80 g, 1/wk or more	714 (15.9)	65 (1.6)
No alcohol	1008 (22.5)	1622 (39.3)
Current smoking, no. (%)		
Yes	3044 (67.0)	764 (18.5)
No	1502 (33.0)	3377 (81.6)
Number of consumer goods, ^a mean (95% CI)	2.51 (2.47, 2.55)	2.37 (2.33, 2.42)
Total working age population		
Unemployed, no. (%)	812 (15.1)	690 (14.2)
Employed, no. (%)	4565 (84.9)	4158 (85.8)
Deaths, ^b no.	309	44
Deaths within 1 y, no.	35	5

Note. CI = confidence interval.

^aHousehold material goods (i.e., color television, video recorder, car, washing machine, dacha [country cottage]) were combined into an asset score of 0 to 5.

^bAmong both the employed and unemployed.

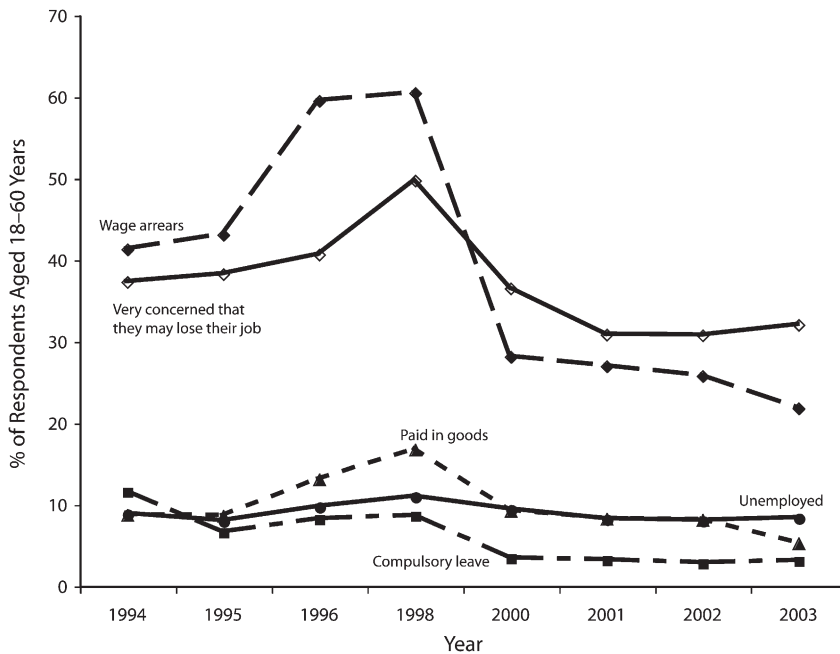


FIGURE 1—Changes in employment-related variables between years in employed people of working age: Russia Longitudinal Monitoring Survey, 1994–2003.

The analyses of unemployment were based on these working-age respondents and the 812 men and 690 women who reported themselves as unemployed. Among the employed and unemployed, there were a total of 309 deaths in men and 44 in women. The significantly higher risk of mortality among unemployed men (Table 4) was only partly explained by alcohol and educational achievement. The nonsignificantly higher risk of mortality among women was explained fully by a combination of other variables, predominantly socioeconomic indicators.

We tested for interaction between unemployment and education on mortality, but found none for death over the whole study nor for death within 1 year. We also tested for interactions between year of entry and measures of insecure employment in their association with mortality, because respondents entered this study in different years when the prevalence of insecure employment varied, but found no significant interactions (not shown in tables).

greater job insecurity, present only in men, was only weakly explained by socioeconomic position. Alcohol consumption and smoking had only a weak effect on the relationships between insecure employment and mortality. Many of

the relationships were stronger for death within 1 year, although with the exception of payment in goods among men, the confidence intervals were often wide, perhaps reflecting the small number of deaths.

DISCUSSION

To our knowledge, ours is the first study in Russia to have examined the effects on mortality of job insecurity and unemployment.

TABLE 2—Associations Between Socioeconomic Position, Wage Arrears, Compulsory Leave, Payment in Goods, and Job Insecurity and Unemployment in People of Working Age: Russia Longitudinal Monitoring Survey, 1994–2003

Socioeconomic Variables	Wage Arrears, ^a OR (95% CI)	Compulsory Leave, ^a OR (95% CI)	Paid in Goods, ^a OR (95% CI)	Very Concerned About Chance of Job Loss, ^a OR (95% CI)	Unemployment at Second (Subsequent) Round, ^a OR (95% CI)
Occupational class^b					
Higher professional or managerial (Ref)	1.00	1.00	1.00	1.00	1.00
Technician or associate professional	0.91 (0.78, 1.05)	1.05 (0.78, 1.39)	1.00 (0.73, 1.39)	1.26 (1.08, 1.47)	1.27 (0.80, 2.04)
Clerical or service	0.47 (0.39, 0.55)	0.76 (0.55, 1.05)	1.36 (0.99, 1.87)	1.38 (1.18, 1.61)	2.15 (1.39, 3.32)
Skilled agricultural, crafts, or trades	1.10 (0.94, 1.28)	2.05 (1.57, 2.69)	1.73 (1.28, 2.34)	1.25 (1.06, 1.46)	2.04 (1.31, 3.16)
Semi- and unskilled manual labor	1.19 (1.03, 1.38)	1.24 (0.94, 1.64)	2.64 (2.00, 3.49)	1.53 (1.32, 1.77)	1.77 (1.16, 2.71)
Education^c					
Higher (Ref)	1.00	1.00	1.00	1.00	1.00
Complete secondary	0.97 (0.87, 1.09)	1.12 (0.92, 1.36)	1.02 (0.84, 1.24)	0.97 (0.87, 1.08)	1.56 (1.19, 2.03)
Primary or incomplete secondary	0.94 (0.80, 1.10)	0.97 (0.73, 1.29)	1.51 (1.19, 1.93)	1.14 (0.97, 1.33)	1.20 (0.80, 1.82)

Note. CI = confidence interval; OR = odds ratio.
^aAdjusted for age and gender.
^bAdjusted for education.
^cAdjusted for occupation.

TABLE 3—Cox Proportional Hazards Ratios (HRs) for Associations Between Labor Market Conditions and Mortality in Employed People of Working Age: Russia Longitudinal Monitoring Survey, 1994–2003

Labor Market Condition	Death During Study				Death Within 1 Year of Study Entry			
	Model 1, HR (95% CI)	Model 2, HR (95% CI)	Model 3, HR (95% CI)	Model 4, HR (95% CI)	Model 1, HR (95% CI)	Model 2, HR (95% CI)	Model 3, HR (95% CI)	Model 4, HR (95% CI)
Men								
Wage arrears: yes	0.91 (0.71, 1.17)	0.88 (0.68, 1.13)	0.89 (0.69, 1.15)	0.89 (0.69, 1.16)	1.11 (0.51, 2.43)	1.09 (0.50, 2.39)	1.11 (0.50, 2.43)	1.14 (0.51, 2.54)
Compulsory leave: yes	1.13 (0.76, 1.69)	1.07 (0.71, 1.60)	1.07 (0.71, 1.62)	1.07 (0.71, 1.61)	1.44 (0.43, 4.84)	1.11 (0.33, 3.78)	1.16 (0.34, 3.96)	1.18 (0.35, 4.06)
Paid in goods: yes	1.46 (1.03, 2.07)	1.37 (0.96, 1.97)	1.30 (0.91, 1.88)	1.25 (0.86, 1.81)	3.85 (1.60, 9.29)	4.09 (1.66, 10.10)	3.91 (1.58, 9.68)	3.48 (1.32, 9.18)
Job insecurity ^a	1.08 (0.83, 1.40)	1.00 (0.77, 1.31)	0.98 (0.75, 1.28)	0.99 (0.75, 1.29)	0.92 (0.40, 2.12)	0.84 (0.36, 1.95)	0.85 (0.37, 1.98)	0.87 (0.37, 2.05)
Women								
Wage arrears: yes	0.81 (0.40, 1.64)	0.86 (0.42, 1.76)	0.79 (0.39, 1.63)	0.84 (0.41, 1.74)	3.65 (0.33, 40.26)	4.13 (0.36, 47.31)	7.50 (0.47, 119.31)	11.65 (0.58, 236.11)
Compulsory leave: yes	3.79 (1.82, 7.88)	4.31 (2.05, 9.06)	4.35 (2.04, 9.29)	4.79 (2.22, 10.31)	3.88 (0.35, 42.89)	5.12 (0.43, 60.41)	6.52 (0.47, 91.10)	8.39 (0.55, 128.54)
Paid in goods: yes	0.72 (0.17, 3.01)	0.54 (0.13, 2.31)	0.56 (0.13, 2.42)	0.60 (0.14, 2.58)
Job insecurity ^a	1.31 (0.66, 2.58)	1.20 (0.60, 2.37)	1.14 (0.57, 2.27)	1.15 (0.58, 2.30)	0.63 (0.06, 6.91)	0.50 (0.04, 5.59)	0.50 (0.04, 6.09)	0.61 (0.05, 7.91)

Notes. CI = confidence interval. For men, working age was 18–59 years; for women, working age was 18 to 54 years. Model 1 was adjusted for age. Model 2 was adjusted for age, education, and occupation. Model 3 was adjusted for age, education, occupation, alcohol, and smoking. Model 4 was adjusted for age, education, occupation, alcohol, smoking, and material goods. All models are adjusted for age at entry, district in Russia, and cluster by household.
^aVery concerned versus moderately concerned or unconcerned about job loss.

Payment in goods, unemployment, compulsory leave, wage arrears, and perceived job insecurity were all common in working people, especially the less-educated and manual workers (both skilled and unskilled groups). Although there were some inconsistencies, several of these adverse employment experiences predicted mortality, particularly unemployment and payment in goods among men and compulsory leave among women.

Strengths and Weaknesses

The RLMS is a large population study¹⁷ that provides a unique opportunity to study

the causes of death in individuals during the Russian mortality crisis. The similarity of the age and gender distribution between the study population and the national population,²⁰ together with the regionally representative nature of the sample, mean that the findings are likely to be generalizable across Russia. The high response rate and the relatively low frequency of missing data (at most 5%, but often less than 0.5% for the key variables) give additional support to the validity of the findings.

Because there were relatively few deaths among the respondents included in these

analyses, especially among women, particular consideration should be given to the reliability of the mortality data. Several factors could have influenced these data. First, because of the reliance on relatives and neighbors in ascertaining deaths in the cohort, mortality may have been underreported. Second, exclusion of single-person households could have affected the results because these respondents were older and less wealthy, and because it was not then possible to adjust for marital status, a known predictor of mortality during the transition.²¹ Third, a quarter of respondents left the RLMS without explanation, and these were more

TABLE 4—Cox Proportional Hazards Ratios (HRs) for Associations Between Mortality and Unemployment in All People of Working Age: Russia Longitudinal Monitoring Survey, 1994–2003

Labor Market Condition	Death During the Study				Death Within 1 Year of Study Entry			
	Model 1, HR (95% CI)	Model 2, HR (95% CI)	Model 3, HR (95% CI)	Model 4, HR (95% CI)	Model 1, HR (95% CI)	Model 2, HR (95% CI)	Model 3, HR (95% CI)	Model 4, HR (95% CI)
Self-reported unemployment								
Male: unemployed vs employed	1.88 (1.38, 2.55)	1.67 (1.23, 2.28)	1.46 (1.06, 2.02)	1.39 (1.00, 1.93)	2.49 (1.05, 5.90)	2.13 (0.89, 5.11)	1.67 (0.66, 4.24)	1.53 (0.60, 3.92)
Female: unemployed vs employed	1.40 (0.54, 3.63)	1.02 (0.36, 2.93)	0.67 (0.23, 1.98)	0.67 (0.23, 2.00)	4.54 (0.41, 50.29)

Notes. CI = confidence interval. For men, working age was 18–59 years; for women, working age was 18 to 54 years. Model 1 was adjusted for age. Model 2 was adjusted for age, education, and occupation. Model 3 was adjusted for age, education, occupation, alcohol, and smoking. Model 4 was adjusted for age, education, occupation, alcohol, smoking, and material goods. All models are adjusted for age at entry, district in Russia, and cluster by household.

likely to be young, less-educated, urban residents with higher incomes.

However, our previous analyses demonstrated standardized mortality ratios of 0.96 among men and 0.78 among women in the total RLMS adult study population compared with national mortality data, and even closer similarity between mortality rates in the RLMS and national data among individuals younger than 60 years.¹⁹ This indicates that there was no major underestimation of mortality in the working-age population we studied. Furthermore, the association between education and mortality was consistent with other studies, indicating that deaths in the RLMS were likely to have been similarly representative.¹⁰ Together, these observations suggest that the mortality data were sufficiently reliable for use.

Limitations in the measurement of other variables could also have influenced the results. First, wage arrears, compulsory leave, and payment in goods at any time during the previous year were recorded. If these events did not occur at the time of interview, they may have been underrecorded. Second, the *Revised International Standard Classification of Occupations*¹⁸ has not been tested previously in Russia. It is based on the education required for a particular occupation, unlike the Erikson–Goldthorpe schema,²² which has been used previously to study social stratification and mobility in Russia and other postcommunist countries.²³ In addition, condensing education into 3 categories could have concealed differences among, for example, technical, general, and combined secondary education, because type of education might influence subsequent employment. This could, in theory, affect the effectiveness of the adjustment of socioeconomic status. Overall, however, different occupational classifications are strongly mutually correlated,²⁴ and a major influence on residual confounding is unlikely.

Third, baseline data were collected at the time when respondents entered the RLMS, and different participants entered in different years. Variations in the prevalence of insecure employment could have influenced the results. However, adjusting the analyses for the year of entry did not materially change the results, and there were no significant interactions between labor market variables and year of entry (data not shown). In addition, it was also not possible to compare women's mortality by

the occupation of the head of household (which in 90% of cases is a man). However, as men are more likely to marry women from similar educational backgrounds,²⁵ their occupational class may be similar, especially if both partners are working.

Fourth, unemployment may have been overreported because the prevalence of self-reported unemployment was much higher than the registered official unemployment rate (2%). However, the latter figure represents access to benefits, which is known to be of limited use in measuring unemployment, and it is particularly low in Russia. The RLMS figures are generally considered reliable by economists.

Finally, an important weakness of our study is the small number of deaths during the study, especially among employed women and within the first year of follow-up. Consequently, the statistical power was probably too small to detect significant differences in mortality in some analyses.

Interpretation of the Results

Our results demonstrate the instability of the job market in Russia during the 1990s. Wage arrears, compulsory leave, payment in goods, job insecurity, and unemployment were common, especially among skilled and unskilled manual workers and clerical workers. The occupational class differences in these experiences support previous findings where manual workers were more likely to experience unemployment,²⁶ and people in lower-status employment lost income and prospects for improving their situation.²³ Sector of employment could also have played a role in job insecurity, because state employees were affected more often than workers at private enterprises, and because certain occupations are more common in different sectors²⁷ (although it is not possible to demonstrate this within these data).

Education seemed protective against some indicators of unstable employment, independently of occupation. Although the reasons are uncertain, it is possible that education may provide resilience or coping skills, as suggested by the association between education and higher perceived control²⁸ or depressive symptoms.²⁹ Qualitative research has also shown that Russians with a higher education use their strong social networks

to find jobs.³⁰ Importantly, higher levels of perceived job insecurity among manual and clerical workers and in less-educated respondents reflected realistic concerns, because these individuals were more likely to have become unemployed by the following round of the RLMS.

Employment and Mortality

Although not entirely consistent, our results support the existence of a link between labor market variables and mortality. Unemployment was significantly and strongly associated with mortality among men, and the effect among women was of a similar magnitude but did not reach statistical significance (probably because of the small number of deaths among women). This finding is consistent with a body of evidence for the association between unemployment, ill health, and mortality.^{13,31–34} Qualitative research has shown that the traditional male role in a Russian household is as principal breadwinner,³⁵ which suggests that unemployment has a particularly high impact on men in Russia because they do not have a traditional role in the home.³⁵

In addition to unemployment, mortality was also associated with being paid in consumer goods (among men) and with compulsory leave (among women). The association between compulsory leave and mortality among women was not unexpected, as compulsory leave has been called Russia's "hidden unemployment."⁷ It is not clear, however, why compulsory leave predicted mortality only among women, whereas being paid in goods was only associated with mortality among men. Of relevance may be the observation that unpaid leave was more common among women than men, both in our study and in others.^{36,37} Perhaps these variables have different connotations between the genders. An additional possible explanation for the inconsistent associations between different measures of job instability and mortality is that people outside employment could have been conducting business through the informal economy. Limitations in the data that could have affected the results were mentioned previously.

The relationship between labor market variables and mortality in this study was only partly explained by material variables, whereas in other countries material factors had a more prominent role.³⁸ Similarly, the significant

association between payment in goods and mortality among men was only weakly explained by material factors and education. The reason for the weak role of material factors is unclear, although the difficulties in measurement described earlier could have played a part. Another possibility is that the “goods” were in fact alcoholic beverages,³⁹ and it is the latter that were harmful to health. However, alcohol explained only a small part of the association between payment in goods (and other employment variables) and mortality.

Insecure employment has been shown elsewhere to be associated with worse self-rated health and physiological outcomes,^{16,40} and has been proposed as a psychosocial mechanism through which occupational conditions affect health. In our study, further analyses showed that concern about job loss did not mediate the associations between compulsory leave or payment in goods and either mortality or self-rated health (data not shown). Given the weak independent effects on mortality among men, our findings were not sufficiently consistent to provide a strong support for the role of insecure employment as a psychosocial mechanism.

An important feature of the Russian mortality crisis during the transition away from communism was the speed of the fluctuation in death rates,³ which suggests that the determinants of increased mortality had short-term effects. Indeed, the temporal association between the mass privatization and mortality has led to the proposition that the changes in labor market played a major role in the mortality crisis.⁹ Our data provide only limited evidence that the labor market variables were associated with deaths within the first year of follow-up more strongly than with deaths throughout the follow-up. However, as noted previously, the number of events was small, and these data do not allow drawing firm conclusions on this important issue.

When one considers the importance of insecure employment in the working-age population, and the fluctuations in these variables that temporally preceded the variations in national mortality rates in Russia during the 1990s, the hypothesis that unemployment and insecure employment are important for mortality in Russia is plausible. The high frequency of unemployment and job insecurity in Russia makes

the labor market consequences of economic instability an important potential public health problem. The observations that these adverse effects were more common in persons in lower educational or occupational groups and that unemployment and insecure employment predicted subsequent mortality are therefore important, especially as this is the largest study conducted in transitional Russia to date. There is an urgent need for further studies of the role of labor market changes on population health in Russia and other former communist countries. ■

About the Authors

At the time of this research, Francesca Perlman and Martin Bobak were with the Department of Epidemiology and Public Health, University College London, England.

Correspondence should be sent to Dr. Francesca Perlman, London School of Hygiene and Tropical Medicine, Keppel St, London WC2E 7HT, UK (e-mail: francesca.perlman@lshtm.ac.uk). Reprints can be ordered at <http://www.ajph.org> by clicking the “Reprints/Eprints” link.

This article was accepted January 8, 2009.

Contributors

F. Perlman developed the original concept for the article, analyzed the data, and wrote the initial draft. M. Bobak refined the concept, proposed further analyses, and redrafted the article. Both authors approved the final version.

Acknowledgments

F. Perlman was supported by a Wellcome Trust Fellowship (035610).

Human Participant Protection

No protocol approval was required for this study, whose data were publicly available.

References

1. Health for All database. Copenhagen, Denmark: World Health Organization, Regional Office for Europe; 1997. Available at: <http://www.euro.who.int/HFADB>. Accessed April 3, 2009.
2. *Highlights on Health in the Russian Federation*. Geneva, Switzerland: World Health Organization; 1999.
3. Leon DA, Chenet L, Shkolnikov V, et al. Huge variation in Russian mortality rates 1984-94: artefact, alcohol, or what? *Lancet*. 1997;350:383-388.
4. Nemtsov AV. Alcohol-related human losses in Russia in the 1980s and 1990s. *Addiction*. 2002;97:1413-1425.
5. Walberg P, McKee M, Shkolnikov V, Chenet L, Leon DA. Economic change, crime, and the Russian mortality crisis: a regional analysis. *BMJ*. 1998;317:312-318.

6. Marmot M, Bobak M. International comparators and poverty and health in Europe. *BMJ*. 2000;321:1124-1128.
7. Mroz T, Henderson L, Popkin B. Monitoring economic conditions in the Russian Federation: The Russia Longitudinal Monitoring Survey 1992-2000. Chapel Hill, NC: Carolina Population Center; 2001. Available at: <http://www.cpc.unc.edu/projects/rllms>. Accessed April 3, 2009.
8. Mroz T, Popkin B. Monitoring economic conditions in the Russian Federation: the Russia Longitudinal Monitoring Survey 1992-1998. Chapel Hill, NC: Carolina Population Center; 1999. Available at: <http://www.cpc.unc.edu/projects/rllms/papers.html>. Accessed June 20, 2008.
9. Stuckler D, King L, McKee M. Mass privatisation and the post-communist mortality crisis: a cross-national analysis. *Lancet*. 2009;373:399-407.
10. Plavinski SL, Plavinskaya SI, Klimov AN. Social factors and increase in mortality in Russia in the 1990s: prospective cohort study. *BMJ*. 2003;326:1240-1242.
11. Shkolnikov VM, Leon DA, Adamets S, Andreev E, Deev A. Educational level and adult mortality in Russia: an analysis of routine data 1979 to 1994. *Soc Sci Med*. 1998;47:357-369.
12. Malyutina S, Bobak M, Simonova G, Gafarov V, Nikitin Y, Marmot M. Education, marital status, and total and cardiovascular mortality in Novosibirsk, Russia: a prospective cohort study. *Ann Epidemiol*. 2004;14:244-249.
13. Bethune A. Unemployment and mortality. In: Dreever F, Whitehead M, eds. *Health Inequalities*. London, England: Her Majesty's Stationery Office; 1997.
14. Martikainen PT, Valkonen T. Excess mortality of unemployed men and women during a period of rapidly increasing unemployment. *Lancet*. 1996;348:909-912.
15. Ferrie JE, Shipley M, Marmot MG, Stansfeld SA, Davey Smith G. An uncertain future: the health effects of threats to employment security in white-collar men and women. *Am J Public Health*. 1998;88:1030-1036.
16. Ferrie JE, Shipley M, Stansfeld S, Marmot M. Effect of chronic job insecurity and change in job security on self-reported health, minor psychiatric morbidity, physiological measures, and health related behaviours in British civil servants: the Whitehall II study. *J Epidemiol Community Health*. 2002;56:450-454.
17. Russia Longitudinal Monitoring Survey. Chapel Hill, NC: University of North Carolina, Chapel Hill; 2005. Available at: <http://www.cpc.unc.edu/projects/rllms>. Accessed April 3, 2009.
18. Revised International Standard Classification of Occupations (ISCO-88). Geneva, Switzerland: International Labor Office; 1990.
19. Perlman F, Bobak M. Socioeconomic and behavioural determinants of mortality in post-transition Russia: a prospective population study. *Ann Epidemiol*. 2008;18:92-100.
20. Boutenko IA, Razlogov KE. *Recent Social Trends in Russia 1960-1995*. Montreal, PQ: McGill-Queen's University Press; 1997.
21. Hajdu P, McKee M, Bojan F. Changes in premature mortality differentials by marital status in Hungary and in England and Wales. *Eur J Public Health*. 1995;5:259-264.

22. Erikson R, Goldthorpe JH. *The Constant Flux*. Oxford, England: Clarendon Press; 1992.
23. Evans G. Are there classes in post-communist societies? A new approach to identifying class structure. *Sociology*. 1999;33:23–46.
24. Bergman MM, Joye D. Comparing social stratification schemas: CAMSIS, CASP-CH, Goldthorpe, ISCO-88, Treiman and Wright. 2001. Available at: http://ecsocman.edu.ru/images/pubs/2003/01/25/0000042173/e_mb_dj_comparing.pdf. Accessed April 3, 2009.
25. Piirainen T. *Towards a New Social Order in Russia*. Aldershot, England: Dartmouth; 1997.
26. Cockerham WC. *Health and Social Change in Russia and Eastern Europe*. New York, NY: Routledge; 1999.
27. Gerber TP. The development of self-employment in Russia. 2001. Available at: http://www.csis.org/media/csis/pubs/pm_0186.pdf. Accessed April 3, 2009.
28. Mirowsky J, Ross CE. *Education, Social Status and Health*. New York, NY: Aldine de Gruyter; 2003.
29. Nicholson A, Pikhart H, Pajak A, et al. Socio-economic status over the life-course and depressive symptoms in men and women in Eastern Europe. *J Affect Disord*. 2008;105(1-3):125–136.
30. Ashwin S, Tartakovskaya I. Who benefits from networks? In: Ashwin S, ed. *Adapting to Russia's New Labour Market: Gender and Employment Behaviour*. New York, NY: Routledge; 2005.
31. Morris JK, Cook DG, Shaper AG. Loss of employment and mortality. *BMJ*. 1994;308:1135–1139.
32. Bartley M. Unemployment and ill health: understanding the relationship. *J Epidemiol Community Health*. 1994;48:333–337.
33. Jin RL, Shah CP, Svoboda TJ. The impact of unemployment on health: a review of the evidence. *CMAJ*. 1995;153:529–540.
34. Ahs AM, Westerling R. Mortality in relation to employment status during different levels of unemployment. *Scand J Public Health*. 2006;34:159–167.
35. Ashwin S, Lytkina T. Men in crisis in Russia: the role of domestic marginalization. *Gen Soc*. 2004;18:189–206.
36. Gerry C, Kim BY, Li CA. The gender wage gap and wage arrears in Russia: evidence from the RLMS. *J Popul Econ*. 2004;17:267–288.
37. Gerber TP, Mayorova O. Dynamic gender differences in a post-Socialist labor market: Russia, 1991–7. Presented at International Sociological Association Research Committee on Social Stratification and Mobility conference; Rio de Janeiro, Brazil; August 8, 2004. Available at: <http://www.iuperj.br/rc28/day3.htm>. Accessed April 3, 2009.
38. Kessler RC, Turner JB, House JS. Effects of unemployment on health in a community survey: main, modifying and mediating effects. *J Soc Issues*. 1988;44:69–85.
39. Taibbi M. Of clowns and men. *Johnson's Russia List*. 2000;4831. Available at: <http://www.cdi.org/russia/johnson/4381.html>. Accessed April 3, 2009.
40. Ferrie JE, Shipley MJ, Marmot MG, Stansfeld S, Davey Smith G. Health effects of anticipation of job change and non-employment: longitudinal data from the Whitehall II study. *BMJ*. 1995;311:1264–1269.