

## ORIGINAL ARTICLE

# Health and Lifestyle in Rural Northeast Germany

The Findings of a Rural Health Study from 1973, 1994, and 2008

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## SUMMARY

**Background:** Secular trends in health-related behavior, the frequency of illness, and life satisfaction in rural areas are inadequately documented. Such information is essential for the planning of health-care policy.

**Methods:** In 1973 and 1994, surveys were performed on the health and lifestyle of all adult inhabitants of 14 selected rural communities in the northern part of the former East Germany. The inhabitants were surveyed again in 2008, and the findings of the surveys were compared.

**Results:** Both the number of respondents and the response rate of the officially registered population in the 14 rural communities declined over the years, from 3603 (83%) in 1973 to 2155 (68%) in 1994 and 1246 (37%) in 2008. In 1973, 3.2% of the women and 2.7% of the men responding to the survey reported that they had diabetes mellitus. For arterial hypertension, the corresponding figures in 1973 were 21.7% and 11.4%; for chronic heart diseases, 16.7% and 12.8%. In 2008, most of the prevalence figures for these conditions were higher: for diabetes, 12.4% and 12.8%; for arterial hypertension, 34.7% and 33.9%; for chronic heart diseases, 12.3% and 15.0%. Men became less likely to report being in good or very good health (decline from 51.1% to 45.0%), while women became more likely to report being in good health (rise from 36.7% to 49.3%). Women generally had a more healthful lifestyle than men.

**Conclusion:** Over the long term, there have been both improvements, particularly in lifestyle, and turns for the worse, e.g., in life satisfaction. While the latter might be due to the increasing marginalization of rural eastern Germany, we interpret the observed improvements as benefits of modernization.

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How do changed living conditions in a peripheral, rural area affect the health and lifestyle of its population? The present study addresses this question. Its special feature is that it compares the findings of a survey we conducted in 2008 with those of earlier surveys conducted by our predecessors in the same communities in 1973 and 1994 (1, 2). We performed this Rural Health Study (*Landgesundheitsstudie*, LGS) to examine secular trends in health, health-related behavior, illness, and living conditions. As far as possible, we will compare its findings with representative data for Germany and evaluate their significance.

## Methods

In this study, we evaluated survey findings from 1973, 1994, and 2008 and supplemented this evaluation with regional statistical analyses and qualitative interviews.

All of the surveys were carried out among the adult population of 14 rural, peripheral communities in northeastern Germany. The communities to be surveyed were chosen at random in 1973 from among all the rural communities of what was then the Neubrandenburg district in East Germany. Standardized paper-and-pencil questionnaires were addressed to all adults in these communities in 1973, 1994, 2004 (the pre-test), and 2008 (the main survey). After correction for qualitatively neutral missing data, the response rate of returned questionnaires in 2004/2008 was 37% (1246 respondents). The corresponding figures for the earlier surveys were 83% (3603) in 1973 and 68% (2155) in 1994.

A comparison with official registry data at the district (*Bezirk*) and state (*Land*) level reveals that the differences over time in age and sex distribution among the respondents to the surveys in 1973, 1994 and 2004/08 (*Table 1*) are well explained by birth and migration trends over the past four decades. A wave comparison thus seems appropriate (3). The survey data from 2004/08 were weighted according to official registry data for the population of the surveyed communities in these years. Controlling for other variables was performed with further tests of representativeness (for details, see *eMethods*, [4] and [5]).

**TABLE 1**

**Distribution of sex, age, and educational level in the Rural Health Study in 1973, 1994 and 2004/08**

	1973	1994	2004/08 (weighted)
Women (%)	56.3	54.5	49.8
Men (%)	43.7	45.5	50.2
Age 18–39 (%)	36.1	40.8	27.3
Age 40–59 (%)	32.2	29.9	40.6
Age 60 and above (%)	31.7	29.2	32.1
< 10 years of school (%)	81.6	53.1	29.8
10 years of school (%)	7.8	32.6	36.8
> 10 years of school (%)	10.6	14.2	33.3
Number of respondents	3603	2155	1246

The data were analyzed with descriptive statistics and binary logistic regressions. The age-adjusted prevalences reported here were adjusted according to the age distribution of the (weighted) sample in 2004/2008. The comparisons over time that are presented here are based on cross-sectional comparisons (for further details on this and on panelization on the basis of individual data, see *eMethods* and [5]).

The quantitative analyses were supplemented by biographical interviews with selected inhabitants of the region and by interviews with experts, mainly the mayors of the surveyed communities. Computer-assisted data analysis with MAXQDA 2007 was performed, as well as analyses that were essentially based on the documentary method (6, 7).

Regional statistical information, cultural-historical information, and our own field observations were compiled in standardized monographs on each community. Some of this information was also evaluated in secondary analyses for an overall characterization of the study area for interregional comparisons, as well as in the context of the survey findings (8). To make interregional comparisons, we used representative data at the national level, as well as the findings of the German Socio-Economic Panel (SOEP), the microcensus of the German Federal Statistical Office, and the German Federal Health Survey (*Bundesgesundheitsurvey*).

**Results**

The first wave of the Rural Health Study was carried out in 1973 during a phase of modernization, in which the differences between urban and rural environments became less pronounced (1). Working and

living conditions had already improved in largely agricultural communities, and the percentage of persons completing secondary education and vocational training had risen, particularly among women. On the other hand, many people retained their traditional health-related habits, such as a high-calorie diet (1).

The second wave was carried out in 1994, by which time rural areas had become further modernized (2): for example, the percentage of the population with more than eight years of education in school had risen from 18% to 48%. Other changes had resulted from the “transformation,” i.e., the collapse of the former German Democratic Republic. The most important of these was a vast decline in employment, e.g., a 75% drop in agricultural employment for the years 1990–93 (2).

The third wave, in 2008, was characterized by regional peripheralization with respect to living conditions, leading to all of the following:

- social-structural decoupling of part of the population;
- low added-value creation, expansion of the low-wage sector, and precarious employment;
- deteriorating infrastructure and diminishing quality of life;
- low political participation and low involvement in institutions (9, 10).

As these processes go on, the options and opportunities for rural inhabitants become narrower, and their living strategies may well be nothing more than an attempt to make the best of a bad situation (11).

**Health-related behavior**

Over the entire period of the study, health-promoting behaviors became more common in most areas of health-related behavior (*Table 2*). The percentage of persons participating in exercise and sporting activities rose markedly (in the last survey), particularly among women, who exercised more than men (58.1% vs. 54.5%).

The rural inhabitants consumed more fruit, vegetables, and dairy products than they had done in 1973 (when some of these were less available); women consumed more of each of these items than men (*Table 2*). On the other hand, the percentage of men who ate meat every day, or almost every day, rose to 28.5% by 2008. There was a steady decline in the percentage of persons who felt that they “had enough time for meals, in particular for the main meal of the day” (which was the evening meal for 20% of persons in 2008), as well as in the percentage of those who thought they had a healthful diet (78.7% in 2008, see *Table 2*).

The mean body-mass index (BMI) rose slightly between waves 2 and 3, with a rise in the percentage of obese respondents to 23.4% among women and 25.0% among men (these figures are both roughly 10% higher than those of the nationwide microcensus for 2009). Comparable findings were obtained in the Study of Health in Pomerania (SHIP), which

**TABLE 2**

**Health-related behaviors: prevalences in 1973, 1994 and 2004/08**

Type of health-related behavior		1973		1994		2004/08 (weighted)	
		%	(95% CI)	%	(95% CI)	%	(95% CI)
Daily or almost daily fruit consumption <sup>*1</sup>	overall	11.7	(10.7–12.8)	65.1	(63.1–67.2)	55.5	(52.8–58.3)
	women	14.5	(13.0–16.0)	71.8	(69.1–74.4)	65.3	(61.5–69.1)
	men	8.1	(6.8–9.5)	57.2	(54.0–60.3)	45.9	(42.0–49.9)
Daily or almost daily meat consumption <sup>*1</sup>	overall			21.4	(19.7–23.2)	20.3	(18.1–22.6)
	women			17.6	(15.4–19.8)	12.0	(9.4–14.6)
	men			26.0	(23.2–28.8)	28.5	(24.9–32.0)
Enough time for meals / for main meal of day <sup>*2</sup>	overall	49.5	(47.9–51.1)	42.2	(40.1–44.2)	32.9	(30.2–35.6)
	women	51.7	(49.5–53.9)	45.8	(43.0–48.7)	34.3	(30.4–38.1)
	men	46.7	(44.2–49.2)	37.8	(34.7–40.8)	31.6	(27.8–35.3)
Subjective evaluation of diet as healthful	overall	92.4	(91.6–93.3)	83.4	(81.9–85.0)	78.7	(76.4–81.0)
	women	92.7	(91.6–93.8)	85.8	(83.8–87.8)	82.5	(79.5–85.6)
	men	92.1	(90.7–93.4)	80.6	(78.1–83.1)	74.9	(71.4–78.4)
Obesity (BMI ≥ 30) <sup>*3</sup>	overall			20.0	(18.3–21.7)	24.2	(21.8–26.6)
	women			20.4	(18.1–22.7)	23.4	(20.0–26.8)
	men			19.5	(17.0–23.0)	25.0	(21.6–28.4)
Smoking	overall	32.2	(30.7–33.7)	32.6	(30.6–34.7)	30.7	(28.1–33.3)
	women	9.5	(8.2–10.8)	22.2	(19.8–24.6)	26.6	(23.0–30.1)
	men	61.2	(58.8–63.6)	45.1	(41.9–48.3)	34.6	(30.8–38.4)
Beginning of smoking before 16th birthday	overall	17.5	(15.3–19.8)	40.3	(36.6–44.1)	48.2	(43.9–53.4)
	women	9.6	(5.4–13.9)	32.5	(26.7–38.3)	42.3	(34.6–50.1)
	men	19.1	(16.6–21.6)	45.0	(40.2–49.8)	52.7	(45.8–59.6)
Number of respondents	overall	3603		2155		1246	
	men	1575		981		532 (626)	
	women	2028		1174		714 (629)	

<sup>\*1</sup> Answer "Daily" or "Almost daily" to the question, "How often do you consume each of the following types of food?"  
Exception: In 1973, answer "Fully applicable" to the question "I generally eat every day. . ."

<sup>\*2</sup> Answer "Fully applicable" to the question "I take enough time for my main meal of the day"

<sup>\*3</sup> Formula: body weight in kilograms divided by body surface area in square meters; BMI, body-mass index; CI, confidence interval

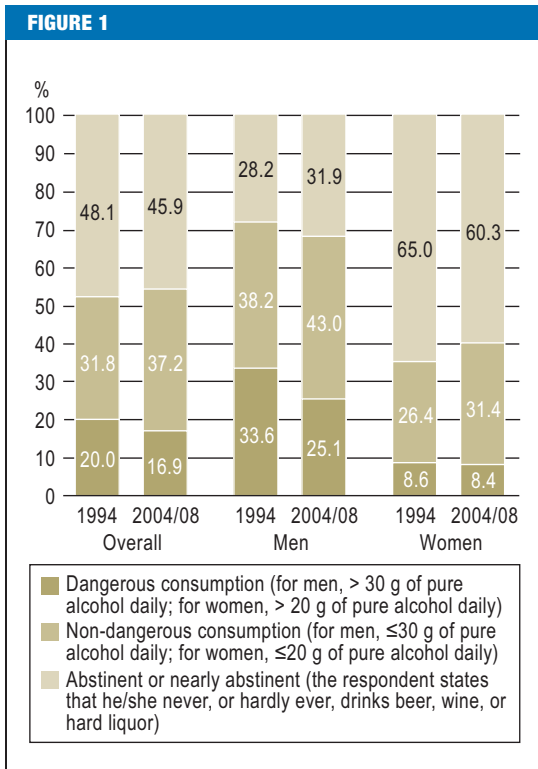
revealed a markedly higher average BMI in the eastern German region of West Pomerania than in the nation at large (12).

The meaning of such findings for the inhabitants' lifestyle is well illustrated by what one of our interviewees said in the qualitative part of the study: "When the money is running low, I sometimes have to make an unhealthy toast sandwich for the children. It's not so bad if I can put some liverwurst on it" (from an unemployed single mother and former factory worker, age 45).

Smoking (Table 2) became much less common among men over the period of the study (from 61.2%

to 34.6%), in accordance with the nationwide trend, but much more common among women (from 9.5% to 26.6%). By 2004/2008, the percentage of persons who had started smoking before their 16th birthday had risen to 42.3% among women and 52.7% among men, and the average age of beginning smoking was lower than that of the nation as a whole. The percentage of persons smoking more than 20 cigarettes per day had risen to 15%.

Among men, the regular consumption of beer and hard liquor declined over time; among women, the regular consumption of wine increased. Between waves 2 and 3, for example, fewer men drank large



**The prevalence of alcohol consumption patterns in the Rural Health Study (LGS), 1994–2008**, based on data from 2155 respondents in 1994 and 1246 respondents in 2004/08.

quantities of beer and/or hard liquor each day (more than 2 liters of beer daily: 3.2% to 0.5%), while more women drank up to one glass of wine daily (24.7% to 29.1%) (13). The prevalence of dangerous alcohol consumption (> 30 g of pure alcohol for men, > 20 g for women) dropped to 25.1% among men, but this figure remained significantly higher than the corresponding figure for women (Figure 1) and also well above the national figure (20.1% / 5.3%) (13). These findings were associated with an increased statewide morbidity and mortality due to alcohol-associated diseases (12).

**Working conditions**

With respect to working conditions in 2004/2008, the region under study was characterized by the following, compared to other regions across Germany:

- a dearth of jobs,
- a high percentage of agricultural workers,
- and a marked decline in industrial employment.

Respondents complained particularly of the fear of losing their jobs and of the hard physical labor that they had to perform (mainly in the agricultural and industrial sectors).

One respondent stated in an interview: “Some of the people who still have work seem to think they’re something special, because they’re working and all. We’d also like to work, but I just don’t get the chance” (from an unemployed female landscape designer, 48).

In 2004/08, the percentage of so-called gratification crises (perceived inadequacy of reward in relation to effort [14]) among employed people in the study region was twice as high as the national average. This was particularly true among workers in the markedly declining industrial sector, more than 40% of whom reported a gratification crisis (15).

**Health and disease**

For both men and women, the age-standardized percentage of persons who reported being in good or very good health was lowest in 1994 (Table 3). The increase from 1994 to 2004/08 was, however, much more pronounced in women than in men. In fact, the percentage of men reporting good or very good health in 2004/08 was slightly less than in 1973, while 17% more women reported being in good or very good health in 2004/08 than in 1973. Similar trends can be seen in nationwide age- and sex-specific health data (12).

The prevalence of chronic heart diseases (Table 4) was highest in 1994, dropping thereafter in women, but only slightly in men; the age-adjusted figures for 2008 show a higher prevalence among men than among women. The prevalence of diabetes mellitus (Table 4) was four times higher among men in 2004/2008 than in 1973, and 3.5 times higher among women (Table 4). A relatively large rise among men was also observed nationwide over the same period, albeit to a lesser extent (12). The mean nationwide diabetes prevalences reported on the basis of the Current Health in Germany 2009 telephone survey (*Gesundheit in Deutschland aktuell 2009*, GEDA09) were markedly lower among both men and women than the corresponding figures that we obtained in the LGS 2004/08 (6–8% vs. 12–13%). The latter figures were also markedly higher than the corresponding figures of the SHIP, which covered both rural and urban areas (12). These findings are clearly related to the markedly above-average BMI among the population of our study region. The lifetime prevalence of high blood pressure also rose steadily and markedly, mainly among men, though not as much as that of diabetes did (Table 4). For more details on health and disease, see (16).

**Satisfaction**

Satisfaction with individual areas of life, as well as with life overall, dropped in practically all areas from 1994 to 2004/08 in the region of the study. The areas of least satisfaction in both 1994 and 2004/08 were financial and occupational. Satisfaction with health declined with increasing age and was also below average among the unemployed and among respondents who had attended school for less than

**TABLE 3**

**Subjective assessment of health as good or very good: prevalences and 95% confidence intervals, 1973–2008**

	1973		1994		2004/08 (weighted)	
	Women	Men	Women	Men	Women	Men
Overall (%)	36.7 (34.3–39.2)	51.1 (48.2–53.9)	35.6 (32.4–38.8)	44.3 (40.7–47.9)	49.3 (44.7–53.9)	45.0 (40.4–49.5)
Age-adjusted* (%)	32.5	46.2	29.9	39.4	49.3	45.0
Number of respondents	2028	1575	1174	981	620	626

\* Reference distribution: Rural Health Study, 2004/08

**TABLE 4**

**Chronic heart diseases, diabetes mellitus, and hypertension: lifetime prevalences and 95% confidence intervals, 1973–2008**

	1973				1994				2004/08 (weighted)			
	Women		Men		Women		Men		Women		Men	
<b>Chronic heart diseases</b>												
Overall (%)	16.7	(14.8–18.6)	12.4	(10.6–14.4)	18.7	(16.1–21.3)	15.3	(12.8–18.0)	12.3	(9.4–15.5)	15.0	(11.6–18.4)
Age-adjusted* (%)	18.3		14.1		20.3		17.4		12.3		15.0	
No. of respondents	2028		1575		1174		981		620		626	
<b>Diabetes mellitus</b>												
Overall (%)	3.2	(2.3–4.1)	2.7	(1.8–3.7)	9.4	(7.5–11.4)	5.6	(4.1–7.5)	12.4	(9.6–15.6)	12.8	(9.9–16.0)
Age-adjusted* (%)	3.5		3.1		10.9		6.8		12.4		12.8	
No. of respondents	2028		1575		1174		981		620		626	
<b>High blood pressure</b>												
Overall (%)	21.7	(19.7–23.9)	11.4	(9.6–13.3)	27.6	(24.7–30.6)	19.1	(16.3–22.0)	34.7	(30.4–39.1)	33.9	(29.7–38.3)
Age-adjusted* (%)	23.6		12.1		30.6		21.0		34.7		33.9	
No. of respondents	2028		1575		1174		981		620		626	

\* Reference distribution: Rural Health Study, 2004/08

Question: "Which of the following diseases have you ever had at any time, including the present?" Answer: "Yes" to the relevant item(s).

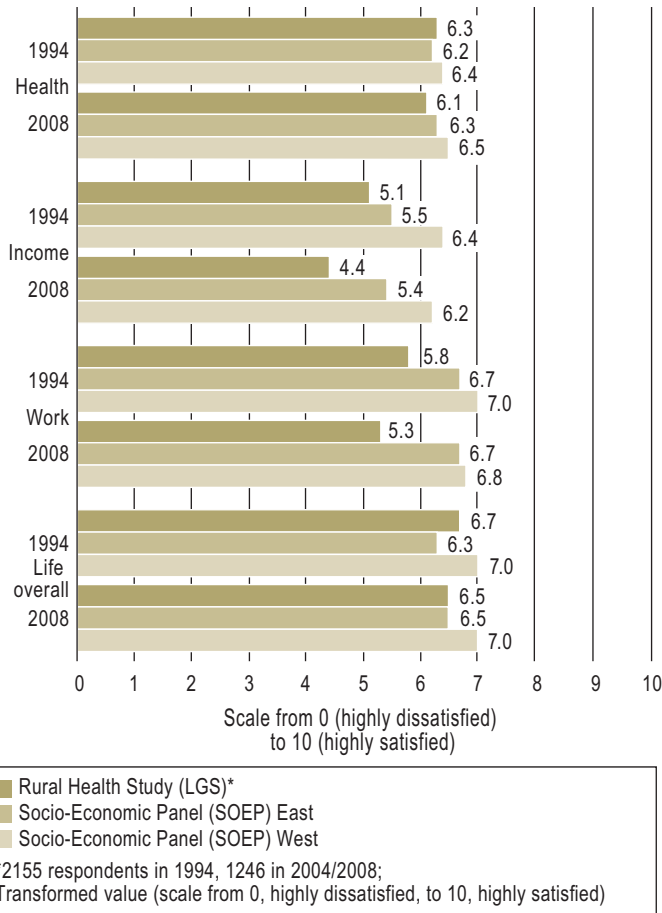
ten years. A comparison of the LGS findings with those of the SOEP (17) reveals (Figure 2) that mean job and income satisfaction in the LGS study region were both markedly lower than they were, on average, in both western and eastern Germany, not only in 1994, but also in 2004/08. Health satisfaction was also lower among LGS respondents than among SOEP respondents, although the difference was less marked than the differences in job and income satisfaction. Health satisfaction increased somewhat from 1994 to 2008 in both the SOEP (West) and the SOEP (East), but declined from 1994 to 2004/08 in the LGS (Figure 2). The smallest differences were found in reported overall life satisfaction: the LGS

figures for both 1994 and 2004/08 were worse than those of the SOEP (West), but they were comparable to the SOEP (East) figures for 2004/08 and actually slightly better than the SOEP (East) figures for 1994. Thus, the overall comparison indicates markedly lower job and income satisfaction in rural northeast Germany in 1994 and 2004/08 (Figure 2).

**Coping strategies**

The qualitative part of the study allowed us to examine how persons in the study area dealt with their problematic living and working conditions and the ensuing consequences for health, disease, and life satisfaction.

FIGURE 2



Satisfaction in various areas of life in the Rural Health Study and the Socio-Economic Panel (East and West), 1994 and 2008 (mean values)

Many interviewees complained of stress resulting from low income and joblessness, and many also complained of a decline in infrastructural resources, such as local public transportation or shopping opportunities. Some, however, said they had succeeded in developing and/or maintaining coherence and life satisfaction despite unfavorable conditions, such as joblessness, poverty, or long-distance commuting, by taking advantage of locally available opportunities, such as non-recompensed individual work (see 18 for a further description), integration, and social support from the village community (18).

One interviewee, for example, said the following: “We always have something to do. . . . I’m always needed. Even if the Job Office doesn’t have any way for me to earn money, I’m needed someplace else, and that means a lot to me. I have interests: my home, rearranging things . . . . yes, that makes life kind of enjoyable” (from the interview transcript of case L:129).

**Discussion**

The analyses of the survey data show that, overall, persons in the study area considered themselves to be in better health at the end of the study than at the beginning, reflecting a trend also seen in the German population as a whole. This improvement was associated with a marked rise in educational attainment and with generally positive changes in dietary habits, exercise/sporting activities, smoking, and alcohol consumption. We cannot fully exclude the possibility that, particularly with respect to health-related behavior (in all waves of the study, 1973 included), the respondents’ answers were colored by social expectations and thus more positive than they should have been.

The increased burden of certain diseases that was observed in the study may be due, in part, to improved diagnosis. It is, nonetheless, clear that the study region had a higher burden of disease than other regions, with correspondingly lower health satisfaction and overall life satisfaction.

The empirical findings provide a basis for potential theoretical explanations of parallel developments in health and lifestyle in the region. In the authors’ view, the observed regional (and also supra-regional) trends in health and disease, education, and health-related behavior, as well as the continuing rationalization of work and the associated loss of jobs, are all manifestations of the modernization of living and working conditions.

On the other hand, we consider the regionally specific differences in employment, living conditions, health, burden of disease, and life satisfaction that were revealed by the LGS to be mainly attributable to the regional and peripheral nature of the study region. All of these differences present a challenge for social and health-care policy. There is a need, in the intermediate term, for the expansion of regional or national programs for the promotion of involvement in civic and cultural life, and for the connection

**KEY MESSAGES**

- The trends toward more physical activity and a more healthful diet that were revealed by the Rural Health Study were largely due to changes in women's lifestyles.
- On the other hand, the observed trends toward less smoking and alcohol consumption were almost entirely due to changes in men's lifestyles.
- In the Rural Health Study, the percentage of persons who considered themselves to be in good or very good health fell among men, but rose among women.
- The rural area under study was poorly rated in terms of health, disease, and satisfaction in comparison to other regions. The authors consider this a result of peripheralization (deteriorating infrastructure, social-structural uncoupling, worsening of objective quality of life).
- Traditional health-related behavior patterns are gradually changing to more modern ones. The parallel trend toward longer schooling likewise reflects societal modernization.

of small communities to such programs ("active village" programs); it would also be desirable to improve the provision of health care in rural areas so that people no longer have to travel far to see a doctor. Nonetheless, as was discussed in the follow-up conferences that were held in the rural communities (19), the remediation of the structural job shortage should also remain a priority, so that the regional problems that are already evident do not become even worse.

**Limitations**

The study findings can presumably be extrapolated to other communities that are located in the region of the study but were not surveyed for it. We do not know, however, to what extent the already observed peripheralization can be expected to continue in the future, or whether the findings are also applicable to other peripheral regions.

Methodological limitations of this study include the declining rate of respondents over the years and the less than full comparability of the items in our survey with those of other surveys. We often had to approximate as well as we could (also because the reference data from other studies represent different areas). Inter-regional comparisons will become easier in the future if further studies on trends and needs in rural, peripheral areas will be performed in other regions besides the one that we investigated in this study.

For further information: see: [www.hs-nb.de/ppages/elkeles-thomas/projekte/](http://www.hs-nb.de/ppages/elkeles-thomas/projekte/)

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**Conflict of interest statement**

The authors declare that no conflict of interest exists.

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**REFERENCES**


1. Koppisch V: Untersuchungen zu einigen Seiten der gesunden Lebensführung der Bevölkerung in Landgemeinden im Norden der DDR von 1973–1976. (Diss. B). Greifswald: Ernst-Moritz-Arnst-Universität Greifswald 1979.
2. Koppisch V, Hüttner H, Wiesner GE: Vergleichende Studie zu Gesundheit und Lebensweise der Erwachsenenbevölkerung in ausgewählten mecklenburg-vorpommerschen Landgemeinden. Schwerin: Sozialministerium Mecklenburg-Vorpommern 1996.
3. Röding D: Bedingungen und Gründe der Bevölkerungsentwicklung in den 14 Untersuchungsgemeinden der Landgesundheitsstudie. Reihe Sonderbeiträge 1: Studienberichte zur Landgesundheitsstudie (ed.: Thomas Elkeles), Nr. 1. Hochschule Neubrandenburg 2010.
4. Elkeles T, Röding D, Beck D, Beetz S: Repräsentativitätsprüfung der dritten Erhebungswelle der Landgesundheitsstudie. Reihe Sonderbeiträge 1: Studienberichte zur Landgesundheitsstudie (ed.: Thomas Elkeles), Nr. 2. Hochschule Neubrandenburg 2010.
5. Hinz E, Beck D: Methodenbericht zum Follow-up-Survey der Landgesundheitsstudie 2004/08. Reihe Sonderbeiträge 1: Studienberichte zur Landgesundheitsstudie (ed.: Thomas Elkeles), Nr. 9. Hochschule Neubrandenburg 2012.
6. Mayring PAE: Qualitative Inhaltsanalyse. Grundlagen und Techniken. Weinheim: Deutscher Studienverlag 1997.
7. Bohnsack R: Rekonstruktive Sozialforschung. Einführung in Methodologie und Praxis qualitativer Forschung. Opladen: Leske + Budrich 2007.
8. Beetz S, Röding D: Lebensqualität und Zufriedenheit mit Wohnumfeldbedingungen im Kontext der Peripherisierung nordostdeutscher Landgemeinden 1994 und 2004/08. Reihe Sonderbeiträge 1: Studienberichte zur Landgesundheitsstudie (ed.: Thomas Elkeles), Nr. 13. Hochschule Neubrandenburg 2010.
9. Beetz S: Peripherisierung als räumliche Organisation sozialer Ungleichheit. In: Barlösius E, Neu, C (eds.): Peripherisierung – eine neue Form sozialer Ungleichheit? Materialien Nr. 21 der IAG LandInnovation der Berlin-Brandenburgischen Akademie der Wissenschaften. Berlin: Berlin-Brandenburgische Akademie der Wissenschaften 2008; 7–16.
10. Beetz S: Räumliche Bedingungen von Gesundheit und Lebensführung im ländlichen Raum. Eine Untersuchung von vierzehn Landgemeinden im Rahmen der DFG-Landgesundheitsstudie an der Hochschule Neubrandenburg. In: Elkeles T, Dehne P (eds.): Gemeinden in peripheren, ländlichen Räumen – empirische Untersuchungsergebnisse aus Mecklenburg-Vorpommern, Brandenburg und der Wojewodschaft Zachodniopomorskie (Wojewodschaft Westpommern). Schriftenreihe E, Interdisziplinäre Schriften, Bd. 3. Neubrandenburg: Hochschule Neubrandenburg 2009; 271–357.
11. Forkel JA, Nebelung C, Elkeles T: Kontinuitäten des Wandels. Herausforderungen im Lebenslauf in ländlichen Gemeinden

- Nordostdeutschlands. In: Soeffner HG (ed.): Transnationale Vergesellschaftungen. Verhandlungen des 35. Kongresses der Deutschen Gesellschaft für Soziologie in Frankfurt am Main 2010. Herausgegeben in deren Auftrag von Hans-Georg Soeffner. Wiesbaden: VS Verlag, CD-ROM, im Erscheinen 2012.
12. Robert-Koch-Institut (ed.): 20 Jahre nach dem Fall der Mauer: Wie hat sich die Gesundheit in Deutschland entwickelt? Beiträge zur Gesundheitsberichterstattung des Bundes. Berlin: Robert-Koch-Institut 2009.
  13. Fischer S: Alkoholkonsum in nordostdeutschen Landgemeinden 1994 und 2004/08. Reihe Sonderbeiträge 1: Studienberichte zur Landgesundheitsstudie (ed.: Thomas Elkeles), Nr. 14. Hochschule Neubrandenburg 2010.
  14. Siegrist J: Soziale Krisen und Gesundheit. Eine Theorie der Gesundheitsförderung am Beispiel von Herz-Kreislauf-Risiken im Erwerbsleben. Göttingen: Hogrefe 1996.
  15. Beck D, Elkeles T: Verteilung und Bedeutung beruflicher Gratifikationskrisen von Erwerbstätigen in nordostdeutschen Landgemeinden. Arbeit – Zeitschrift für Arbeitsforschung, Arbeitsgestaltung und Arbeitspolitik 2010; 19: 5–20.
  16. Beck D, Elkeles T: Gesundheit und Lebenszufriedenheit in nordostdeutschen Landgemeinden 1973, 1994 und 2004/08. Gesundheitswesen 2012; 74:132–8. DOI: 10.1055/s-0030–1270506. 2012.
  17. Deutsches Institut für Wirtschaftsforschung (ed.): SOEPmonitor 1984–2008. Zeitreihen zur Entwicklung ausgewählter Indikatoren zu zentralen Lebensbereichen. Berlin 2009.
  18. Nebelung C, Forkel JA, Elkeles T: Alltägliche Lebensführung und Solidarität in nordostdeutschen Landgemeinden – Erste qualitative Ergebnisse der Landgesundheitsstudie. Gesundheitswesen 2010; 72: 140–5.
  19. Forkel JA, Nebelung C, Elkeles T: Gemeinschaft und Gesundheit in ländlichen Gemeinden Mecklenburg-Vorpommerns – Ressourcen und Potentiale. Ergebnisse eines Anschlussprojekts zur Landgesundheitsstudie. LVG-Information (Mitteilungsblatt der Landesvereinigung für Gesundheitsförderung Mecklenburg-Vorpommern e. V.) 2011; Ausgabe 1/2011 (März): 8–10.

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 For eReferences please refer to:  
[www.aerzteblatt-international.de/ref1612](http://www.aerzteblatt-international.de/ref1612)  
 eMethods and eTables:  
[www.aerzteblatt-international.de/12m285](http://www.aerzteblatt-international.de/12m285)



## ORIGINAL ARTICLE

# Health and Lifestyle in Rural Northeast Germany

The Findings of a Rural Health Study from 1973, 1994, and 2008

Thomas Elkeles, David Beck, Dominik Röding, Stefan Fischer, Jens A. Forkel

## eReferences

- e1. Beetz S: Räumliche Bedingungen von Gesundheit und Lebensführung im ländlichen Raum. Eine Untersuchung von vierzehn Landgemeinden im Rahmen der DFG-Landgesundheitsstudie an der Hochschule Neubrandenburg. In: Elkeles T, Dehne P (eds.): Gemeinden in peripheren, ländlichen Räumen – empirische Untersuchungsergebnisse aus Mecklenburg-Vorpommern, Brandenburg und der Wojewodschaft Zachodniopomorskie (Woiwodschaft Westpommern). Schriftenreihe E, Interdisziplinäre Schriften, Band 3. Neubrandenburg: Hochschule Neubrandenburg 2009; 271–357.
- e2. Hinz E, Beck D: Methodenbericht zum Follow-up-Survey der Landgesundheitsstudie 2004/08. Reihe Studienberichte der Landgesundheitsstudie (ed.: Elkeles T), Nr. 9. Hochschule Neubrandenburg: Neubrandenburg 2012.
- e3. Elkeles T, Röding D, Beck D, Beetz S: Repräsentativitätsprüfung der dritten Erhebungswelle der Landgesundheitsstudie. Reihe Studienberichte der Landgesundheitsstudie (ed.: Elkeles T), Nr. 2. Hochschule Neubrandenburg: Neubrandenburg 2010.
- e4. Popp M, Elkeles T, Kreher S: Methodenbericht zur Entwicklung und Durchführung sowie zu den Ergebnissen des Pretests 2004/2005. Schriftenreihe der Hochschule Neubrandenburg. Reihe G Fachbereich Gesundheit und Pflege, Band 1. Hochschule Neubrandenburg: Neubrandenburg 2005.

**eTABLE 1**

**Health-related behaviors: prevalences in 1973, 1994 and 2004/08**

Type of health-related behavior		1973		1994		2004/08 (weighted)	
		%	(95% CI)	%	(95% CI)	%	(95% CI)
Physical activity <sup>1</sup>	overall	27.5	(25.9–28.9)	12.9	(11.5–14.4)	56.3	(53.4–59.3)
	women	25.0	(23.1–26.9)	10.1	(8.4–11.9)	58.1	(53.9–62.2)
	men	30.6	(28.3–32.9)	16.3	(13.9–18.6)	54.5	(50.3–58.8)
Daily or almost daily fruit consumption <sup>2</sup>	overall	11.7	(10.7–12.8)	65.1	(63.1–67.2)	55.5	(52.8–58.3)
	women	14.5	(13.0–16.0)	71.8	(69.1–74.4)	65.3	(61.5–69.1)
	men	8.1	(6.8–9.5)	57.2	(54.0–60.3)	45.9	(42.0–49.9)
Daily or almost daily raw vegetable consumption <sup>2</sup>	overall	7.7	(6.9–8.6)	13.5	(12.0–15.0)	27.4	(24.9–29.9)
	women	9.0	(7.7–10.2)	16.3	(14.1–18.4)	33.8	(30.0–37.5)
	men	6.1	(4.9–7.3)	10.2	(8.3–12.1)	21.2	(18.0–24.5)
Daily or almost daily consumption of dairy products <sup>2</sup>	overall	23.7	(22.3–25.1)	22.5	(20.8–24.3)	31.7	(29.1–34.3)
	women	23.7	(21.8–25.5)	27.7	(25.2–30.3)	39.8	(35.9–43.7)
	men	23.8	(21.7–25.9)	16.3	(14.0–18.6)	23.7	(20.3–27.1)
Daily or almost daily meat consumption <sup>2</sup>	overall			21.4	(19.7–23.2)	20.3	(18.1–22.6)
	women			17.6	(15.4–19.8)	12.0	(9.4–14.6)
	men			26.0	(23.2–28.8)	28.5	(24.9–32.0)
Evening meal as main meal of day <sup>3</sup>	overall	5.3	(4.6–6.0)	19.2	(17.5–20.8)	21.6	(19.2–24.1)
	women	3.1	(2.3–3.8)	13.6	(11.6–15.6)	16.0	(12.9–19.1)
	men	8.1	(6.8–9.5)	25.8	(23.0–28.6)	27.3	(23.5–31.0)
Enough time for meals / for main meal of day <sup>4</sup>	overall	49.5	(47.9–51.1)	42.2	(40.1–44.2)	32.9	(30.2–35.6)
	women	51.7	(49.5–53.9)	45.8	(43.0–48.7)	34.3	(30.4–38.1)
	men	46.7	(44.2–49.2)	37.8	(34.7–40.8)	31.6	(27.8–35.3)
Subjective evaluation of diet as healthful	overall	92.4	(91.6–93.3)	83.4	(81.9–85.0)	78.7	(76.4–81.0)
	women	92.7	(91.6–93.8)	85.8	(83.8–87.8)	82.5	(79.5–85.6)
	men	92.1	(90.7–93.4)	80.6	(78.1–83.1)	74.9	(71.4–78.4)
Obesity (BMI ≥ 30) <sup>5</sup>	overall			20.0	(18.3–21.7)	24.2	(21.8–26.6)
	women			20.4	(18.1–22.7)	23.4	(20.0–26.8)
	men			19.5	(17.0–23.0)	25.0	(21.6–28.4)
Smoking	overall	32.2	(30.7–33.7)	32.6	(30.6–34.7)	30.7	(28.1–33.3)
	women	9.5	(8.2–10.8)	22.2	(19.8–24.6)	26.6	(23.0–30.1)
	men	61.2	(58.8–63.6)	45.1	(41.9–48.3)	34.6	(30.8–38.4)
Beginning of smoking before 16th birthday	overall	17.5	(15.3–19.8)	40.3	(36.6–44.1)	48.2	(43.9–53.4)
	women	9.6	(5.4–13.9)	32.5	(26.7–38.3)	42.3	(34.6–50.1)
	men	19.1	(16.6–21.6)	45.0	(40.2–49.8)	52.7	(45.8–59.6)
Heavy smoking (> 20g tobacco/day)	overall	7.2	(5.7–8.7)	9.9	(7.6–12.2)	14.8	(11.1–18.4)
	women	1.6	(0.0–3.4)	5.0	(2.3–7.8)	14.2	(8.7–19.7)
	men	8.3	(6.5–10.0)	12.7	(9.5–15.9)	15.2	(10.3–20.1)
Regular beer drinking <sup>6</sup>	overall			35.9	(33.9–38.0)	35.2	(32.5–38.0)
	women			11.0	(9.1–12.8)	10.5	(8.0–13.0)
	men			65.3	(62.3–68.3)	59.6	(55.6–63.5)
Regular wine drinking <sup>6</sup>	overall			12.8	(11.4–14.3)	17.5	(15.4–19.7)
	women			15.4	(13.3–17.5)	21.2	(18.0–24.5)
	men			9.7	(7.8–11.6)	13.7	(10.9–16.4)

Type of health-related behavior		1973		1994		2004/08 (weighted)	
		%	(95% CI)	%	(95% CI)	%	(95% CI)
Regular drinking of hard liquor <sup>6</sup>	overall			15.1	(13.6–16.6)	10.3	(8.6–12.0)
	women			5.3	(4.0–6.7)	4.4	(2.7–6.1)
	men			26.6	(23.8–29.4)	16.0	(13.0–18.9)
Number of respondents	overall	3,603		2,155		1,246	
	men	1,575		981		532 (626)	
	women	2,028		1,174		714 (629)	

<sup>1</sup> Persons who reported regular exercise or sporting activity; for details, cf. *eMethods*.

<sup>2</sup> Answer "Daily" or "Almost daily" to the question, "How often do you consume each of the following types of food?"  
Exception: In 1973, answer "Fully applicable" to the question "I generally eat every day. . ."

<sup>3</sup> Answer "Evening" to the question, "When do you usually have your main meal of the day?"

<sup>4</sup> Answer "Fully applicable" to the question "I take enough time for my main meal of the day"

<sup>5</sup> Formula: body weight in kilograms divided by body surface area in square meters

<sup>6</sup> Answer "Daily," "Almost daily," "More than once a week," or "Once a week" to the question, "How often do you drink each of the following types of beverage?"  
BMI, body-mass index; CI, confidence interval

**eTABLE 2**

**Features of the qualitative sample (overview)**

	Case	Age	Sex	Employment status: 1 = employed 2 = un-employed 3 = retired 4 = independent	Employment sectors	Occupational situation	Family status: 1 = married 2 = single 3 = divorced 4 = widowed	Number of children	School education: 1 = <10 years of school 2 = 10 years of school 3 = high school diploma	Housing situation: 1 = New building 2 = Old building 3 = Home-stead (old) 4 = Home-stead (new)	Reference to local surroundings: 1 = long-established 2 = moved there 3 = moved back 4 = commuting	Social networking activity: 1 = involved 2 = passive
Community 1	A	60	w	3	3	retired industrial saleswoman	1	2	2	1	1	1
		70	m	3	2	retired construction manager	1	2	2	1	1	2
	B	83	w	3	3	retired scoutmaster & teacher, active in communal organizations	4	3	3	1	1	1
	C	45	w	1	3	seamstress, kindergarten helper, cleaner; now runs a bed-and-breakfast	1	4	2	4	1	2
	D	58	w	2	3	economist, now hospice volunteer	1	4	3	3	1	1
	E	60	m	3	2	retired electrician	3	3	2	2	1	2
	F	28	w	1	3	dental hygienist	2	1	2	1	1	1
Community 2	G	26	m	4	2	toolmaker; now independent & active in communal organizations	2	0	2	3	2	1
	H	35	w	1	3	dental hygienist	1	2	2	3	3	1
	I	55	w	1	3	office worker, community representative	1	0	2	3	1	1
		57	m	2	2	unemployed automobile mechanic	1	0	2	3	1	1
	J	50	w	2	3	dispatcher, in-keeper, now unemployed	4	0	2	3	2	2
	K	45	m	2	1	agricultural technician, now unemployed	1	0	2	3	1	1
	L	48	w	2	2	landscape gardener, now unemployed	3	2	2	3	2	1
	M	50	w	2	3	news technician, saleswoman, now unemployed	1	2	2	1	1	2
	N	55	m	1	2	mason	1	1	2	4	4	2
	X	45	w	2	2	unemployed factory worker	3	5	2	3	3	2

	Case	Age	Sex	Employment status: 1 = employed 2 = unemployed 3 = retired 4 = independent	Employment sectors	Occupational situation	Family status: 1 = married 2 = single 3 = divorced 4 = widowed	Number of children	School education: 1 = <10 years of school 2 = 10 years of school 3 = high school diploma	Housing situation: 1 = New building 2 = Old building 3 = Home-stead (old) 4 = Home-stead (new)	Reference to local surroundings: 1 = long-established 2 = moved there 3 = moved back 4 = commuting	Social networking activity: 1 = involved 2 = passive
Community 3	O	45	w	1	1	livestock farmer, now cleaner	1	0	2	3	1	2
	P	45	m	2	3	bodyguard, insurance agent, administrative worker; now unemployed	3	3	2	1	2	2
	Q	31	w	1	3	legal assistant	1	1	3	4	2	1
		32	m	1	2	energy electro-technician, now electrician	1	1	2	4	3/4	1
	R	55	w	1	1	agriculturist, active in communal organizations	1	2	3	3	1	1
	S	62	w	3	3	retired teacher	1	2	3	3	2	2
Sociodemographic features										Locality-related features		

## eMETHODS

# Health and Lifestyle in Rural Northeast Germany

The Findings of a Rural Health Study from 1973, 1994, and 2008

Database and Principles of Analysis

Thomas Elkeles, David Beck, Dominik Röding, Stefan Fischer, Jens A. Forkel

## Questionnaire data

A random sampling of the northeast German rural population was carried in a two-step selection process:

**Step 1 (1973):** 14 rural communities were chosen at random, according to community size classes, from among the rural communities with names beginning with B in what was then the district (*Bezirk*) of Neubrandenburg.

In the aftermath of German reunification, this district no longer exists, and some of the original communities are no longer the same administrative entity either, as some of the community borders have changed. The authors, therefore, currently designate the originally studied B-communities simply as a sample of the rural communities of northeast Germany. Seven of them are in the state of Mecklenburg-West Pomerania, and seven are in the state of Brandenburg.

**Step 2:** In these 14 B-communities, all officially registered adult inhabitants were surveyed from house to house with the help of trained community assistants. The identical method was applied later, in 1994, by the same study director who had conducted the 1973 wave of the study, and then again by the authors (from the Neubrandenburg University of Applied Sciences), who conducted the pre-test and main test of the last wave of the study in 2004 and 2008, respectively.

Thus, the samples of the rural population of northeast Germany that were taken in the three waves of the study were not independent of one another. Among the participants in the last wave, 409 remembered having participated in 1994, while 663 said they had not participated (174 did not reply to this question).

## Changes over time

Changes in the composition of the population can be seen in *Table 1* of the main article (for changes at the community level, see [e1]).

We analyzed the questionnaire data cross-sectionally and also studied changes over time. Thus, the comparisons were not based on data from single individuals. The constant feature is that the data from all three waves of the study were obtained from the adult inhabitants of the same communities.

We initially chose not to panelize, even though panelization would have been feasible, because of the low percentage of repeat participants. We currently plan to carry out a follow-up project with panel evaluations that will be based on individual data from the persons who participated in both 1994 and 2004/08. There were 382 such persons, making up 30.7% of the net sample in 2004/08 and 35.0% of those who had reached adulthood by 1994.

## Inclusion criteria 2004/08:

All persons were included in the study who were officially registered inhabitants of the study communities and were at least 18 years old (= the registered adult population).

## Exclusion criteria 2004/08:

The criteria for exclusion from the study, and for quality-neutral data deletion, were the following:

- prolonged absence,
- physical and/or mental impairment making participation in the survey impossible.

The amount of data that was deleted in quality-neutral fashion in 1973 and 1994 is unknown; in 2004/08, this amount was about 15%. These persons had moved away from the area or from their reported address (10%), had been absent for a long time (2%), or were physically or mentally unable to participate (3%).

## Respondent yield and weighting in 2004/08

In 2004/08, 54% of persons in the registered adult population declined to participate in the survey or gave no information about their age and sex. Thus, usable questionnaire data were available, in the end, only from circa 31% of the registered adult population. After correction for quality-neutral deletions, the respondent yield of the LGS 2004/08 was 37% (1246 respondents). The corresponding figures for the first two waves were higher: for the LGS 1973, 83% (3603 respondents); for the LGS 1994, 68% (2155 respondents).

Community lists with the official registration data for the entire inhabitant population were available for all communities in the study sample for the third wave of the study (LGS 2004/08). A comparison of the age

and sex distribution of LGS 2004/08 respondents with that of the totality of registered inhabitants showed that women and persons aged 45 and older were overrepresented in the LGS 2004/08. We therefore decided to perform all descriptive evaluations of the LGS 2004/08 findings with a survey weighting to compensate for this potential source of bias. The weighting factors in the LGS 2004/08 ranged from 0.76 to 1.04 for women and from 0.80 to 1.81 for men. We could not calculate survey weightings retrospectively for the LGS 1973 and the LGS 1994, because we had no way of obtaining official registration data or comparably informative data on the age and/or sex distribution of the inhabitants of the surveyed communities in 1973 and 1994 (e2).

#### Further evaluation of representativeness

In view of the large fraction of the population of the communities surveyed that did not participate in the surveys, particularly in the third wave (2004/08), we sought further data to be used for comparisons, both from the microcensus of the Federal Statistical Office, which is representative of the entire German population, and from the Federal Employment Agency (*Bundesagentur für Arbeit*), in order to assess the representativeness of the LGS 2004/08 and to determine whether comparisons of the three waves were justifiable (e3). These data from other sources were not robust enough to be used for the determination of survey weightings, but a comparison of the distribution of school education among LGS 2004/08 respondents with the official regional statistics and with the microcensus regional file for the year 2000 led us to conclude that more educated persons were overrepresented, and less educated persons underrepresented, in the LGS 2004/08. This may have influenced some of the findings, but we think it unlikely that there was a large bias, considering that other sociodemographic variables (joblessness, marital/familial status, size of household, coverage by medical insurance) accorded well with the reference data used for comparison, and also that different categories of educational attainment were represented in the same order of frequency among the LGS 2004/08 participants and in the reference data (e3).

#### Item construction

The standardized questionnaire contained 90 questions on 12 different topics; like the questionnaires in previous waves of the Rural Health Study, it contained questions on health, satisfaction, everyday behavior, health-related behavior, and living and working conditions. The main criterion used in the generation of the questionnaire was comparability with the questions asked in the earlier waves of the study; some of the questions were altered in the light of changed standards and issues of interest in health sciences research, while some new questions were added (many of them taken from the German Federal Health Survey) (e4). Such decisions were made from case to case, often as a compromise.

#### Item construction and testing of indicators of health and disease

For the data analyses described here, indicators of health and disease were chosen that were comparably operationalized in all three waves of the study and could therefore be evaluated for comparisons across the three waves.

This was the case both for the participants' subjective evaluation of their state of health and for the determination of lifetime prevalences of chronic heart diseases (1973: answer "Yes" to the question, "Do you have a chronic heart disease?" 1994 and 2004/08: answer "Yes" to the question, "Do you have angina pectoris or a weak heart, or did you ever have a heart attack?"), high blood pressure, and diabetes mellitus (answer "Yes" to identically phrased questions in all three waves of the study). The study participants rated their state of health on a scale from 1 (very good) to 5 (poor) in all three waves of the study, with a comparably, but not identically, phrased introductory question (1973: "How would you rate your current state of health?" 1994 and 2004/08: "How would you describe your present state of health?"). The answers were dichotomized for further analysis (1: very good or good, 2: satisfactory, less than satisfactory, or poor).

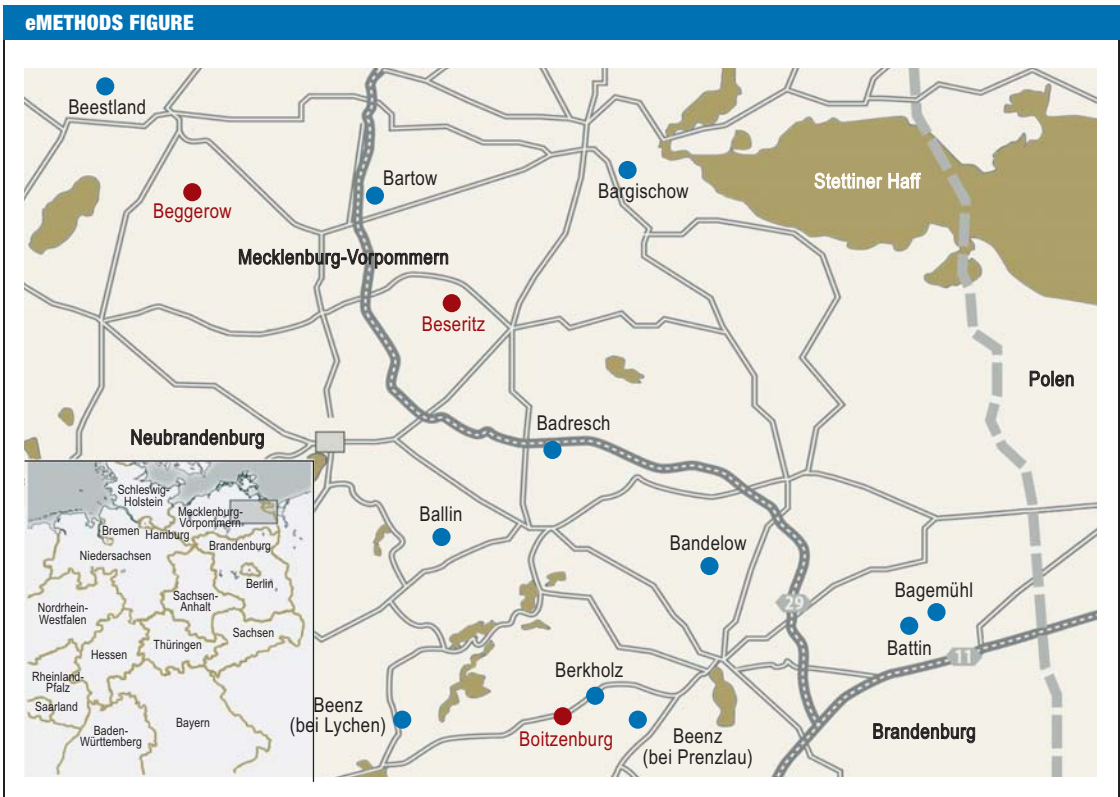
For the evaluation of life satisfaction, the participants in 1994 and in 2004/08 were asked to rate their satisfaction in eight life areas on a scale from 1 (highly dissatisfied) to 7 (highly satisfied), with the introductory question, "How satisfied are you with the following areas in your life?" The eight areas were

- work situation,
- living situation,
- financial situation,
- leisure time,
- health,
- family situation,
- relations with friends, neighbors, and acquaintances, and
- life in general.

The mean satisfaction values were evaluated and compared across waves of the study; in a second step, they were also compared with the corresponding findings of the Socio-Economic Panel (SOEP). In the SOEP, satisfaction was rated on a scale with 11 levels; thus, for the purpose of comparison, the LGS satisfaction ratings had to be linearly transformed onto a scale with the same size as the SOEP scale ( $z = [(x/6) - (1/6)] \times 10$ ). Because of the difference between the two scales, the mean satisfaction values were not necessarily comparable even after transformation of the LGS values; nevertheless, we consider the transformed values an adequate basis for a rough evaluation of differences in satisfaction levels.

#### Evaluation of validity

To evaluate the validity of data on health and satisfaction, we calculated various correlations between related measures and determined distributions with respect to age, sex, employment status, educational level, and



Map of the study area with community names; the communities from which qualitative data were obtained are specially indicated

income. All of the findings indicated that the measurements were valid (e2). An evaluation of the item-specific non-response fractions revealed that these tended to be higher with increasing age for the measures used here. Non-response fractions were also higher than average among unemployed persons and among those with less than ten years of school education.

The non-response fractions for questions concerning the subjectively evaluated state of health were very low (< 2%) in all waves of the study. In contrast, the non-response fractions were much higher for questions regarding job satisfaction (12–20 %) and satisfaction with life overall (3–26 %). Unemployed and older persons were particularly likely to leave questions in these areas unanswered; older persons tended to have spent fewer years in school than younger persons and were also more likely to be unemployed. Thus, the measurement of satisfaction in these areas is biased to some extent by the non-representativeness of the subset of respondents who chose not to answer these particular questions.

All other variables were similarly checked for the frequency and possible systematic features of non-response to the questions (e2).

For example, the non-response fractions were unexpectedly low for the items reported here that concerned

alcohol consumption (4–11%); lack of response to such questions had no systematic relationship to other variables, except for a mild effect of age and educational level. We have therefore not listed the numbers of responders to each particular question in Table 2, but rather only the total number of male and female respondents in each wave of the study.

**Operationalization of health-related behaviors**

Health-related behaviors are represented in Table 2 (long version: eTable 1). The operationalization of each type of behavior is documented in a footnote to the table where needed, except for the area of exercise and participation in sports; for this area, the questions asked in the three waves of the study were so different that there was little basis for a comparison of the answers across waves. The reported prevalences of participation in sports were constructed as follows for the three waves: For the 1973 wave, the participants’ responses to two questions were evaluated.

The first of these questions was: “Do you currently do calisthenics every day?” There were three response categories:

- 1 = “I do not do any calisthenics”
- 2 = “Yes, for less than 10 minutes”
- 3 = “Yes, for 10 minutes or more”



The second question was: “Do you currently do any type of physical training other than calisthenics (for example, swimming, cycling, rowing, running and other track-and-field sports, gymnastics, etc.)?”

There were six response categories:

- 1 = “Yes, but not regularly”
- 2 = “Yes, once a week”
- 3 = “Yes, twice a week”
- 4 = “Yes, three times a week”
- 5 = “Yes, four times a week”
- 6 = “Yes, five or more times a week”

Persons were judged as physically active if their answer to at least one of these questions was 2 or higher.

In the 1994 wave, physical activity was also judged on the basis of the respondents’ answers to two questions. The question on daily calisthenics was identical. The second question was, “Do you participate in sports (for example, in a sporting club)?” The possible answers were 1 (Yes) and 2 (No). Persons were judged as physically active if they gave an answer of 2 or higher to the first question, and/or answered “Yes” to the second question.

In the 2008 wave, the respondents’ degree of physical activity was judged on the basis of a single question: “Do you participate regularly in sports?” The response categories were the following:

- 1 = “Regularly, for more than 4 hours per week”
- 2 = “Regularly, for 2–4 hours per week”
- 3 = “Regularly, for 1–2 hours per week”
- 4 = “Less than one hour per week”
- 5 = “No, not at all”

Persons were judged as physically active if they gave any answer other than 5.

The results were analyzed with descriptive statistical methods with the aid of the SPSS 17, Systat 11, and MS Excel 2003 programs.

### Qualitative Data

From April to November 2009, field data were gathered in two one-week periods in each of three communities that were among the communities participating in the overall study: Boitzenburg, Beggerow, and Beseritz (*Figure in eMethods*). Further field trips were made to particular events and festivals in these communities and for the purpose of interviewing some of the inhabitants (20 interviews with 23 interviewees) (*eTable 2*).

The interviews were conducted on the basis of an interview manual (*Table in eMethods*) that was based on the manual of Research Project 333 at the Univer-

eMETHODS: TABLE	
Manual for narrative-producing interviews (summary) Rural Health Study, 2008	
Questions to introduce particular topics	Biographical narratives and locality-related information
Everyday life and work	occupational history
	stresses and rewards
	unemployment
	free time
Resources	time
	space, mobility
	social networks
	money
Health	general state of health
	nutrition
	alcohol use
	exercise, sports, and leisure-time activities
Coping	
Overall views and prospects	

sity of Munich, Subproject A1 (Daily Lifestyle), integrating semi-standardized, specific questions about rural and health-related lifestyle. The questions were phrased in such a way as to elicit narrative answers. The two interviewers were able to adapt their questioning to the situation and to conduct the interviews as openly as possible; as a result, in most interviews, the interviewees themselves determined which topics they spoke about at greatest length. They could introduce their own topics or take a personal position on any topic. The interview manual served nonetheless to ensure the relevance of the topics discussed to the overall theme of the study.

Computer-assisted, qualitative data analysis was performed with MAXQDA 2007 and with methods that were essentially based on the documentary method.

The interview extracts quoted (in English translation) in the present article were chosen by the usual procedure for selecting plausible qualitative material to illustrate qualitative results.