Original Research

A European Approach to Rural–Urban Differences in Mental Health: The ESEMeD 2000 Comparative Study

Viviane Kovess-Masféty, MD, PhD[1], Jordi Alonso, MD, MPH, PhD[2], Ron de Graaf, PhD[3], Koen Demyttenaere, MD, PhD[4], on behalf of the ESEMeD 2000 Investigators[5]

Objective: The study aimed to answer the following questions: Are there any rural–urban differences in mental health, once sociodemographic variables are controlled for, and are any of these differences observed in EU countries? Did the individuals suffering from mental health disorders have the same characteristics in rural and urban areas, particularly concerning self-reported impairment?

Method: The European Study of the Epidemiology of Mental Disorders (ESEMeD 2000 study) is a cross-sectional, in-person, household interview survey based on probability samples representative of the adult population of 6 European countries: Belgium, France, Germany, Italy, the Netherlands, and Spain. The rural population is defined as those living in towns with fewer than 10 000 inhabitants, and the urban population is defined as those living in towns or cities with 10 000 or more inhabitants. A stratified, multistage, random sample without replacement was drawn in each country. The overall response rate of the study was about 61.2% (weighted response rate).

Results: The study results confirmed previous findings on the variation in mood disorders between rural and urban areas. Overall, urbanicity seemed to be linked to a higher risk of mental health disorders, particularly depressive disorders, whereas the link to anxiety disorders was only moderate and there was no link at all to alcohol disorders. Country differences concerned male respondents and not female respondents, with the exception of Belgium, where the differences concerned women only (and showed fewer disorders in rural areas).

Conclusions: This study will, hopefully, stimulate further intra-European studies using comparable methods and instruments to look at the experience across the European continent and introduce steps to harmonize rural–urban population limits across diverse countries.

(Can J Psychiatry 2005;50:926–936)

Information on funding and support and author affiliations appears at the end of the article.

Clinical Implications

- This study will potentially encourage further intra-European studies using comparable methods and instruments.
- The introduction of 2 categories of urbanicity (medium-sized city and metropolis) to compare mental health and control for major demographic differences demonstrates the need to unify measures of mental health.

Limitations

- It was difficult to employ a uniform rural–urban definition across 6 European countries.
- An arbitrary criterion (below 10 000 and above 10 000 inhabitants) does not correspond to most national definitions.
- Different countries have various levels of urbanization and population density.

Key Words: *rural–urban, mental health, ESEMeD study, European approach*

Many studies of rural–urban differences in mental disorders have been conducted to identify risk factors and social causes of mental illness. In the past, these studies often involved multidisciplinary teams who took into account psychiatric as well as social and cultural variables. Today, such studies are usually instigated by mental health service planners concerned about possible disparity in service provision between rural and urban areas, as well as about the regional organization of care, which is a particular concern at the European level.

Most studies have reported a higher prevalence of mental disorders, particularly depression, in urban areas. This has been attributed to several factors: first, the decline in community relationships and social isolation in cities (1–3); second, greater stress relating to housing, work, marriage, child rearing, and security, combined with inadequate resources to cope with the stresses of urban life (4,5) and high urban levels of hostility (6); third, higher concentrations of poverty in city centres (7); and fourth, poor social integration and social withdrawal (1), coupled with sociocultural disintegration (including family and marital disintegration), which limit social networks (8). In addition, migration from rural to urban areas, which involves stress factors and coping resources as well as changes in culture, may also play a part (9,10).

Several extensive mental health surveys of adult populations in the US and Canada have evaluated rural–urban differences in mental health. The milestone US Epidemiologic Catchment Area Study reported that individuals living in urban settings had a significantly higher risk of major depression (2.4%), as measured by the DIS (11), than did those living in rural areas (1.1%) (12). In a study conducted in Quebec, using DSM-III criteria, a significantly different point prevalence of major depression was noted for rural and urban areas (3.7%, compared with 1.1%) (13). This study suggested that the difference was mainly attributable to unemployed men and women without partners. The researchers were also able to differentiate 3 levels of urban–rural diversity in the prevalence of depression: a metropolis (Montreal); a small provincial city (Rimouski), where depression was the lowest; and a rural area (around Rimouski). This finding underlines the importance of how the notions of rural and urban are defined. The Stirling County Study supported the view that the proportion of psychiatric disorders is lower in rural and more integrated societies (6). However, a mental health survey conducted in the Edmonton metropolitan area found a lower 6-month prevalence of major depression (3.2%), compared with that found in the Stirling County Study, as measured by the DIS (14). Moreover, the National Comorbidity Survey found no difference between metropolitan areas, smaller cities, and rural areas when the current (30-day) and 12-month prevalence of major depression were compared (15,16). Similarly, no significant difference in the prevalence of major depression between rural and urban areas was seen in studies conducted in Taipei, Taiwan (17), and Seoul, Korea (18), nor was it seen in the Ontario Health Supplement Study (19).

Several published reports on rural–urban differences and mental health issues describe studies from the UK. Over 2 decades ago, researchers collected data on depression in women from 2 highly differentiated samples: an urban group in a south London suburb and 2 other groups living on 2 Scottish islands, one of which included a small town (20,21). The results showed a significant decrease in depression associated with rural living. In addition, several environmental factors, specific for each sample (referred to as "provoking agents" and "major difficulties"), were shown to predict part of the variance. More recently, 2 of 3 nationwide surveys conducted in the UK compared psychiatric morbidity in urban and rural areas (22,23). In the Health and Lifestyle Survey, individual interviewers categorized psychiatric morbidity into 3 classes according to subjects' place of residence: urban without open space, urban with open space, and rural (22). The ORs for psychiatric morbidity adjusted for sociodemographic variables supported the idea of rural living as a protective factor for mental health. The more recent National Morbidity Survey found a similar result, although in this study, rural living did not explain any significant amount

Abbreviations used in this article

CI	confidence interval
CIDI	Composite International Diagnostic Interview
DIS	Diagnostic Interview Schedule
ESEMeD	European Study of Epidemiology of Mental Disorders
INSEE	Institut National de la Statistique et des Études
MCS	mental component summary
MDE	major depressive episode
MHS-50	SF12 mental health score
NPHS	National Population Health Survey
ODIN	Outcome of Depression International Network
OR	odds ratio
PCS	physical component summary
SE	standard error
SF12	Short Form 12-Item Health Survey

of variance in the prevalence of either drug or alcohol dependence (23).

Another recent large-scale survey was conducted in the Netherlands, where rural areas were defined according to national population density criteria (bottom 80% of counties); the results again supported an advantage for rural living (24). The ORs (adjusted for age and sex) for mood and substance use disorders as well as for comorbidity (2 or more disorders) were significantly lower in rural areas. Other European studies comparing depression in rural and urban areas have produced diverse results (21,24–29).

Although most studies showed a higher prevalence of depression in large cities, compared with rural environments, the findings were by no means concordant, and the studies are difficult to compare because of methodological diversity. Inconsistencies among studies may be attributed to differences in several areas: the mental health measurement instruments used, definitions of depression and of urban and rural settings, methods of calculating prevalence, and sociodemographic characteristics across the rural study areas. In particular, depression was defined quite diversely in terms of the nosological entity studied, classification system, and method of diagnostic assignment. The distinction between depressive symptoms and depressive disorders seems important, since, for some authors, it is the former category that differs between rural and urban areas (30). The definition of urban and rural settings also has been a concern, given the variability in conceptualization across studies. The most widely used discriminants have been population density, interviewer judgment, and size of the communities where people live, defined by different cut-off thresholds (for example, 5000 or 10 000 inhabitants). Finally, the sociodemographic composition of urban and rural populations differs, for example, in age, marital status, and employment status. This needs to be controlled for carefully, since many of these variables have been shown to be independently associated with variance in the prevalence of mental health disorders.

Attempts were made to eliminate this diversity in the European multicentre ODIN study, which interviewed a randomized sample of people residing in specified urban and rural areas in 4 European countries (Finland, Ireland, Norway, and the UK) in a 2-step procedure (screening plus standardized clinical interview) (31). The ODIN investigators found large urban–rural differences in the prevalence of depressive disorders in the British Isles (that is, in the UK and Ireland) but not in the 2 participating Nordic countries (Finland and Norway). They also observed notable differences between the urban sites studied, which did not appear between the rural sites. Compared with the corresponding rural site, a marked urban preponderance in the prevalence of depressive disorders was seen in women in the UK and Ireland, whereas, in men and in the total sample, this difference did not reach statistical significance. Logistic regression analysis including selected risk factors for depression showed an even higher risk of depressive disorders in both Dublin and Liverpool, compared with the Finnish urban site (Turku), which had the lowest urban prevalence. In addition, the ODIN investigators found that factors such as lack of confidence and difficulty in getting practical help from neighbours were important predictors of depressive disorders (32).

Most of the previous studies, however, failed to consider disability or impairment levels when comparing the prevalence of major depression and depressive symptoms in rural and urban areas. Therefore, the findings provide limited information for mental health service planning and for understanding the etiology of depressive disorders (33). To address this issue, Wang analyzed data from the 1998–1999 Canadian NPHS (which collected data on mental health as well as on impairment) and reported that NPHS participants in rural areas showed a lower prevalence of MDE than those in urban areas, after controlling for the effects of race, immigration status, work, and marital status (34). Nonimmigrants and white participants in rural areas had a lower prevalence of MDE than did those in urban areas, and such differences depended on age and geographic region. Rural and urban participants did not differ in 2-week disability and interference in daily life due to depressive symptoms. The author concluded that the reasons for the rural–urban differences in the prevalence of MDE were complex and might depend on the individuals' age, immigration status, race, work, marital status, and province of residence.

A European study, the ESEMeD, has offered a unique opportunity to compare rural–urban differences in mental disorders in diverse countries, along with other relevant variables; it uses a common methodology and a similar definition of rural and urban areas across participating countries. This paper presents results of the ESEMeD study. It has 2 principal objectives: to determine whether rural–urban differences in mental health exist in European Union countries after sociodemographic variables are controlled for and to assess whether the characteristics of individuals with mental health disorders are similar in rural and urban areas, particularly concerning self-reported impairment.

Material and Methods

The ESEMeD 2000 study was a transversal survey carried out between 2001 and 2003 in the general population of Germany, Belgium, Spain, France, the Netherlands, and Italy.

Subjects

The target population consisted of noninstitutionalized individuals, aged 18 years and over, residing in private

households in the 6 countries studied. A stratified, multistage, random sample (without replacement) was drawn in each country from the most representative national database available (that is, the electoral roll in Italy, the postal directory in the Netherlands, a randomly generated list of telephone numbers in France, and household registries in Belgium, Germany, and Spain.) Professional interviewers interviewed subjects at home. The weighted overall response rate was 61.2%.

Data Collection

The CIDI, a comprehensive, fully structured, diagnostic interview, was used to assess mental disorders (16,35). This allowed retrospective assignment of psychiatric diagnoses according to the ICD-10 (36) and DSM-IV (37) criteria. Using standard computerized algorithms, lifetime (12-month) and current (1 month before interview) prevalence rates were estimated. Two further questions were included to capture information on the DSM-IV criteria for impairment (Q1: "How severe was your emotional stress during those times: very severe, severe, mild, moderate?" Q2: "How often during those times was your emotional stress so severe that you could not carry out your daily activities: often, sometimes, rarely, never?"). In addition, psychological distress was assessed with the Mental Health subscale of the SF12, a short version of the SF36 that contains only 12 items. This instrument generates 2 summary scores: the PCS score, indicating the physical quality of life, and the MCS score, indicating the mental quality of life. Each scale uses all 12 items but with different weights. In this study, we used the MCS-50 version of the mental summary scale, which considers a score of 50 as neutral and generates positive and negative scores by subtracting 50 from the total score (a higher score indicates a better quality of life and therefore less psychological distress).

The population size of the community where participants resided was recorded. Communities were classified as rural or urban according to the number of inhabitants determined from national census data. A bimodal dichotomization of above and below 10 000 inhabitants was used.

Statistical Analysis

We used STATA/SE V8.1 (38) for the statistical analysis. We calculated results with svy commands, which enabled calculation of the CI within the sampling design. A probability threshold of $P < 0.05$ was considered statistically significant. We compared categorical variables with the chi-square test. We used univariate and multivariate logistic regression analyses to compare diagnostic groups and to adjust for country and sociodemographic variables.

Results

Rural–Urban Differences in Mental Health Across Countries

Table 1 presents the sociodemographic distribution of the rural and urban populations in the different countries studied. In France, Germany, and Spain, the distribution of subjects by age group and marital status varied significantly between rural and urban areas. We therefore applied weighting to take into account these sociodemographic differences when calculating the prevalence of psychiatric disorders. For the unemployed category, we calculated rates from the workforce population only (excluding retirees, students, housewives, and others who had not worked for at least 6 months).

We compared 12-month prevalence rates of psychiatric disorders in men and women according to DSM-IV criteria (Table 2). Overall, we observed a higher risk of mental health disorders for subjects living in an urban environment. This association was particularly strong for depressive disorders and less so for anxiety disorders. In contrast, we observed no such association for alcohol-related disorders. However, these rural–urban differences were not identical in all countries. In France and Germany, higher rates of all types of disorder appeared in the rural sample, whereas in Belgium, rates were higher in the urban sample. We saw no rural–urban differences in the remaining countries. Looking at individual psychiatric disorders, we found rural–urban differences for mood disorders in France and Germany, and for anxiety disorders in France, but no differences for alcohol-related disorders. We also noted a sex interaction, finding significant rural–urban differences only in men, except for those in Belgium, where the urban preponderance of psychiatric disorders was restricted to women.

Sensitivity to the Definition of Rural and Urban

We reanalyzed the data using a cut-off threshold of 5000 inhabitants to define rural and urban communities (France was the only country where this was possible). This yielded qualitatively similar differences in prevalence rates of psychiatric disorders between rural and urban areas as in the principal analysis (data not shown). We performed a multivariate regression analysis to take into account the potential influence of sociodemographic variables. This yielded an OR for having any mental disorder over 12 months of 1.29 (95%CI, 0.98 to 1.69) in the urban population, compared with the rural population, and a corresponding OR for a mood disorder of 1.08 (95%CI, 0.73 to 1.59). Neither OR was statistically significant; hence, using a more restrictive definition did not change the results.

In a second step, we reanalyzed the data for the 3 countries in which we observed rural–urban differences (Belgium, France, and Germany), assigning communities to 1 of

Table 1 Comparison of main sociodemographic variables between rural and urban areas of different countries

	Belgium *n* = 2419		France *n* = 2894		Germany *n* = 3555		Italy *n* = 4712		Netherlands *n* = 2371		Spain *n* = 5474		Average *n* = 21 425	
Variable	Rural 13%	Urban 87%	Rural 48%	Urban 52%	Rural 33%	Urban 67%	Rural 36%	Urban 64%	Rural 5%	Urban 95%	Rural 26%	Urban 74%	Rural 33%	Urban 67%
Men	52.55	48.37	48.26	47.01	49.10	47.73	47.86	48.16	50.82	48.82	48.92	47.48	48.59	47.79
Women	47.45	51.63	51.74	52.99	50.90	52.27	52.14	51.84	49.18	51.18	51.08	52.52	51.41	52.21
18–24 years	13.85	10.72	6.85[a]	12.31[a]	9.92	9.95	10.30	10.07	19.38	13.19	13.00[a]	15.61[a]	9.38[a]	11.65[a]
25–64 years	67.25	67.55	72.06[a]	69.06[a]	69.23	69.31	67.18	68.54	64.07	69.85	60.61[a]	65.76[a]	68.46[a]	68.45[a]
≥ 65 years	18.90	21.73	21.10[a]	18.63[a]	21.57	20.74	22.51	21.39	16.55	16.96	26.39[a]	18.64[a]	22.15[a]	19.90[a]
Married	65.13	71.01	77.97[a]	65.98[a]	71.90[a]	62.77[a]	65.57	65.07	68.71	70.59	65.83	64.70	71.30[a]	65.19[a]
Previously married	12.58	11.73	10.72[a]	12.45[a]	10.39[a]	15.19[a]	9.26	10.24	9.67	11.69	8.54	9.61	10.01[a]	12.25[a]
Never married	22.29	17.26	11.31[a]	21.57[a]	17.70[a]	22.05[a]	25.17	24.70	21.62	17.72	25.63	25.69	18.68[a]	22.56[a]
Labour market population	Belgium *n* = 1490		France *n* = 1901		Germany *n* = 2050		Italy *n* = 3031		Netherlands *n* = 1433		Spain *n* = 2756		Average *n* = 11 859	
Employed	91.22	88.01	92.35	90.07	88.46	87.74	87.89	90.21	94.41	94.94	85.92	85.68	89.37	89.02
Unemployed	8.78	11.99	7.65	9.93	11.54	12.26	12.11	9.79	5.59	5.16	14.08	14.32	10.63	10.98

[a] $P < 0.05$

3 classes: metropolis (>100 000 inhabitants), medium-sized city (10 000 to 100 000 inhabitants), or rural (<10 000). The resulting prevalence values were somewhat different from those obtained from a bimodal definition of rural and urban (Table 3). For example, the lower risk of psychiatric disorder associated with urban living among women in Belgium no longer appeared for those living in a metropolis, remaining only for those in medium-sized cities. In addition, this lower risk associated with women in medium-sized Belgian cities also emerged for anxiety disorders. Similarly, in France, it was only in medium-sized cities that we observed an altered risk of psychiatric disorders, compared with rural areas. Living in a medium-sized city in Germany was associated with an elevated risk of mood disorders, and living in a metropolis was associated with an elevated risk of alcohol-related disorders.

Sociodemographic Determinants of Rural–Urban Differences

For those countries with demographic differences between rural and urban populations (France, Germany, and Spain), we used multivariate logistic regression to control for these differences (Table 4). This approach confirmed the rural–urban differences in prevalence of any mental disorder observed for France and Belgium. In contrast, the rural–urban difference seen in Germany seemed to be due to differences in marital status. An independent effect of marital status also appeared in France (with higher prevalence in previously married subjects), whereas in Spain, an age effect occurred (with higher prevalence in younger subjects).

When the prevalence of any mental disorder in all urban areas was compared with that in rural areas, the urban–rural differences that remained statistically significant in the multivariate regression analysis involved a lower risk in Belgium and a higher risk in France. For residents of medium-sized cities, compared with rural residents, we found a lower risk for any mental disorder and for an anxiety disorder in Belgium, an elevated risk for any disorder in France, and an elevated risk for a mood disorder in Germany. For individuals living in a metropolis, the only significant urban–rural difference was the increased risk observed in Germany for alcohol-related disorders.

Rural–Urban Differences in Psychological Distress and Impairment due to Mental Health Status

Table 5 presents the psychological distress results measured with the SF12 MHS-50. The MHS-50 score was significantly higher (indicating less psychological distress) among men in the rural sample in France and among women living in urban

Table 2 Prevalence of DSM-IV disorders over 12 months by sex, rural or urban setting, and country

	Any disorders			Any mood			Any anxiety			Alcohol		
Variable	Rural	Urban	Average	Rural	Urban	Average	Rural	Urban	Average	Rural	Urban	Average
Belgium												
Men	15.18	10.30	11.00	3.46	4.05	3.97	9.39	5.20	5.80	4.42	2.61	2.87
Women	16.75[a]	10.15[a]	10.97[a]	9.61	5.81	6.28	8.69	6.36	6.65	1.10	0.65	0.71
Average	15.93[a]	10.22[a]	10.98[a]	6.38	4.96	5.15	9.06	5.80	6.23	2.85	1.60	1.77
France												
Men	6.81[a]	13.58[a]	10.26[a]	2.85[a]	6.06[a]	4.49[a]	3.24[a]	6.54[a]	4.92[a]	1.98	2.80	2.40
Women	15.17	18.49	16.91	7.88	8.27	8.08	11.31	13.33	12.37	0.18	0.30	0.24
Average	11.13[a]	16.18[a]	13.74[a]	5.45	7.23	6.37	7.41[a]	10.14[a]	8.82[a]	1.05	1.47	1.27
Germany												
Men	5.05[a]	8.93[a]	7.64[a]	1.07[a]	3.07[a]	2.40[a]	3.39	5.48	4.78	1.25	2.35	1.99
Women	10.02	10.46	10.32	3.06	4.60	4.11	8.10	7.99	8.02	0.00	0.05	0.04
Average	7.58	9.73	9.03	2.08[a]	3.87[a]	3.28[a]	5.79	6.79	6.46	0.65	1.39	1.15
Italy												
Men	3.39	4.11	3.85	1.40	2.20	1.91	1.99	2.14	2.09	0.12	0.32	0.25
Women	9.42	9.70	9.60	3.86	4.97	4.57	7.78	6.75	7.13	0.01	0.00	0.00
Average	6.54	7.01	6.84	2.68	3.64	3.29	5.01	4.53	4.71	0.13	0.19	0.17
Netherlands												
Men	5.30	7.59	7.48	1.86	3.23	3.16	1.59	3.38	3.29	2.81	2.92	2.91
Women	14.76	16.73	16.64	4.72	6.97	6.87	10.04	12.03	11.94	0.00	1.06	1.01
Average	9.95	12.27	12.16	3.27	5.15	5.06	5.75	7.81	7.71	1.43	1.97	1.94
Spain												
Men	4.88	5.38	5.25	2.26	2.35	2.33	2.20	2.64	2.53	1.58	1.32	1.38
Women	10.49	11.76	11.44	5.39	6.54	6.25	8.12	7.43	7.61	0.00	0.00	0.00
Average	7.75	8.73	8.48	3.86	4.55	4.37	5.22	5.16	5.17	0.70	0.66	0.69

[a] $P < 0.05$

areas in Belgium, supporting the differences in prevalence of mental health disorders described above. In Italy and the Netherlands, MHS-50 scores were higher for women living in rural areas, compared with those in urban areas. In Germany and Spain, we saw no differences in psychological distress scores. When we reanalyzed the data according to the 3 classes of rural and urban, we obtained qualitatively similar results (Table 6), with the exception of those for men living in the Netherlands and in Italy, for whom we observed significantly lower MHS-50 scores in metropolitan dwellers, compared with rural residents and inhabitants of medium-sized cities, respectively.

For individuals with mood disorders, a significant ($P = 0.006$) rural–urban difference was observed in response to the question concerning interference with carrying on daily activities. In rural areas, 65.6% of subjects with depression answered "often" or "sometimes," compared with 58.5% in the urban samples.

Discussion

Our ESEMeD study results confirm previous findings on the variation in the prevalence of mood disorders between rural and urban areas. We observed such rural–urban differences in 3 countries, with a higher prevalence of mood disorders in

Table 3 Prevalence of DSM-IV disorders over 12 months by sex; rural, medium-size city or metropolis setting; and country

	Any disorders			Any mood			Any anxiety			Alcohol		
Variable	Rural	Medium-size	Metropolis	Rural	Medium-size	Metropolis	Rural	Medium-size	Metropolis	Rural	Medium-size	Metropolis
Belgium												
Men	15.18			3.46			9.39			4.42		
Women	16.75	9.34[a]	15.85[a]	9.61	5.65	6.97	8.69	5.64[a]	11.49[a]	1.10		
Average	15.93[a]	9.82[a]	13.38	6.38	4.84	5.88	9.06[a]	5.38[a]	9.07	2.85	1.61	2.53
France												
Men	6.81			2.85			3.24			1.98		
Women	15.17			7.88			11.31			0.18		
Average	11.13[a]	16.35[a]	15.85	5.45	7.39	6.92	7.41	10.02	10.37	1.05	1.43	1.56
Germany												
Men	5.05			1.07			3.39			1.25		
Women	10.02			3.06			8.10			0.00		
Average	7.58	9	10.51	2.08[a]	4.04[a]	3.68	5.79	6.47	7.13	0.65[a]	0.93	1.8[a]

[a] $P < 0.05$

urban areas of France and Germany but a lower urban prevalence in Belgium. We found no rural–urban difference in prevalence in the 3 other participating countries (Italy, the Netherlands, and Spain). This finding of varied rural–urban differences in prevalence among countries recalls the results of the ODIN study, which found large rural–urban differences in the prevalence of depression in the UK and Ireland but not in Nordic countries (Finland and Norway) (30,31). Similarly, the urban–rural differences reported in the Canadian study by Wang varied according to region, even though, at the national level, rural areas had a lower rate of depression overall (34).

The fact that most of the risk of mental health disorders associated with living in an urban environment disappeared after adjustment for marital status may explain some of the variance in rural–urban differences in prevalence between countries, since the specific rural and urban rates of divorce and separation vary across countries. In the ESEMeD population, the distribution of subjects by marital status differed between rural and urban areas only in France and Germany. Differences in the age distribution of rural and urban populations could also contribute to prevalence differences since, in the overall ESEMeD population, older individuals seemed to have a lower risk of mental health problems, compared with those in younger age groups. A similar case could be made for the role of employment status, although this cannot be addressed in the ESEMeD study because no rural–urban differences in this sociodemographic variable were observed in any country (39).

Since a uniform definition of urban and rural settings was required across the countries studied, we applied an arbitrary cut-off threshold to distinguish the 2 groups (10 000 inhabitants). This definition, however, does not match many national definitions of urban areas. In France, for example, several small towns are located close to large regional cities or conurbations; these are considered as rural under our definition but would be defined as suburban in the French national census data (see www.insee.fr/fr/home/home_page.asp). If the French sample is differentiated using the rural–urban definitions of the INSEE census data, many individuals currently considered as rural dwellers in our study do indeed live in small towns or villages (population below 10 000); however, others live in the Parisian metropolitan area (2.1%), close to a city with more than 100 000 inhabitants (13.2%), or in a town or city with 20 000 to 100 000 inhabitants (8.8%). In addition, the different countries have various levels of urbanization and population density. Of the 6 ESEMeD countries, Belgium and the Netherlands showed the highest proportion of urban inhabitants, and Italy, the lowest (39).

Since the cut-off points used to define urban and rural areas were arbitrary, we reanalyzed the data, using a cut-off point of 5000 inhabitants, and obtained identical results with this more

Table 4 Influence of rural or urban living and other sociodemographic variables on the prevalence of psychiatric disorders as determined by multivariate logistic regression analysis

Country	Demographic variables	Any disorder OR (95%CI)	Mood disorder OR (95%CI)	Anxiety disorder OR (95%CI)	Alcohol disorder OR (95%CI)
Belgium	Urban or rural	0.60 (0.39–0.91)[a]	0.76 (0.43–1.35)	0.62 (0.36–1.06)	0.56 (0.22–1.38)
	Medium cities or rural	0.57 (0.38–0.87) [a]	—	0.57 (0.32–0.99) [a]	–
	Metropolis or rural	0.81 (0.47–1.40)	—	1.00 (0.51–1.97)	—
France	Urban or rural	1.42 (1.09–1.85) [a]	1.22 (0.84–1.76)	1.33 (0.95–1.84)	1.09 (0.49–2.43)
	Medium cities or rural	1.49 (1.10–2.02) [a]	—	—	—
	Metropolis or rural	1.28 (0.91–1.81)	—	—	—
	18–24 years or adult	1.39 (0.83–2.33)	1.85 (0.83–4.11)	1.22 (0.66–2.27)	2.04 (0.82–5.11)
	> 65 years or adult	0.38 (0.23–0.62) [a]	0.45 (0.24–0.83) [a]	0.34 (0.17–0.66) [a]	—
	Previously married or married	1.62 (1.09–2.42) [a]	2.20 (1.35–3.59) [a]	1.59 (0.98–2.59)	1.19 (0.36–3.98)
	Never married or married	1.35 (0.91–2.00)	1.23 (0.64–2.39)	1.17 (0.73–1.86)	2.64 (1.13–6.19) [a]
Germany	Urban or rural	1.27 (0.95–1.70)	1.72 (0.99–2.97)	1.14 (0.81–1.60)	2.06 (0.93–4.60)
	Medium cities or rural	—	1.93 (1.08–1.46) [a]	—	1.45 (0.59–3.60)
	Metropolis or rural	—	1.52 (0.82–2.79)	—	2.69 (1.16–6.23) [a]
	Previously married or married	1.29 (0.89–1.85)	2.64 (1.54–4.52) [a]	1.36 (0.89–2.07)	0.83 (0.27–2.53)
	Never married or married	1.72 (1.27–2.34) [a]	2.61 (1.57–4.36) [a]	1.66 (1.15–2.39) [a]	2.29 (1.16–4.49) [a]
Italy	Urban or rural	1.07 (0.83–1.39)	1.37 (0.94–2.00)	0.90 (0.67–1.21)	1.50 (0.29–7.79)
Netherlands	Urban or rural	1.27 (0.66–2.42)	1.61 (0.59–5.07)	1.39 (0.65–2.97)	1.38 (0.30–6.38)
Spain	Urban or rural	1.11 (0.84–1.46)	1.19 (0.82–1.73)	0.95 (0.68–1.34)	0.77 (0.28–2.17)
	18–24 years or adult	1.19 (0.85–1.68)	0.84 (0.52–1.38)	1.62 (1.08–2.42) [a]	0.97 (0.35–2.65)
	> 65 years or adult	0.74 (0.56–0.98) [a]	0.98 (0.69–1.39)	0.77 (0.54–1.09)	—

[a] $P < 0.05$

restrictive definition of rural, which corresponds to that used by INSEE. When we divided communities into 3 urban–rural categories, living in a metropolis carried more risk of psychiatric morbidity than living in medium-sized cities. This observation is consistent with previous findings in Quebec showing that people living in a medium-sized city presented fewer psychiatric disorders than those in a metropolitan area (13). However, this finding did not appear in France, where we saw a higher risk of any psychiatric disorder in medium-sized cities, or in Germany, with respect to mood disorders.

When we considered psychological distress, we observed greater levels of distress in subjects living in urban areas in France and in metropolitan areas in Italy and the Netherlands. As with psychiatric morbidity, the results from Belgium did not follow the general pattern, with higher levels of distress being observed in women living in medium-sized cities. We found no rural–urban differences in the degree of psychological distress in Germany or Spain.

A sex-related effect on the prevalence of mental disorders, which was described extensively in the ODIN study (30), also appeared in the current study. However, in contrast to the ODIN results, we found rural–urban differences in all the countries except Belgium to be more pronounced for men than for women. Part of this sex interaction may be attributable to

Table 5 Psychological distress: SF12 mental health score deviations. Statistically significant differences between rural and urban samples divided into 2 classes

	Men				Women			
Country	Rural	SE	Urban	SE	Rural	SE	Urban	SE
Belgium	4.73	0.64	5.40	0.25	2.06[a]	0.80	4.00[a]	0.31
France	4.34[a]	0.36	3.07[a]	0.42	1.98	0.41	1.27	0.38
Germany	4.97	0.31	5.18	0.22	3.89	0.36	3.83	0.25
Italy	4.81	0.25	4.25	0.19	2.76[a]	0.30	1.53[a]	0.24
Netherlands	6.18	0.69	5.28	0.25	6.52[a]	0.99	3.80[a]	0.29
Spain	4.64	0.37	4.93	0.21	2.65	0.38	2.56	0.22

[a] $P < 0.05$

Table 6 Psychological distress: SF12 mental health score deviations. Statistically significant differences between rural and urban samples divided into 3 classes

	Men						Women					
	Rural	SE	Medium-size	SE	Metropolis	SE	Rural	SE	Medium-size	SE	Metropolis	SE
Belgium	4.73	0.64	5.54	0.27	4.16	0.71	2.06[a]	0.80	4.19[a]	0.33	2.69	0.96
France	4.34[a]	0.36	2.89[a]	0.53	3. 44	0.67	1.98	0.41	1.37	0.49	1.07	0.59
Germany	4.97	0.31	4.98	0.31	5.39	0.31	3.89	0.36	3.86	0.35	3.80	0.36
Italy	4.81[a]	0.25	4.44	0.23	3.98[a]	0.33	2.76[a]	0.30	1.67[a]	0.31	1.33[a]	0.38
Netherlands	6.18	0.69	5.64[a]	0.29	4.48[a]	0.48	6.52[a]	0.99	4.11	0.34	3.10[a]	0.54
Spain	4.65	0.37	4.74	0.30	5.11	0.29	2.65	0.38	2.39	0.32	2.71	0.30

[a] $P < 0.05$

differences in marital status between subjects living in rural or urban areas, notably in France and Germany.

Conclusions

Most European studies have shown a higher risk of mood disorders in urban areas, compared with rural areas. This effect was found in the Netherlands and also seemed to exist in the UK. The ESEMeD study found excess psychiatric morbidity in urban areas of France and Germany but found the opposite tendency in Belgium. After controlling for marital status, however, the rural–urban difference disappeared for the German study population. A genuine rural–urban effect on mental health was therefore observed in 2 of 6 countries.

Further subdivision of the urban population into those living in medium-sized cities and those in metropolitan areas demonstrated that the threshold used to classify rural and urban areas has a major influence on the results. This shows the value of assessing the impact of the particular definitions of rural and urban settings used in studies that attempt to compare mental health in these settings. Moreover, it is also important to control for major demographic differences between rural and urban populations, to standardize diagnostic instruments, and to consider psychological distress in the assessment of mental health.

This study demonstrates the need for additional intra-European studies using standardized methods and instruments to further assess psychiatric morbidity across the European continent, along with the need to identify the most appropriate definition of the rural–urban divide that could be used to harmonize data collection in the different European countries.

Funding and Support

This project was funded by the European Commission (Contract QLG5-1999-01042); the Piedmont Region (Italy); Fondo de Investigación Sanitaria, Instituto de Salud Carlos III, Spain (FIS 00/0028); Ministerio de Ciencia Y Tecnología, Spain (SAF 2000-158-CE); Departament de Sanitat, Generalitat de Catalunya, Spain; other local agencies; and by unrestricted educational grant from GlaxoSmithKline. These activities were also supported by the John D and Catherine T MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (1R13MH066849, R01-MH069864, and R01 DA016558), Eli Lilly and Company, GlaxoSmithKline, Ortho-McNeil Pharmaceuticals, and the Pan American Health Organization.

Acknowledgements

The ESEMeD has been conducted in conjunction with the World Health Organization's World Mental Health (WMH) Survey Initiative. We thank the WMH staff for assistance with instrumentation, fieldwork, and data analysis.

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Manuscript received November 2004, revised and accepted March 2005.
[1]Head, MGEN Public Health Foundation, Paris 5 university affiliated, Paris, France.
[2]Head, Health Services Research Unit, Institut Municipal d'Investigació Mèdica (IMIM–IMAS), Barcelona, Spain.
[3]Researcher, Netherlands Institute of Mental Health and Addiction, Utrecht, The Netherlands.
[4]Professor, Department of Psychiatry, University Hospital Gasthuisberg, Leuven, Belgium.
[5]ESEMeD/MHEDEA 2000 Investigators

Jordi Alonso, Matthias Angermeyer, Sebastian Bernert, Ronny Bruffaerts, Traolach S Brugha, Heather Bryson, Giovanni de Girolamo, Ron de Graaf, Koen Demyttenaere, Isabelle Gasquet, Josep Maria Haro, Steven J Katz, Ronald C Kessler, Viviane Kovess, Jean Pierre Lépine, Johan Ormel, Gabriella Polidori, and Gemma Vilagut.

Additional Project Investigators

Josué Almansa, Saena Arbabzadeh-Bouchez, Jaume Autonell, Mariola Bernal, Martine A Buist-Bouwman, Miquel Codony, Antònia Domingo-Salvany, Montserrat Ferrer, Montserrat Martínez-Alonso, Fausto Mazzi, Zoe Morgan, Pierluigi Morosini, Concepció Palacín, Josep M Puigvert, Nick Taub, and Wilma A.M. Vollebergh.

Affiliations

Jordi Alonso, Gemma Vilagut, Josué Almansa, Miquel Codony, Antònia Domingo, Montserrat Ferrer, Montserrat Martínez-Alonso, and Albert Sánchez: Health Services Research Unit, Institut Municipal d'Investigació Mèdica (IMIM–IMAS), Barcelona, Spain.

Matthias Angermeyer and Sebastian Bernert: Department of Psychiatry, University of Leipzig, Leipzig, Germany.

Ronny Bruffaerts and Koen Demyttenaere: Department of Psychiatry, University Hospital Gasthuisberg, Leuven, Belgium.

Traolach S Brugha, Nick Taub, and Zoe Morgan: Division of Psychiatry, Department of Health Sciences, University of Leicester, Leicester, UK.

Heather Bryson: Psychiatry, Clinical Development and Medical Affairs, GlaxoSmithKline, Uxbridge, UK.

Giovanni de Girolamo: Department of Mental Health, AUSL Città di Bologna, Bologna, Italy.

Pierluigi Morosini and Gabriella Polidori: National Centre of Epidemiology, Surveillance and Health Promotion, National Institute of Health, Rome Italy.

Fausto Mazzi: Psychiatric Clinic, University of Modena and Reggio Emilia, Modena, Italy.

Ron de Graaf and Wilma AM Vollebergh: Netherlands Institute of Mental Health and Addiction, Utrecht, The Netherlands.

Isabelle Gasquet: University Hospital Paul Brousse, Assistance Publique–Hôpitaux de Paris, Paris, France.

Josep Maria Haro, Mariola Bernal, Jaume Autonell and Concepció Palacín: Sant Joan de Déu-SSM, Barcelona, Spain.

Steven J Katz: University of Michigan, Ann Arbor, Michigan.

Ronald C Kessler: Harvard Medical School, Boston, Massachusetts.

Viviane Kovess: Department de Recherche en Sante Publique (MGEN), Paris, France.

Jean Pierre Lépine and Saena Arbabzadeh-Bouchez: Department of Psychiatry, Hôpital Lariboisière Fernand Widal, Assistance Publique Hôpîtaux de Paris, Paris, France.

Address for correspondence: Dr V Kovess-Masfety; MGEN Public Health Foundation, 3 square Max Hymans, 75015 Paris, France.
e-mail: vkovess@mgen.fr

Résumé : Une approche européenne des différences de santé mentale en milieu rural ou urbain : l'ESEMeD/MHEDEA 2000, une étude comparative

Objectif : L'étude visait à répondre aux questions suivantes : y a-t-il des différences de santé mentale entre le milieu rural et le milieu urbain, une fois les variables sociodémographiques contrôlées, et ces différences s'observent-elles dans les pays de l'UE? Les personnes souffrant de troubles mentaux avaient-elles les mêmes caractéristiques en milieu rural et urbain, surtout en ce qui concerne l'incapacité auto-déclarée?

Méthode : L'étude européenne sur l'épidémiologie des troubles mentaux (ESEMeD/MHEDEA 2000) est une étude transversale, avec entrevues en personne des ménages, basée sur des échantillons aléatoires représentatifs de la population adulte de 6 pays européens : la Belgique, la France, l'Allemagne, l'Italie, les Pays-Bas et l'Espagne. La population rurale est définie par ceux qui habitent des villes de moins de 10 000 habitants, et la population urbaine, par ceux qui habitent les villes de 10 000 habitants ou plus. Un échantillon stratifié, à plusieurs degrés et aléatoire sans remplacement a été tiré de chaque pays. Le taux de réponse global de l'étude était d'environ 61,2 % (taux de réponse pondéré).

Résultats : Les résultats de l'étude confirment les constatations précédentes sur la variation des troubles de l'humeur entre milieu rural et urbain. En général, l'urbanité semblait être liée à un risque accru de troubles mentaux, surtout des troubles dépressifs, tandis que le lien aux troubles anxieux n'était que modéré et que le lien aux troubles liés à l'alcool était inexistant. Les différences entre les pays concernaient les répondants masculins et non les femmes, à l'exception de la Belgique, où les différences ne concernaient que les femmes (et indiquaient moins de troubles en milieu rural).

Conclusions : Il est à souhaiter que cette étude inspire d'autres études intra-européennes à l'aide de méthodes et d'instruments comparables pour observer les expériences de tout le continent européen et instaurer des mesures afin d'harer les limites des populations rurales et urbaines dans divers pays.