Assessing Self-Assessed Health Data

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DOCUMENTO DE TRABAJO 2002-24R

February 2003

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Abstract

One of the most often available micro data on health is self-assessed self-reported health status. Many studies have used these data to examine the determinants of health status and the effects of health status on broad areas of human behavior. Given the subjectivity and possible measurement errors imbedded in self-assessed health data, we consider the reliability and usefulness of this type of data. A main conclusion is that cross-country or cross-region health comparisons based on self-assessed data are extremely unreliable due to the predominant effect of culture and social environment. Even within a same population, two surveys carried out in a similar time period with only slight differences in survey design produce significantly different health status outcome. On the other hand, education level, along with age, appears to affect persistently individual health status across country.

Resumen:

Uno de los micro datos disponibles sobre salud es la valoración del estado de salud por parte de los propios encuestados. Varios estudios han utilizado estos resultados para examinar los determinantes del estado de salud de los individuos en general, y sus efectos sobre distintas áreas del comportamiento humano. Dada la subjetividad y los posibles errores de medida que una autovaloración del estado de salud puede presentar, en este trabajo estudiamos la fiabilidad y utilidad de este tipo de datos. Una de las principales conclusiones que obtenemos es que la comparación del estado de salud entre los distintos países o regiones, carece de demasiada fiabilidad, debido a que los factores más determinantes en los resultados son efectos culturales o el entorno social. Incluso dentro de un mismo país, dos encuestas realizadas en un período de tiempo similar, pero que presentan pequeñas diferencias en el diseño de la muestra, proporcionan resultados significativamente distintos. Por otro lado, el nivel educativo afecta sustancialmente al estado de salud declarado por los individuos en todos los países.

Acknowledgement: Financial support from the European Commission to AGIR (Ageing, Health and Retirement in Europe) project under the FP5.

1. Introduction

Health is one of the most important factors which determine human well-being. Besides, it has important implications in broad areas of economics, from productivity and labor supply to health care costs and sustainability of public health care system. Some even attempts to include health status of the population in measuring the wealth of a nation (Nordhaus 2001). As life expectancy has increased substantially over the decades, there are also increasing interests in measuring life expectancy which considers health status of the population (Mathers et al. 2000 and Robine et al. 2001). Despite its utmost importance for human welfare health is an area which is not so much developed in empirical economics research as in other areas. One of the main reasons is that health is conceptually complex matter and therefore difficult to measure. There has been little reliable data which measure individuals' health status. Most part of economic research in this area has been dedicated to the demand for health care system and health insurance (mainly for the US where the private health care system is dominant) and to the finance of health care system mainly motivated by the public finance implications of ongoing population aging (see for example the NBER Economics of Aging series and OECD Ageing series).

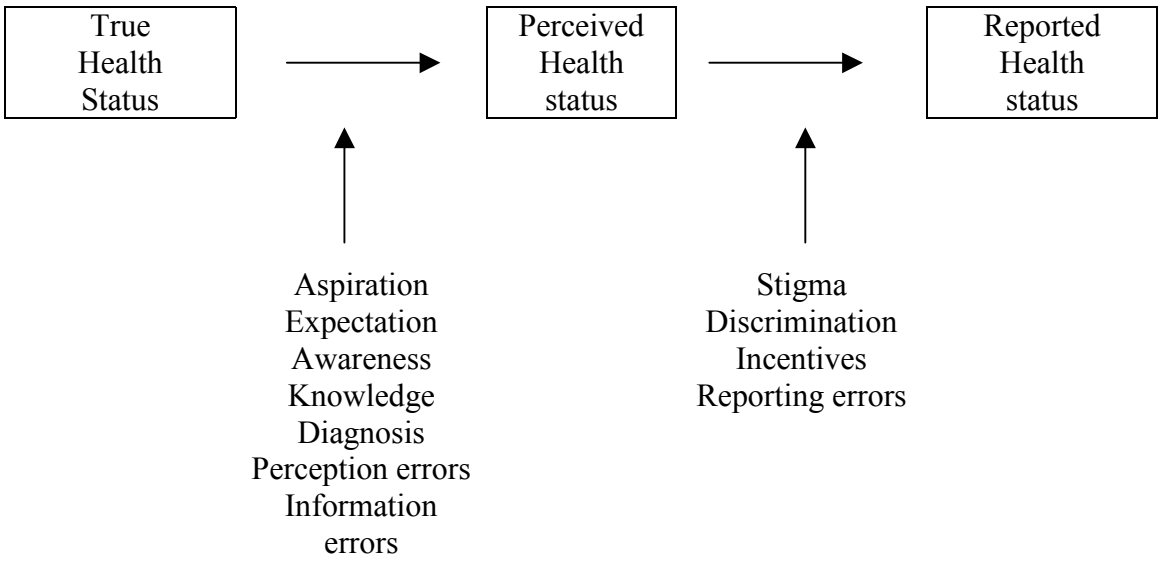
Recently, with the arrival of survey data which include some health measures of individuals there are appearing a growing number of studies which deal with individual health status. One of the most often available micro data on health is self-assessed health status of individuals. One important problem of the self-assessed health status is that it is a subjective measure, therefore is conditioned by one's cultural and social environment (Sen, 2002). One good example which illustrate this problem is the cross-country and cross-region comparison shown in Murray and Chen (1992) which shows a negative association between self-assessed health status and the level of development. People in a more developed society (Kelara region compared to other Indian regions or US compared to India) with better health conditions report worse health status mainly because they are more health conscious or they aspire to better health than those in a less developed society.

The example above highlights the potential risk when one wishes to compare health status across countries, across regions within a country, even across the groups with different socioeconomic characteristics within a region. In this paper, I evaluate reliability and usefulness of self-assessed health status data in micro surveys.

2. Conceptual Framework and Previous Studies

Self-reported health status depends on many other factors as well as true underlying health status. Scheme 1 illustrates the link between the true health status and self-reported health status.

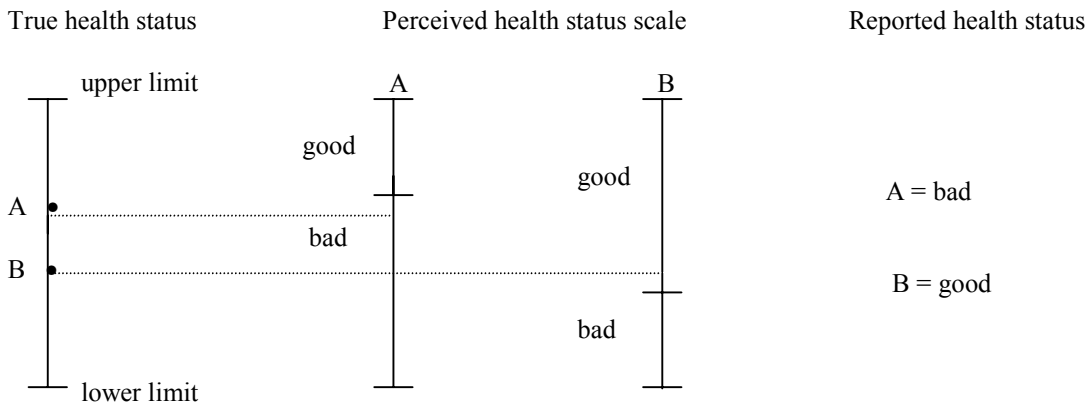
Scheme 1



Given a true (objective) level of health status, perceived (self-assessed) health status of an individual depends on his/her aspiration, expectation, awareness, health knowledge and information, diagnoses received, health status of the people around him/her, culture and social norms, and etc.. Therefore, perceived health status is subjective and conditional on own knowledge, surroundings and perception and information errors. Self-reported health status, in turn, may vary from perceived one due to reporting errors, stigma and discrimination or incentives not to report true status.

As perceived health status between individuals or populations could differ due to the factors other than true health status, it is possible that perceived health rankings do not follow true health rankings as shown in a simple dichotomous good-bad health status in Scheme 2. Individual A could report a bad health while individual B report a good health status although A's true health status is better than B's. The same example can be applied in inter-temporal comparisons for the same individual or population.

Scheme 2



There is a growing literature which evaluate reliability, validity and comparability of self-reported health data. On this issue, continuous efforts have been put on from the World Health Organization as well as other institutions and individuals. Given that most health questions in micro surveys are categorical, a large part of effort has been dedicated to the assignment of a cardinal scale to categorical health status to improve comparability between groups of people (Sadana et al. 2000; Iburg et al. 2000; Murray et al. 2001) or to improve inequality measures of health (Dooslaer and Jones 2003). Despite the effort to improve the comparability of survey-based health data across populations, it appears that we stand far away from a reasonable solution. For example, after applying their method (factor analysis) to numerous household surveys around the world, Sadana et al. (2000) conclude that the valid comparison of existing data from household surveys across counties is limited. Several strategies to improve comparability are recommended in both Sadana el al. (2000) and Murray et al. (2001).

3. Cross-country Comparisons

One of the main data sources of self-assessed health status in Europe is European Community Household Panel survey (ECHP) which started in 1994 across 12 European countries. Sampling and survey questions are carefully prepared to insure maximum comparability across countries.[1] A further advantage of the ECHP is that surveyed countries share more or less similar cultures and development levels as well as geographical proximity. One of the questions included in the survey regarding health status is "How is your health in general?" with possible responses, "very good", "good", "fair", "bad" and "very bad".

[1] See Peracchi (2002) for a general description of the survey and some discussion on the problems of attrition, non-response and weighting procedures in the survey.

Another question addresses chronic illness or disability, "Are you hampered in your daily activities by any chronic physical or mental health problem?" with possible responses, "Yes, severely", "Yes, to some extent", and "No". I analyze the responses to these two questions.

We examine only the first wave (1994) of the survey to avoid the problems of attrition.[2] First, it is useful to check the internal consistency of self-assessed health status by examining the correlation between the two indices of health status that we will analyze. We expect a strong correlation between general health status and disability status: those who suffer from disability are likely to report worse health status. Indeed, as we can see in the table below, there exists a strong correlation between the two variables. The proportion who suffer some degree of disability increases substantially as the declared health status worsens: the disability proportion decreases from 92% to 83%, 41%, 8% and to 3% as the declared health status moves from "very bad" to "bad", "fair", "good", and to "very good". When we examine each country, we find the same pattern without exception. This result is comforting as it provides some evidence for internal consistency at least at individual level.

Proportion with Disability and annual medical consultation for Each Health Status – ECHP 1994

	General Health Status					
	Very Bad	Bad	Fair	Good	Very Good	Total
% with Disability	91.79	83.43	40.66	8.35	2.59	22.23
# annual medical consultation	8.54	7.55	5.28	3.14	2.34	3.91
# Observation	3166	9716	29423	52250	32181	126736

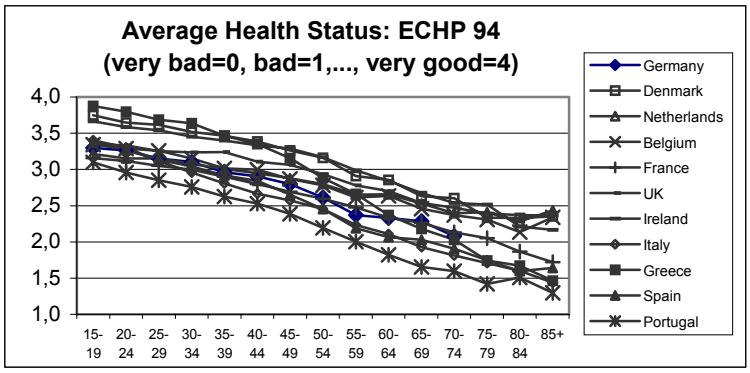
Another check of internal consistency is performed by examining the correlation between health status and the use of health care services. Medical consultation frequencies increase significantly as individuals' health status worsen.

[2] Attrition problem is likely to be serious in the analysis of health status as health could be a cause of attrition. Indeed, among the respondents aged 65 and more in the first wave of the ECHP, the proportion missing in the second wave were 14.3%, 11,6%, 13.8%, 16.3% and 24.4% respectively corresponding to the first-wave reported health status 'very good', 'good', 'fair', 'bad' and 'very bad'.

General Health Status

The general health status question is based entirely on individuals' own perception. The question asked is not concrete in terms of reference time period nor in the description of each category of health status, therefore leaving large rooms for interpretation variability by interviewees. Second, the possible responses are ordered qualitatively. Comparing the responses between groups of people is not straightforward. We begin with simple "averages" of the responses after assigning a cardinal value for each response ("very bad"=0, "bad"=1,..., "very good"=4). The simple average provides a health index[3] (the bigger the average, the better health) which is comparable across the populations if we are willing to assume the linearity across responses. The "average" health status by 5 years age interval for 11 European countries is presented in Figure 1.[4] Luxembourg is excluded for its small sample size (Appendix A presents sample size for each country by 5 year age intervals.)

Figure 1



The first impression we receive from the figure is that self-assessed health status gets worse with age by a similar gradient across countries. More importantly, there are large differences in health status for given ages between the countries. For most age groups, Denmark and Ireland report best health status while Portugal, Italy and Spain report worst health status. Peculiarly, Greece report best health among the young (less than 40) population but relatively worse health among the elderly (over 70) population. The differences between the countries is surprisingly

[3] Wagstaff and Van Doorslaer (1994) use a lognormal distribution of underlying health measure to scale categorical health status. Other strategies are surveyed in Murray et al. (2001).

[4] The oldest group is those aged 85 or more except for Germany where the oldest group include those aged 70 or more.

large and the ranking is not completely convincing as judged by other health measures, such as life expectancy.[5]

Given that the comparison of "average" health status analyzed above is valid only in the case that the response categories can be assigned with linearly aligned values, the index loses substantive meaning in general. For the comparisons which suffer less of this arbitrary assignment of values, we compare the proportions who report good or very good health status as well as the proportions with bad or very bad health status.

Figure 2

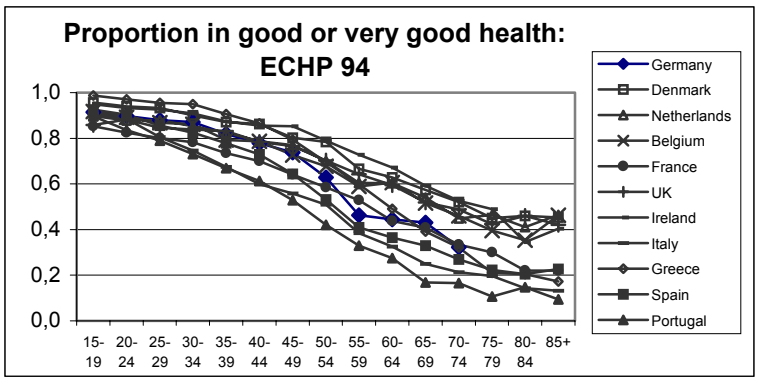
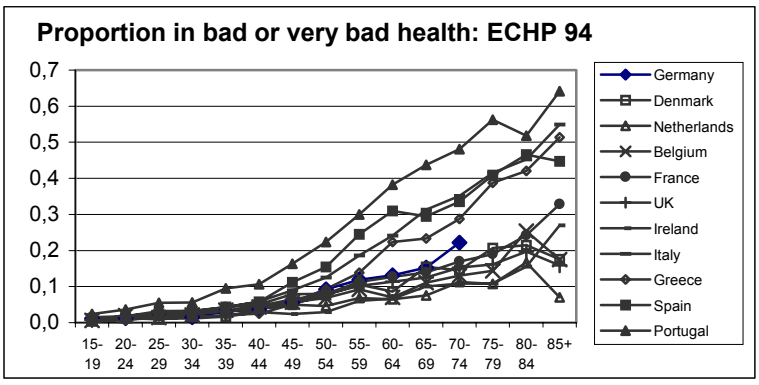


Figure 3



In the case of good or very good health, the proportion varies substantially between countries even among the young population and the difference widens with age. The cross-country differences are too large to accept as genuine differences. For example, the proportion in good health among the population aged 65-69 is less than 20% in Portugal while it is close to 60% in Ireland and Denmark.

[5] According to WHO (2000), life expectancy at birth is longest in France, Italy and Spain and shortest in Ireland, Portugal and Denmark with the differences of about 2.5 years between the two groups.

In the case of bad or very bad health, the differences across countries are even larger among the middle and old age population. For example, Ireland and The Netherlands have the proportion in bad or very bad health at lower than 10% among the population aged 65-69, while the corresponding proportion is higher than 30% in Portugal, Spain and Italy.

Disability Status

The second question we analyze is the prevalence of chronic illness and disability. In principle, we think that disability status would suffer less from the cultural or social environment bias, as the question is more concrete and less subjective. Given that the response categories are "none", "to some extent" and "severely", we consider the proportion with severe or moderate disability as well as that with only severe disability.

Figure 4

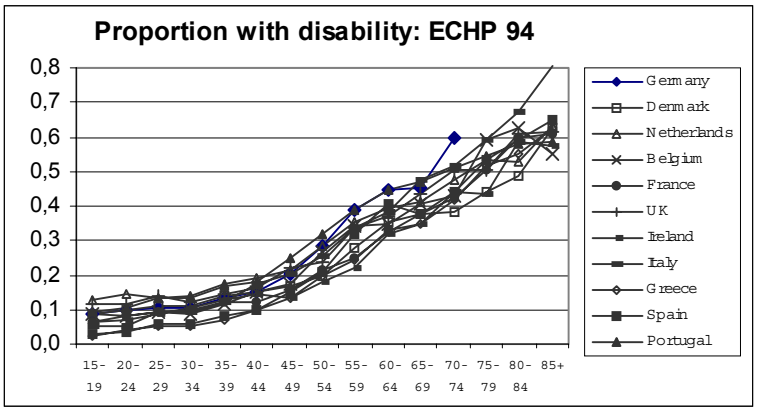
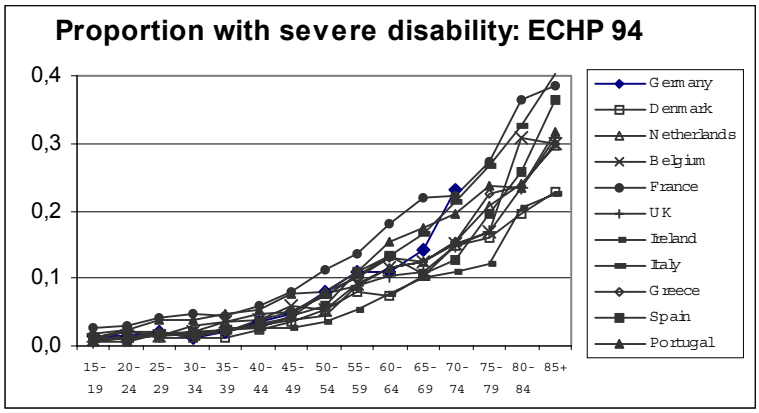


Figure 5



The age profile of disability is as expected: older people suffer more often chronic illness or disability. Cross-country differences are somewhat smaller than in the case of general health status. Nevertheless, the differences between countries are again substantial enough to lead us to be reluctant in accepting them as genuine differences across countries. For example, the proportion with some disability among the population aged 16-24 is less than 5 percent in Spain and Greece while it is higher than 12 percent in The Netherlands. Among the population aged 55-59, as another example, the disability rate is less than 25% in Ireland and Greece while it is almost 40% in Germany and Portugal. If we examine the proportion with severe disability, the cross-country differences are proportionally larger, especially among the elderly population. Here, France stands out for its high prevalence of severe disability. For example, at ages 65 to 69, the severe disability rate is 22% in France while that in UK, Ireland and Spain is only 10%. Moreover, the country ranking of disability rate is widely different from that of general health status. A part of cross-country differences at old ages may be due to the differences in the proportion of institutionalized population which is not included in the ECHP.

One potential factor which might contribute to cross-country differences in the perception of health status is the time (month) of year when the survey is carried out. Indeed, there were considerable variations between countries in the month of year when the surveys are carried out. It is possible that people enjoy different health status according to the season due to seasonal variation of physical exercise. Mental health and mood may also vary according to the season. To explore this possibility, we estimated individual health status (ordered logit regression for health status and logit regression for disability status) including month and country dummies. The results indicate that month dummies are in general not significant, therefore not a factor which can explain the observed cross-country differences in self-assessed health status.

In summary, self-assessed general health status and disability status vary widely across European countries. The differences are so large and often the country rankings change across different measures or do not coincide with other health measures (such as life expectancy) that we are reluctant to accept the validity of these measures in cross-country comparisons.

4. Cross-region Comparisons

One of the reasons for the wide variation and sometimes unreasonable rankings across countries in self-assessed health status is that responses to these survey questions could be affected by the level of development, culture and social environment in which individuals live. To alleviate this "cultural" effect on self-assessed health status we examine regional differences within a county, Spain. The Spanish sample of the ECHP surveys provide about 18000 individuals in the first wave (1994) of the survey. The survey distinguishes 7 regions (NUTS 1 level) across Spain. The sample size is sufficiently large for each region, ranging from 1100 for Canary Islands to 3800 for East region, to carry out the analysis by 5 year age intervals (Appendix B presents sample size for each region in 5 year age intervals.).

Figure 6

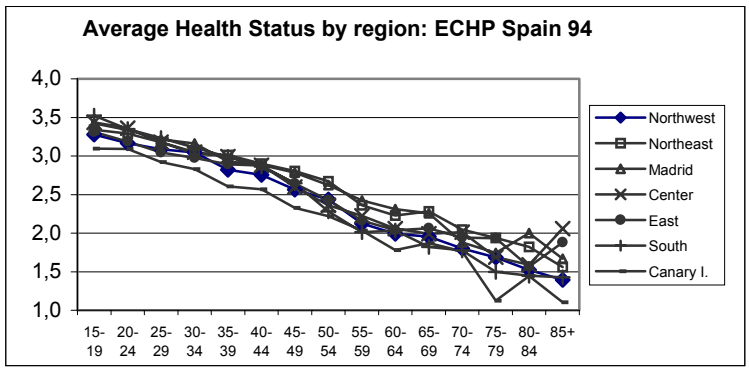


Figure 7

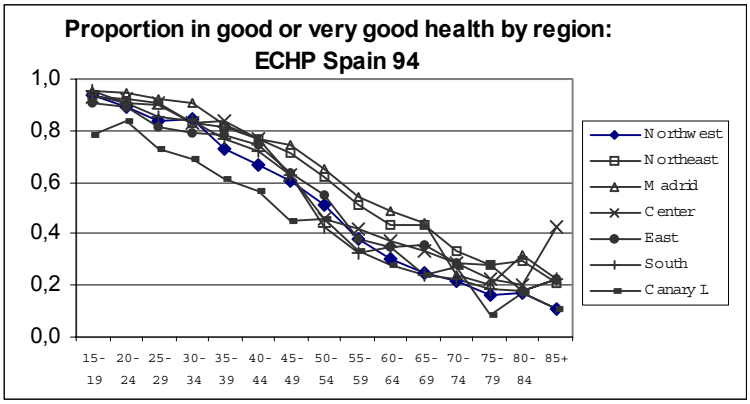
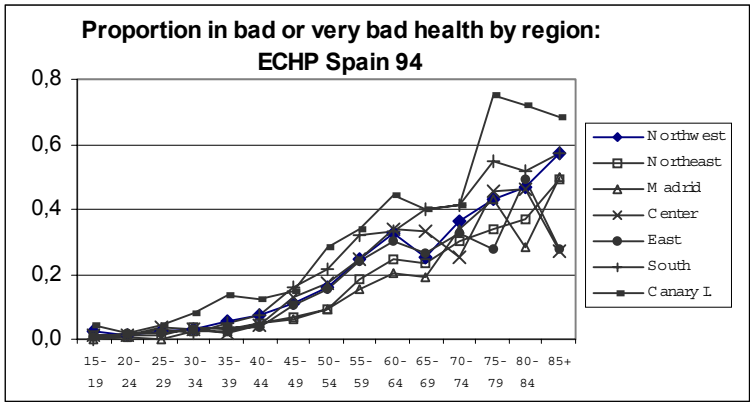
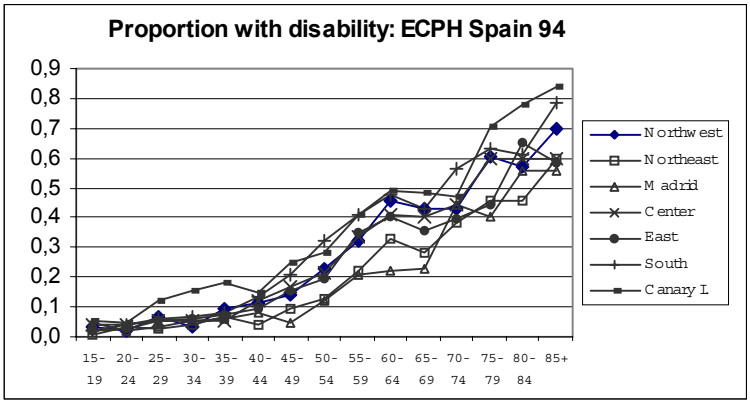


Figure 8



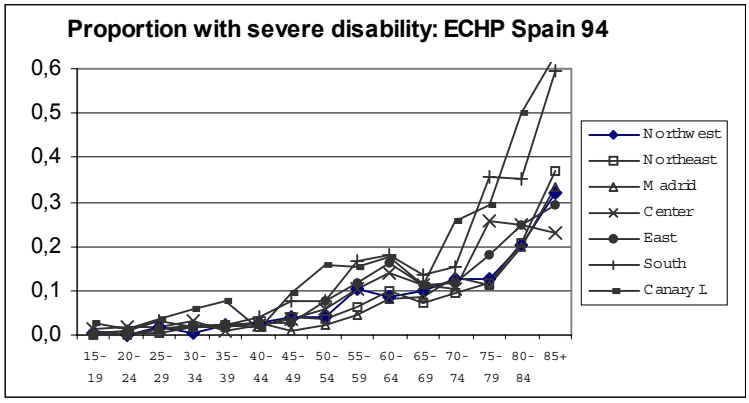
The differences between Spanish regions in self-assessed health status are substantial although they are smaller than the cross-country differences. In the average health status Canary Islands stands out for its worse health status compared to the regions in peninsula. Even among the peninsula regions the differences become substantial at ages over 50.[6] Between the ages 45-69, health status is significantly better in Madrid and Northeastern regions of Spain than the rest.

Figure 9



[6] One should note that the variation may increase with age in part due to the decreasing sample size (see Appendix B).

Figure 10



Similar variability is observed in disability rates between Spanish regions. Disability rate starts to vary substantially between regions at ages 40 or higher. Regional patterns are similar to that of general health status, higher disability rates in central and southern regions and lower rates in Madrid and northeastern regions. However, regional differences are too large to accept without reservation. For example, at ages 55-59 the disability rate is around 20% in Madrid and the Northeast, while it is over 40% in the South and Canary Islands. With respect to the severe disability, the prevalence rate in the South and Canary Islands are almost triple that in Madrid and the Northeast at ages 55-59.

Although both the general health status and the disability rate vary more than expected across the Spanish regions, the region rankings are more or less consistent with the region rankings in life expectancy. According to the Spanish National Statistical Institute (2002), life expectancy at birth is longest in Madrid, Center and Northeastern regions and shortest in the Southern region and the Canary Islands with the differences of about 2 years between the two groups.

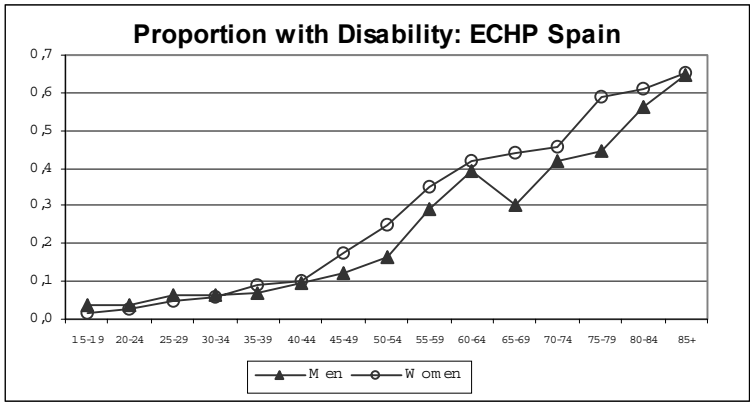
Justification Bias

One interesting pattern common in both types of disability is that the disability rate decreases noticeably at ages 65-69 compared to that for 60-64 years of age. Similar phenomenon can be observed in the case of the proportion of bad or very bad health status. This "strange" improvement in health status around age 65[7], as it is difficult to believe as genuine improvement, is likely to be related to the

[7] It should be noted that different age groups represent different birth cohorts as the data used are from a cross-sectional survey (ECHP-1994). Therefore, the differences by age confound cohort effects. In Spain, one significant historical event which could have rendered cohort effects is the Civil War (1938-1941). Those aged 60-64 in 1994 were born in 1930-34 and those at ages 65-69 were born in 1925-29, both cohorts well before the War. Hence, it is unlikely to exist any significant cohort effects between the two cohorts.

prevalence of disability pensioners. At ages below legal retirement age (normally 65) the pensioners of this type tend to justify their early retirement as disability regardless of their real health status (a similar finding for the US in Waidmann, et al. 1995). This can be ascertained by comparing men and women as there are much fewer disability pensioners among women.

Figure 11



The proportion with disability decreases almost by 10 percentage points between 60-64 and 65-69 among men while it continues to increase among women at the same age interval. This illustrates that the self-assessed health status is also significantly affected by the institutions, such as pension system. It appears that many respondents, presumably pensioners with disability pension, give erroneous responses to justify their beneficial situation until they reach legal retirement age.

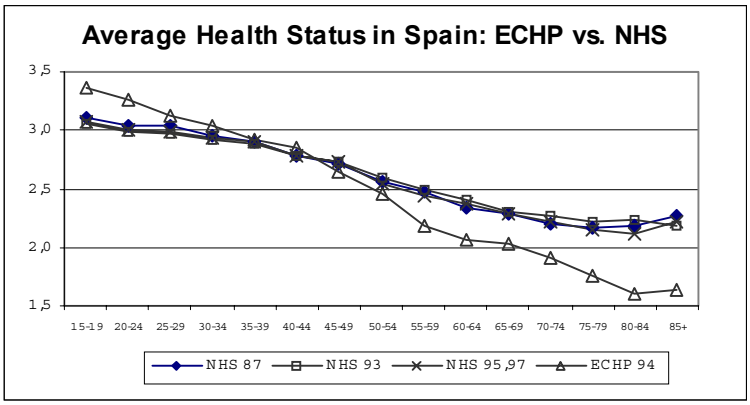
Another possible explanation may be that people feel healthier after retirement. They might dedicate more time in healthy activities when retired than when working. Or simply, the work they had to carry out before retirement were detrimental to health. Furthermore, as the retired people do not work anymore, the demand for physical and mental effort in daily activities would be reduced, therefore reducing the proportion who feel hampered in their daily activities even though their disability status remains the same.

5. Comparisons across Surveys within a Country

As we have seen above, cross-region comparisons within a country also suffer considerable variability which is difficult to accept as genuine differences across regions. As in cross-country differences, the differences between regions may be due to the differences in culture and social environment across regions.

Now, we examine two different surveys carried out in similar time period in the same country to check the variability across surveys for the same country. If the samples of the two surveys represent the same population, as in our case, average reported health status should be the same across the surveys conditional on the measurement errors. The other survey that we examine to compare with ECHP-Spain is National Health Survey (NHS). Currently, we have available four cross-section data from NHS carried out in 1987, 1993, 1995 and 1997. The NHS is carried out mainly to assess health status, health risk factors and health care service utilization of the population. It includes a wide variety of questions regarding health, diagnosis-based as well as self-assessed health measures. Self-assessed health status questions included in NHS are health status in 5 categories as in the ECHP.[8] The sample sizes of the four NHS surveys are about 30000 in 1987, 21000 in 1993, and 6400 in 1995 and 1997 each. First, we compare the average health status using the previously used linear scaling (0=very bad, 1=bad, 2= regular, 3=good, 4=very good).

Figure 12



Two things stand out in the comparison. First, between the NHS surveys of different years the average health status is quite close one another at given ages for

[8] Questions regarding disability status are widely different between the two surveys in wording, reference period and disability description, thus disabling any reasonable comparisons between the two.

all age intervals. The hypothesis that the estimated values between years are different is strongly rejected. This similarity within the NHS surveys suggests that the responses are not completely random. Provided the same structure and wording of questionnaire, self-assessed health status shows a high degree of consistency between different years even though the surveyed individuals are different between years.

Second, perhaps more importantly, the average health status index between the NHS and the ECHP crosses each other as the age profile is steeper in the ECHP than in the NHS. Young people report better health in the ECHP than in the NHS while the opposite is true among old people. The differences between the two surveys are largest at youngest and oldest ages. Similar crossings are observed when we compare the two surveys for each region.

Why this significant difference between the surveys? We can think of several possible explanations. First, the questionnaire structure and wording are not exactly same in the two surveys. While NHS includes many other questions regarding health, ECHP has only few questions about health. Therefore, the respondents in NHS may have more time and information to assess their health than those in ECHP. Another difference is that the health status questions appear in the beginning of the survey in NHS while it is at the end in ECHP. Given that ECHP is a comprehensive survey (consisting of almost 100 A4 pages) which require considerable concentration and effort, the respondents are likely to lose concentration at the later part of the survey causing lower precision in responses.

Moreover, there are two differences in wording between the two surveys. While the reference time period in ECHP is “in general”, it is “during the past 12 months” in NHS. It is not clear what bias could cause this difference as one may understand the word “in general” as either longer than 12 months (lifetime so far, for example) or shorter (for example, nowadays). It is likely that the lack of specific reference time period in ECHP may increase (decrease) the variability of reported health status if the perceived reference period in ECHP is shorter (longer) than a year. The ratio of the estimated mean health status to its standard errors was similar in both surveys, suggesting, on average, neither shorter nor longer reference time period as understood by ECHP respondents compared to those in NHS.

The other “wording” difference is that the middle category in possible responses is “acceptable” in ECHP but “regular” in NHS. Given that the other four categories are same in both surveys, in order to alleviate the bias due to this

wording difference we have compared the proportion in good (or very good) health and that in bad (or very bad) health.

Figure 13

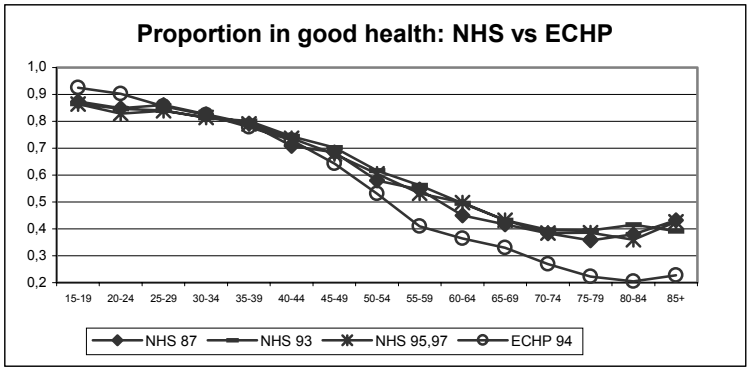
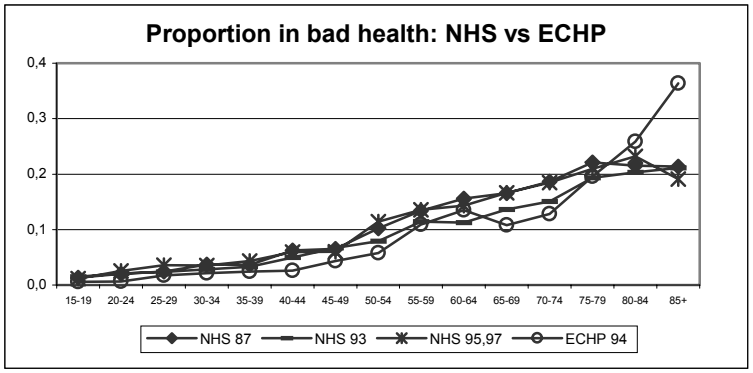


Figure 14



We can observe that the proportion reporting good or bad health is in general lower among ECPH respondents than among NHS respondents. That is, the proportion of respondents who report middle category ("regular" in NHS and "acceptable" in ECHP) health status is larger in ECHP than in NHS, probably consistent with the hypothesis of different levels of concentration between the surveys when the interviewees arrive at health questions. Or, it might be simply due to the different wording, that "acceptable" is a broader concept than "regular" and in particular, "acceptable" is more inclined toward "good" than "regular". Another interesting difference is that the health improvement observed in ECHP at ages 60s does not appear in NHS. This might be due to the difference in the order where health status questions appear in the surveys. While in NHS they appear in the beginning, in ECHP they appear after the questions regarding labor market situation and income sources.

Finally, another potential factor that could have contributed to the crossing of the age profiles of health status between the surveys is that health information in the ECHP is addressed to all household members over 16 years while in the NHS only one person for each household is interviewed. Although the health information in the ECHP is obtained in most cases through a direct face-to-face interview with each household member, it is possible that one tends to report own health status relative to other household members, more so when all household members are interviewed than when only one member is interviewed.

The main conclusion of our analysis so far is that self-assessed health status data appear to suffer large measurement errors, but more importantly, they are sensitive to culture and social environment in which the respondents live. Even within a country two different surveys carried out at a similar time period with only slight differences in the survey structure provide two substantially different results. Comparisons across countries or across regions with different environment appear to be an extremely risky business. This is consistent with the results in Crossley and Kennedy (2002) which show that a large proportion of respondents (28%) change their reported health status when they are asked twice – before and after an additional set of health related questions in the same survey. However, the surveys within an area with the same structure and wordings of questionnaire (as in the NHS-various years) seem to provide consistent patterns in self-assessed health status. We now turn to examine health status by some socioeconomic characteristics.

6. Determinants of Individuals' Health Status and Disability

Given that the cross-country comparisons of health status are not reliable, we look for the usefulness of self-assessed health data when analyzed within a country. There is abundant evidence of a significant association between individuals' demographic and socioeconomic characteristics and their health. To see the effect of relevant factors on health status, we run ordered logit regressions for each country and for three age groups separately. Having ordered the health status so that higher categories represent better health status, positive (negative) coefficients represent better (worse) health status. In the case of disability, the dependent variable takes value one if the respondents suffer disability which hamper their daily activity and zero otherwise. Therefore, positive (negative) coefficients represent higher (lower) probability of disability. Age and its squared value, gender and education levels are included in the regressions.

Age

As we have seen in the previous section, health status, both self-assessed general health status and the prevalence of disability, gets worse clearly with age. In the case of disability rate, it shows a convex age profile, that is, accelerating disability at old ages. However, we observe flattening profiles at very old ages (ages over 80), which is likely to be due to the omission of institutionalized (elderly residential care facilities) population in the surveys.

Gender on General Health Status

As can be seen in Figures 15-16, in Spain men report slightly better health status than women for given ages, and the difference increases with age. This might be due to the different perception of health by gender. Another possible explanation of gender differentials, especially at old ages, is the mortality selection; as the mortality rate is higher for men than for women, those who survive in higher mortality environment (as faced by men) are on average genetically stronger than the survivors in lower mortality environment (as faced by women). This explanation, however, is not convincing as it is a well established fact that mortality rates are higher for males than for females at all ages.

Figure 15

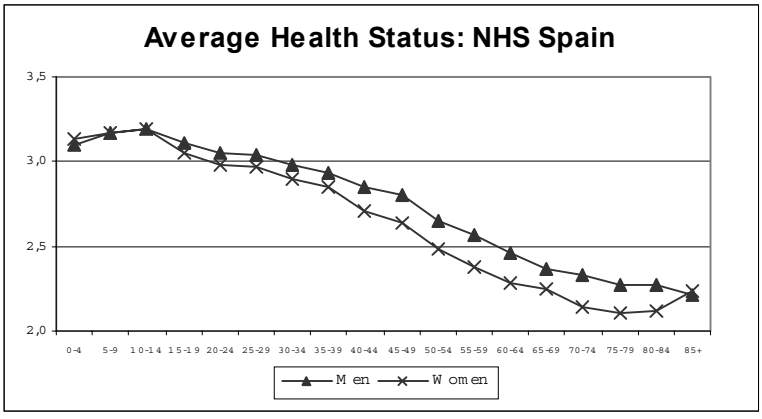


Figure 16

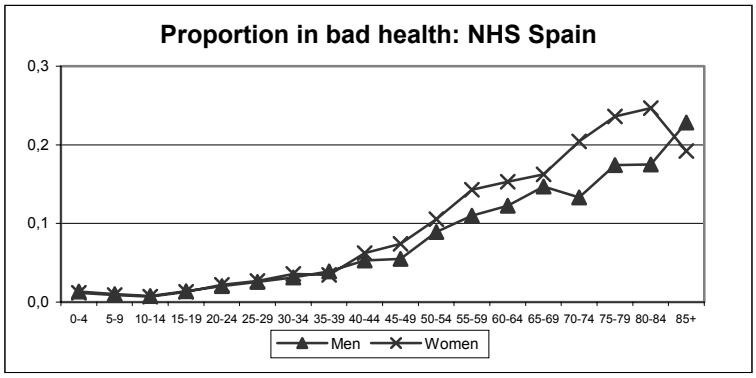


Table 1: Effect of Gender (omitted category: women) on Health Status in ECHP

(ordered logit coefficients in parenthesis are not significant at 5% level)

	25-44	45-64	65+
	Men	Men	Men
Germany	(0.113)	(-0.058)	0.230
Denmark	(0.090)	(0.153)	0.255
Netherlands	0.377	0.178	(0.086)
Belgium	0.380	0.257	0.405
France	0.266	0.181	0.238
UK	0.149	(0.062)	(-0.006)
Ireland	(0.117)	(-0.031)	(0.147)
Italy	0.313	0.280	(0.138)
Greece	0.329	0.338	0.175
Spain	(0.031)	0.269	0.352
Portugal	0.384	0.595	0.351

As for the regression results using ECHP data (Table 1), among the 33 estimated coefficients, all but three are positive, but the magnitude and statistical significance vary widely across country. A general pattern is that gender difference in self-assessed health status is not significant in Northern Europe while it is significant in Southern Europe (including Belgium) favoring men. This contrasts with north-south patterns in life expectancy in Europe: according to WHO (2000), female-male differences in life expectancy is greater in Southern Europe by almost 2 years than in Northern Europe.

Gender on Disability

With respect to gender effect on disability status, half of the 33 estimated coefficients are significant at 5% significance level. In most cases, men report lower prevalence of disability although for the French people aged 25-44 and the

Germans aged 45-64 the opposite is true. The magnitude and statistical significance vary widely across country and between age groups. Contrary to the case of general health status, there is no clear difference between Northern and Southern Europe. Among those over 44, men report significantly lower prevalence of disability than women in Denmark and The Netherlands and Southern European countries (except for Greece) while the gender difference is insignificant in other countries.

Table 2: Effect of Gender (omitted: women) on Disability Status

(logit coefficients in parenthesis are not significant at 5% level)

	25-44	45-64	65+
	Men	Men	Men
Germany	(0.006)	0.228	(0.139)
Denmark	(-0.116)	-0.236	-0.378
Netherlands	-0.200	-0.165	-0.440
Belgium	-0.376	-0.218	(-0.151)
France	0.247	(-0.007)	(-0.083)
UK	(0.003)	(-0.043)	(-0.077)
Ireland	-0.276	(0.071)	(-0.037)
Italy	(-0.031)	-0.178	-0.167
Greece	(-0.155)	(-0.113)	(0.053)
Spain	(0.049)	-0.232	-0.317
Portugal	(-0.130)	-0.281	-0.202

Education on General Health Status

Many studies have found a positive association between health and socioeconomic status (income, wealth, education and occupation level, and employment status). However, the direction of causation between them is difficult to establish, and is most likely that it runs both way (see Bound 1991, Dwyer and Mitchell 1999 and the survey by Smith 1999). For example, those with better health are likely to be more productive and enjoy therefore greater earning potentials. On the other hand, greater wealth allows easier access to and better quality of health care therefore providing better health outcome. It is also possible that there are unobserved factors which affect both wealth and health in a same direction, thus leading to the observed positive relation between the two. For example, those who are far sighted are likely to take more care of their health and therefore more productive and also save more, therefore leading to the observed positive association.

Education level suffers less from endogeneity problems than other socioeconomic variables since most people complete their schooling relatively early (before age 25) when their health status is in most cases good enough not to interfere with their schooling. For example, as we could observe earlier, the proportion with bad or very bad health among those aged less than 35 is less than 5% in all the ECHP countries. Many studies have shown education as a single most important socioeconomic characteristics in determining various measures of health (for example, Elo and Preston (1996) in mortality and Freedman and Martin (1999) in function limitations). In the following table we present regression results of health status for the 11 European countries in ECHP. Three schooling levels are distinguished, low (omitted category), medium and high.

Table 3: Effect of Education Level (relative to low education level) on Health Status

(ordered logit coefficients in parenthesis are not significant at 5% level)

	Ages 25-44		Ages 45-64		Ages 65+	
	Medium	High	Medium	High	Medium	High
Germany	0.176	0.508	0.292	0.757	0.385	0.421
Denmark	0.551	0.903	0.769	0.988	0.258	0.553
Netherlands	0.299	0.708	0.402	0.669	0.391	0.638
Belgium	0.269	0.644	0.371	0.600	(0.363)	0.618
France	0.304	0.405	0.355	0.613	0.322	0.588
UK	0.322	0.778	0.473	0.869	0.449	0.754
Ireland	0.675	0.904	0.485	0.991	0.759	1.145
Italy	0.342	0.672	0.444	0.610	0.548	1.008
Greece	0.172	0.300	0.597	0.832	0.433	1.062
Spain	0.365	0.599	0.824	1.145	1.038	0.817
Portugal	0.701	1.055	1.209	0.969	1.282	0.998

The results are encouraging. Among the 66 estimated coefficients, only one (medium education level for ages 65+ in Belgium) is not significant at 5% level. We can see persistently substantial effects of education on self-assessed health status across countries and for all age groups, suggesting that there exist a genuine beneficial effects of education in health. This hypothesis is supported by the fact that even when we include other socioeconomic variables, such as employment status and household income, the education coefficients maintain almost entirely their magnitude and statistical significance.

Education on Disability

Education again stands out as an important factor in determining the probability of disability across countries and in all age groups. In most cases, education lowers substantially the probability of suffering disability. This difference by education level is greater among younger people than those over 64 years. Among those 65 or older, only those with high education level enjoy significantly lower rates of disability, and this effect of high education is greater among the Southern European countries than other countries.

Table 4: Effect of Education Level (omitted: low) on Disability Status

(logit coefficients in parenthesis are not significant at 5% level)

	25-44		45-64		65+	
	Medium	High	Medium	High	Medium	High
Germany	(0.045)	-0.366	(-0.083)	-0.447	(-0.101)	(-0.142)
Denmark	-0.848	-1.014	-0.675	-0.896	(-0.150)	(-0.281)
Netherlands	-0.281	-0.640	-0.341	-0.693	(-0.102)	(-0.259)
Belgium	-0.272	-0.952	-0.379	-0.386	(-0.193)	-0.386
France	-0.374	-0.900	-0.324	-1.169	-0.250	-0.512
UK	-0.223	-0.607	-0.279	-0.542	(-0.145)	-0.345
Ireland	-0.824	-1.082	-0.632	-1.198	(-0.154)	-0.933
Italy	-0.390	-0.992	-0.629	-0.835	-0.285	-0.870
Greece	-0.453	-0.518	-0.586	-0.996	(-0.187)	-1.028
Spain	-0.676	-1.222	-0.791	-1.441	-0.800	-0.677
Portugal	-0.671	-0.730	-0.863	-0.524	-0.938	-0.498

Educational Composition to Explain Cross-country Health Status Differences

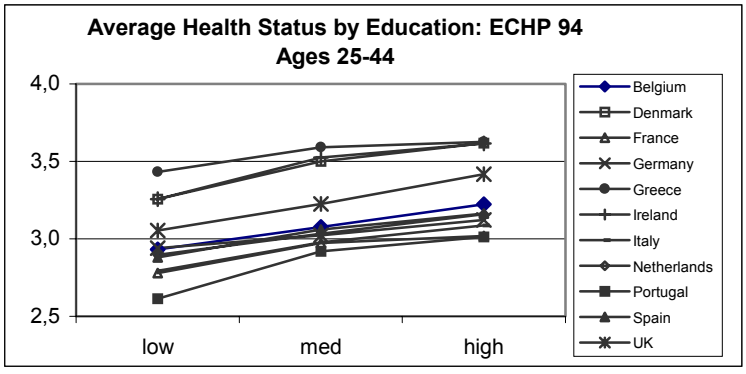
Given the persistent effect of education level on individual health status for all countries analyzed, we may ask “Is it the differences in educational composition which explain cross-country differences in health status?” Indeed, education level shows substantial differences between the countries across the age groups. For example, the proportion with the high level of education is close to 40% in Belgium and Denmark while it is less than or close to 10% in Portugal and Italy among those aged 25 to 44. Similar differences exist for other age groups.

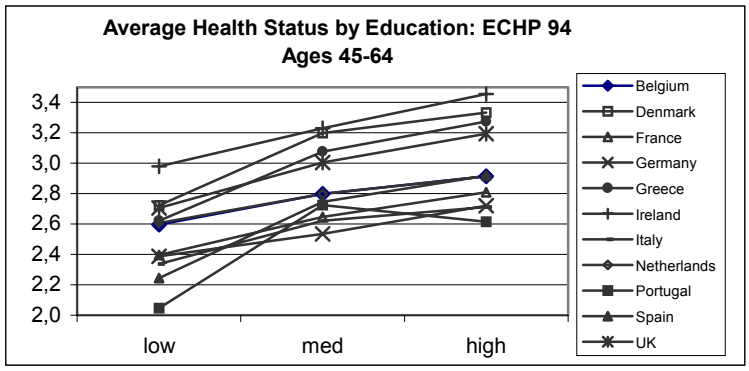
Table 5: Educational Composition : ECHP 94

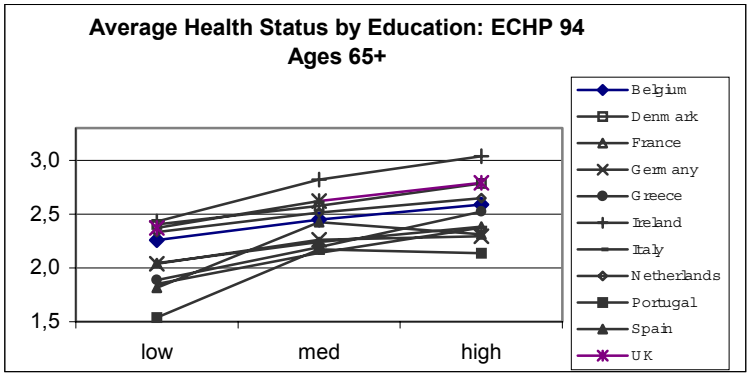
	Ages 25-44		Ages 45-64		Ages 65+	
	% medium	% high	% medium	% high	% medium	% high
Belgium	34.98	39.14	27.49	26.65	22.57	13.42
Denmark	40.88	39.11	35.06	31.21	24.09	14.40
France	46.21	24.30	31.50	15.67	15.27	7.00
Germany	55.31	23.49	46.55	21.52	38.21	14.30
Greece	31.40	28.12	15.24	11.21	9.03	4.16
Ireland	42.40	16.63	27.36	10.80	12.89	5.63
Italy	42.63	10.12	20.78	6.34	13.17	3.80
Netherlands	63.10	21.39	56.58	18.07	43.61	9.91
Portugal	12.69	6.62	3.17	3.43	1.41	1.17
Spain	20.20	24.81	6.92	9.18	3.88	3.94
UK	38.61	26.11	27.85	19.98	18.49	10.72

To contrast the hypothesis, we examine the health status by education level for three age groups as defined earlier as shown in the following graphs. If the individuals in the same education category but in different countries show similar levels of health status, cross-country health status differences could be attributed to the compositional differences in education.

Figures 17-19







The hypothesis can be rejected clearly. Education level affects significantly individual health status in all countries as shown in the positive slope. However, education profiles of health status are parallel between countries for most countries. Cross-country health status variations at each level of education are much greater than the variations by education within each country. Therefore, the differences in health status between countries are attributed more to the country specific effects than to the educational composition.

7. Conclusions

Health is a multidimensional and complex matter, thus difficult to measure. Our analysis, although descriptive, provides a clear evidence against careless uses of self-assessed health status survey data. The strongest case is cross-country comparisons of self-assessed health status and disability rate. Age-specific health measures based on self-assessed health status vary enormously between countries and often country rankings are hard to believe, thus suggesting that the differences between countries represent social and cultural differences in perception of health rather than genuine health differences.

Volatility in self-assessed health status is also present across regions within a country and between different surveys carried out at a similar time period and in the same country. Even a slight difference in questionnaire structure seems to result in a significant variation in responses across surveys. Self-assessed health measures are also sensitive to the institutional settings such as pension system. For example, in Spain some retired people who receive disability pension seem to declare worse health status than real to justify their pension eligibility.

Nevertheless, we should not disregard completely self-assessed health data. How one feels about his/her health provides valuable information about individuals' well-being which cannot be obtained through diagnosis-based health measures. Therefore, despite the problems of subjectivity and measurement errors, self-assessed health data, when used carefully, could be a useful variable in welfare and health economics research. For example, age and education level show persistent and substantial effects in health status for all age groups and across countries in the expected direction. The effect of these two variables persists even when other variables, such as income and employment status, are included. A tentative conclusion is that education and age are the only legitimate variables in the analysis of self-assessed health status when it is compared within each country.

This gives rise to an important implication regarding the population health status in the future. As we could see in Table 5, in all countries average education level of the population will increase as better educated younger generations replace older generation with lower levels of education. This is likely to be translated to the improvement in population health status. This compositional effect is likely to be greater in the Southern European countries as the educational differences between generations are greater in that region.

REFERENCES

Bound, J (1991) "Self-reported versus objective measures of health in retirement models", *Journal of Human Resources*, 26: 106-38.

Crossley, TF and S. Kennedy (2002) "The reliability of self-assessed health status", *Journal of Health Economics* 21: 643-658.

Van Doorslaer, E and AM Jones (2003) "Inequalities in self-reported health: validation of a new approach to measurement", *Journal of Health Economics* 22: 61-87.

Dwyer, DS and OS Mitchell (1999) "Health problems as determinants of retirement: Are self-rated measures endogenous?", *Journal of Health Economics* 18(2): 173-193.

Elo, IT and SH Preston (1996) "Educational differentials in mortality: United States, 1979-1985", *Social Science and Medicine* 42(1): 47-57.

Freedman, VA and LG Martin (1999) "The role of education in explaining and forecasting trends in functional limitations among older Americans", *Demography* 36(4): 461-473.

Iburg, KM, Salomon, J, Murray, CJL and A Tandon (2000) "The measurement and interpretation of health in social surveys", in *Summary measures of population health*, CJL Murray et al. (eds.).

Instituto National de Estadistica (Spanish National Statistical Institute) (2002) *Cifras INE: Boletin informativo del Instituto National de Estadística*. INE. Madrid.

Mathers, C, Lopez, AD, Salomon, J, Murray, CJL and AD Lopez (2000) "Estimates of DALE for 191 counties: methods and results", GPE Discussion Paper No. 16. Geneva: World Health Organization.

Murray, CJL and LC Chen (1992) "Understanding morbidity change", *Population and Development Review* 18(3): 481-503.

Murray, CJL, Tandon, A, Salomon, J and CD Mathers (2001) "Enhancing cross-population comparability of survey resutls", GPE Discussion Paper No. 35, WHP/EIP, Geneva.

Nordhaus, WD (2002) "The health of nations: the contribution of improved health to living standards", NBER Working Paper 8818.

Peracchi, F (2002) "The European Community Household Panel: A review", *Empirical Economics* 27: 63-90.

Robine, JM, Jagger, C and I. Romieu (2001) "Disability-free life expectancies in the European Union countries: calculation and comparisons", *Genus* LVII (2): 89-101.

Sadana, R. Mathers, CD, Lopez, AD, Murray, CJL and K Iburg (2000) "Comparative analysis of more than 50 household surveys on health status", GPE Discussion Paper No. 15, EIP/GPE/EBD, World Health Organization, Geneva.

Sen, A. (2002) "Health: Perception versus observation", *British Medical Journal*, 324 (April): 860-861.

Smith, JP (1999) "Healthy bodies and thick wallets: the dual relation between health and economic status", *Journal of Economic Perspectives* 13(2): 145-166.

Waidmann, T, Bound, J and M. Schoenbaum (1995) "The illusion of failure: Trends in the self-reported health of the U.S. elderly", NBER working paper No. 5017.

WHO (2000) *The Work Health Report 2000*, World Health Organization.

Appendix

A: Sample Size: ECHP 1994

Age	Belgium	Denmark	France	Germany	Greece	Ireland	Italy	Luxemburg	Netherlands	Portugal	Spain	UK
15-19	304	280	758	419	641	820	1087	84	459	754	1166	431
20-24	521	446	1455	648	1032	1292	1903	167	669	1095	1815	700
25-29	576	579	1300	870	1085	861	1749	212	867	780	1606	1004
30-34	830	595	1335	1014	1077	866	1652	269	1036	979	1620	1112
35-39	761	583	1356	1012	1090	886	1571	245	1174	935	1582	1047
40-44	619	554	1378	906	1045	846	1471	180	1045	949	1475	905
45-49	618	568	1366	717	1077	872	1695	197	909	899	1346	913
50-54	413	458	933	865	879	759	1438	160	651	916	1296	812
55-59	392	379	962	885	960	682	1348	135	544	873	1222	723
60-64	456	336	977	664	1081	585	1131	128	542	946	1366	727
65-69	405	350	901	595	933	460	960	109	558	885	1134	698
70-74	383	302	734	895*	622	433	753	77	425	743	943	635
75-79	202	213	329		423	279	388	36	289	386	584	410
80-84	150	163	332		333	174	369	35	168	311	441	241
85+	80	97	217		214	89	214	12	71	170	297	159
Total	6710	5903	14333	9490	12492	9904	17729	2046	9407	11621	17893	10517

*: ages 70+

B: Sample Size: ECHP 94 – Spanish Regions

Age	Northwest	Northeast	Madrid	Center	East	South	Canary I.
15-19	155	205	125	139	226	239	74
20-24	224	277	176	261	360	374	129
25-29	218	234	144	247	327	300	117
30-34	218	258	181	210	330	320	99
35-39	217	273	160	219	333	274	104
40-44	224	252	155	194	327	232	88
45-49	195	233	130	161	304	246	73
50-54	196	222	133	190	281	214	50
55-59	209	178	109	180	263	186	91
60-64	217	188	113	224	297	235	86
65-69	169	163	105	195	244	185	70
70-74	164	157	83	152	201	135	51
75-79	105	109	35	90	138	82	24
80-84	88	68	25	80	101	57	18
85+	56	57	18	52	58	37	19
Total	2655	2874	1692	2594	3790	3116	1093