The United Nations
University

WIDER

World Institute for Development Economics Research

Research for Action 42

The Transition's Mortality Crisis in East Germany

Regina T. Riphahn and Klaus F. Zimmermann

UNU World Institute for
Development Economics Research
(UNU/WIDER)

Research for Action 42

The Transition's Mortality Crisis
in East Germany

Regina T. Riphahn and Klaus F. Zimmermann

UNU World Institute for Development Economics Research (UNU/WIDER)
A research and training centre of the United Nations University

UNU World Institute for Development Economics Research (UNU/WIDER) was established by the United Nations University as its first research and training centre and started work in Helsinki, Finland in 1985. The purpose of the Institute is to undertake applied research and policy analysis on structural changes affecting the developing and transitional economies, to provide a forum for the advocacy of policies leading to robust, equitable and environmentally sustainable growth, and to promote capacity strengthening and training in the field of economic and social policy making. Its work is carried out by staff researchers and visiting scholars in Helsinki and through networks of collaborating scholars and institutions around the world.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

CVD   Cardiovascular diseases

DIW   Deutsches Institut für Wirtschaftsforschung

GDR   German Democratic Republic

GSO   German Statistical Office

GSOEP   German Socioeconomic Panel

WHO   World Health Organization

FOREWORD

Was there a dark side to the reunification process of Germany? Did the almost forgotten social and demographic crisis affect part of the population of the former German Democratic Republic immediately after the reunification? Most likely, according to the authors of this study, Regina Riphahn and Klaus Zimmermann.

This study provides plenty of new empirical evidence on the first two years of reunification revealing a significant negative impact on the health and mortality of middle-aged men mainly caused by a surge in cardiovascular mortality, accidents and deaths due to unknown causes. The authors specify and assess the causation mechanism; the main finding is that mortality and health amongst middle-aged men during the early years after reunification were negatively and significantly affected by two typical sources of stress - unemployment and, to a lesser extent, family disruption. The main explanation put forward is the inability to cope with the unfamiliar and disruptive phenomenon of great societal change facing a large segment of the population. A phenomenon which ushered in a new system of values, producing bewildering feelings of uncertainty for many.

While for the younger generation the process of becoming familiarised and adapting to the new ways was fairly rapid, blue-collar middle-aged men suddenly lost, along with their jobs, the only social framework which they knew. The restoration of coping mechanisms took about two years to take affect. By 1992, the overall mortality started to move back to the pre-1989 levels. Yet, in 1994, the mortality rates of men in the 25-60 age bracket were still 10-20 per cent higher than in 1989.

The analysis performed in this study introduces a critical view of the reunification process highlighting the human cost of the first years. What is important, and what the study strongly points out, is that such a sad cost might have been avoided by labour market and other policies which could have prevented a large increase in unemployment and by measures reducing uncertainty and the reconstruction of coping mechanisms along with the protective measures of a modern welfare state.

This study - which is a component of the UNU/WIDER project on Economic Shocks, Social Stress and the Demographic Impact - is a good causal and descriptive analysis of a short term mortality crisis and I strongly recommend it to researchers and policy makers with an interest in the welfare impact of transition.

Giovanni Andrea Cornia
Director, UNU/WIDER
November 1997

ACKNOWLEDGEMENTS

ABSTRACT

Several studies have indicated an increase in men's mortality in East Germany between 1989 and 1991 in the wake of the reunification of 1990. For some age-groups, death rates soared by up to thirty per cent. This study investigates the evolution and the causes of such ashort term demographic crisis.

A preliminary analysis clearly indicates that the reported mortality growth is not just a statistical artefact that could have been due to administrative and statistical adjustments after reunification. The theories generally advanced to explain mortality crises have therefore been tested on the East German case. The hypothesis that the death crisis is related to psychosocial stress and to economic uncertainty does appear to be plausible. The drastic political, social, and economic changes which took place during the first years of the transition from the socialist to the market economy might have caused much individually experienced stress and, in turn, an increase in mortality.

The hypothesis is evaluated using detailed regional cause-of-death statistics as well as individual level micro data. The cause-of-death data indicate a rising relevance of circulatory and heart problems, as well as of alcohol and accident-related deaths amongst the age-groups most affected by the hardship of the transition. We find further confirmation for the psychosocial stress explanation in a positive causation between individual health satisfaction and stress and economic uncertainty in the individual level data.

I INTRODUCTION

By the fall of 1989 most East Germans had realized that the political and social system of the German Democratic Republic (GDR) was about to change. The demonstrations against the regime grew steadily in size and number, and on 3 October 1990 the "Länder" of the GDR officially joined their western neighbours in the unified Federal Republic of Germany (Figure 1). Unexpectedly, the social, political, and economic changes accompanying the reunification triggered drastic demographic developments. The total fertility rate dropped from 1.52 to 0.75 over 1990-4, the number of marriages per 1,000 population declined from 7.9 to 3.1 over 1989-93, and the number of divorces (per 10,000 marriages) dropped from 30.1 to 6.6 over 1989-92. These numbers describe a society in a state of shock.

This study focuses on one aspect of this transition-related demographic adjustment, i.e. the impact on the health status and risk of death of the population of the former GDR. Initially, it was suggested that the deterioration in the age-specific mortality rates of male adults - the main group affected - was a statistical artefact explained by changes in classification criteria and migratory movements during reunification. This study examines the validity of these conclusions by presenting new data on mortality trends for the East German Länder and their major cities. In addition, the study provides a causal explanation of the observed mortality and health changes during the transition making use of detailed cause-of-death statistics and of a large panel dataset relating individuals' measures of health satisfaction to their economic and social conditions. The study ends emphasizing the role of psychosocial stress as a major cause of the recent increase in cardiovascular and external mortality.

FIGURE 1
POLITICAL MAP OF EUROPE
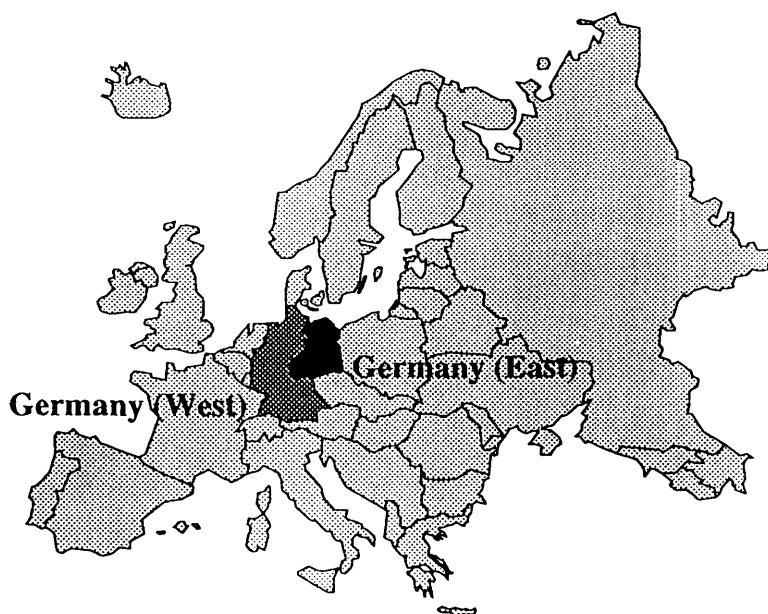
II MORTALITY CHANGES: EVIDENCE FROM NATIONWIDE DATA

2.1   Stylized facts

Eberstadt (1993, 1994a) was the first to point at the deterioration in age-specific mortality rates in East Germany since 1989. Presenting unpublished data of the German Statistical Office (GSO) he provided evidence pointing to sizeable increases in the mortality rates of teenagers and young and middle-aged adults, and for the 45-49 year olds over 1989-90. In a later paper, the same author (Eberstadt, 1994b), still citing unpublished GSO data for the years 1989 and 1991, provided evidence of surges of 28-38 per cent in the mortality rates of men aged 15 through to 44 years. Mortality changes for women in the same age brackets were not as marked or widespread, and peaked at 19 per cent for the 35-44 year olds.

The mortality rates published by the GSO for East Germany for the years 1989-94 are presented in Table 1 (with the exception of the year 1990, for which the GSO never published any data citing as a cause of this omission insufficient information about the population structure in that year). The data show that over 1989-91 the crude death rate rose by 7 per cent for men and remained constant for women. To correct for changes in population structure, Häussler *et al.* (1995) calculated age standardized mortality rates for the years between 1989 and 1992. Their data point to a 4.3 per cent increase in overall male mortality between 1989 and 1990 (Table 2). Thus, relative to 1989, there were 3,861 additional male deaths in 1990 and 2,060 in 1991. In contrast, the standardized female mortality rate declined by 1.3 per cent in 1990 and more substantially over the two subsequent years.

Examination of the data in Table 1 confirms the earlier findings of Eberstadt in terms of the age-sex group affected by the reunification's mortality rise. Indeed, over 1989-91, one observes an average *relative* increase by about 30 per cent in the mortality risk of men in the 15-50 age-group. The increase is most pronounced for young male adults (25-35 years of age) and appears relatively persistent over time: while in most cases age-specific mortality rates peaked in 1991 and started declining thereafter (especially for people in the age-groups 15-20 and 25-30), in 1994 all of them were still 10-20 per cent higher than in 1989. More worryingly, no decline at all was discernible for men aged 40-45. Increases in death rates for women were much more contained and showed a clear rise only for age-groups 10-20 and 35-45. However, in contrast to the case of men, after 1991 female mortality rates fell steadily, and by 1993-4 they were fully reabsorbed. The 1989-91 increase in the young adult female mortality rates was therefore transitory. An inspection of *absolute* changes in mortality rates, indicates that the age-groups most affected were those 35-55 and 60-65, for which the mortality rate jumped by 1.3 points per thousand between 1989 and 1991 (Table 1). Relative to the changes observed for males the absolute increases for females were negligible.

2

TABLE 1
AGE-SEX-SPECIFIC MORTALITY RATES IN FORMER EAST GERMANY (PER 1,000 INHABITANTS)

Age	1988	1989	1991	1992	1993	1994
Men						
0-1	9.0	8.5	7.0	7.2	6.5	7.1
1-5	0.6	0.4	0.5	0.4	0.4	0.4
5-10	0.3	0.3	0.3	0.2	0.2	0.2
10-15	0.3	0.3	0.3	0.2	0.2	0.2
15-20	0.8	0.9	1.2	1.0	0.9	1.1
20-25	1.1	1.1	1.5	1.4	1.4	1.3
25-30	1.3	1.2	1.7	1.5	1.3	1.3
30-35	1.8	1.7	2.2	2.1	2.0	1.9
35-40	2.3	2.5	3.2	3.2	3.1	2.9
40-45	3.5	3.5	4.3	4.4	4.1	4.4
45-50	5.9	5.6	6.5	6.2	6.0	6.0
50-55	9.6	9.3	9.9	9.4	9.3	8.9
55-60	15.8	15.4	15.7	15.4	14.6	13.9
60-65	22.9	22.6	23.9	23.6	23.6	22.3
65-70	36.6	36.8	35.9	33.3	33.6	32.9
70-75	63.0	57.8	55.3	51.9	54.1	52.0
75-80	97.9	93.7	94.0	89.0	85.2	80.3
Total	11.9	11.4	12.2	11.6	11.5	11.2
Women						
0-1	6.7	5.9	4.9	5.9	5.7	5.1
1-5	0.5	0.4	0.4	0.3	0.3	0.3
5-10	0.2	0.2	0.2	0.2	0.1	0.1
10-15	0.2	0.1	0.2	0.2	0.2	0.2
15-20	0.3	0.4	0.5	0.4	0.4	0.4
20-25	0.4	0.4	0.4	0.4	0.4	0.4
25-30	0.5	0.5	0.5	0.5	0.5	0.4
30-35	0.7	0.8	0.8	0.8	0.8	0.7
35-40	1.1	1.1	1.3	1.1	1.0	1.1
40-45	1.8	1.6	1.9	1.7	1.8	1.6
45-50	2.8	2.8	2.9	2.8	2.5	2.5
50-55	4.6	4.3	4.2	3.8	3.9	3.8
55-60	7.2	7.0	6.9	6.6	6.1	5.8
60-65	11.3	11.4	11.2	10.6	10.2	9.7
65-70	20.1	20.0	18.9	17.5	16.4	15.8
70-75	38.1	35.3	32.1	29.6	29.4	29.1
75-80	64.3	62.3	60.0	56.5	53.9	50.6
Total	13.6	13.2	13.2	12.5	12.2	12.1
Source	b	a, b	a	a	a	a

Source: a = German Statistical Yearbook 1994, 1995;
b = Demographic Yearbook of the United Nations 1988, 1991, 1992.

TABLE 2
LIFE EXPECTANCY AT BIRTH IN GERMANY

A: German Statistical Office data

Base years	West		Base years	East		Difference	
	Men	Women		Men	Women	Men	Women
1969-71	67.3	73.6	1970	68.1	73.3	-0.8	0.3
1975-77	68.6	75.2	1976	68.8	74.4	-0.2	0.8
1980-82	70.2	76.9	1981	69.0	74.8	1.2	2.1
1985-87	71.8	78.4	1986-87	69.8	75.8	2.0	2.6
1988-90	72.6	79.0	1988-89	70.0	76.2	2.6	2.8
1991-93	73.1	79.5	1991-93	69.9	77.2	3.2	2.3
1993-95	73.5	79.8	1993-95	70.7	78.2	2.8	1.6

Sources: German Statistical Yearbook; and for the east prior to 1991 the Statistical Yearbook of the GDR, various issues.

B: Calculations by Häussler *et al.* 1995

Year	Life expectancy at birth		Mortality relative to 1989	
	Men	Women	Men	Women
1989	70.10	76.34	100.0%	100.0%
1990	69.21	76.24	104.3%	98.7%
1991	69.44	76.63	102.3%	95.7%
1992	70.03	77.28	96.8%	88.5%

Source: Häussler *et al.* (1995, Table 1).

The World Health Organization (WHO) provides mortality data also for the year 1990 (Table 3). These data confirm the sex-age pattern of mortality increases identified on the basis of GSO data, but - together with the data computed by Häussler *et al.* (Table 2) - allow to conclude that the 1989-91 increase reported in Table 1 took place mainly in 1990, a year of turmoil and of the eventual unification of the two Germanies.

Changes in overall mortality can also be gauged by changes in life expectancy at different ages. As in other socialist countries, in East Germany life expectancy at birth improved rapidly until the early 1970s. Up to then, East Germany had a male and female life expectancy comparable to that of West Germany (Table 2, panel A). Then male life expectancy at birth grew slowly or stagnated, (while it continued rising steadily in West Germany) and declined modestly in the initial years after reunification. Official GSO data provide three year averages and thus conceal short term variations (Table 2, panel A). In particular they do not provide information for 1990, though they show a small drop over 1991-3 in relation to 1988-90. During 1988-90, in contrast, the life expectancy at birth of East German women appeared to be catching up with that of West German women, whereas the difference in life expectancies for men kept increasing further until after reunification.

TABLE 3
MORTALITY TRENDS WORLD HEALTH ORGANIZATION DATA
AGE-SEX-SPECIFIC MORTALITY RATES (PER 100,000 INHABITANTS)

Age	1988	1989	Change (in %)	1990	Change (in %)	1989-90 (absolute)
Men						
0	919.6	889.6	-3.3	835.8	-6.1	-53.8
1-5	56.4	42.5	-24.7	60.9	43.3	18.4
5-15	28.9	28.2	-2.4	38.3	35.8	10.1
15-25	100.8	100.7	-0.1	137.0	36.1	36.3
25-35	151.5	142.4	-6.0	178.8	25.6	36.4
35-45	283.7	288.5	1.7	339.3	17.6	50.8
45-55	763.3	744.0	-2.5	863.1	16.0	119.1
55-65	1870.6	1845.2	-1.4	1936.0	4.9	90.8
65-75	4660.3	4396.4	-5.7	4420.1	0.5	23.7
75+	13962.2	13578.0	-2.8	13860.0	2.1	282.0
Total	1188.3	1144.3	-3.7	1230.3	7.5	86.0
Women						
0	689.0	618.6	-10.2	625.4	1.1	6.8
1-5	50.2	38.5	-23.3	45.8	19.0	7.3
5-15	20.1	15.1	-24.9	27.7	83.4	12.6
15-25	39.8	42.2	6.0	47.2	11.9	5.0
25-35	58.6	63.3	8.0	67.6	6.8	4.3
35-45	141.7	129.6	-8.5	143.1	10.4	13.5
45-55	367.6	353.2	-3.9	369.8	4.7	16.6
55-65	924.3	917.2	-0.8	949.7	3.5	32.5
65-75	2739.9	2561.7	-6.5	2459.4	-4.0	-102.3
75+	10754.4	10471.1	-2.6	10384.0	-0.8	-87.1
Total	1361.2	1322.0	-2.9	1347.0	1.9	25.0

Source: WHO (World Health Statistics Annual, 1987-92).

Yearly estimates of life expectancy for the years between 1989 and 1992 by Häussler *et al.* (1995) point to a decline in male life expectancy at birth by 0.9 years between 1989 and 1990 (Table 2, panel B). Life expectancy increased in the two successive years and reached the 1989 level again in 1992. Since the estimation method used by these authors weights the loss of years lived by the younger age-groups more heavily than the gains that occurred above age 50, even in 1990 there is hardly any decline in female life expectancy, despite the increase in the mortality rates for women in the central age-groups.

Analysis of changes in mortality rates by cause-of-death over 1989-90 poses a number of problems. Brückner (1993) summarizes the difficulties faced by the GSO when, following reunification, it had to adapt the cause-of-death statistics of the former GDR to the classification followed in West Germany. His study recommends to refrain from comparing the 1990 data with those of 1991, particularly if the purpose is to compare East and West Germany, as the methodologies used in the two countries differed in a variety of ways.

TABLE 4
CAUSE-OF-DEATH STATISTICS FOR EAST GERMAN MEN BY AGE (1989 AND 1990)

(A) Age-sex-specific mortality rates (MR) per 100,000 men for selected causes

Cause	ICD (9) #	No. of cases all ages		MR all ages		MR ages 15-25		MR ages 25-35		MR ages 35-45		MR ages 45-55		MR ages 55-65	
		1989	1990	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990
All causes		91,091	94,654	1144.3	1230.3	100.7	137.0	142.4	178.8	288.5	339.3	744.0	863.1	1845.2	1936.0
Diseases of the circulatory system	25-30	46,797	46,980	587.9	610.6	5.3	5.7	13.8	20.2	62.7	70.4	224.2	254.8	751.4	787.4
Acute myocardial infarction	270	5,660	7,008	71.1	91.9	0.3	0.4	3.6	4.9	18.2	22.4	65.9	75.5	188.6	215.5
Dis. of pulmonary circ. and other forms of heart disease	28	6,880	8,786	86.4	114.2	3.0	3.9	4.8	7.7	16.1	21.1	40.6	55.2	106.4	140.3
Atherosclerosis	300	10,533	8,222	132.3	106.9	0.1	0	0.4	-	1.6	1.2	9.3	10.6	70.9	57.6
Pneumonia	321	1,604	2,205	20.1	28.7	0.9	1.2	1.7	2.7	4.3	5.6	8.8	14.6	23.3	34.7
Chronic liver disease and cirrhosis	347	2,109	2,606	26.5	33.9	0.5	0.6	4.8	9.5	20.6	30.4	54.9	69.0	79.7	95.6
Signs, symptoms, and other ill-defined conditions	460-464, 466, 467, 469	757	3,107	9.5	40.4	1.3	11.2	4.0	16.5	8.3	24.9	13.6	46.9	17.6	65.5
Accidents and adverse effects	E47-E53	4,055	4,891	50.9	63.6	51.6	84.0	42.4	54.9	44.9	565	54.0	70.7	59.2	67.5
Motor vehicle traffic accidents	E471	1,332	2,197	16.7	28.6	31.7	62.9	16.4	31.5	12.3	23.7	14.6	25.5	19.9	27.6
Suicide and self-inflicted injury	E54	2,873	2,681	36.1	34.8	15.5	11.8	27.3	25.7	39.1	37.5	52.2	57.0	55.0	54.6

Table 4 (continued)

(B) Changes in age-sex-specific mortality rates (MR) per 100,000 men between 1989 and 1990 for selected causes

Cause	ICD (9) No.	No. of cases all ages 1990-89	MR all ages 1990-89	MR ages 15-25 1990-89	MR ages 25-35 1990-89	MR ages 35-45 1990-89	MR ages 45-55 1990-89	MR ages 55-65 1990-89
All causes		3,563	86.0	36.3	36.4	50.8	119.1	90.8
Diseases of the circulatory system	25-30	183	22.7	0.4	6.4	7.7	30.6	36.0
Acute myocardial infarction	270	1.348	20.8	0.1	1.3	4.2	9.6	26.9
Dis. of pulmonary circ. and other forms of heart disease	28	1.906	27.8	0.9	2.9	5.0	14.6	33.9
Atherosclerosis	300	-2,311	-25.4	-0.1	-0.4	0.4	1.3	-13.3
Pneumonia	321	601	8.6	0.3	1.0	1.3	5.8	11.4
Chronic liver disease and cirrhosis	347	497	7.4	0.1	4.7	9.8	14.1	15.9
Signs, symptoms, and other ill-defined conditions	460-464, 466-467,469	2,350	30.9	9.9	12.5	16.6	33.3	47.9
Accidents and adverse effects	E47-E53	836	12.7	32.4	12.5	11.6	16.7	8.3
Motor vehicle traffic accidents	E471	865	11.9	31.2	15.1	11.4	10.9	7.7
Suicide and self-inflicted injury	E54	-192	-1.3	-3.7	-1.6	1.6	4.8	-0.4

Source: WHO, World Health Statistics Annual, 1990 and 1992.

For the first nine months of 1990, the former East German rules were applied, before the classification started to be adjusted to the West German model in the last three months of 1990. This circumstance makes it plausible to compare the 1990 cause-of-death WHO estimates with those gathered in 1989. While these data have to be interpreted with a grain of salt, they still offer an interesting picture (Table 4).

Almost one third of the total net increase in overall mortality (86.0 points per 100,000 men) is accounted for by unknown causes ('signs, symptoms and other ill-defined conditions'). Another 71.3 points are due to the increase in cardiovascular problems (diseases of the circulatory system, myocardial infarction, and other heart diseases). Accidents (including traffic accidents) increased by another 24.6 points, while arteriosclerosis mortality declined sharply and other causes of death remained broadly unchanged.

The increase in accident-related deaths was particularly remarkable for men in the 15-35 age bracket. For those above age 45 the increase in unknown causes plays a major role. This effect is most likely related to the above mentioned shifts in data collection and classification during 1990. In contrast, large increases in deaths due to the cardiovascular problems play a major role for mature men (in the 45-55 and 55-65 age brackets). Suicide rates are cited for the first time in 1989 in East Germany.[1] The figure does not increase between 1989 and 1990 (except for the 45-55 age-group), but remains above the West German suicide rate of 22.4 for 100,000 men across all ages in 1990.

Häussler *et al.* arrive at similar conclusions about the causes of the upsurge in male mortality between 1989 and 1990-1 (ibid.: 368-9). For the 15-25 year old males, nearly the entire additional mortality was due to car accidents. Mortality rises at older ages were mainly due to ischaemic heart diseases and, starting from 1991, to cirrhosis of the liver. In 1990 fewer suicides occurred than were expected on the basis of the 1989 data, but in 1991 they exceeded the 1989 level. All in all, these authors attribute an equal share of the increase in deaths over 1990 and 1991 to traffic accidents, ischaemic heart diseases and liver cirrhosis, and to unknown causes (though this most likely reflects the statistical difficulties met in adjusting cause-of-death statistics to the new system).

The main conclusions stemming from the analysis of aggregate statistics can be summarized as follows:

(i)   East German mortality rates increased between 1989 and 1991. The main increase occurred between 1989 and 1990.

(ii)   The increase affected mostly young adult males. The relative rise in mortality rates was the highest for men aged 15 through 35, whereas absolute upsurges were most pronounced for middle-aged men (ages 35-55) and those in the 60-65 age-group.

(iii)   The mortality increase recorded for young women adults was fully reabsorbed in 1991 and decreased steadily in the subsequent years. The decline for men was less

---

[1] Eberstadt (1994b: 211) reports that in East European cause-of-death statistics the victims of suicide and homicide were frequently hidden in the accident and injury categories.

pronounced and in 1994 the mortality rates of the central age-groups were still 10-20 per cent higher than in 1989.

(iv)   The increase in mortality rates was largely due to an increase in deaths due to unknown causes, accident-related mortality for younger men, and an overall increase in deaths due to diseases of the circulatory system.

2.2   Underlying causes of the observed mortality changes

The literature offers a number of theoretical and practical explanations of short term mortality crises (see Chapter 4, Cornia, 1996). Hereafter, the most frequent of these explanations and theoretical models are discussed in relation to the East German experience.

2.2.1   Measurement problems

It has been suggested that the changes in overall mortality illustrated above might simply be due to the greater data transparency (or *glasnost*) brought about by changes in political regime; these changes would have unveiled the data falsifications typical of the past regime. Measurement problems may also be due to changes in classification systems and data gathering methodologies, or be related to shifts in the boundaries of the various territorial units.

The former East German administration was well-known for politically motivated 'polishing' of statistics. Eberstadt (1993: 505) states that 'the incentive structure in Soviet-type planning rewarded overstatement of results at all levels, including the very highest'. This suggests that mortality levels in the GDR might have been purposely underreported. Misreporting might have began at the hospital level, where doctors wanted to avoid blame for poor health care, and it might have reached to the upper echelons who attempted to provide a positive image of the socialist society. Yet, it has equally often been mentioned that 'the GDR mortality data (if not the cause-of-death data) had been reasonably good' (Eberstadt, 1993: 513), or that 'the mortality data for non-infants, and in particular for adults, seem to have been characterized by nearly universal coverage since at least the mid-1960s' (Eberstadt, 1994: 209). Thus, mortality statistics, at least for non-infants, seem to be reliable. In addition, the pattern of mortality changes recently observed in East Germany closely resembles that observed in other former socialist countries of Europe, a fact that is hard to attribute to the co-ordinated falsifications of myriads of doctors, nurses and statisticians scattered all over the region.

Deliberate misreporting might have been more important in the case of cause-of-death statistics. Höhn and Pollard (1991) compare the mortality trends of East and West Germany for the decade from 1976 to 1986 and conclude that the GDR did not report to the WHO data on several causes of death, among them those due to cirrhosis of the liver, ill-defined signs and symptoms, and complications of medical and surgical care. Similarly, Eberstadt (1994b: 211) reports that in Eastern European statistics victims of suicide and homicide were frequently hidden in the accident and injury categories.

Factual mistakes can also be a problem. A 1990 study of the GSO in the East German states found that in about 40 per cent of a sample of 2,500 cases the cause-of-death coded by personnel of the statistical office differed from that indicated by the certifying physician, with severe errors in 15 per cent of the cases (Brückner, 1993). Yet, similar problems were observed in the United States (Rosenberg, 1989 cited by Eberstadt, 1994b), while differences in coding practices between countries of the European Community are common (Brzezinski, 1986).

Five main methodological problems might also influence the measurement of mortality:

(i)   In the former GDR, the definition of mortality rate differed from the West German definition. The number of deceased individuals was divided by a different measure of 'average population.' While in the West the average of 12 monthly figures is used, the GDR office annually calculated an average of the midyear and year end populations (Brückner, 1993). Except for years with unusual population movements (e.g. 1990, with vast outmigration from East Germany) this is unlikely to cause major differences in mortality rates.

(ii)   The boundaries of administrative units may have changed. This may affect the time-series of mortality rates for cities and states, but should not affect the national level data discussed in Section 2.1.

(iii)   With the abandonment of old statistical system, the definition of some vital statistics have changed (e.g. the definition of a live birth). However, there have not been any changes that might have affected the mortality of non-infants, and the problem thus appears negligible.

(iv)   DIW (1994) indicates that young and highly qualified individuals have migration probabilities that are respectively 200 and 50 per cent greater than those of the average population. This suggests that out-migration from East to West Germany is likely to be selective to good health conditions, a fact which may bias upward mortality rates. While this could certainly be a valid argument, nobody so far has provided empirical evidence for it. In addition even if it were true, it could not explain the rise in the total number of deaths.

(v)   The change in personnel and training methods for data collection might also render complicated the construction of reliable time-series. Brückner (1993) describes the procedural changes in cause-of-death coding, which was performed by physicians in the GDR and which is now carried out by specially trained individuals in the regional statistical offices. This might cause a structural change in the cause-of-death statistics, and it might generate learning effects, such as a declining number of 'unknown' cases, but it should not affect overall mortality rates.

Two main conclusions follow from this discussion. First, it is unlikely that the increase in mortality rates can be explained by greater *glasnost in statistics*. The quality of mortality data is generally considered reliable. Thus, the increase in overall mortality in 1990 and 1991 can hardly be explained by measurement errors. Second, caution must be exercised

when using cause-of-death statistics to determine the reasons of the mortality development, due to possible misreportings. The study thus makes an attempt at addressing the problem of misreported aggregate information by evaluating also regionally disaggregated measures from different statistical sources. Clearly, the figures may not be free from measurement errors and misrepresentation; however, one might reasonably expect that issues like politically motivated data 'polishing' may be less relevant at the disaggregated level.

2.2.2   Changes in long term risk factors

According to this approach, long term mortality trends reflect changes in environmental risk factors, as well as changes in health-related behaviour such as alcohol consumption, smoking, nutrition, personal hygiene, and physical activity.

Most of these factors are likely to have had a strong effect on the individual health of East Germans. However, they are unlikely to be a main cause of the sudden rise in mortality recently observed in East Germany, because of the slow and gradual manner in which these variables produce their effects. For instance, an increase in alcohol consumption may cause a short run increase in violent and accidental deaths. In contrast, the impact on liver cirrhosis will take some time to occur. If an increase in alcohol consumption is prompted by a change in the social environment (for which German unification may be a proper example), we would expect to observe an increase in alcohol-related mortality with a different lag structure for different causes of death. The little information available on alcohol intake in East Germany indicates a clear decline in the consumption of spirits since 1989. Breitenacher (1992, 1994, 1996) indicates that alcohol consumption per capita declined from 15.5 litres in 1989, to 12 in 1993, and 9 in 1995. Representative surveys on beer and wine consumption in East Germany indicate a roughly constant propensity to consume beer and a decline in wine consumption (Simon *et al.* 1997). Similar considerations apply to changes in smoking, diet structure and other risk factors. Thus, it is unlikely that changes in long term risk factors can explain the mortality increase observed in East Germany in 1990 and 1991.

2.2.3   Recession models

This group of models explains sudden mortality surges on the basis of short term economic recessions. The central hypothesis is that declines in household income, public transfers and subsidies, higher prices for basic goods and services, and falling public health expenditures can be the source of deteriorations in health status.

Comparison of the real incomes of the East German population before and after unification is difficult, as a new currency and a new pricing system were introduced overnight on 1 July 1990. In comparison to West Germans, East Germans were and remain worse off even after adjusting for differences in purchasing power parities (DIW, 1995b). A comparison of subjective income satisfaction between East and West Germans supports this conclusion (Wagner *et al.*, 1992), even though the East German income distribution is characterized by less inequality than the West German one. Yet, while reunification was accompanied by a large fall in GDP, there is no evidence of declines in average per capita income before, between, and after the transition.

TABLE 5
PUBLIC HEALTH CHARACTERISTICS

	1991	1992	1993	1994
A: Number of physicians per 10,000 people by state				
Brandenburg	22.2	23.2	24.0	25.0
Mecklenburg-Vorpommern	27.5	28.0	28.7	29.8
Sachsen	25.9	26.4	26.4	27.6
Sachsen-Anhalt	23.8	24.4	25.4	26.5
Thüringen	24.7	25.4	26.6	27.9
Bayern	32.3	33.0	34.1	35.1
Niedersachsen	26.9	27.6	28.4	29.1
B: Number of beds in public hospitals per 100,000 people by state				
Brandenburg	701.4	659.0	504.8	417.5
Mecklenburg-Vorpommern	780.6	605.7	510.2	443.0
Sachsen	707.2	646.6	603.6	550.7
Sachsen-Anhalt	697.4	720.3	647.7	589.0
Thüringen	689.0	647.3	643.3	575.3
Bayern	531.7	534.1	525.2	519.9
Niedersachsen	369.2	375.0	346.3	340.9

Source: German Statistical Yearbook (various issues).

C: Expenditures of public health insurance per member (in 1,000 DM)

	1991	1992	1993	1994	1995
West Germany					
Retirees	5.61	6.21	6.13	6.59	6.67
Other members	3.21	3.48	3.43	3.64	3.83
All	3.90	4.26	4.21	4.49	4.68
East Germany					
Retirees	2.82	4.12	4.57	5.24	5.39
Other members	1.52	2.24	2.46	2.80	3.04
All	1.86	2.73	3.04	3.51	3.77

Source: Bundesminister für Arbeit und Sozialordnung. *Arbeits und Sozialstatistik - Hauptergebnisse* (various issues).

Indeed, reunification gave rise to a massive infusion of public transfers financed by West Germany. Between 1989 and 1990, public expenditure on unemployment compensation rose from zero to almost 2.5 billion DM (for the period from 3 October to the end of the year), to 30 billion DM in 1991 and to 46 billion DM in 1992, i.e. the same amount disbursed in the three-times-bigger West Germany (Nauck and Joos 1995). Likewise, public expenditure on pensions and social assistance rose significantly in the first years after reunification. Thus, while it is possible that some households with several unemployed individuals might have suffered a loss of real income, there is hardly any

evidence that severe impoverishment became a major problem, as traditional recession-based mortality models would suggest.

The adjustments intervened in the health sector are also difficult to evaluate. The East German health care system suffered from inadequate investment in equipment, hospital buildings and medical supplies (see Mielck 1991, and the sources cited therein). In addition, the first migrant outflow to West Germany appears to have compriseda large number of health sector workers, thus possibly reducing the number of health personnel in the initial transition period. However, it is not plausible that a modest decline in medical staff could affect mortality in 1990 and 1991. To start with, the socialist health care system was systematically overstaffed. In addition, the increase in mortality would have affected all population groups who are biologically weaker, i.e. a fact which has not been observed.

Data on health inputs from 1991 onward suggest that the total resources made available to the health sector rose steadily. Starting from 1991, the number of physicians per 10,000 population has been climbing (see Table 5, panel A which compares this ratio with those of the best- and worst-equipped West German states) and expenditure on public health insurance per member has risen sharply for all social groups between 1991 and 1995 (Table 5, panel C). None of these figures permits a conclusive statement on changes in the health care situation in East Germany during the reunification. Yet, the sharp rise in health expenditure makes the deterioration of the health care system an unlikely cause of the mortality increase. Thus, the impoverishment related arguments of recession models may not be central to the explanation of the East German mortality crisis.

2.2.4 Unemployment stigma models

Stigma models have been developed in the Nordic countries where low unemployment has been the rule until recently (Björklund and Eriksson, 1995). These models explain changes in mental health status and in mortality rates on the basis of shifts in unemployment, particularly long term unemployment. Loss of employment is seen not so much as source of income loss, but rather as the cause of loss in the unemployed's relative income position, social purpose and social status, i.e. all factors leading to increased (true or perceived) social stigma and rising health problems. Interestingly, stigma and health outcomes should improve if aggregate unemployment rises, as lack of employment becomes a common problem.

The German reunification triggered a rapid rise in joblessness. Data in Table 6 show that unemployment shot up to 10.3 per cent already in 1991 and peaked at 16 per cent in 1994 (with much higher rates for women than for men). Official data, however, refer to narrowly defined unemployment and do not include a vast hidden unemployment due to out-migration, short-working schedules, retraining courses and other labour market programmes; Zimmermann (1993: 198-201) corrected the official unemployment rates so as to take into account this hidden unemployment. His estimates suggest that 'broad unemployment' rose from 4.9 per cent in the second quarter of 1990 to 16 per cent in the third quarter and to more than 40 per cent in 1992.

TABLE 6
UNEMPLOYMENT SITUATION IN EAST GERMANY

	1991	1992	1993	1994	1995
Brandenburg	10.3	14.8	15.3	15.3	14.2
Mecklenburg-Vorpommern	12.5	16.8	17.5	17.0	16.1
Sachsen	9.1	13.6	14.9	15.7	14.4
Sachsen-Anhalt	10.3	15.3	17.2	17.6	16.5
Thüringen	10.2	15.4	16.3	16.5	15.0
All East German States	10.3	14.8	15.8	16.0	14.9
Unemployment: Men	8.5	10.5	11.0	10.9	10.7
Women	12.3	19.6	21.0	21.5	19.3

Source: Bundesanstalt für Arbeit. *ANBA (Amtliche Nachrichten der Bundesanstalt für Arbeit)* (various issues).

In view of the rapid and pervasive spread of joblessness during unification, it is doubtful that stigma-based models can explain the sudden increase in young and adult male mortality between 1989 and 1991. Thus, while stigma models may be very useful to explain the long run health developments in East German states after unification they may have less to contribute to the search for an explanation of the 1990-1 mortality crisis.

2.2.5 Psychosocial stress models

Stress is a condition in which an individual perceives a discrepancy between the demands placed by the social environment on him/her and the personal and collective resources available to meet these demands. Epidemiological research indicates that stress is an important contributor to mental health problems, cardiovascular deaths, and deaths due to accidents, suicide, homicide and excessive alcohol consumption.

Psychosocial stress models allow to highlight a few crucial aspects of the mortality crisis experienced by East Germany during the reunification. With an overnight change from a centrally planned to a market economy, East Germans were subjected to a large and sudden shock. With rapid and unexpected changes in the economic, social, legal, administrative, working and political situation, the living environment changed radically. Many people experienced large changes in the established working and living conditions, growing and hitherto unknown uncertainty, and rapid obsolescence of learned behaviours, approaches to problem-solving and social networks. To the degree that the demands posed by the new circumstances exceeded available resources, stress was unavoidable.

Among the new stressful situations, loss of employment, industrial restructuring, changes in hierarchies and distress migration must be mentioned on a priority basis. Between mid 1989 and the end of 1991, the number of workplaces plummeted from 9.6 to 5.7 million. Loss of employment affected equally men and women, though women found it much more difficult to re-enter employment, and by 1992 accounted for almost two thirds of the unemployed (Nauck and Joos, 1995). Elderly employees were also affected disproportionately by loss of employment, though they were explicitly targeted by labour market policies: about 300 thousand of them went on early retirement in 1992 and nearly

half a million accepted the 'old-age transitional allowance' which carried them through until the pensionable age (ibid). The young with job skills were able to relocate, while those without had difficulties in acquiring professional training, since places in training establishments were very scarce (ibid.). In a sense, the young and middle age-group - particularly those with lower educational and skill levels - would appear to have been comparatively neglected by active labour market policies.

TABLE 7
SOCIOGEOGRAPHIC INFORMATION

A: East German states

States	Area (in km^2)	Population as of 31.12.94 (in million)	Percentage female	Population density (population/ km^2)	Capital
Berlin	889	3.472	51.93	3,905	Berlin
Brandenburg	29,481	2.537	51.01	86	Potsdam
Mecklenburg-Vorpommern	23,170	1.832	50.93	79	Schwerin
Sachsen	18,412	4.584	52.18	246	Dresden
Sachsen-Anhalt	20,446	2.759	51.72	135	Magdeburg
Thüringen	16,171	2.518	51.63	156	Erfurt

B: East German cities

Cities	Area (in km^2)	Population as of 30.6.94 (in million)	Percentage female	Population density (population/ km^2)
Dresden	225.75	0.4776	52.47	2,115
Erfurt	107.62	0.2015	52.36	1,873
Gera	77.64	0.1256	52.07	1,618
Jena	58.63	0.1002	52.10	1,710
Leipzig	148.58	0.4877	52.63	3,282
Potsdam	109.37	0.1392	51.58	1,272
Rostock	180.68	0.2361	51.08	1,307
Weimar	51.31	0.0605	52.56	1,179
Zwickau	59.86	0.1068	52.72	1,783

Source: German Statistical Yearbook (1996).

Loss of employment has been accompanied in many cases by the loss of social status, role, and prestige, and - in same cases - by loss of a purpose in life. Particularly those who had been well established (e.g., party and army cadres, purged university professors, workers of the vanguard heavy industry, and so on) in the prior system may have suffered from the sudden obsolescence of their previously valued human and ideological capital. For many of them, replacement by West Germans has been an additional source of perceived loss of status.

When applying the psychosocial stress model to the East German transition one is confronted with the apparent discrepancy between the greater unemployment shock suffered by women and the minuscule, or even positive, changes in female mortality rates. This phenomenon, which has been observed in all other transitional economies of Europe, is generally explained by the greater physical resilience enjoyed by women, their more efficient coping strategies, and the differential perception of the sense of failure and frustration due to loss of employment, social status and purpose.

III CHANGES IN MORTALITY RATES: EVIDENCE FROM STATE AND CITY LEVEL STATISTICS

This section uses regional data from East Germany to assess on a more detailed dataset whether there was an increase in mortality in 1990 and 1991, and what have been its causes. While nationwide data may suffer from aggregation bias, state and city level data should offer greater variance and thus help to strengthen the conclusion arrived at on the basis of aggregate data.

3.1   Data at the state and city level

After reunification in 1990, the former GDR now consists of the six states (Länder) of Mecklenburg-Vorpommern, Sachsen-Anhalt, Berlin (merging West Berlin and East Berlin), Brandenburg, Thüringen and Sachsen (Figure 2). The boundaries of these new states do not coincide exactly with the detailed political districts existing under the communist regime.

FIGURE 2
MAP OF THE FORMER GDR

Not all states and main cities therein were able or willing to provide the relevant statistics for the analysis below. Thus new complete state-wise datasets could be compiled only for the states of Brandenburg, Mecklenburg-Vorpommern, Sachsen-Anhalt and East Berlin (West Berlin is excluded for obvious reasons). The data for Thüringen is incomplete but still usable, while that for Sachsen is not available. Nine of the larger East German cities also provided new data. Dresden, Erfurt and Jena provided complete information. The data from Gera, Leipzig and Weimar are incomplete, but still usable for males, and only usable for females in case of Leipzig. Altogether this new data provide a rich picture of the mortality changes during the transition.

TABLE 8
TEMPORARY RISE OF MORTALITY RATES AFTER 1989[1]

	Total[2]	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
Males									
States									
Berlin-East	+	+	+	+	+	+	+	+	+
Brandenburg	+	+	+	+	+	+	+	+	+
Mecklenburg-Vorpommern	+	+	+	+	+	+	+	+	+
Sachsen-Anhalt[3]	+	+		+		+		+	+
Thüringen[4]	+	+	+	+	-	+	+	+	+
Cities									
Dresden	+	+	0	+	+	+	+	+	+
Erfurt	+	+	+	-	-	+	+	+	-
Gera[4]	+	-	-	-	-	-	+	+	-
Jena	+	+	+	+	0	+	+	-	+
Leipzig[4]	+	0	0	+	+	+	+	+	+
Weimar[4]	+	+	-	+	+	+	+	-	-
Females									
States									
Berlin-East	+	+	-	+	+	+	+	-	+
Brandenburg	0	+	-	+	-	+	+	+	+
Mecklenburg-Vorpommern	+	0	+	+	+	+	+	+	+
Sachsen-Anhalt[3]	+	+		+		-		-	+
Thüringen[4]	0	+	-	+	-	-	-	+	-
Cities									
Dresden	-	-	-	-	+	+	-	+	-
Erfurt	+	+	+	+	+	-	-	-	+
Jena	+	+	+	+	-	-	-	-	-
Leipzig[4]	0	-	+	-	-	+	+	0	+

Notes: (1) "+": increase, "-": decrease, "0": no clear effect. (2) Refers to all age groups (also below 25 and above 65). (3) Figures for Sachsen-Anhalt represent age groups 20-30, 30-40, etc. (4) Only partial information.

Examination of mortality changes over time for states, cities, gender and selected 5-year age-groups is carried out in a summary way in Table 8. In the table, a 'temporary' 1990 rise

18

in mortality in relation to 1989 (to be reabsorbed by 1992 or later) is indicated with the sign '+'. In some cases (Thüringen, Gera, Leipzig or Weimar) there were not enough recent years available to observe the fall, but the observations could still be consistent with the hypothesis. Mortality declines are marked by a '-' sign and cases with inconclusive ups and downs by a '0'. The overall picture provided by Table 8 is telling: there are many '+' signs, at least for males. Rises in female mortality are less frequent, affect narrower age-groups or are inconclusive, as shown by the data for Dresden and Leipzig and the states of Bandenburg and Thüringen. A first general conclusion is that the temporary rise in mortality has mainly affected males in the 25-65 age-groups.

Greater detail about changes in mortality by 5 year age-groups of the male population and states/cities is presented in Table 9. Its data confirm the findings in section 2, i.e. that the *absolute* increases in mortality was most pronounced for the middle-aged adults in the 40-60 age-group. However, in most cases, the increase was also significant for older age-groups, and, in the case of Brandenburg and Dresden, for the 30-40 years old. In contrast, as seen also in section 2, the *relative* increase in mortality rates was mostly found among young adults. For instance, in the case of East Berlin (the largest city of East Germany, with a considerable share of its overall population).

TABLE 9
MALE MORTALITY RATES IN SELECTED LOCATIONS[1,2]
(PER 1,000 MEN OF THE CORRESPONDING MALE AGE-GROUP)

A: East Berlin

Age	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-5	2.53	2.51	2.48	2.05	1.50	1.32	1.06	1.26	1.14	1.13
5-10	0.24	0.23	0.26	0.43	0.13	0.31	0.28	0.28	0.20	0.11
10-15	0.25	0.15	0.14	0.16	0.35	0.27	0.44	0.32	0.16	0.16
15-20	0.69	0.47	0.83	0.67	0.91	0.81	0.71	0.69	0.54	0.73
20-25	0.77	0.87	0.85	0.61	1.07	1.06	1.08	0.98	0.66	0.92
25-30	1.22	0.96	0.87	0.76	0.85	1.22	1.11	0.99	0.95	0.83
30-35	1.20	1.23	1.11	1.01	1.24	1.52	1.91	1.76	1.45	1.09
35-40	1.53	1.64	1.69	1.73	2.13	2.42	2.40	2.52	2.15	1.95
40-45	2.58	3.06	2.85	2.98	3.52	3.62	4.22	3.30	4.19	2.75
45-50	4.60	4.47	4.60	5.21	5.77	5.68	5.59	5.28	5.40	5.50
50-55	9.06	7.88	8.32	8.41	8.58	10.38	8.84	8.46	8.01	7.16
55-60	13.06	14.81	13.42	13.36	14.10	14.15	14.30	13.75	12.67	11.79
60-65	23.83	20.28	22.65	21.05	21.39	23.27	20.89	20.41	19.69	18.20
65-70	38.87	38.93	38.58	35.34	37.07	35.14	29.59	29.52	29.44	28.23
70-75	63.95	61.81	64.03	60.82	54.26	55.94	53.35	52.95	54.31	42.80
75-80	101.26	97.10	90.87	95.81	97.33	95.30	89.44	81.00	75.56	70.01
Total	10.41	9.71	9.45	9.20	9.65	9.74	9.26	8.85	8.51	7.94

Notes: (1) Mortality rates are defined as the number of deceased men per 1,000 of the correspondingmale age group in the population.
(2) Mortality rates labeled 'Total' represent figures for ages 0-80.

Table continues ...

Table 9 (continued)
Male mortality rates in selected locations

B: Brandenburg

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-1	11.77	10.41	10.43	9.53	9.84	9.17	8.93	8.85	7.67	6.87	4.76
1-5	0.88	0.57	0.70	0.52	0.44	0.57	0.57	0.47	0.51	0.42	0.37
5-10	0.29	0.28	0.37	0.37	0.36	0.53	0.33	0.23	0.17	0.19	0.24
10-15	0.37	0.34	0.23	0.24	0.15	0.46	0.29	0.26	0.23	0.25	0.12
15-20	0.92	0.90	1.15	1.00	1.04	1.33	1.49	1.33	1.02	1.11	1.13
20-25	1.40	1.34	1.17	1.23	1.28	1.51	1.98	1.53	1.75	1.83	1.49
25-30	1.48	1.46	1.50	1.44	1.54	1.63	2.15	1.72	1.66	1.57	1.35
30-35	1.75	1.76	1.86	2.00	1.88	2.47	2.36	2.35	2.29	2.16	1.90
35-40	2.03	2.16	2.52	2.57	2.61	3.24	3.57	3.28	3.78	3.56	3.14
40-45	3.99	4.34	4.44	3.78	3.62	3.81	4.37	4.76	5.00	4.68	4.09
45-50	5.68	6.14	6.16	6.45	6.67	7.54	8.13	7.52	6.75	6.49	5.70
50-55	9.45	9.12	9.96	10.05	10.00	11.04	11.18	11.00	9.89	10.06	9.12
55-60	13.66	14.65	15.28	16.35	15.65	16.66	15.89	16.67	15.63	14.60	13.71
60-65	23.46	22.42	23.25	23.99	22.95	24.67	23.08	24.72	23.87	22.13	21.92
65-70	36.87	35.57	34.57	37.84	38.20	39.38	35.96	31.87	33.27	33.30	30.34
70-75	66.40	67.24	67.08	69.12	62.59	54.90	51.21	50.91	55.60	52.16	49.50
75-80	105.6	102.8	98.87	101.41	98.07	102.54	102.88	100.07	96.39	84.57	73.12
Total	8.53	8.27	8.20	8.31	8.12	8.77	8.67	8.48	8.41	8.17	7.79

C: Mecklenburg-Vorpommern

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-1	9.30	11.10	8.80	9.40	7.10	9.40	6.70	7.60	5.70	9.90	4.50
1-5	0.80	0.80	0.50	0.40	0.40	0.70	0.70	0.40	0.30	0.50	0.60
5-10	0.40	0.40	0.30	0.30	0.20	0.40	0.20	0.30	0.20	0.40	0.30
10-15	0.30	0.30	0.30	0.30	0.20	0.40	0.20	0.30	0.40	0.40	0.30
15-20	1.20	1.10	1.10	0.80	1.10	1.50	1.50	1.10	1.20	1.50	1.30
20-25	1.30	1.40	1.50	1.30	1.50	1.90	2.00	2.20	2.20	1.60	1.80
25-30	1.50	1.30	1.40	1.50	1.30	2.10	1.90	1.90	2.00	1.90	1.50
30-35	2.00	2.30	2.00	2.20	2.10	3.00	2.80	2.90	2.50	2.50	2.50
35-40	2.90	2.40	2.40	2.80	2.60	4.00	4.00	4.80	4.50	4.00	3.70
40-45	4.90	5.00	3.90	4.30	4.00	5.40	5.60	5.80	5.20	5.50	5.80
45-50	7.30	6.60	7.50	7.90	7.40	8.50	8.10	7.30	8.20	7.50	7.20
50-55	10.40	10.70	10.90	10.60	10.80	13.10	12.00	11.60	11.20	10.50	10.00
55-60	15.00	16.80	16.40	17.20	17.20	18.70	18.40	17.00	17.70	15.80	16.00
60-65	25.70	25.10	22.70	23.10	22.30	23.90	26.70	25.90	25.10	24.20	23.80
65-70	39.30	55.50	37.70	36.70	38.50	38.90	38.10	34.70	35.10	35.10	36.00
70-75	69.80	74.60	72.30	75.50	65.30	61.50	59.40	56.00	56.70	56.40	50.20
75-80	111.50	106.70	101.40	107.10	102.70	107.70	97.20	93.60	89.00	86.60	78.00
Total [2]	8.40	8.30	7.90	8.00	7.70	11.60	11.10	10.80	10.80	10.80	10.60

Table 9 (continued)
Male mortality rates in selected locations

D: Sachsen-Anhalt

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-1	11.41	12.27	10.31	9.53	9.61	9.89	8.12	8.45	5.41		
1-5	0.62	0.68	0.57	0.68	0.49	0.71	0.54	0.26	0.37		
5-10	0.39	0.38	0.26	0.23	0.33	0.29	0.29	0.18	0.27		
10-15	0.35	0.33	0.30	0.23	0.31	0.39	0.23	0.20	0.26		
15-20	0.92	1.00	0.94	0.90	0.91	1.25	1.23	1.04	1.02		
20-30	1.30	1.28	1.27	1.32	1.03	1.67	1.55	1.47	1.34		
30-40	1.70	1.73	2.13	2.00	2.19	2.69	2.88	2.69	2.53		
40-50	4.72	4.70	4.93	5.31	4.81	6.07	6.01	5.50	5.13		
50-60	12.07	12.88	12.33	13.11	12.22	13.44	12.90	12.80	12.33		
60-70	28.29	29.04	28.34	28.36	29.21	30.72	30.68	29.20	30.00		
70-80	86.97	87.06	85.66	86.62	81.59	78.68	77.57	69.20	66.03		
Total	13.25	12.98	12.48	12.55	12.07	13.14	13.13	12.43	12.34		

F: Dresden

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-1	9.29	13.26	9.67	10.93	9.14	7.01	11.16	7.51	25.24	3.04	0.79
1-5	0.42	0.35	0.43	0.73	0.30	0.56	0.43	0.39	0.35	0.85	1.12
5-10	0.22	0.38	0.16	0.50	0.36	0.37	0.25	0.06	0.32	0.00	0.14
10-15	0.20	0.27	0.26	0.26	0.38	0.25	0.30	0.18	0.18	0.06	0.06
15-20	0.49	0.88	0.91	0.54	0.66	0.65	0.37	1.09	0.51	1.04	0.80
20-25	1.14	0.99	0.94	0.77	0.96	1.75	1.57	1.22	0.79	1.19	0.59
25-30	0.75	0.98	1.27	0.94	0.83	1.52	1.13	1.04	0.73	0.73	0.85
30-35	1.29	1.86	1.31	1.59	1.64	1.04	1.64	1.29	1.83	1.28	1.36
35-40	0.90	1.69	2.16	1.48	1.75	2.48	2.50	1.96	1.97	2.31	2.58
40-45	3.15	2.80	2.65	2.89	2.51	3.05	3.19	3.80	3.04	2.99	2.88
45-50	3.94	4.17	4.28	4.39	4.54	5.01	5.30	5.49	5.42	5.50	4.95
50-55	7.86	6.50	5.25	6.84	6.43	7.73	7.17	6.91	5.97	5.06	6.06
55-60	10.26	12.54	12.75	11.60	10.46	11.06	12.33	11.67	10.33	9.78	10.02
60-65	21.87	20.21	18.31	14.88	18.63	19.86	17.79	17.57	18.35	17.44	14.62
65-70	28.12	30.22	28.07	35.48	29.68	33.81	31.18	23.43	27.10	28.16	28.69
70-75	57.72	58.91	61.12	64.31	51.76	41.42	41.25	38.80	49.31	44.32	41.33
75-80	99.34	88.65	83.15	85.59	87.37	82.44	82.57	89.77	67.56	71.38	66.01
Total [2]	8.05	7.79	7.26	7.27	7.04	7.35	7.20	6.81	6.92	6.46	6.37

Table 9 (continued)
Male mortality rates in selected locations

G: Erfurt

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-1	8.27	5.36	5.44	3.72	7.31	8.38	6.19	6.90	3.25	5.41	7.09
1-5	0.00	0.60	0.60	0.20	0.20	0.65	0.23	0.73	0.29	0.00	1.01
5-10	0.12	0.12	0.23	0.59	0.87	0.64	0.40	0.26	0.14	0.42	0.15
10-15	0.42	0.30	0.44	0.00	0.13	0.65	0.00	0.26	0.26	0.41	0.00
15-20	0.46	0.69	0.47	0.25	0.54	1.38	0.98	1.62	1.08	0.73	0.83
20-25	1.63	1.66	1.46	1.05	1.22	0.65	0.94	2.02	0.85	0.44	1.41
25-30	1.30	0.84	1.01	1.64	0.77	1.37	1.45	1.61	1.20	1.34	0.74
30-35	2.00	1.60	1.39	1.82	1.08	2.87	1.57	2.07	0.52	1.34	1.88
35-40	1.50	1.49	1.41	2.45	3.65	2.75	2.92	2.44	2.14	1.30	2.11
40-45	2.97	1.14	2.65	4.41	4.79	3.39	3.81	3.62	3.09	3.65	2.29
45-50	4.45	4.28	3.96	4.42	4.58	5.47	5.50	4.60	5.63	5.69	4.95
50-55	7.96	8.59	7.74	7.40	8.01	9.67	7.98	6.23	8.55	7.80	6.18
55-60	11.54	13.27	14.90	14.34	10.73	12.62	14.24	14.26	12.12	12.48	10.48
60-65	19.49	27.75	23.68	19.03	24.42	23.01	24.23	23.32	25.68	19.59	15.08
65-70	35.26	36.97	35.28	37.84	32.20	32.46	36.36	35.74	32.50	31.55	28.40
70-75	69.52	64.81	58.82	65.15	57.47	55.41	52.33	46.13	49.98	47.30	56.66
75-80	108.01	107.91	101.13	98.70	94.97	98.99	99.83	97.56	101.44	75.16	75.39
Total [2]	8.03	7.95	7.41	7.46	7.39	8.09	8.03	7.74	7.57	7.01	6.87

H: Jena

Age	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
0-1	11.7	9.0	15.6	4.2	7.5	7.9	14.0	2.9	9.6		
1-5	0.9	0.9	-	0.3	0.7	-	0.4	-	-		
5-10	0.2	1.2	-	0.7	0.2	0.5	0.3	-	0.6		
10-15	-	0.6	-	-	-	1.1	0.5	0.3	0.3		
15-20	0.5	0.2	1.0	0.3	0.8	1.2	0.3	-	0.3		
20-25	0.7	0.9	1.6	0.9	1.4	1.4	1.4	0.5	0.3		
25-30	1.0	1.2	1.2	0.9	0.2	0.9	0.9	1.4	0.5		
30-35	1.3	0.2	0.5	0.5	1.0	2.3	1.3	1.5	1.5		
35-40	1.1	1.6	1.5	1.4	2.4	2.5	2.3	2.1	1.8		
40-45	2.3	3.3	2.5	2.6	2.1	0.6	3.5	3.6	3.7		
45-50	4.4	4.6	2.7	3.9	3.6	6.1	4.4	3.0	4.1		
50-55	7.6	8.6	8.0	7.1	6.3	6.5	9.5	9.2	7.8		
55-60	9.1	12.9	14.3	10.3	12.5	12.4	9.6	10.3	9.2		
60-65	31.3	16.3	19.3	13.7	14.5	21.3	19.8	23.3	19.3		
65-70	28.0	39.5	31.6	39.7	26.9	26.4	32.8	25.6	33.5		
70-75	52.0	54.0	46.6	47.6	46.3	48.0	56.6	41.6	42.1		
75-80	83.4	81.8	94.5	83.6	89.3	73.4	89.2	74.4	82.1		
Total	9.6	9.4	9.4	8.7	8.7	9.5	10.3	9.3	9.0		

Table continues...

Table 9 (continued)

Male mortality rates in selected locations

J: Leipzig

Age	1988	1989	1990	1991
0-1	7.72	5.35	10.61	5.96
1-5	0.67	0.40	0.00	0.00
5-10	0.18	0.19	0.00	0.00
10-15	0.37	0.28	0.00	0.00
15-20	0.51	0.74	0.00	0.00
20-25	1.33	0.67	0.00	0.00
25-30	1.11	1.24	0.88	1.70
30-35	1.60	1.90	1.77	2.17
35-40	2.17	2.38	3.05	2.91
40-45	3.46	3.24	3.80	4.00
45-50	5.31	5.59	6.32	6.15
50-55	8.66	7.51	9.70	9.40
55-60	15.27	14.97	15.80	15.44
60-65	23.58	19.78	24.95	21.40
65-70	35.41	34.61	38.34	31.72
70-75	55.64	53.94	56.90	56.23
75-80	94.64	81.19	86.40	95.42
Total	12.33	11.62	8.75	8.57

Source: data provided by city and state statistical offices.

Between 1989 and 1991, the largest absolute changes were recorded for the age-groups 50-55 (2.0 points per thousand) and 60-65 (2.2 points), while their relative changes were quite modest (21 and 10 per cent, respectively). In contrast, in age-groups 20-25 and 25-30 absolute changes were negligible, (0.45 and 0.46), while the relative changes were 55.3 and 47.3 per cent respectively. Hence, the middle ages are largely responsible for the increase in mortality during this period, although the behavioural changes among young adults is noticeable.

3.2   Regression analysis of main determinants on aggregate mortality

To test the hypothesis of a 'temporary' transition-related increase in mortality over 1990-1, a multivariate regression analysis was carried out for the period 1985-95 using as a dependent variable region- (i.e., state and city) and gender-specific mortality rates. This database covers a reasonable period before and after reunification. At first, the analysis is carried out on the total sample of 201 observations. Gender- and state/city-specific mortality rates (in natural logs) were regressed on a constant, a linear time trend, and a dummy variable equal to 1 for 1990-1 and 0 for all other years. The linear trend is expected to capture the long run decline in mortality, while the dummy variable should capture the 1990-1 increase in mortality caused by the dislocation brought about by reunification. While in some cases the mortality increase persisted after 1991, the analysis here focuses on a sharper short term test.

23

Column 1 in Table 10 reports the results of the above regression. The time trend has a negative parameter which is significantly different from zero, while the period dummy for 1990-1 is positive and statistically significant. The reported t-ratios (in parenthesis under the coefficients) are the heteroscedastic-consistent Huber-White t-ratios. The analysis has then been replicated by splitting the sample for males and females mortality rates (see the third and fifth column in Table 10). The respective findings support the conjecture that the issue is related to males only. The 1990-1 dummy is statistically non-significant for females, but remains significant for males. In addition, the time trend for males becomes less significant.

TABLE 10
MULTIVARIATE ANALYSIS OF REGIONAL MORTALITY RATES BY GENDER (1985-95)

	Full sample		Men		Women	
	(1)	(2)	(1)	(2)	(1)	(2)
Time	-0.014 **	-0.054 **	-0.010	-0.042 **	-0.019 *	-0.068 **
	(2.17)	(3.95)	(1.37)	(3.08)	(1.68)	(2.76)
Years 1990 and 1991	0.082 *	0.102 **	0.079 *	0.098 **	0.086	0.105
	(1.87)	(2.41)	(1.74)	(2.31)	(1.11)	(1.40)
Female	--	-0.038	--	--	--	--
		(1.04)				
State	--	0.085 **	--	0.108 **	--	0.059
		(2.25)		(2.89)		(0.88)
Unemployment rate	--	0.020 **	--	0.017 **	--	0.025 **
		(3.56)		(2.87)		(2.40)
Constant	3.508 **	6.916 **	3.090 **	5.844 **	3.924 *	8.089 **
	(5.92)	(5.78)	(4.95)	(4.91)	(3.84) *	(3.78)
Adj. R^2	2.83	10.06	2.26	15.22	1.91	6.09
N.Obs.	201	201	106	106	95	95

Notes: (1) Huber/White adjusted absolute t-values in parentheses: * and ** indicate significance of the coefficients at the 90 and 95 per cent level, respectively.

(2) For years prior to 1990 the unemployment rate is set to a value of zero.

Source: see Table 9.

The above test ignores differences between cities versus states, and does not include in the analysis specific determinants of the transitional mortality, such as unemployment. Hence, the basic regression model tested on the full sample was enriched by adding a gender dummy (1 if female, 0 otherwise), a state dummy (1 if state, 0 if city or East Berlin) and the regional unemployment rate (set equal to zero for the period prior to unification in 1990). The results (see the second column in Table 10) show that the female dummy is not significant, but that the state dummy and the unemployment rate have positive and highly significant coefficients. In addition, the time trend becomes more significant and its negative coefficient is much larger than in the previous test, while the 1990-1 dummy assumes a bigger coefficient and a higher t-ratio.

The same equation is then estimated for the two subsamples of men and women, and its results are presented in the fourth and sixth columns of Table 10. The 1990-1 period

dummy and the state dummy are not significant for females. The negative coefficient of the time trend is - rather plausibly - much bigger for females than for males. Also, unemployment has contributed to an increase in mortality for both males and females. Hence, these results confirm that there was a temporary increase in mortality in East Germany after unification, but that the increase concerned only the male population.

A problem with the above analysis is that mortality rates refer to all age-groups combined, while it has been shown above that the impact differs widely according to age. The regression has been re-run therefore by expressing the dependent variable in age-specific mortality rates for men only (Table 11).

The main conclusion flowing from the analysis of disaggregated data on mortality rates allows the following conclusions to be drawn:

(i)   The long term mortality trend in East Germany is declining, with a stronger rate of decline for females than males.

(ii)   The temporary increase in mortality is clearly visible for all adult men, and also for some age-groups of women. This finding is confirmed by the regression analysis which controls for the influence of other variables.

(iii)   The absolute increases in male mortality were most pronounced for middle-aged adults (40-60 years old), while the relative rises affected most young males in the twenties had the largest increases. The multivariate regressions for the age cohorts, identifies a significant 1990-1 increase in mortality for age-groups 25-30, 35-40, and 45-60.

(iv)   Aggregate unemployment and mortality correlate closely for both males and females. Lack of data on age-specific mortality rates do not allow to come to more specific conclusions about the intensity of this relation for specific age cohorts.

(v)   The 'state dummy' is strongly significant suggesting the working of additional location-specific mechanisms in each of the main East German states.

TABLE 11

MULTIVARIATE ANALYSIS OF REGIONAL MORTALITY RATES BY AGE GROUP FOR MEN (1985-95)

	Full Sample	Age-group 25-30	Age-group 30-35	Age-group 35-40	Age-group 40-45	Age-group 45-50	Age-group 50-55	Age-group 55-60	Age-group 60-65
Year	-0.011	-0.071 **	0.049	0.019	0.023	0.009	-0.019	-0.015	-0.036 **
	(1.45)	(2.59)	(0.21)	(0.89)	(1.02)	(0.58)	(-1.13)	(-1.28)	(-2.43)
Years 90, 91	0.128 **	0.226 **	0.113	0.195 **	0.032	0.191 **	0.125 **	0.078 **	0.067
	(5.75)	(3.69)	(1.34)	(3.33)	(0.38)	(4.21)	(2.49)	(2.37)	(1.56)
State	0.182 **	0.308 **	0.273 **	0.257 **	0.210 **	0.242 **	0.077	0.143 **	-0.045
	(9.69)	(5.96)	(4.42)	(5.54)	(3.43)	(6.07)	(1.461)	(5.18)	(-0.93)
Unemploy.	0.014 **	0.038 **	0.008	0.019	0.005	0.010	0.009	0.004	0.154 **
Rate	(3.92)	(2.85)	(0.72)	(0.10)	(0.51)	(1.24)	(1.15)	(0.84)	(2.29)
Ages 25-30	0.989	--	--	--	--	--	--	--	--
	(1.52)								
Ages 30-35	1.258 *	--	--	--	--	--	--	--	--
	(1.92)								
Ages 35-40	1.659 **	--	--	--	--	--	--	--	--
	(2.52)								
Ages 40-45	1.975 **	--	--	--	--	--	--	--	--
	(3.02)								
Ages 45-50	2.498 **	--	--	--	--	--	--	--	--
	(3.81)								
Ages 50-55	2.914 **	--	--	--	--	--	--	--	--
	(4.45)								
Ages 55-60	3.416 **	--	--	--	--	--	--	--	--
	(5.22)								
Ages 60-65	3.834 **	--	--	--	--	--	--	--	--
	(5.84)								
Constant	--	6.148 **	-0.152	-1.079	-1.010	0.677	3.671 **	3.860 **	6.171 **
		(2.59)	(-0.08)	(-0.58)	(-0.51)	(0.49)	(2.56)	(3.76)	(4.77)
Adj. R²	97.65	27.11	12.75	40.95	12.96	33.61	4.52	20.77	3.18
N.Obs.	847	106	106	105	106	106	106	106	106

Notes: (1) Huber/White adjusted absolute t-values in parentheses. * and ** indicate significance of the coefficients at the 90 and 95 per cent level, respectively. (2) For years prior to 1990 the unemployment rate is set to a value of zero.

IV   CHANGES IN MORTALITY BY CAUSES OF DEATH: EVIDENCE FROM STATE AND CITY LEVEL STATISTICS

To address the problem of possible data misreporting at the national level, the cause-of-death statistics of smaller regional units, such as the comparatively dynamic city of East Berlin and the highly rural, low-density and high unemployment state of Mecklenburg-Vorpommern are analysed hereafter (Tables 12 and 13).

4.1   Unknown causes of death

As mentioned above, the changes in coding procedures introduced in late 1990 could be expected to produce a one-off structural shift in the frequency distribution of deaths across causes and, possibly, an increase in the number of unknown causes of death. While it appears difficult to clearly determine whether a structural shift in mortality by cause-of-death took place, the tables document a clear rise in the frequency of deaths due to unknown causes in 1990. The phenomenon is stronger for older than for younger men. However, it is unclear to what degree this increase is due to changes in coding practices, or to the behaviour of physicians unfamiliar with the deceased (a fact observed in other countries in transition, especially in the presence of large migrations and vagrancy) (Senatsverwaltung, 1996: 48).

4.2   Alcohol-related deaths

Heavy alcohol consumption can be an important factor in mortality. Continuous overconsumption can damage internal organs and cause - after prolonged exposure - serious heart and liver diseases, while binge drinking increases the risk of accidental and violent deaths (Chen *et al.,* 1996; Cornia, 1996: 19).

Examination of Tables 12 and 13 provides clear evidence of an increase between 1990 and 1991 (and in subsequent years) in deaths due to chronic liver disease, cirrhosis and alcohol addiction for both East Berlin and Mecklenburg-Vorpommern. The increase is highest in rural Mecklenburg-Vorpommern where in 1993 it reached about 100 alcohol-related deaths per 100,000 men of all ages. While alcohol-related mortality appears to have risen very fast among young men, the phenomenon is far more acute and widespread among older males. The 1990-1 increase in alcohol-related mortality might be explained by a surge in drinking at the time of unification. However the literature cited in section 2 (Breitenacher 1992, 1994, 1996) indicates that alcohol consumption declined between 1989 and 1993. The increase could be explained also by the fact that, until 1990, alcohol-related deaths were incorrectly coded until 1990. The drastic increase in the deaths due to liver cirrhosis (from 59 to 138 between 1990 and 1991) in East Berlin is hard to accept at face value and might precisely be due to changes in measurement criteria. As noted in section 2, in the former GDR, deliberate misreporting of certain causes of death was common, including those due

to cirrhosis of the liver, ill-defined signs and symptoms, and complications of medical and surgical care (Höhn and Pollard 1991). If the increase is due to this coding effect, the initial increase should stabilize. Sudden rises in alcohol mortality could also be due to the lagged effect of overconsuming prior to the unification, with a further increase after unification acting as a final triggering factor (see the discussion in Häussler *et al.*, 1995).

To conclude, it would appear likely that alcohol-related mortality in East Germany rose after unification and continued to increase in the case of Mecklenburg-Vorpommern, and for East Germany as a whole (Brückner, 1993; Gräb, 1994). Less firm conclusions can be reached, however, about the causes of this phenomenon.

4.3 Circulatory and heart problems

Much has been written on the relationship between stress and mortality due to cardiovascular problems, violent causes and alcohol overconsumption (Sterling and Eyer, 1981; Henry, 1982). Mortality due to ischaemic heart diseases, and diseases of the cerebrovascular system show drastic increases across all ages in the two locations studied (Table 12 and 13). Older men (50-55 years of age) were affected much more severely: in East Berlin deaths due to ischaemic heart diseases for this age-group went up by one third between 1990 and 1991, in Mecklenburg-Vorpommern by about fifty per cent over 1989-91.

Since similar increases were observed over 1990-1 in the whole of East Germany, the GSO concluded (Brückner, 1993; Gräb, 1994) that much of the change was probably due to structural differences in coding practices between the East and West German administrations. This is particularly true in case of multiple morbidity. Since victims of cardiovascular diseases are frequently in the higher age-groups, the probability of multiple morbidity is particularly high in these cases, which renders CVD coding sensitive to individual judgement.

This view, however, does not stand up to closer scrutiny. First of all, mortality due to ischaemic heart diseases was already much higher in East than in West Germany (see Brückner, 1993; Gräb, 1994; Höhn and Pollard, 1991, for a review of past trends), thus making the case for its past underreporting less credible. Second, different age-groups were affected to different degrees, thus making the case for massive misreporting weaker. Third, cardiovascular mortality continued to rise after 1991, when a new coding system was in place (see for instance, the figures on ischaemic heart disease for Mecklenburg-Vorpommern). Fourth, as shown in section 2, the total number of deaths rose between 1989 and 1990-1, a fact which can not be explained by changes in the allocation of deaths to different causes. In conclusion, as noted by Häussler *et al.* (1995), while some of the classification shifts (e.g. from hypertonia and arteriosclerosis to ischaemic heart diseases and cerebrovascular diseases) might be the result of statistical artefacts, cardiovascular mortality among East German men appears to have increased clearly since 1991, and, most likely, since 1989-90.

TABLE 12
CAUSE-OF-DEATH INDICATORS FOR MEN IN BERLIN-EAST, 1986-95
(DEATHS PER 100,000 MALES OF CORRESPONDING AGE GROUP)

ICD No.	Cause	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
A: All age groups											
001-999	All	1041.00	971.00	945.00	920.00	965.00	974.00	926.00	885.00	851.00	794.00
140-239	Neoplasms	214.94	208.27	201.76	210.45	190.13	197.10	199.36	193.15	206.45	197.17
303	Alcohol addiction	5.38	5.61	6.32	9.47	10.90	16.23	21.45	25.28	25.21	23.04
410-414	Ischaemic heart disease	211.64	204.19	211.40	202.94	212.10	240.06	219.04	215.73	195.73	192.78
410	Acute myocardial infarction	72.92	83.75	85.43	79.35	99.77	139.54	122.42	116.05	107.32	92.63
420-429	Other heart diseases	33.86	37.88	35.90	36.24	55.01	47.55	46.13	45.15	46.81	40.59
430-438	Diseases of the cerebrovascular system	57.29	60.81	60.66	62.20	69.54	100.02	90.00	76.47	78.80	65.20
531	Ulcer of the stomach	5.56	4.59	5.98	3.59	2.97	2.13	1.94	2.54	2.52	2.82
571	Chronic liver disease and cirrhosis	26.56	21.06	21.61	27.10	25.60	40.67	37.90	41.33	38.61	33.23
780-799	Unknown	11.63	13.59	15.29	10.12	54.18	87.07	82.26	80.44	70.92	58.46
E810-E819	Motor vehicle traffic accidents	13.37	10.36	11.30	10.94	15.03	23.78	20.16	13.04	11.50	10.81
E950-E959	Suicide and self-inflicted injury	22.22	22.59	18.78	15.84	18.50	20.99	20.65	23.05	19.07	25.23
B: Age group 30-35 years											
001-999	All	120.00	123.00	111.00	101.00	124.00	152.00	191.00	176.00	145.00	109.00
140-239	Neoplasms	10.17	21.82	34.45	1.87	11.27	12.52	18.11	10.71	14.50	13.97
303	Alcohol addiction	2.03	1.98	0.00	1.87	1.88	12.52	18.11	13.77	5.80	9.78
410-414	Ischaemic heart disease	6.10	9.92	3.83	9.35	13.15	7.15	6.59	7.65	4.35	2.79
410	Acute myocardial infarction	2.03	9.92	3.83	5.61	11.27	7.15	6.59	6.12	2.90	1.40
420-429	Other heart diseases	6.10	3.97	1.91	1.87	3.76	1.79	0.00	6.12	5.80	2.79
430-438	Diseases of the cerebrovascular system	0.00	0.00	3.83	1.87	5.64	1.79	3.29	1.53	2.90	0.00
531	Ulcer of the stomach	0.00	0.00	0.00	1.87	0.00	0.00	0.00	0.00	0.00	0.00
571	Chronic liver disease and cirrhosis	8.14	3.97	1.91	5.61	5.64	8.94	9.88	21.43	11.60	4.19
780-799	Unknown	4.07	3.97	9.57	13.09	15.03	14.31	26.34	12.24	13.05	6.99
E810-E819	Motor vehicle traffic accidents	14.24	13.89	5.74	5.61	11.27	37.55	21.41	15.30	17.40	12.58
E950-E959	Suicide and self-inflicted injury	28.47	17.85	19.14	9.35	16.91	16.09	24.70	36.73	26.10	25.15

Table 12 (continued)
Cause of death-indicators for men in Berlin-East, 1986-95
(Deaths per 100,000 males of corresponding age group)

ICD No.	Cause	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
C: Age group 50-55 years											
001-999	All	906.00	788.00	832.00	841.00	858.00	1038.00	884.00	846.00	801.00	716.00
140-239	Neoplasms	247.79	220.64	265.97	253.60	206.59	236.38	219.99	226.68	231.22	184.56
303	Alcohol addiction	10.32	16.97	18.19	32.51	31.62	47.28	60.55	91.08	68.13	53.37
410-414	Ischaemic heart disease	188.43	162.45	177.31	143.06	158.11	201.43	131.19	109.29	146.57	117.85
410	Acute myocardial infarction	116.15	106.68	93.20	78.03	107.51	170.60	106.97	78.93	119.74	80.05
420-429	Other heart diseases	28.39	31.52	11.37	28.18	35.84	47.28	34.31	54.65	43.35	40.02
430-438	Diseases of the cerebrovascular system	12.91	21.82	20.46	39.02	16.86	39.05	48.44	20.24	35.10	28.91
531	Ulcer of the stomach	5.16	0.00	13.64	6.50	0.00	4.11	0.00	0.00	2.06	2.22
571	Chronic liver disease and cirrhosis	54.21	46.07	52.28	67.19	59.03	137.71	74.68	85.00	59.87	51.14
780-799	Unknown	25.81	24.25	20.46	6.50	94.86	121.27	119.08	123.46	72.26	62.26
E810-E819	Motor vehicle traffic accidents	15.49	2.42	4.55	2.17	14.76	22.61	26.24	6.07	10.32	13.34
E950-E959	Suicide and self-inflicted injury	54.21	29.10	25.01	19.51	35.84	41.11	44.40	24.29	28.90	35.58

Source: Statistical Office of the City of Berlin.

30

TABLE 13
CAUSE-OF-DEATH INDICATORS FOR MEN IN MECKLENBURG-VORPOMMERN, 1985-95
(DEATHS PER 100,000 MALES OF CORRESPONDING AGE GROUP)

ICD No.	Cause	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
A: All ages												
001-999	All	1146.55	1132.00	1064.16	1078.41	1054.48	1178.54	1136.32	1097.61	1102.37	1080.00	1060.00
140-239	Neoplasms	204.81	197.98	206.70	203.65	204.33	207.42	240.54	245.13	246.23	246.49	259.77
303	Alcohol addiction	n.a.	n.a.	n.a.	n.a.	n.a.	26.48	29.54	34.32	37.46	36.09	34.99
410-414	Ischaemic heart disease	163.50	157.74	148.73	149.79	165.14	204.60	237.67	226.18	261.87	253.71	261.56
410	Acute myocardial infarction	52.46	51.47	47.60	49.12	56.67	84.34	114.98	106.85	121.82	121.80	122.96
426-428	Other heart diseases	35.83	37.99	33.64	35.34	35.48	57.42	35.72	31.42	24.41	24.76	25.60
430-438	Diseases of the cerebrovascular system	73.81	74.27	67.07	71.53	78.28	83.69	125.78	105.29	104.05	100.71	81.71
531	Ulcer of the stomach	n.a.	n.a.	n.a.	n.a.	n.a.	3.58	3.64	5.35	3.49	3.44	3.47
571	Chronic liver disease and cirrhosis	18.99	20.12	22.43	26.19	25.42	39.40	56.00	61.73	63.22	60.29	62.37
780-799	Unknown diseases	13.63	13.06	11.11	10.41	12.82	44.18	18.52	16.71	17.10	14.21	9.72
E810-E819	Motor vehicle traffic accidents	18.88	18.83	20.42	16.83	21.40	40.16	48.72	47.24	36.90	35.86	33.76
E950-E959	Suicide and self-inflicted injury	44.42	37.56	39.77	38.71	37.18	31.69	32.85	31.09	29.58	28.42	25.26
B: Age group 25-30 years												
001-999	All	153.15	139.90	142.45	146.48	132.74	213.77	199.89	193.51	204.05	190.00	150.00
140-239	Neoplasms	18.29	13.04	10.87	13.80	17.27	10.40	9.75	6.41	12.24	12.57	7.43
303	Alcohol addiction	n.a.	n.a.	n.a.	n.a.	n.a.	11.56	8.53	11.53	16.32	6.99	7.43
410-414	Ischaemic heart disease	3.43	1.19	2.17	4.25	4.32	2.31	1.22	0.00	4.08	2.79	1.49
410	Acute myocardial infarction	1.14	0.00	1.09	3.18	3.24	2.31	1.22	0.00	4.08	1.40	0.00
426-428	Other heart diseases	0.00	0.00	2.17	3.18	1.08	1.16	3.66	1.28	2.72	1.40	2.97
430-438	Diseases of the cerebrovascular system	1.14	2.37	0.00	2.21	0.00	1.16	3.66	3.84	1.36	0.00	1.49
531	Ulcer of the stomach	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	1.36	0.00	0.00
571	Chronic liver disease and cirrhosis	3.43	2.37	3.26	2.12	3.24	8.09	14.63	11.53	8.16	11.18	4.46
780-799	Unknown diseases	6.86	4.74	0.00	1.06	6.48	18.49	4.88	5.13	6.80	4.19	8.91
E810-E819	Motor vehicle traffic accidents	19.43	18.97	35.88	15.92	19.43	56.62	81.66	75.61	65.30	62.87	44.55
E950-E959	Suicide and self-inflicted injury	40.00	27.27	39.15	37.15	19.43	35.82	15.85	23.07	19.04	22.35	20.79

Table continues...

Table 13 (continued)
Cause of death-indicators for men in Mecklenburg-Vorpommern, 1985-95
(Deaths per 100,000 males of corresponding age group)

ICD No.	Cause	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
C: Age group 50-55 years												
001-999	All	1035.81	1385.11	1105.02	1059.03	1084.69	1317.04	1192.16	1183.95	1156.44	1050.00	1000.00
140-239	Neoplasms	285.91	345.26	316.38	304.02	304.67	289.11	336.25	317.86	282.93	281.39	288.53
303	Alcohol addiction	n.a.	n.a.	n.a.	n.a.	n.a.	68.44	84.76	104.98	109.77	94.87	82.44
410-414	Ischaemic heart disease	153.57	194.97	155.88	132.56	139.64	185.75	170.90	185.17	199.44	168.84	172.04
410	Acute myocardial infarction	81.69	81.24	74.08	61.96	77.58	104.75	104.21	137.06	122.14	125.42	107.53
426-428	Other heart diseases	16.34	20.31	12.35	17.29	16.93	43.30	22.23	24.79	18.55	27.34	19.71
430-438	Diseases of the cerebrovascular system	22.87	20.31	32.41	23.05	40.90	39.11	44.46	23.33	51.02	40.20	26.88
531	Ulcer of the stomach	n.a.	n.a.	n.a.	n.a.	n.a.	8.38	1.39	4.37	1.55	4.82	3.58
571	Chronic liver disease and cirrhosis	45.75	67.02	69.45	80.69	66.77	101.96	130.61	134.14	143.78	114.17	125.45
780-799	Unknown diseases	19.61	22.34	20.06	15.85	25.39	74.02	37.52	27.70	21.64	24.12	12.54
E810-E819	Motor vehicle traffic accidents	21.24	24.37	10.08	18.73	16.93	37.71	26.40	34.99	29.37	17.69	23.30
E950-E959	Suicide and self-inflicted injury	80.05	91.39	69.45	61.96	64.88	62.85	68.08	62.70	57.20	33.77	35.84

Source: Statistical Office of the State of Mecklenburg-Vorpommern.

32

4.4   Traffic accidents

Reunification brought about a sudden increase in the availability of fast cars. This had fatal implications for a large share of the young male East German population. The increase in mortality by motor vehicle traffic accidents is noticeable already for the year 1990. The effects are strongest for the younger age-groups but still visible for older men. Häussler *et al.* (1995) find that about one third of the calculated decline in male life expectancy was due to traffic accidents (see Table 2). Different driving behaviour for men and women is one of the reasons why the mortality crisis did not affect East German women. Fortunately, the phenomenon is on the decline: the total mortality rate due to traffic accidents dropped from 68.9 in 1991 to 53.3 in 1992 and to 49.9 in 1993 (Brückner, 1993 and Gräb, 1994).

4.5   Suicide

It is difficult to formulate a clear behaviour of suicide mortality in the wake of unification. On the one hand, the frequency of suicide in East Germany was high, and one could expect that some of its sources might disappear with unification. On the other hand, the uncertain economic situation and the threat of unemployment (and the end of socialism for some true believers) might have presented new psychic burdens on the population leading to an increase in the suicide rate.

The aggregate cause-of-death statistics presented in Table 4 indicate a decrease in the suicide mortality, at least for 1990. This is roughly confirmed by the regional statistics for all age-groups. However, when disaggregating the overall trend by main age-groups, the trend is not as clear. For instance, in East Berlin there is a clear-cut increase in suicides among older men between 1990 and 1992. The rates for young men in Mecklenburg-Vorpommern suggest a possible interaction between the frequency of suicides and that of vehicle accidents. This, however, might represent more of a coding problem than an actual epidemic of suicides. In sum, while one cannot attribute the mortality increase of 1990-1 to an surge in the number of suicides, it is quite possible that the decline in the overall suicide rate hides quite different age-specific behaviours.

In conclusion, analysis of the mortality changes by main causes of death carried out on the basis of disaggregated regional data on cause-of-death statistics confirms the main conclusions arrived at on the basis of aggregate statistics:

(i)   The most important causes of the increase in death rates in East Germany are stress-related circulatory and heart problems.

(ii)   Alcohol-related mortality most likely increased after reunification and the number of alcohol-related deaths is still rising, though the precise causality behind this phenomenon remains ambiguous.

(iii)   Fatal traffic accidents presented an important transitory phenomenon responsible for the deaths of young men.

(iv)   While overall suicide rates are decreasing, their development differs strongly by age-group.

V CHANGES IN HEALTH SATISFACTION DURING THE REUNIFICATION: EVIDENCE FROM THE GERMAN SOCIOECONOMIC PANEL

The hypothesis that the social and economic stress induced by the reunification has affected the health status negatively can also be tested on individual level data generated by the German Socioeconomic Panel (GSOEP)[2] on East Germany. The GSOEP is a nationally representative household panel study conducted by the German Institute for Economic Research (DIW) in Berlin. Approximately 6,000 West German households have been interviewed each year since 1984. A supplementary sample of just under 2,000 East German households was added in 1990. Since June of 1990 (a few months before unification) the GSOEP has surveyed over 4,000 East German respondents on a yearly basis. Among other topics the survey covers labour force participation, family events, attitudes and opinions regarding current developments and future trends, including health satisfaction as well as fears or worries about the economic situation.

We use the measures of health satisfaction and worries about the current economic situation and future employment conditions to carry out an empirical test of the relation between health and perceived economic uncertainty. The observations on East Germans from 1990 through 1994 are pooled and then divided into a few distinct subsamples of the East German population. The basic sample are all East German males and females in the age-group 25-65, who responded to all questions used in this analysis. The full sample has 14,841 observations (7,304 males and 7,537 females). Since the mortality crisis was largely observed for males, we further study the male age-groups 25-34 (2,130), 35-44 (2,107), 45-54 (1,734) and 55-64 (1,333) in more detail (sample sizes in parentheses). The sub-sample of those men who were unemployed at the time of the annual surveys contains 702 observations, while the sub-sample of those men who were in full-time employment contains 2,826 annual observations. The difference between these two sub-samples and the total number of male observations stems from losses of observations due to missing values for additional questions used for these two groups, and from the fact that many workers were employed in part-time work or public programmes. To explore whether there are differences in behaviour between all groups of men, it is sufficient to examine the extreme cases of the employed and unemployed.

The measure of individual health satisfaction is a self-rated index varying between 0 (lowest point) and 10 (highest point). Averages of these responses for the full sample (including, for comparative purposes, also individuals below age 25 and above 65) and differentiated by gender and age are given in Table 14. Health satisfaction appears to be higher for men than for women, and tends to decline over time (with the exception of 1991 for males and 1992 for females). As expected, health satisfaction declines with age.

---

[2] See Wagner *et al.* (1993) for a more detailed description of the data.

TABLE 14
MEAN OF AGE GROUP SPECIFIC HEALTH SATISFACTION
(CODED 0 TO 10, INDICATING LOW AND HIGH SATISFACTION RESPECTIVELY)

Full Sample	1990	1991	1992	1993	1994
Age 0-24	7.86	7.96	7.86	7.78	7.68
Age 25-34	7.68	7.70	7.62	7.44	7.18
Age 35-44	6.89	6.93	6.92	6.69	6.52
Age 45-54	6.24	6.24	6.31	6.06	5.98
Age 55-64	5.51	5.41	5.76	5.72	5.62
Age 65 and older	5.24	5.05	4.89	4.98	5.15
Full sample	6.75	6.73	6.72	6.58	6.44
Men only					
Age 0-24	7.94	8.12	8.09	8.01	7.83
Age 25-34	7.74	7.75	7.70	7.45	7.23
Age 35-44	7.06	7.14	7.10	6.87	6.68
Age 45-54	6.32	6.42	6.45	6.16	5.99
Age 55-64	5.62	5.62	6.02	5.90	5.76
Age 65 and older	5.34	5.13	4.61	4.86	5.28
Full sample	6.91	6.93	6.90	6.74	6.58
Women only					
Age 0-24	7.78	7.80	7.65	7.55	7.55
Age 25-34	7.61	7.65	7.54	7.44	7.13
Age 35-44	6.72	6.73	6.75	6.53	6.37
Age 45-54	6.16	6.04	6.16	5.96	5.97
Age 55-64	5.41	5.21	5.49	5.54	5.47
Age 65 and older	5.21	5.01	5.04	5.05	5.09
Full sample	6.61	6.54	6.55	6.43	6.31

Source: own calculations based on GSOEP.

TABLE 15
MEAN OF HEALTH SATISFACTION BY YEAR, GENDER, AND LEVEL OF WORRIES
(CODED 0 TO 10, INDICATING LOW AND HIGH SATISFACTION RESPECTIVELY)

	Worries about personal economic situation				
	1990	1991	1992	1993	1994
Very worried:					
Men	6.63	6.66	6.63	6.25	6.01
Women	6.39	6.38	6.34	6.08	5.96
All	6.50	6.51	6.47	6.16	5.98
Somewhat worried:					
Men	6.96	7.09	6.94	6.79	6.68
Women	6.74	6.65	6.65	6.50	6.45
All	6.85	6.86	6.79	6.64	6.56
Not worried at all:					
Men	7.37	7.15	7.32	7.30	7.14
Women	6.58	6.62	6.72	6.78	6.43
All	6.96	6.89	7.02	7.04	6.78

Source: own calculations based on GSOEP.

36

Table 15 cross tabulates the index of health satisfaction by year, gender and level of economic worries. The respondents were asked to rate their worries about the economic situation as 'none', 'somewhat' and 'very much'. Again, at all levels of worry and across time, health satisfaction of females is lower than for males. Also, all age- and gender-specific averages of health satisfaction clearly increase with a decline in economic worries. Hence, there appears to be an association between worries about economic conditions and health satisfaction. Other measures of worries also correlate with perceived health status but are not reported here due to lack of space.

An interesting phenomenon apparent in Tables 14 and 15 is that average health satisfaction declines over time. This contradicts the observation that mortality peaked in 1990 and 1991 and declined in the subsequent years. The explanation for this paradox might be related to the panel nature of the data: Landua (1993) found that the response behaviour of individuals answering satisfaction questions changes with repeated questioning in two ways. The variance of answers declines and so does mean satisfaction. Individuals become increasingly hesitant to indicate high levels of satisfaction, while low satisfaction is reported consistently over time. Therefore, average satisfaction declines across the waves of a panel survey, an effect that our descriptive statistics confirm. In a regression analysis, these effects can be separated from other causes by employing a common time trend.

5.1 A regression analysis of health satisfaction

Information on general economic worries (expressed by two dummy variables for 'strong worries' and 'some worries' leaving 'no worries' as the reference case) is available for all sub-groups. For those in full employment, other worries variables were introduced: worries about job uncertainty were coded '1' if they were strong and '0' otherwise; and if the individual considers it likely to lose the job or to move to a lower position in the current firm, the respective dummy were coded '1' and '0' otherwise.

A number of control variables were employed. These covariates are age, male, married, household net income, children in household aged 16 and younger, handicapped status, a series of educational indicators (schooling at the level of 8, 10 and 12 years with different degrees; apprenticeship training; master of crafts; college degree), and a time trend. In the sample for employed men, gross income was used instead of household income. In the sample of unemployed men a variable measuring unemployment duration (in years) was also introduced. The regressions for the full sample and its male and female sub-samples also contain dummies for full-time and part-time employment, and for out of the labour force, leaving the unemployed as a reference group.

Table 16 contains the results of a multivariate regression analysis of health satisfaction explained by economic worries and individual characteristics. The table also includes an F-test of the joint significance of economic worries and problematic job expectations. Judging from the findings for the total sample (see the first column of Table 16), age and handicapped status have a strong and negative effect on health satisfaction. Males are significantly more satisfied with their health than females; being married and having children affects health satisfaction positively, though the related parameters are not

statistically different from zero. Income is positively and significantly correlated with health satisfaction, while the education affects it in a differentiated manner: in comparison to no schooling degree, 8 and 10 years schooling are associated with a decline in health satisfaction while 12 years of schooling is not. Having completed an apprenticeship or being a master of crafts has no significant impact on health satisfaction while having a college degree affects it in a positive and statistically significant manner. While household income and education are correlated, they measure different aspects of health production. The income variable measures the potential for investments in health production, while education gauges the knowledge about health prevention methods. It is plausible to expect that the impact of education on health satisfaction is non-linear. Full-time and part-time workers are not different from the unemployed and those out of the labour market; for lack of space, the corresponding effect parameters and their t-values are not reported in Table 16.

The coefficient of the time trend is negative, which may be explained by the mechanisms inherent in a repeated survey of satisfaction questions (see Landua, 1993). The most interesting effect is that of the variables measuring 'economic worries' i.e. the stress and uncertainty felt at the individual level. Table 16 provides evidence of a significant and sizeable effects of 'strong economic worries' on individual health satisfaction. This suggests that there is a correlation between uncertainty and health, or in other words between *psychosocial* stress - here measured by means of economic worries - and health. The negative impact of 'strong worries' on health satisfaction is twice as large as that of 'some worries', a result which is quite plausible. Finally, the F-test of their joint effects is highly significant. This implies that even after controlling for many individual effects and general trends, we obtain a very strong effect of economic worries on health satisfaction.

The second and third column of Table 16 explores whether there are notable differences between males and females. The coefficients of age and of the time trend are somewhat more negative for females than for males. Income affects positively female health satisfaction but it is insignificant for males, and the reverse is true for having children in the household. The negative schooling effects apply for females only.

All other effects are very similar for both males and females. This might be surprising especially in the case of the variables measuring worries, since the mortality crisis hardly affected females (Section 4). However, it must be stressed that the relation established above is between worries and health satisfaction, and not between worries and real health status. Health satisfaction might be differently related to mortality for males than for females. Unfortunately, we have no data to investigate this important relationship. However, as also argued by Häussler *et al.* (1995), females have stronger, socially accepted strategies than males to cope with a crisis in their labour force participation. In contrast to men, they can retire from the labour market and concentrate on family activities.

TABLE 16
DETERMINANTS OF INDIVIDUAL HEALTH SATISFACTION

	Full sample	Men	Women	Full-time employed men	Unemployed men
Age	-0.059 **	-0.056 **	-0.061 **	-0.049	-0.054
	(-27.45)	(-19.86)	(-18.20)	(-11.182)	(-6.23)
Male	0.216 **	–	–	–	–
	(6.17)				
Married	0.264	0.024	0.016	-0.019	-0.301
	(0.52)	(0.33)	(0.22)	(-0.193)	(-1.50)
Income^2	0.314 *	0.183	0.45 *	-0.753 *	-2.345 **
	(1.82)	(0.79)	(1.75)	(1.90)	(-2.80)
Children in household	0.065	0.108 *	0.010	0.148	0.240
	(1.35)	(1.67)	(0.14)	(1.62)	(1.15)
Handicapped	-1.003 **	-1.163 **	-0.836 **	-1.547 **	-1.253 **
	(-9.26)	(-7.45)	(-5.61)	(-5.56)	(-3.01)
Schooling: 8 years	-0.153 *	-0.055	-0.246 **	-0.320	0.066
	(-1.75)	(-0.45)	(-1.97)	(-1.15)	(0.22)
Schooling: 10 years	-0.140 *	-0.059	-0.216 *	-0.443	-0.399
	(-1.76)	(-0.53)	(-1.91)	(-1.62)	(-1.21)
Schooling: 12 years	0.015	0.175	-0.142	-0.283	0.084
	(0.17)	(1.49)	(-1.13)	(-1.05)	(0.23)
Apprenticeship	0.047	0.057	0.040	0.041	0.280
	(0.77)	(0.67)	(0.45)	(0.31)	(1.17)
Master of crafts	0.034	0.116	-0.44	0.355 *	-0.069
	(0.33)	(0.83)	(-0.30)	(1.93)	(0.17)
College degree	0.247 **	0.268 **	0.231 **	0.210	0.777 **
	(3.30)	(2.60)	(2.14)	(1.44)	(2.32)
Time trend	-0.078 **	-0.077 **	-0.081 **	-0.108 **	-0.169 *
	(-5.22)	(-3.69)	(-3.74)	(-3.24)	(-1.83)
Economic worries: strong	-0.895 **	-0.970 **	-0.827 **	-0.807 **	-0.972 **
	(-14.58)	(-11.74)	(-8.89)	(-5.70)	(-2.55)
Economic worries: some	-0.458 **	-0.482 **	-0.434 **	-0.375 **	-0.430
	(-8.32)	(-6.74)	(5.08)	(-3.49)	(-1.14)
Job worries: strong	–	–	–	0.016	–
				(-0.01)	
Expects job loss	–	–	–	-0.232 **	–
				(-2.09)	
Expects worse employment	–	–	–	0.003	–
				(-0.02)	
Unemployment duration	–	–	–	–	-0.108
					(-0.84)
Constant	9.772 **	9.876 **	9.897 **	9.940 **	10.821 **
	(76.25)	(59.14)	(49.22)	(28.16)	(17.16)
Adjusted R^2	0.126	0.123	0.124	0.098	0.126
Number of observations	14,841	7,304	7,537	2,826	702
F-test [3]	115.31	71.66	45.59	10.65	6.45

Note: * (**) represents significance at the 90 (95) per cent level.
Source: own calculations based on GSOEP.

Finally, Table 16 illustrates the differential impact of economic worries and individual characteristics on the two sub-samples of full-time employed and unemployed men. The results are largely consistent with those about men (Table 16, column 2). There are, however, some important differences. The impact of economic worries on unemployed men are nearly the same as for the total sample of men. The impact of economic worries of full-time employed men are somewhat less negative, which is quite intuitive. For the employed, health satisfaction is also affected by economic worries related to the uncertainties concerning the present job, particularly the expectations of job loss. This result may explain the differences in the effects of economic worries between employed and unemployed males reported above. However, the time trend of health satisfaction of the unemployed is more negative than for the employed, possibly pointing at the increased stress derived from the status of being unemployed. Unsurprisingly, unemployment duration exhibits no significant effect: as it is measured in years, its effect is captured by time trend variable. Finally, unemployed men with a college degree exhibit a higher health satisfaction than those with no such degree.

Analysis of the determinants of health satisfaction has been repeated for men in the age-groups 25-34, 35-44, 45-54, and 55-64 (Table 17). Most notable are the findings about the impact of the time trend and of the economic worries which explain most of the variations in health satisfaction. The time trend effect parameters become less negative with rising average age of the cohort; for age 55-64, the effect parameter is even positive and significant. The negative impact of 'strong' and 'some' worries is largest for the two central age cohorts but the impact is strong and significant also for the 25-34 and 55-64 age-groups.

5.2   Summary of findings of the analysis of individual data

The results of the analysis of the GSOEP data of individual health satisfaction and economic worries can be summarized as follows:

(i)   Economic worries have a strong and negative impact on health satisfaction for both males and females, although the effects are somewhat stronger for males. For males, these effects are strongest for the middle age-groups 35-44 and 45-54, and concern both sub-samples of male employed and unemployed. Hence, a channel has been clearly established through which economic worries affect health.

(ii)   Health satisfaction is declining over time (net of the effects due to repeated questioning of the same sample), and this trend is strongest for unemployed men. This may have to do with the rising dissatisfaction with the market economy that can be observed in East Germany.

(iii)   Surprisingly, individual characteristics play a minor role in the regressions. Income has a positive effect only on the health satisfaction of women, while the presence of dependent children in the household has a positive and significant effect on males only. This points at different channels in the home production of health.

40

TABLE 17
DETERMINANTS OF INDIVIDUAL HEALTH SATISFACTION BY AGE-GROUP

Men aged	25-34	35-44	45-54	55-64
Married	0.143	0.061	-0.252 *	0.125
	(1.10)	(0.39)	(-1.84)	(0.64)
Household net income *10⁻⁴	-0.354	0.232	0.524	0.645
	(-0.86)	(0.57)	(1.13)	(0.86)
Children in household	0.021	0.119	0.101	0.326
	(0.17)	(0.94)	(0.82)	(1.17)
Handicapped	-0.551	-1.320 **	-1.477 **	-1.014 **
	(-1.33)	(-3.43)	(-5.01)	(-4.48)
Schooling: 8 years	-0.051	-0.042	0.004	-0.479
	(-0.20)	(-0.18)	(-0.02)	(-1.39)
Schooling: 10 years	-0.024	0.168	-0.066	-0.659 *
	(-0.11)	(0.86)	(-0.30)	(-1.87)
Schooling: 12 years	0.294	0.378 *	0.035	-0.252
	(1.45)	(1.84)	(0.15)	(-0.68)
Apprenticeship	0.065	0.062	-0.000	0.149
	(0.38)	(0.37)	(-0.00)	(0.78)
Master of crafts	0.131	0.424	0.079	-0.084
	(0.46)	(1.55)	(0.29)	(-0.30)
College degree	0.221	0.185	0.390 *	0.377
	(1.10)	(1.00)	(1.95)	(1.49)
Full-time	-0.180	-0.286	0.096	0.504 *
	(-1.12)	(-1.59)	(0.51)	(1.78)
Part-time	-0.329	-0.317	-0.145	0.716 *
	(-1.12)	(-1.04)	(-0.50)	(1.83)
Out of the labour force	-0.003	-0.007	-0.108	0.075
	(-0.02)	(-0.03)	(-0.55)	(0.26)
Time trend	-0.123 **	-0.118 **	-0.100 **	0.100 *
	(-3.33)	(-3.21)	(-2.27)	(1.80)
Economic worries: strong	-0.828 **	-1.217 **	-1.115 **	-0.754 **
	(-5.62)	(-8.49)	(-6.46)	(-3.45)
Economic worries: some	-0.425 **	-0.521 **	-0.783 **	-0.255
	(-3.39)	(-4.45)	(-5.01)	(-1.30)
Constant	8.468 **	7.806 **	7.354 **	5.738 **
	(42.19)	(37.50)	(28.52)	(15.726)
Adjusted R²	0.021	0.050	0.044	0.038
Number of observations	2,130	2,107	1,734	1,333
F-test [3]	16.08	37.11	20.90	7.98

Notes: (1)   The first three regressions in Table (a) also contain dummies for full-time and part-time employment, and for out of the labour force. Coefficients are all small and insignificant and are left out for lack of space.

(2)   Income represents household net income (*10⁻⁴) for all regressions; the only exception is the equation for full-time employed men, where income represents gross monthly earnings.

(3)   Test for joint significance of variables indicating level of worries.

(4)   * (**) represents significance at the 90 (95) per cent level.

(5)   Heteroscedasticity consistent Huber-White corrected t-values in parentheses.

VI CONCLUSIONS

The study has reviewed in detail the evidence about changes in mortality rates which have occurred in East Germany in the wake of reunification. The data (disaggregated by year, age-group, region, gender and cause of death) clearly point to a mortality increase between 1989 and 1991. The upsurge in mortality affected more than proportionally young and middle-aged male adults (especially the age-groups 40-60) and was mainly caused by an increase in alcohol-related deaths (that are still rising), circulatory and heart problems, and fatal traffic accidents (among young men). While aggregate suicide rates declined, that of a few age-groups rose modestly.

In the years 1992-5, the mortality rise of 1990-1 was quickly reabsorbed for females but only very gradually for the middle-aged men. Among the several models advanced in the literature to explain short term mortality crises, it would appear - *prima facie* - that *psychosocial* stress models offer the most convincing explanation of the observed changes. This approach argues that, in line with findings of epidemiological research, individually experienced stress affects the health status. The drastic social, political, and economic changes that took place during the transition from the socialist to the market economy might well be the reason for much individually experienced stress. It therefore appears plausible to expect an increase in stress-related morbidity and ultimately in mortality (one cannot exclude, however, the possibility that long term unemployment may also affect health status and mortality).

The strong explanatory power of the *psychosocial* stress hypothesis was confirmed by multivariate regression analysis on regional data and on the basis of the GSOEP (1990-4) data which confirmed that increases in stress, uncertainty and unemployment affect individual health satisfaction. These finding are further supported by the increase in deaths due to alcohol overconsumption and circulatory and heart problems, which epidemiological research has shown to be closely related to *psychosocial* stress.

These findings suggest a critical re-examination of the East German transition process. Reunification has had a significant welfare impact. Its employment consequences are well known, and the low relative income position of East Germans in the new united German Republic are sometimes lamented. This study points to the health and mortality impact of the transition. It remains open to discussion whether different political and economic approaches to reunification would have generated more preferable outcomes. One important lesson of these findings relates to the current discussion about the relevance of the welfare state and its supposed disincentive effects. The findings presented here emphasize the beneficial effects of an uncertainty-reducing set of policy measures like those implemented in a number of welfare states. Dismantling the protective measures of social welfare and insurance would not just affect economic variables like work incentives, income distribution, and fiscal deficits. It would also affect the health, and physical well-

42

being of the population. Other evidence (see Björklund and Eriksson, 1995, for instance) suggests that poor economic conditions may have negative health consequences even outside periods of transition.

REFERENCES

Björklund, Anders and Tor Eriksson. 1995. *Unemployment and Mental Health - Evidence from Reserach in the Nordic Countries*. Working Paper 95-12, Centre for Labour Market and Social Research. University of Aarhus.

Breitenacher, Michael. 1992. Ostdeutsche übernehmen zusehends westliche Trinkgewohnheiten. *IFO-Schnelldienst* 24/92: 17-20.

_____. 1994. Getränkemarkt auf Durststrecke. *IFO-Schnelldienst* 15/94: 13-15.

_____. 1996. Getränkemarkt: Wettbewerb verschärft sich. *IFO-Schnelldienst* 23/96: 18-22.

Brzezinski, Zbigniew J. 1986. Mortality Indicators and Health-for-All Strategies in the WHO European Region. *World Health Statistics Quarterly* 39(4): 365.

Brückner, Gunter. 1993. Todesursachen 1990/91 im vereinten Deutschland - Methodische Bemerkungen und Ergebnisse. *Wirtschaft und Statistik* 4: 257-278.

Bundesanstalt für Arbeit. *ANBA (Amtliche Nachrichten der Bundesanstalt für Arbeit)* (various issues).

Bundesminister für Arbeit und Sozialordnung. *Arbeits und Sozialstatistik - Hauptergebnisse* (various issues).

Chen, Lincoln C, Friederike Wittgenstein, and Elizabeth McKeon. 1996. The Upsurge of Mortality in Russia: Causes and Policy Implications. *Population and Development Review* 22(3): 517-530.

Cornia, Giovanni Andrea. 1996. *Labour Market Shocks, Psychosocial Stress and the Transition's Mortality Crisis*. Research in Progress No.4, United Nations University, World Institute for Development Economics Research (UNU/WIDER), Helsinki.

DIW (Deutsches Institut für Wirtschaftsforschung). 1994. Wanderungen von Ost- nach Westdeutschland. *DIW Wochenbericht* 9: 128-132.

_____. 1995a. Alternde Gesellschaft - Zur Bedeutung von Zuwanderung für die Altersstruktur der Bevölkerung in Deutschland. *DIW Wochenbericht* 33: 579-589.

_____. 1995b. Ostdeutschland fünf Jahre nach der Einheit: Rückgang der Erwerbsbeteiligung schein gestoppt, Einkommen gleichen sich weiter an, Armut stagniert. *DIW Wochenbericht* 50: 863-869.

Eberstadt, Nicholas. 1993. Mortality and the Fate of Communist States. *Communist Economies and Economic Transformation* 5(4): 499-517.

_____. 1994a. Demographic Shocks after Communism: Eastern Germany, 1989-93. *Population and Development Review* 20(1): 137-152.

_____. 1994b. Health and Mortality in Central and Eastern Europe: Retrospect and Prospect. In, *The Social Legacy of Communism*, edited by James R. Millar and Sharon L. Wolchik.

Gräb, Christopher. 1994. Sterbefälle 1993 nach Todesursachen. *Wirtschaft und Statistik* 12: 1033-1041.

Häussler, B., E. Hempel, and P. Reschke. 1995. Die Entwicklung von Lebenserwartung und Sterblichkeit in Ostdeutschland nach der Wende 1989-92. *Öffentliches Gesundheitswesen* 57: 365-372.

Henry, James P. 1982. The Relation of Social to Biological Processes in Disease. *Social Science and Medicine* 16: 369-380.

Höhn, Charlotte and John Pollard. 1991. Mortality in the two Germanies in 1986 and trends 1976-86. *European Journal of Population* 7: 1-28.

Landua, Detlef. 1993. *Die Auswirkungen von Panelstudien auf die Antwortmuster von Zufriedenheitsangaben.* DIW Discussion Paper No.67, German Institute for Economic Research, Berlin.

Mielck, Andreas. 1991. Mortalität und Lebenserwartung: Unterschiede zwischen Ost- und Westdeutschland. *Sozialer Fortschritt* 9: 220-223.

Nauck, Bernhard and Magdalena Joos. 1995. East joins West: child welfare and market reforms in the "special case" of the former GDR. *Innocenti Occasional Papers, Economic Policy Series* No. 48. Florence: UNICEF-ICDC.

Rosenberg, Harry M. 1989. Improving Cause-of-Death Statistics. *American Journal of Public Health* 79(5): 563-564.

Senatsverwaltung für Gesundheit Berlin. 1996. *Jahresgesundheitsbericht Berlin 1995*, Referat Gesundheitsstatistik.

Simon, Roland, Martin Tauscher, and Almut Gessler. 1997. *Suchtbericht Deutschland 1997*, Erstellt im Auftrag des Bundesministeriums für Gesundheit, Institut für Therapieforschung München.

Sterling, Peter and Joe Eyer. 1981. Biological Basis of Stress-Related Mortality. *Social Science and Medicine* Vol. 15E: 3-42.

Wagner, Gert G., Richard Hauser, Klaus Müller, and Joachim Frick. 1992. Einkommensverteilung und Einkommenszufriedenheit in den neuen und alten Bundesländern. In, *Lebensverhältnisse in Deutschland: Ungleichheit und Angleichung*, edited by Glatzer, Wolfgang and Heinz-Herbert Noll, Campus Verlag: Frankfurt Main.

Wagner, Gert G., Richard V. Burkhauser, and Friederike Behringer. 1993. The English Language Public Use File of the German Socio-Economic Panel. *Journal for Human Resources* 28(2): 429-433.

World Health Organisation. 1993. *World Health Statistics Annual.* Geneva: WHO.

Zimmermann, Klaus F. 1993. Labour responses to taxes and benefits in Germany. In, *Welfare and work incentives: a North European perspective*, edited by A.B. Atkinson and Gunner Viby Mogensen. Oxford, UK: Oxford University Press.

UNU/WIDER Research for Action series

RFA1 Hunger and Entitlements by Amartya Sen, January 1988 *out of print*

RFA2 Lessons of the Golden Age of Capitalism by Stephen A. Marglin, April 1988

RFA3 Conditionality: Facts, Theory and Policy by Dragoslav Avramovic, July 1989

RFA4 The World Economic and Financial Crisis by Celso Furtado, Lal Jayawardena and Masaru Yoshitomi, November 1989 *out of print*

RFA5 The Affinity between Ownership and Coordination Mechanisms. The Common Experience of Reform in Socialist Countries by János Kornai, January 1990

RFA6 Towards a Peaceful Sri Lanka. Six Introductory Seminars for University Students by Carlo Fonseka, October 1990

RFA7 Gender, Development, and Policy: Toward Equity and Empowerment by Valentine M. Moghadam, November 1990

RFA8 Foreign Resource Flows and Developing Country Growth by Lance Taylor, March 1991

RFA9 A Global Environmental Compact for Sustainable Development: Resource Requirements and Mechanisms by Lal Jayawardena, August 1991

RFA10 Privatization and Democratization in Central and Eastern Europe and the Soviet Union: The Gender Dimension edited by Valentine M. Moghadam, January 1992

RFA11 Aid and Development Policy in the 1990s by Arjun Sengupta, February 1993

RFA12 The Potential of Development Contracts and Conditionality: Towards Sustainable Development Compacts by Lal Jayawardena, February 1993 *out of print*

RFA13 Gender and the Development Process in a Changing Global Environment. Results of the UNU/WIDER Research Programme on Women and Development by Valentine M. Moghadam, July 1993

RFA14 The New Regionalism: Implications for Global Development and International Security by Björn Hettne and András Inotai, February 1994

RFA15 Economic Reform and Its Interpretations in Russia by Ruben N. Yevstigneyev and Arkady M. Voinov, May 1994

RFA16 Structural Adjustment in Africa. A Performance Review of World Bank Policies under Uncertainty in Commodity Price Trends: The Case of Ghana by Tetteh A. Kofi, June 1994 *out of print*

RFA17 Russian Transition - Chinese Reforms: A Comparative View by András Blahó, June 1994 *out of print*

RFA35 The Liberalization of Foreign Exchange Markets and Economic Growth in Sub-Saharan Africa by Nguyuru H. I. Lipumba, May 1997

RFA36 Political Sources of Humanitarian Emergencies by K. J. Holsti, May 1997

RFA37 The Role of Civic Organizations in the Provision of Social Services: Towards Synergy by Mark Robinson and Gordon White, July 1997

RFA38 Emergence of Unorthodox Ownership and Governance Structures in East Asia: An Alternative Transition Path by Laixiang Sun, July 1997

RFA39 The Determinants of Economic Performance in Transitional Economies: The Roles of Ownership, Incentives and Restructuring by Derek C. Jones, August 1997

RFA40 Towards the Abyss? The Political Economy of Emergency in Haiti by Mats Lundahl, August 1997

RFA41 Community and Village-Based Provision of Key Social Services: A Case Study of Tanzania by Marja Liisa Swantz, September 1997

RFA42 The Transition's Mortality Crisis in East Germany by Regina T. Riphahn and Klaus Zimmermann, November 1997

For price and order information, please contact the address given below.

UNU/WIDER Publications
Katajanokanlaituri 6 B
00160 Helsinki, Finland

Telephone (+358-9) 6159911
Facsimile (+358-9) 61599333
Telex 123455 unuei fi
E-mail wider@wider.unu.edu