

Jérôme Schoenmaeckers

16 Filling in the gap: how to explain the divergence between subjective and objective health measures

-
- ▶ Most respondents underestimate their health compared to a “true health index” based on objective factors
 - ▶ The older respondents are, the less likely they under- and more likely they overestimate their health
 - ▶ Public health expenditures link more closely to objective than to subjective health measures
 - ▶ Future research should focus on understanding the genesis of health assessment
-

16.1 Assessing health: just how?

Increasing the quality of life for older people is a major concern because the proportion of the ageing over the active population continues to grow. In order to optimise older people’s opportunities, evaluating their situation and their health status in particular is essential for policy makers at a time when European countries are facing substantial public deficits.

As Sen (2002) pointed out, a critical analysis of public health care and a resulting medical strategy depends, among other things, “on how individual states of health and illness are assessed”(Sen 2002: 860). He also noticed that “the internal view of health deserves attention, but relying on it in assessing health care or in evaluating medical strategy can be extremely misleading”(Sen 2002: 861). Indeed, the design of a public policy requires precise information so as to allocate rare resources in the most efficient way. As there is a mismatch between self-reported health (SRH) and physician-reported health information (which can also include health register data), measuring the gap between both indicators and decoding systematic patterns dependent on socioeconomic differences can be helpful. This divergence between SRH and the “actual” health state of individuals measured by using medical records or clinical examination, has notably been demonstrated by Mackenbach et al. (1996) and Crossley and Kennedy (2002).

A part of literature explains that self-reporting underestimates actual health, by respondents forgetting some diseases, or by thinking that they no longer have a certain disease, because it has been or is being treated – even though they were

asked “Has a doctor ever told you that you had/have now...?”. Moreover, Subramanian et al. (2009) insist on the fact that “self-assessment of health is directly contingent on social experience; it has been argued that disadvantaged groups will fail to perceive and report the presence of illness or health deficits”. This may also be due to non-information by the health professional to the patient/respondent.

In this article, we will conduct within country analyses of SRH for all countries included in SHARE. More precisely, we use SHARE data from the fourth wave to assess whether compatriots speak “different languages” when responding to a same health question. Our analysis is twofold. Firstly, we compute a “true health index” following the methodology proposed by Poterba et al. (2011) and compare the distributions of this index to SRH measures in the SHARE countries. Secondly, we try to explain the divergence observed between SRH and a true adjusted health status. More precisely, we test the explanatory power of gender, age, education, income and wealth but also that of other variables that can have an influence on self-assessment, such as happiness that we characterise by social network size, marital and dwelling statuses following former research (Layard 2005).

16.2 Introducing a new “true health index”

In addition to SRH which is asked to respondents at the question PH003 : “Would you say your health is...?” in Wave 4, SHARE provides a wide range of information relating to specific health problems described in detail in other contributions to this volume. Questions on self-reported diagnosed chronic conditions, physical symptoms or functional limitations combined with the results of physical tests (predictive of disability and mortality in old age, Jürges 2007) are used to compute, for each individual, a “true health index”. Table 16.1 shows the various conditions chosen by Jürges (2007) on the one hand, and by Poterba et al. (2010) on the other to build their own latent health index. The third column lists the various conditions considered in the creation of our index. This health index is also not completely objective; it is just a different and more complex measure than SRH, based on self-reported medical diagnosis. For simplicity, we will call it “true health index” from now.

Like Jürges (2007), we used different self-reported physical conditions, having ever been treated for depression, body mass index (BMI), grip strength and peakflow (“low” corresponds to the bottom quartile once data were sex standardised and “no” corresponds to tests which were not complete for health, or other, reasons). We added three measures of functional limitations: *those* in

Table 16.1: Comparison of health indexes based on self-reported physical conditions

Jürges (2007)	Poterba et al. (2010)	Our index
Generalised Ordered Probit Model	First Principal Component	First Principal Component
Heart attack or other heart problems	Number of periods: health problems limit work	Heart attack or other heart problems
High blood pressure	Number of periods with difficulty push/pull	High blood pressure
High blood cholesterol	Number of periods: self-reported health fair or poor	High blood cholesterol
Stroke or cerebral vascular disease	Number of periods with difficulty walking several blocks	Stroke or cerebral vascular disease
Diabetes	Number of periods with difficulty lift/carry	Diabetes
Chronic lung disease	Number of periods with some difficulty with an ADL	Chronic lung disease
Asthma	Number of periods with difficulty stoop/kneel/crouch	Arthritis or rheumatism
Arthritis or rheumatism	Number of periods with difficulty getting up from chair	Cancer or malignant tumor
Osteoporosis	Number of periods with difficulty reach/extend arms up	Stomach, duodenal or peptic ulcer
Cancer	Number of periods with difficulty climbing stairs	Parkinson disease
Stomach, duodenal or peptic ulcer	Number of periods: health worse in previous period	Cataracts
Parkinson disease	Ever experience arthritis	Hip fracture or femoral fracture
Cataracts	Number of doctor visits	Other fractures
Hip fracture or femoral fracture	Number of periods with difficulty pick up a dime	Alzheimer's disease, dementia
Other conditions	Number of periods with difficulty sitting two hours	Other conditions
Ever treated for depression	Number of periods with back problems	Ever treated for depression
Low grip strength	Ever experience psychological problems	Low grip strength
No grip strength	Ever experience lung disease	No grip strength
Low peakflow	Ever experience diabetes	No peakflow
No peakflow	Ever experience high blood pressure	No peakflow
BMI<20 (underweight)	BMI at beginning of period	BMI<20 (underweight)
25<BMI<30 (overweight)	Number hospital stays	25<BMI<30 (overweight)
BMI>30 (obese)	Number of periods: home care	BMI>30 (obese)
	Ever experience stroke	Mobility (3 mobility limitations or more)
	Ever experience cancer	ADL2
	Number of nursing home stays	IADL2

Source: SHARE Wave 4 release 1; Jürges (2007); Poterba et al. (2010)

activities of daily living (ADL2), in instrumental activities of daily living (IADL2) and in mobility (MOBILIT3) following Poterba et al. (2010).

Like the latter, we chose the method of first principal component to build our true health index whereas Jürges (2007) calculated weights for each condition or impairment from a generalised ordered probit model with country dummies. The first principal component synthesises the above 26 measures (see Table 16.1). We used this method for each country separately so as to obtain a measure free of systematic institutional and reporting differences. We predicted a value for each individual and rescaled the predicted values by normalising (1= “best observed health”, 0 = “worst observed health”) in order to classify the SHARE countries by the distribution of this health index. Figure 16.1 illustrates countries ranked by the median value. The healthiest respondents came from Denmark, followed closely by Switzerland and the Netherlands (left side of the graph) while Hungary and Estonia occupied the last two ranks.

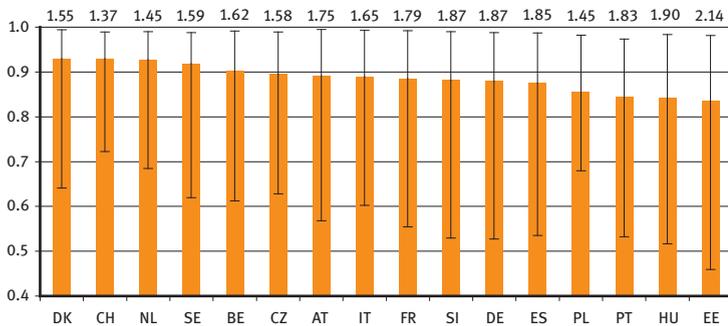


Figure 16.1: Distribution of normalised true health index by country, ranked by median value and 90th/10th inequality ratio (n=57,262)

Source: SHARE Wave 4 release 1

The upper and lower bars represent the 90th and the 10th percentile of health distribution, respectively. Looking at Figure 16.1 and health inequalities in terms of the 90th/10th percentile ratio, Switzerland (1.37) did a little better than the Netherlands and Poland (1.44), while Estonia was far behind (2.14) and showing the highest inequality in terms of the percentile ratio.

16.3 Comparing self-reported health (SRH) and the true health index

A simple way to check the robustness of SRH measures is to compare them to the true health index. Indeed, we expect that two individuals reporting the same SRH should have a similar, though not exactly the same, true health state, measured by the true health index. At least, the variance of the true health index should be minimal. When comparing the two measures, the distribution of the principal component health index (considered as true value) was divided in quintiles that we related to the five SRH statuses that are reported in SHARE. We expected that people reporting poor SRH, the worst possible subjective health status, would mainly occupy the first quintile of the true index, whereas most people in excellent health should be located in the highest quintile. We performed this exercise for men and women separately in order to compare misreporting between genders (see Table 16.2). For respondents declaring poor health, we find that the proportion of women in the first quintile of true health (65%) was greater than that of men (58%). Thus, women in bad health seem to assess their health more accurately than men based on our true health indicator. The same seems to happen when we look at “excellent” health evaluated: women are more likely to be in the highest quintile of our true indicator than men (46.1% vs. 45%).

Table 16.2: Percentage of individuals in SRH categories in true health quintiles (n=57,262)

Quintiles “True health measure”	Poor		Fair		Good		Very good		Excellent	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1st	58.0	65.0	22.1	29.4	8.0	10.6	3.5	4.9	2.5	2.5
2nd	24.2	22.3	27.5	27.8	17.4	18.6	11.3	11.6	9.1	8.5
3rd	11.0	7.8	23.6	21.1	24.1	22.8	20.1	18.2	17.1	15.0
4th	5.0	3.2	17.7	15.0	26.8	25.8	28.7	28.0	26.2	27.8
5th	1.8	1.8	9.1	6.7	23.8	22.2	36.5	37.3	45.0	46.1

Source: SHARE Wave 4 release 1

16.4 Profiling the gap

In the following, we look at the determinants of mismatches between SRH and true health measures as explained above. We performed an ordered probit model with SRH as dependent variable on a country-by-country basis and the predicted value from the first principal component analysis as explanatory. For each country, threshold parameters were computed and used to replace respondents in order to adjust their true health measure. If we randomly pick the case of Belgium, each respondent whose non-standardised health index was inferior to -1.71 (first average threshold) was considered in excellent health. If health index was between the first and second average thresholds (from -1.71 to -0.75), the respondent was assigned to very good health, and so on. We categorised the adjusted health measure from 1 (synonymous of excellent health) to 5 (poor health). If the difference between the indicators was positive, respondents overestimated their health, if there was no difference, the evaluation was equivalent to the true measure and if the difference was negative, they underestimated their health status. Table 16.3 shows evaluation differences for each country. Eastern (and particularly Estonian), Portuguese and German citizens seemed to better evaluate their health (more than 40 % of correct estimations) while Italians were the ones who most underestimated their health, in addition to exhibiting the lowest overlap between SRH and the indicator among SHARE countries (only 33.4% of correct evaluations). The Dutch citizens are most likely to overestimate their health (27.5%). However, these conclusions must be drawn carefully because they could be due to measurement differences between the countries.

Health comparisons across nations have also been questioned and criticised as health evaluation is affected by social and cultural values as well as by language specificities (Sommerfeld et al. 2002, Jürges 2005). To assess who are the respondents who might under- or overestimate their adjusted true health, we performed multinomial probit analysis across all countries. Explanatory variables used were gender, age, education, income, wealth, home ownership, social network (the existence of at least one confidant, see Stoeckel and Litwin in this volume for details) and marital status. We use the latter three as external factors indicating unhappiness which is likely to have an influence on misreporting instead of health indicators like the EURO-D scale. A survey of the Belgian Observatory of Life at Home shows that tenants are less happy than the owners (Layard 2005). Nearly half of the tenants believe they would be happier in a home of their own. Moreover, for 85 per cent of Belgians, owning a home is essential to be happy. That could impact the reporting of health. One can also imagine that having no one to talk to or being alone might influence our health judgment insofar as respondents have no one to compare to (see Shiovitz-Ezra in this volume for the relationship between loneliness and depression).

Table 16.3: Percentages of under-, correct and overestimation of the adjusted true health index compared to SRH, by country (n=57,262)

	Underestimation	Correct estimation	Overestimation
SE	42.4	34.2	23.4
DK	41.2	36.0	22.8
DE	36.2	40.8	23.0
NL	38.2	34.3	27.5
BE	40.1	34.4	25.5
FR	38.4	36.1	25.5
CH	39.7	35.4	24.9
AT	40.0	33.7	26.4
PT	36.9	40.3	22.8
ES	39.5	37.9	22.6
IT	43.1	33.4	23.5
EE	31.0	49.3	19.8
PL	36.6	43.0	20.4
CZ	36.7	40.3	23.0
HU	35.6	42.9	21.5
SI	38.3	36.0	25.8

Source: SHARE Wave 4 release 1

On the contrary, within country comparisons of SRH are less problematic (Deboosere 2008). For instance, income does not seem to impinge on the answering behaviour and thus does not bias health inequality indicators (Burstrom & Fredlund 2001). However, divergences in responding to SRH may arise by gender (Idler et al. 1992, Spiers et al. 2003, van Doorslaer & Gerdtham 2003). Deboosere (2008) showed that evaluation of good and very good health is probably influenced by education and concluded that low-educated people tend to underestimate their health. On the contrary, no educational gradient has been found regarding bad health assessment (Huisman et al. 2007).

Table 16.4 shows the results of the model. The reference was no misreporting men, aged 50–69, having a low or middle education, no social network, being tenant, not in couple and whose income and wealth were below median. Across all countries, women were less likely to underestimate their health. Age had a significant effect: the older the respondents, the less likely they underestimated and the more likely they overestimated their health. A more educated person less likely underestimated his or her health.

Table 16.4: Determinants of under- and overestimation of the adjusted true health index compared to SRH: Results of multinomial probit models across all SHARE countries (n=56,886)

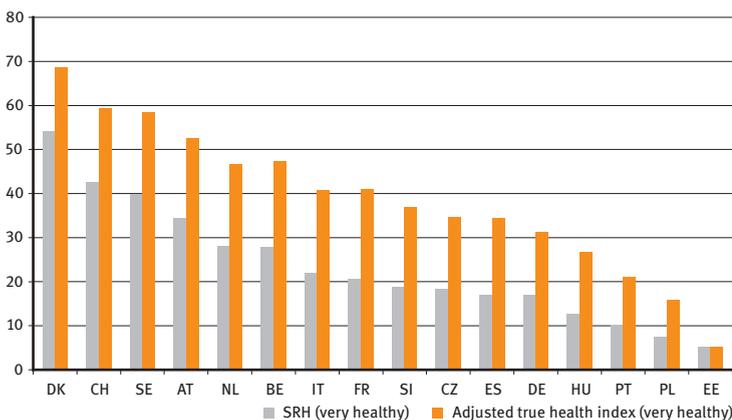
	Under- estimation	Standard deviation	Over- estimation	Standard deviation
Woman	-0.0826***	(0.0158)	-0.0156	(0.0169)
Age (70+)	-0.4759***	(0.0168)	0.2303***	(0.0172)
High education	-0.1281***	(0.0185)	-0.0228	(0.1987)
Income	-0.0003	(0.0176)	-0.0335*	(0.0191)
Wealth	0.0867***	(0.0176)	0.0579***	(0.0189)
Homeowner	-0.0014	(0.0219)	-0.1874***	(0.0228)
Social network (>=1)	0.1046***	(0.0233)	-0.2199***	(0.0243)
In relationship	0.1167***	(0.0196)	-0.1365***	(0.0205)
Log-likelihood	-60026.856			

Significance: *** = 1%; ** = 5%; * = 10 %

Source: Wave 4 release 1

When SHARE respondents' income was higher than the country-specific median, they less likely overestimated their health, and we noted the opposite trend once we considered wealthier people. The wealthier respondents were, the more likely they under- and overestimated health.

Homeowners were less likely to overestimate their health. The results for the underestimation are not significant. Finally, if people were not alone or if they reported to have at least one person to talk about important matters, they were

**Figure 16.2:** Self-reported health (SRH) and adjusted very healthy SHARE respondents, by country (n=57,262)

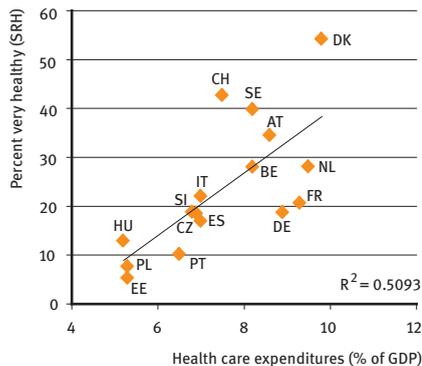
Source: SHARE Wave 4 release 1

more likely to underestimate and less likely to overestimate their health. These results are surprising and should be assessed in future research.

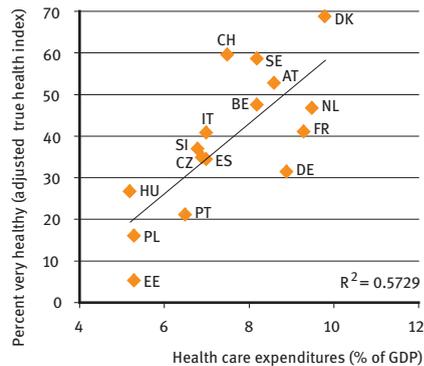
Finally, looking at the new distribution of the adjusted true health index, we see that the proportion of respondents in excellent or in very good health seems to be much higher than for SRH. This result is true for every country and especially pronounced for France where the gap was 20.3 per cent. On the contrary, this gap appears to be almost non-existent for Estonia where it reached only 0.1 per cent. It is important to note that these results, illustrated on Figure 16.2, are in line with our previous findings. Indeed, considering all countries, we found that respondents are more likely to underestimate their health than to overestimate it.

16.5 Implications for public policy design

Different health status assessments could be problematic in terms of policy design especially when needs are not properly assessed. To illustrate this point, we followed Jürges (2007) and decided to analyse the relationship between public health expenditures and SRH as well as the adjusted true health index. These relations are presented in Figure 16.3.



(a) Percentage very healthy according to SRH



(b) Percentage very healthy according to adjusted true health index

Figure 16.3: Percentages of very healthy SHARE respondents (SRH and adjusted true health index) and care expenditures, by country (n=57,262)

Source: SHARE Wave 4 release 1; European Commission (2012, p.159): data from 2009

One major conclusion can be derived from these figures. We observe that the explained variance was a little higher ($r^2=0.57$) when public health expenditures were used to explain our adjusted health measure instead of self-reported health ($r^2=0.51$). This indicates that public health expenditures are linked to adjusted true health more than to SRH, highlighting the effects of reporting styles.

16.6 The differences between subjective and objective health measures

In our analysis we found that self-reported health varies largely between SHARE countries. Scandinavian respondents report better health than their Eastern and Southern counterparts. We introduced the concept of a true health index based on the prediction of the first principal component. We adjusted this index to take into account country-specific reporting styles and found that Eastern, Portuguese and German respondents had the most accurate assessment of their health.

We then described the profile of people who under- and overestimated their health by a multinomial probit analysis. Being female, older or highly-educated implies a lower probability to underestimate health, and this probability is higher if people are wealthier and have confidants in their social network. Besides, people are more likely to overestimate their health if they are older or wealthier; on the contrary, this probability is lower if they are homeowners or have someone in entourage to talk to.

In addition to the impact of loneliness which should be analysed more precisely, future research should focus on understanding the reasons for these differences while studying the topic at the national level and to dwell on the origins of health misreporting. Public health expenditures were more closely linked to our true health index than to subjective self-reports. Thus, for the social planner, it is important to identify the objective picture to fight the hard core of health poverty.

References

- Burström, Bo; Fredlund, Peeter (2001): "Self-rated health: is it as good a predictor of subsequent mortality among adults in lower as well as in higher social classes?". In: *Journal of Epidemiology and Community Health* 55(11), p. 836–840.
- Crossley, Thomas, Kennedy, Steven (2002): "The reliability of self-assessed health status". In: *Journal of Health Economics* 21(4), p. 643–658.
- Deboosere, Patrick (2008): *The age-profile of self-rated health in men and women (PhD Dissertation)*, Vrije Universiteit Brussel, p. 53–63.

- European Commission (2012): “The 2012 ageing report”. In: *European Economy* 2/2012. European Communities, DOI: 10.2765/19991.
- Huisman, Martijn, Van Lenthe, Frank, Mackenback, Johan (2007): “The predictive ability of self-assessed health for mortality in different educational groups”. In: *International Journal of Epidemiology* 36(6), p. 1207–1213.
- Idler, Ellen, Russell, Louise, Davis, Diane (1992): “Survival, functional limitations, and self-rated health in the NHANES I epidemiologic follow-up study”. In: *American Journal of Epidemiology* 152(9), p. 874–883.
- Jürges, Hendrik (2007): “True health vs response styles: exploring cross-country differences in self-reported health”. In: *Health Economics* 16(2), p. 163–178.
- Layard, Richard (2005): *Happiness: lessons from a new science*. London: Penguin.
- Mackenbach, Johan, Looman, Caspar, Van Der Meer, Joost (1996): “Differences in the misreporting of chronic conditions, by level of education: the effect on inequalities in prevalence rates”. In: *American Journal of Public Health* 86(5), p. 706–711.
- Poterba, James; Venti, Steven; Wise, David (2010): “The asset cost of poor health”. In: *Faculty Research Working Paper Series RWP11-005*, Harvard Kennedy School.
- Sen, Amartya (2002): “Health: perception versus observation”. In: *British Medical Journal* 324, p. 860–861.
- Sommerfeld, Johannes, Baltussen, Rob, Metz, Laurien, Sanon, Mamadou, Sauerborn, Rainer (2002): “Determinants of variance in health state valuations”. In Murray, Christopher, Salomon, Joshua, Mathers, Colin, Lopez, Alan (Eds.): *Summary measures of population health*, Geneva, World Health Organization, p. 549–579.
- Spiers, Nicola, Jagger, Carol, Clarke, Michael, Arthur, Antony (2003): “Are gender differences in the relationship between self-rated health and mortality enduring? Results from three birth cohorts in Melton Mowbray, United Kingdom”. In: *Gerontologist* 43(3), p. 406–411.
- Subramanian, SV, Huijts, Tim, Avendano, Mauricio (2009): “Self-reported health assessments in the 2002 World Health Survey: how do they correlate with education?”. In: *Bulletin of the World Health Organization* 2010 88, p. 131–138. DOI: 10.2471/BLT.09.067058.
- Van Doorslaer, Eddy, Gerdtham, Ulf (2003): “Does inequality in self-assessed health predict inequality in survival by income? Evidence from Swedish data”. In: *Social Science and Medicine* 57(9), p. 1621–1629.

