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Abstract

Aim:

A global question on chronic morbidity is included in many national health interview surveys. According to a recent EU Commission regulation, information on this item should be collected in all EU member states. However, little is known about the reliability and validity of such a question.

Subject and methods:

The reliability of a global question on chronic morbidity was investigated among persons who participated in 2001 both in the Belgian health interview survey (HIS) and the national population census (n = 2,871), by using kappa statistics and logistic regression.

In addition, data from the HIS 2001 and 2004 (n = 21,376) were used to study estimates and determinants of the sensitivity of this global chronic morbidity measure among people with specific chronic diseases.

Results:

In terms of reliability, the kappa statistic showed only a moderate agreement (0.559; 95% CI 0.523-0.594).

Additionally, the sensitivity of the global question on chronic morbidity ranged from 49.9 to 87.2%, depending on the type of disease. A much higher sensitivity was observed among people who rated their health status to be moderate to bad (adjusted OR 3.85; 95% CI 3.17-4.69).

Conclusion:

Self-reported chronic morbidity, measured by a single and global question, is a reasonably reliable instrument to measure ill health. The global instrument provides useful information on the burden of disease, because it takes into account the relevance of the diseases for the people themselves.

Keywords: chronic disease, validity, reliability, health interview survey

Introduction

Chronic diseases are the largest cause of death in the world and contribute substantially to the burden of disability (Murray et al. 2012). Moreover, deaths from chronic diseases are projected to increase dramatically between now and 2030 (Mathers et al. 2006). Chronic diseases have a significant impact on the quality of life of those affected and their families and are a major driver of health care costs, especially in case of multimorbidity.

To describe the burden of disease, calculate health indicators which measure life expectancy in relation to health status, and assess differences in ill health between population groups, there is a need for concise, population-based information on the prevalence of chronic morbidity. This information can most easily be collected through one global question in a population survey. An example of such question is: "Do you suffer from any chronic illness or condition?". This question is part of the Minimum European Health Module (MEHM), an instrument developed in the framework of the Euro-REVES project, with global questions on perceived health, chronic morbidity and activity limitation. The MEHM is included in the European Survey on Income and Living Conditions (EU-SILC) and the European Health Interview Survey (EHIS). The module allows collecting information on items for which according to an EU Commission Regulation[1], European member states are bound to provide data to Eurostat. Even though the EHIS regulation was only published in February 2013, global questions on chronic morbidity have been used in many national health surveys in Europe well before (Aromaa et al. 2003). In the UK, a global question on chronic morbidity has been included in the General Household Survey (GHS) since 1971 (Macintyre et al. 2005). In Belgium, information on this item has been collected since the first national Health Interview Survey in 1997 (Demarest et al. 2013).

The most straightforward indicator that is derived from such a global question is the prevalence of self-reported chronic morbidity. This indicator has been included in the shortlist of the European Core Health Indicators (ECHI), which is a comprehensive list of public health indicators at the EU level (Verschuuren et al. 2013). Another indicator based

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:047:0020:0048:EN:PDF

on this question is life expectancy with and without chronic morbidity. The algorithm to calculate this indicator is based on the Sullivan method (Sullivan 1971) and was developed by Eurostat in collaboration with the European Health Expectancy Monitoring Unit (EHEMU). EU-SILC data have been used to calculate the prevalence of chronic morbidity and life expectancy with and without chronic morbidity in 25 EU member states (Jagger et al. 2008).

Although the validity and reliability of self-reported health status measures have been studied extensively, up to now most research has focused on self-rated health. This concept, which is measured with the question, "How do you rate your health in general?", appears to be an excellent predictor of mortality, morbidity, functional status, disability, and health consumption (de Bruin et al. 1996). Furthermore, several studies have assessed the validity of specific self-reported chronic diseases (Martin et al. 2000). The results depend on the type of disease; a specificity of 90% or higher is found for self-reported diabetes, hypertension, stroke, cancer, and asthma (Engstad et al. 2000; Fowles et al. 1998); in contrast, for self-reported arthritis, hypothyroidism, hyperthyroidism and acne the specificity is less than 75% (Bombard et al. 2005; Brix et al. 2001; Menon et al. 2008).

Compared to the question on self-rated health, the global question to measure self-reported chronic morbidity has far less been studied. Conceptual work has been done by Robine et al. (2002) and Burata et al. (2003). Cox et al. (2009) assessed the reliability of the MEHM in a small sample. However, to date, no large scale studies are available that investigate both the reliability and validity of a global question on chronic morbidity at population level.

Therefore, the main aim of this study was to assess the reliability and validity of a global question on self-reported chronic morbidity within a large and representative sample of the general population. An additional aim was to investigate to which extent the reliability and validity of this question varied in function of socio-demographic and interview-related background characteristics.

Methods

Data

In Belgium, national health interview surveys (HIS) have been organised periodically since 1997, with intervals varying between 3 and 5 years. For this study, data were used from the respondents, aged 15 years and older, participating in the HIS 2001 (n = 10,156) and the HIS 2004 (n =11,220). The HIS 2001 and the HIS 2004 are independent cross sectional surveys. The sampling frame is the national register. The probability that the same person is selected for both surveys is negligible (approximately 1/1,000,000).

In the HIS, information is collected on the health status, the life style, and the health care utilization of a representative sample of the total Belgian population. The face to face questionnaire includes a global question on chronic morbidity. The exact formulation of this question is: “Do you have a longstanding disease, condition or handicap? (yes/no)”. This question differs from the question in the MEHM, because at the time the first health survey was conducted in Belgium in 1997, the MEHM question was not yet available. To be able to follow time trends, the original question has been consistently used in all consecutive health surveys.

The same question was also included in the national Belgian population census of 2001. Participation in the census was mandatory for all Belgian residents (n = 10,263,414). For the respondents, aged 15 years and older, who participated between September 2001 and January 2002 both in the HIS and the census (n = 2,871), an individual data linkage was performed between the HIS 2001 data and the answer to the global question on chronic morbidity in the census, using the National Population Register ID as key variable.

Three types of variables were identified as potential determinants of the reliability and validity of self-reported chronic morbidity: 1) socio-demographic variables (gender, age, educational attainment, nationality); 2) health-related variables (type and number of

specific self-reported chronic diseases, self-rated health, mental health); and 3) an interview-related variable (self-reporting versus proxy-interview).

Educational attainment was defined at the level of the household. Information on specific chronic diseases and conditions was obtained by asking if the person had suffered from that particular disease during the twelve months preceding the survey. Mental health was measured through the General Health Questionnaire (GHQ) (Goldberg et al. 1988), in its short version (GHQ-12). This questionnaire assesses the notion of “general sufferance as unique and global morbid class”, i.e. psychological distress. A score of 4 or more indicates the presence of psychological problems, probably calling for professional help. The indicators on mental health and self-rated health were based on questions in the self-administered questionnaire. Therefore, no information on those indicators was available for respondents for whom the information was collected via a proxy-interview (5.9% of respondents), because for those interviews it was not authorised to complete a self-administered questionnaire.

Analysis

For the respondents who participated both in the HIS and the census, the reliability of the answer to the question “Do you have a long standing disease, condition or handicap?” between HIS and census was investigated via kappa statistics. Determinants of responding inconsistently were assessed through logistic regression.

For the validity calculations, combined data of the HIS2001 and the HIS2004 were used. In the assessment of the validity of an instrument, different aspects can be considered: content validity, face validity, correlational validity and criterion validity (McDowell et al. 1996). Criterion validity considers whether the instrument correlates highly with a “gold standard”. This was the approach followed in the current study, with having a specific chronic disease as a “gold standard”. In a first step, a selection was made of specific chronic diseases included in the HIS, for which self-reported information was estimated to be sufficiently accurate. This was assessed by searching PubMed, Embase and Scopus for studies published until January 2013, using the following search strategy: "self-report" AND

"validity" AND "(morbidity OR disease)" AND "survey". This search strategy yielded 2001 references. Based on the title, and if the title alone was not sufficient, the abstract, 41 articles were retrieved and full-text screened. In 27 papers results were reported on the specificity of one or more self-reported chronic diseases which were included in the list of diseases in the HIS questionnaire. Chronic diseases were eligible for inclusion if literature findings were available that pointed out that the specificity of self-reported information for that disease, defined as the number of true negatives divided by the number of true negatives and false positives, was at least 80%, using medical records or clinical measurements as gold standard. For the sensitivity analyses we focused on respondents with at least one of the selected specific chronic diseases. A true positive was defined as a person who had responded positively to the global question on chronic morbidity, a false negative a person who had answered negatively to this question; the sensitivity was then calculated as the true positives divided by the true positives and the false negatives. In a final step, a multivariate analysis was performed to verify if the sensitivity varied significantly in function of potential determinants. Information on self-rated and mental health, which was collected via a self-administered questionnaire, was not available for respondents who were interviewed via a proxy. Therefore proxy interviews (n = 112) were excluded from the multivariate analyses.

All analyses were carried out with Stata/SE 10.1 (StataCorp, College Station, Texas). Estimates and standard errors were calculated, taking into account the stratified, clustered sampling design of the HIS.

Results

General agreement HIS – census

Among the 2,871 respondents who participated in the last quarter of 2001 both in the HIS and the census, the prevalence of self-reported chronic morbidity was 28.4% (95% CI 25.9-30.9%) according to the HIS and 26.3% (95% CI 23.6-29.2%) according to the census (Table 1). A discordant result was found in 469 (18.2%) of the 2,626 participants for whom valid information on the global question of chronic morbidity was available in both data

sources. Accordingly, the kappa statistic showed only a moderate agreement (0.559; 95% CI 0.523-0.594).

PLEASE INSERT TABLE 1 HERE

Results by gender, age, self-rated health, GHQ-score, education, nationality, and type of respondent (Table 1) revealed that the reliability did not vary a lot by subgroup, except among persons with a GHQ-score of 4 or more (kappa 0.631;95% CI 0.596-0.667), who showed a substantially higher reliability than persons with a GHQ-score between 0 and 3 (kappa 0.526;95% CI 0.488-0.565). Non-Belgian citizens (kappa 0.417;95% CI 0.379-0.456) showed a substantially lower reliability than Belgians ones (kappa 0.574;95% CI 0.539-0.609).

In a multivariate analysis, investigating the discrepancy between HIS and population census, only age came out as a significant factor (Table 2). An increasing age was clearly associated with a higher discrepancy of the results. The odds ratio for the age group of 65 years and older was 2.57 (95% CI 1.29-5.12), compared to the reference category of 15-24 years. Neither mental health, nor self-rated health appeared to have an impact on the reliability of self-reported chronic morbidity.

PLEASE INSERT TABLE 2 HERE

Disease-specific consistency in reporting

From the literature findings, it appeared that for ten specific chronic diseases which were included in the HIS, the specificity of self-reported prevalence compared to clinical measurement or medical records was at least 80%: asthma, hypertension, serious heart disease or heart attack, stroke, diabetes mellitus, epilepsy, Parkinson's disease, cataract, glaucoma, and malignant neoplasm or cancer. The outcome of the literature review is presented more in detail in Table 3.

PLEASE INSERT TABLE 3 HERE

The sensitivity of the global chronic morbidity measure in the combined data of the HIS 2001 and the HIS 2004 ranged from 49.9% (95% CI 47.3-52.6%) among people with hypertension to 87.2 (95% CI 72.0-94.7%) among people with Parkinson's disease (Table 4), and was for each disease substantially higher for people who consider their health to be moderate or bad than for those who consider themselves to be in good health.

PLEASE INSERT TABLE 4 HERE

Figure 1 shows the increase of the sensitivity of the global chronic morbidity measure in function of the number of reported diseases. If one disease was reported, the sensitivity was 52.3% in men and 53.2% in women. In case of three reported diseases, the sensitivity was around 80%. Only from the presence of 5 diseases in women and 6 diseases in men onwards, the sensitivity was 100%.

PLEASE INSERT FIGURE 1 HERE

Unlike the reliability, the sensitivity of the global chronic morbidity measure varied far more in function of background characteristics (Table 5). The sensitivity was significantly higher in people indicating that their subjective health was moderate to bad (OR 3.85; 95% CI 3.17-4.69 compared to those estimating their health to be good to very good). It was significantly lower in non-Belgians (OR 0.60; 95%CI 0.41-0.86 compared to Belgians). Diseases that were strongly associated with a higher sensitivity were epilepsy, stroke, cancer, asthma, diabetes, and serious heart disease or heart attack. Also a GHQ-score of 4 or more was significantly associated with a higher sensitivity (OR 1.34; 95% CI 1.02-1.75 compared to those with a GHQ below 4).

PLEASE INSERT TABLE 5 HERE

Discussion

According to criteria proposed by Landis et al. (1977), the overall kappa value of the global question on self-reported chronic morbidity in this study is moderate, and lower than expected, especially in comparison with the results from Cox et al. (2009) or those from an Australian study assessing the reliability of self-reported specific chronic conditions (Dal Grande et al. 2012). The relatively low reliability may be related to the difference in the mode of data collection between the HIS and the population census. In survey methodology, it is well known that the quality of the data is affected by the mode of the data collection (Groves et al. 2004). Whereas in the HIS, data were collected via a face to face interview, census information was initially collected via a postal survey, and only in case of non-response an interviewer visited the respondent for a face to face interview. Other methodological reasons why people may have answered in a discordant way could be: differences in the focus of the survey (health versus socio-economic information), the length of the questionnaire, and the mandatory nature of the census. The difference in the mode of the data collection between the HIS and the census may also have affected the results on the discrepancy in self-reported chronic morbidity in function of background characteristics, which are presented in Table 2. This is e.g. possible if the impact of the mode of the data collection is more important for one population group than for another.

In international comparisons of survey results, the impact of the data collection mode, which is assumed to be a major explanatory factor of the relatively low reliability in our study, is often insufficiently considered. During the last decade, both WHO and Eurostat have done major efforts for the harmonization of instruments in health surveys at the European level. Nevertheless, it is unfortunate that in the current EU Commission EHIS regulation, no guidelines are included on the exact formulation of the questions, nor on the data collection mode. Not only this under valorises the huge amount of preparatory work that has been done in the field of pre-harmonisation of the questions, but also it jeopardises substantially the international comparability of the data that are submitted to Eurostat, including those on self-reported chronic morbidity.

The sensitivity of the global chronic morbidity measure depends strongly on the type of specific disease. The impact of a disease, in terms of symptoms and effect on the daily living, may substantially affect the people's judgment on whether they consider themselves to have a chronic disease or not. This may explain why only half of the patients with hypertension, which often presents without any symptoms, report to have a chronic disease via the global question.

Although the analyses were restricted to diseases for which there is evidence in the literature that self-reports are sufficiently valid, the use of self-reported information as gold standard is definitely a weakness. Also the assumption that self-reported information is valid when it is confirmed by medical records or clinical measurements may not be completely true. The information from medical records may be incomplete and clinical measurements may vary over time. However, in the absence of more objective information, the use of self-reported chronic diseases as gold standard was the best option that could be taken. Another weakness is that the specificity of the global question could not be tested, because the information on specific chronic diseases in the HIS is not exhaustive. Hence, it was not possible to identify false positives, i.e. persons answering positively to the global question on chronic morbidity without having a specific chronic disease.

An important strength of this study is that it was conducted in a large, representative sample of the total population. Seasonal effects, which could have affected the results on the reliability were avoided by including only persons who participated, within the same period of four months, both to the census and the HIS. Proxy-interviews were included as well. It is remarkable that the reliability of self-reported chronic morbidity was quite similar for respondents who answered themselves and via proxy-respondents. However, this result should be interpreted with caution. The number of proxy-respondents was low, and the impact of a proxy-interview could not be adjusted for subjective and mental health, because for those respondents no self-administered questionnaire was available.

Some determinants of the validity and reliability of self-reported chronic morbidity appear to be the same as those identified in studies assessing the reliability and validity of self-rated health. This applies for age (Crossley et al. 2002; Zajacova et al. 2011) and nationality

(Bombak et al. 2012), and to some extent to gender (Deeg et al. 2003). A higher age is associated with a lower reliability, but not with a different validity. Nationality has no impact on the reliability, but among respondents with one or more specific chronic diseases non-national citizens answer significantly less often positively to the global question on chronic disease. The sensitivity of the global chronic morbidity measure is also lower in women than in men. Perhaps the perception on what is a chronic disease may vary among different population groups. After adjustment for age, gender and nationality, our study did not point out any educational differences. Our data thus support the hypothesis that a global question in a health survey is suitable to estimate socioeconomic status gradients in chronic morbidity, which is in line with the findings of Macintyre et al. (2005).

Although chronic diseases include essentially cardiovascular diseases, cancer, chronic respiratory diseases and diabetes (Horton 2005), this list is not exhaustive (Piot et al. 2010) and especially lay people might interpret this arbitrarily. Still, it is reassuring that a strong, significant and independent association was found between the global question on chronic morbidity and most of the specific chronic diseases that were selected. Also the sharp increase of the sensitivity in function of the number of specific chronic conditions confirms the value of this indicator as a global measure of chronic morbidity.

Table 4 indicates that the sensitivity of the global chronic morbidity measure is substantially higher among people who assess their subjective health as bad to very bad than among those who consider themselves to be in good health. The difference is particularly high for persons with hypertension, cataract and glaucoma. It is remarkable that especially those diseases show only a weak or no association with self-reported chronic morbidity. These findings support the hypothesis that the question on chronic morbidity in a HIS covers more the concept of “illness” than the one of “disease”. Illness is defined as the ill health people identify themselves with. In contrast, disease is a condition that is defined by a physician, or another medical expert (Wikman et al. 2005). It may be that respondents only identify a specific chronic disease or condition as a chronic illness if this disease has a clear impact on their living situation in terms of suffering or other inconveniences.

The subjective component of a global question on chronic morbidity should not be taken in a negative way. Subjective judgments should be considered a valid approach to measurement. Biases inherent in subjective judgments do not threaten the validity of the measurement process: health, or quality of life, is inherently subjective and is as the patient perceives it (McDowell et al. 1996). The interpretation of the concept of chronicity may also vary among respondents, albeit that the word "longstanding" is clear enough to assume that only diseases are considered with a duration of at least a couple of months.

Unfortunately there are no easy recipes to increase the reliability and validity of a global question on chronic morbidity. It is clear that unambiguous and specific questions are more reliable and valid than global, less precise questions. Further research should aim to increase our understanding on the way in which the concept of chronic morbidity based on one global question in a survey relates to objective measures of chronic morbidity. Such research should including cognitive testing and physical examinations or linkage with chronic disease registers.

Conclusion

Self-reported chronic morbidity, measured by a single and global question, is a reasonably reliable instrument to measure ill health, but for the comparison over time or between countries, standardised methods of data collection are essential. The instrument seems to underestimate the prevalence of persons with chronic diseases based on medical diagnoses, but provides useful information on the burden of disease, because it takes into account the relevance of these diseases for the people themselves. This relevance may be related to the impact of the disease on their daily living situation in various ways: functional limitations, pain, financial and social consequences, etc. Therefore self-reported chronic morbidity cannot substitute information on chronic diseases in medical registries, but is complementary. The relatively easy way to obtain this type of information is definitely an advantage.

Conflict of interest

The authors declare that they have no conflict of interest.

Reference List

Aromaa A, Koponen P, Tafforeau J, Vermeire C (2003) Evaluation of Health Interview Surveys and Health Examination Surveys in the European Union. European Journal of Public Health 13:67-72

Bombak AE and Bruce SG (2012) Self-rated health and ethnicity: focus on indigenous populations. Int J Circumpolar Health 71. doi: 10.3402/ijch.v71i0.18538

Bombard JM, Powell KE, Martin LM, Helmick CG, Wilson WH (2005) Validity and reliability of self-reported arthritis: Georgia senior centers, 2000-2001. Am J Prev Med 28:251-258

Brix TH, Kyvik KO, Hegedus L (2001) Validity of self-reported hyperthyroidism and hypothyroidism: comparison of self-reported questionnaire data with medical record review. Thyroid 11:769-773

Burata V, Frova L, Gargiulo L, Gianicolo E, Prati S, Quattrociocchi L (2003) Development of a common instrument for chronic physical conditions. In: Nossikov A, Gudex C (eds) Development of Common Instruments for Health Surveys. IOS Press, Amsterdam, pp 21-34

Cox B, Van OH, Cambois E, Jagger C, le RS, Robine JM, Romieu I (2009) The reliability of the Minimum European Health Module. Int J Public Health 54:55-60

Crossley TF and Kennedy S (2002) The reliability of self-assessed health status. J Health Econ 21:643-658

Dal Grande E, Fullerton S, Taylor AW (2012) Reliability of self-reported health risk factors and chronic conditions questions collected using the telephone in South Australia, Australia. BMC Med Res Methodol 12:108

de Bruin A, Picavet HS, Nossikov A (1996) Health Interview Surveys: towards international harmonization of methods and instruments. World Health Organisation, Copenhagen

Deeg DJ and Kriegsman DM (2003) Concepts of self-rated health: specifying the gender difference in mortality risk. Gerontologist 43:376-386

Demarest S, Van der Heyden J, Charafeddine R, Drieskens S, Gisle L, Tafforeau J (2013) Methodological basics and evolution of the Belgian Health Interview Survey 1997-2008. Arch Public Health 71(1): 24. doi: 10.1186/0778-7367-71-24

Engstad T, Bonaa KH, Viitanen M (2000) Validity of self-reported stroke : The Tromso Study. Stroke 31:1602-1607

Fowles JB, Fowler EJ, Craft C (1998) Validation of claims diagnoses and self-reported conditions compared with medical records for selected chronic diseases. J Ambul Care Manage 21:24-34

Goldberg D and Williams P (1988) A user's guide to the General Health Questionnaire. NFER-NELSON, Berkshire

Groves R, Fowler F, Couper M, Lepkowski J, Singer E, Tourangeau R (2004) Survey Methodology. Wiley, Hoboken, New Jersey

Horton R (2005) The neglected epidemic of chronic disease. Lancet 366:1514

Jagger C, Robine JM, Van Oyen H, Cambois E (2008) Life Expectancy with Chronic Morbidity. In: Giampaoli S, Van Oyen H, Devillé W, Verschuuren M (eds) Major and Chronic Diseases Report 2007. European Commission, Luxemburg, pp 292-304

Landis JR and Koch GG (1977) The measurement of observer agreement for categorical data. Biometrics 33:159-174

Macintyre S, Der G, Norrie J (2005) Are there socioeconomic differences in responses to a commonly used self report measure of chronic illness? Int J Epidemiol 34:1284-1290

Martin LM, Leff M, Calonge N, Garrett C, Nelson DE (2000) Validation of self-reported chronic conditions and health services in a managed care population. Am J Prev Med 18:215-218

Mathers CD and Loncar D (2006) Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med 3(11):e442

McDowell I and Newell C (1996) Measuring Health. A guide to rating scales and questionnaires. Oxford University Press, New York

Menon C, Gipson K, Bowe WP, Hoffstad OJ, Margolis DJ (2008) Validity of subject self-report for acne. Dermatology 217:164-168

Murray CJ, Vos T, Lozano R, et al (2012) Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 380:2197-2223

Piot P and Ebrahim S (2010) Prevention and control of chronic diseases. BMJ 341:c4865

Robine JM, Jagger C, Romieu I (2002) Selection of a Coherent Set of Health Indicators for the European Union. Phase II: Final report, Euro-Reves

Sullivan DF (1971) A single index of mortality and morbidity. HSMHA Health Reports 86:347-354

Verschuuren M, Gissler M, Kilpelainen K, Tuomi-Nikula A, Sihvonen AP, Thelen J, Gaidelyte R, Ghirini S, Kirsch N, Prochorskas R, Scafato E, Kramers P, Aromaa A (2013) Public health indicators for the EU: the joint action for ECHIM (European Community Health Indicators & Monitoring). Arch Public Health 71(1):12. doi: 10.1186/0778-7367-71-12

Wikman A, Marklund S, Alexanderson K (2005) Illness, disease, and sickness absence: an empirical test of differences between concepts of ill health. J Epidemiol Community Health 59:450-454

Zajacova A and Dowd JB (2011) Reliability of self-rated health in US adults. Am J Epidemiol 174:977-983

Table 1 Estimates[1] and reliability of a general question on self-reported chronic morbidity in HIS and census, population > 14 years, Belgium, 2001

	N	Prevalence self-reported chronic morbidity in HIS	Prevalence self-reported chronic morbidity in census[2]	Reliability
		% (95% CI)	% (95% CI)	Kappa (95% CI)
Gender				
Men	1,408	28.3 (25.2-31.6)	25.4 (22.0-29.2)	0.562 (0.527-0.598)
Women	1,463	28.4 (25.1-32.1)	27.2 (23.8-30.8)	0.555 (0.520-0.590)
Age				
15-24 yrs	358	12.7 (8.6-18.5)	10.1 (6.3-15.8)	0.456 (0.418-0.494)
25-44 yrs	1,083	18.2 (15.2-21.8)	13.1 (10.5-16.4)	0.506 (0.469-0.542)
45-64 yrs	839	32.7 (28.4-37.3)	31.4 (26.9-36.3)	0.540 (0.504-0.576)
65 + yrs	591	50.4 (43.9-56.9)	54.3 (47.1-61.4)	0.474 (0.437-0.511)
Self-rated health				
Very good to good	1,930	15.7 (13.3-18.5)	11.8 (9.5-14.5)	0.367 (0.329-0.407)
Moderate to bad	658	68.0 (63.0-72.5)	68.4 (63.5-73.0)	0.427 (0.389-0.465)
GHQ-score				
0-3	2,197	47.6 (40.1-55.1)	42.1 (34.6-49.9)	0.526 (0.488-0.565)
4 or more	341	24.7 (22.1-27.6)	22.5 (19.8-25.5)	0.631 (0.596-0.667)
Education				
Primary	475	39.4 (32.4-46.9)	49.4 (40.3-58.6)	0.563 (0.527-0.599)
Lower secondary	569	36.2 (30.3-42.5)	32.8 (26.8-39.3)	0.506 (0.469-0.544)
Higher secondary	784	23.7 (19.4-28.6)	19.1 (15.4-23.5)	0.590 (0.555-0.625)
Tertiary	929	21.3 (17.9-25.0)	16.2 (13.1-19.9)	0.523 (0.486-0.560)
Nationality				
Belgian	2,591	28.7 (26.1-31.4)	26.7 (23.9-29.8)	0.574 (0.539-0.609)
Non-Belgian	277	23.4 (17.3-30.9)	20.3 (14.4-27.8)	0.417 (0.379-0.456)
HIS respondent				
Selected person	2,755	28.2 (25.7-30.9)	25.8 (23.2-28.5)	0.559 (0.523-0.594)
Proxy	112	32.3 (19.1-49.2)	39.2 (23.7-57.2)	0.555 (0.519-0.590)
Total	2,871	28.4 (25.9-30.9)	26.3 (23.6-29.2)	0.559 (0.523-0.594)

[1] weighted percentages

[2] calculated among HIS respondents only

Table 2 Discrepancy in self-reported chronic morbidity among respondents (> 14 years) participating both in HIS and census during the same time period. Belgium, 2001 (total n* = 2.527)

	% discrepancy (95% CI)	OR inconsistent result versus consistent result (95% CI)**
Gender		
Men	18.8 (15.6-22.5)	1.00
Women	17.7 (14.9-20.8)	0.90 (0.66-1.23)
Age		
15-24 yrs	10.7 (6.6-16.8)	1.00
25-44 yrs	13.4 (10.8-16.6)	1.17 (0.64-2.14)
45-64 yrs	21.4 (17.5-25.9)	**1.98 (1.06-3.69)**
65 + yrs	27.2 (20.5-35.0)	**2.57 (1.29-5.12)**
Education		
Primary	25.6 (17.9-35.1)	1.30 (0.75-2.24)
Lower secondary	20.7 (16.6-25.6)	1.17 (0.79-1.74)
Higher secondary	16.2 (12.4-20.9)	0.96 (0.63-1.47)
Tertiary	14.6 (11.8-17.9)	1.00
Nationality		
Belgian	17.8 (15.5-20.5)	1.00
Non-Belgian	23.6 (17.0-31.7)	1.18 (0.70-1.98)
Self-rated health		
Very good to good	16.3 (13.6-19.5)	1.00
Moderate to bad	24.3 (20.3-28.9)	1.24 (0.83-1.86)
GHQ-score		
0-3	18.4 (15.8-21.3)	1.00
4 or more	16.6 (11.6-23.1)	0.84 (0.50-1.41)
Total	18.2 (16.0-20.7)	

* proxy interviews not included

**based on logistic regression adjusted for all other variables in the model

Table 3. Outcome of the literature review exploring the specificity of self-reported chronic diseases included in the list used in the HIS 2001 and the HIS 2004, compared to a gold standard

Paper	Gold standard	Disease[§]	Specificity
Ahluwalia IB. Tessaro I. Rye S. Parker L. Self-reported and clinical measurement of three chronic disease risks among low-income women in West Virginia. J Women's Health 2009;18(11):1857-62.	Clinical assessment	Hypertension	86.0%
Bombard JM. Powell KE. Martin LM. Helmick CG. Wilson WH. Validity and reliability of self-reported arthritis: Georgia Senior Centers. 2000-2001. Am J Prev Med 2005;28(3):251-8.	Clinical assessment	Arthritis	70.3%
Bowlin SJ. Morrill BD. Nafziger AN. Lewis C. Pearson TA. Reliability and changes in validity of self-reported cardiovascular disease risk factors using dual response: The behavioral risk factor survey. J Clin Epidemiol 1996;49(5):511-7.	Clinical assessment	Hypertension Diabetes	84.0% 98.0%
Brix TH. Kyvik KO. Hegedus L. Validity of self-reported hyperthyroidism and hypothyroidism: Comparison of self-reported questionnaire data with medical record review. Thyroid 2001;11(8):769-73.	Medical records	Hyperthyroidism Hypothyroidism	57.0% 67.0%
Brooks DR. Avetisyan R. Jarrett KM. Hanchate A. Shapiro GD. Pugh MJ. et al. Validation of self-reported epilepsy for purposes of community surveillance. Epilepsy Behav 2012 Jan;23(1):57-63.	Medical records	Epilepsy	99.2%
Carter K. Barber PA. Shaw C. How does self-reported history of stroke compare to hospitalization data in a population-based survey in New Zealand? Stroke 2010;41(11):2678-80.	Hospitalisation data	Stroke	98.0%
Engstad T. Bonaa KH. Viitanen M. Validity of self-reported stroke: The Tromso study. Stroke 2000;31(7):1602-7.	Clinical assessment	Stroke	99.0%
Espelt A. Goday A. Franch J. Borrell C. Validity of self-reported diabetes in health interview surveys for measuring social inequalities in the prevalence of diabetes. J Epidemiol Community Health 2012;66(7).	Clinical assessment	Diabetes	98.8%
Fowles JB. Fowler EJ. Craft C. Validation of claims diagnoses and self-reported conditions compared with medical records for selected chronic diseases. J Ambul Care Manage 1998;21(1):24-34.	Medical records	Asthma Cancer or tumor Chronic lung disease Diabetes Heart trouble or angina Hypertension Liver problems Stroke Sciatica or chronic back problem	99.0% 96.0% 98.0% 100.0% 97.0% 98.0% 100.0% 98.0% 98.0%
Giles WH. Croft JB. Keenan NL. Lane MJ. Wheeler FC. The validity of self-reported hypertension and correlates of hypertension awareness among blacks and whites within the stroke belt. Am J Prev Med 1995 May;11(3):163-9.	Clinical assessment	Hypertension	88.0–91.0%
Halabi S. Zurayk H. Awaida R. Darwish M. Saab B. Reliability and validity of self and proxy reporting of morbidity data: a case study from Beirut. Lebanon. Int J Epidemiol 1992 Jun;21(3):607-12.	Clinical assessment	Heart disease Hypertension Back pain	94.0-97.0% 81.0-92.0% 55.0-79.0%
Jin YP. Di LS. Ostbye T. Feightner JW. Saposnik G. Hachinski V. Is stroke history reliably reported by elderly with cognitive impairment? A community-based study. Neuroepidemiology 2010;35(3):215-20.	Clinical assessment	Stroke	97.0%
Linton KLP. Klein BEK. Klein R. The validity of self-reported and surrogate-reported cataract and age-related macular degeneration in the Beaver Dam Eye Study. Am J Epidemiol 1991;134(12):1438-46.	Clinical assessment	Cataract	> 90,0%

Paper	Gold standard	Disease[§]	Specificity
Machon M. Arriola L. Larranaga N. Amiano P. Moreno-Iribas C. Agudo A. et al. Validity of self-reported prevalent cases of stroke and acute myocardial infarction in the Spanish cohort of the EPIC study. J Epidemiol Community Health 2013 Jan;67(1):71-5.	Medical records	Stroke Acute myocardial infarction	99.6% 99.6-99.8%
Martin LM. Leff M. Calonge N. Garrett C. Nelson DE. Validation of self-reported chronic conditions and health services in a managed care population. Am J Prev Med 2000;18(3):215-8.	Medical records	Hypertension Diabetes	81.4% 99.3%
Menon C. Gipson K. Bowe WP. Hoffstad OJ. Margolis DJ. Validity of subject self-report for acne. Dermatology 2008;217(2):164-8.	Clinical assessment	Acne	72.0%
Muhajarine N. Mustard C. Roos LL. Young TK. Gelskey DE. Comparison of survey and physician claims data for detecting hypertension. J Clin Epidemiol 1997 Jun;50(6):711-8.	Clinical assessment	Hypertension	82.6%
Okura Y. Urban LH. Mahoney DW. Jacobsen SJ. Rodeheffer RJ. Agreement between self-report questionnaires and medical record data was substantial for diabetes. hypertension. myocardial infarction and stroke but not for heart failure. J Clin Epidemiol 2004 Oct;57(10):1096-103.	Medical records	Heart failure Diabetes Hypertension Myocardial Infarction Stroke	97.0% 99.7% 92.2% 98.2% 98.6%
Patty L. Wu C. Torres M. Azen S. Varma R. Validity of self-reported eye disease and treatment in a population-based study: The Los Angeles latino eye study. Ophthalmology 2012;119(9):1725-30.	Clinical assessment	Cataract	92.5% 96.3%
Reitz C. Schupf N. Luchsinger JA. Brickman AM. Manly JJ. Andrews H. et al. Validity of self-reported stroke in elderly African Americans. Caribbean Hispanics. and Whites. Arch Neurol 2009 Jul;66(7):834-40.	Magnetic Resonance Imaging (MRI)	Stroke	78.9%
Schneider ALC. Pankow JS. Heiss G. Selvin E. Validity and reliability of self-reported diabetes in the atherosclerosis risk in communities study. Am J Epidemiol 2012;176(8):738-43.	Clinical assessment	Diabetes	95.6-96.8%
Simpson CF. Boyd CM. Carlson MC. Griswold ME. Guralnik JM. Fried LP. Agreement between self-report of disease diagnoses and medical record validation in disabled older women: factors that modify agreement. J Am Geriatr Soc 2004 Jan;52(1):123-7.	Clinical assessment	Parkinson's disease Diabetes mellitus Cancer (any) Stroke Arthritis	100.0% 99.0% 98.0% 97.0% 45.0%
Stavrou E. Vajdic CM. Loxton D. Pearson SA. The validity of self-reported cancer diagnoses and factors associated with accurate reporting in a cohort of older Australian women. Cancer Epidemiol 2011 Dec;35(6):e75-e80.	Cancer registry	Cancer	96.9%
Taylor A. Grande ED. Gill T. Pickering S. Grant J. Adams R. et al. Comparing self-reported and measured high blood pressure and high cholesterol status using data from a large representative cohort study. Aust New Zealand J Public Health 2010;34(4):394-400.	Clinical assessment	Hypertension	>98.0%
Vargas CM. Burt VL. Gillum RF. Pamuk ER. Validity of self-reported hypertension in the National Health and Nutrition Examination Survey III. 1988-1991. Prev Med 1997;26(5 I):678-85.	Clinical assessment	Hypertension	90.0%
Wada K. Yatsuya H. Ouyang P. Otsuka R. Mitsuhashi H. Takefuji S. et al. Self-reported medical history was generally accurate among Japanese workplace population. J Clin Epidemiol 2009;62(3):306-13.	Clinical asessment	Hypertension Diabetes	95.9% 99.3%
Yoo KH. Johnson SK. Voigt RG. Campeau LJ. Yawn BP. Juhn YJ. Characterization of asthma status by parent report and medical record review. J Allergy Clin Immunol 2007;120(6):1468-9.	Medical records	Asthma	94.3%

[§] Only diseases which are included in the Belgian HIS2001 and the HIS2004 are considered

Table 4 Sensitivity of the global chronic morbidity measure, by self-rated health, HIS Belgium 2001-2004[1]

					Proportion (95% CI) [2]			
	Self-rated health	Cases	True +	False -	Crude		Adjusted for age. gender and the other diseases [3]	
Asthma	Good to very good	423	242	181	61.7	(54.7-68.2)	56.9	(50.5-63.3)
	Moderate to bad	472	381	91	81.5	(76.4-85.7)	83.9	(80.0-87.7)
	Total	895	623	272	71.6	(67.3-75.5)	69.7	(64.8-74.6)
Hypertension	Good to very good	1,466	482	984	30.2	(27.1-33.5)	27.8	(24.9-30.7)
	Moderate to bad	1,388	1017	371	72.0	(68.5-75.2)	60.3	(56.1-64.4)
	Total	2,854	1499	1355	49.9	(47.3-52.6)	40.1	(36.9-43.3)
Serious heart disease or heart attack	Good to very good	258	145	113	58.5	(49.5-66.9)	49.6	(42.3-57.0)
	Moderate to bad	648	547	101	83.3	(78.2-87.3)	79.5	(74.5-84.5)
	Total	906	692	214	75.9	(71.6-79.7)	67.4	(61.6-73.1)
Stroke and complications of stroke	Good to very good	35	17	18	63.7	(41.4-81.4)	53.5	(36.8-70.3)
	Moderate to bad	85	73	12	86.1	(75.0-92.8)	82.0	(71.9-92.0)
	Total	120	90	30	78.5	(67.5-86.5)	66.0	(52.4-79.7)
Diabetes mellitus	Good to very good	299	170	129	52.6	(43.0-62.0)	46.2	(38.6-53.9)
	Moderate to bad	489	411	78	80.1	(74.5-84.7)	77.2	(71.7-82.8)
	Total	788	581	207	69.5	(63.8-74.6)	61.2	(54.3-68.1)
Epilepsy	Good to very good	43	25	18	61.0	(42.2-77.1)	66.8	(53.2-80.3)
	Moderate to bad	65	60	5	94.6	(85.7-98.1)	88.8	(82.7-94.9)
	Total	108	85	23	80.1	(69.1-87.9)	80.2	(70.2-90.2)
Parkinson's disease	Good to very good	14	10	4	73.6	(35.2-93.5)	59.0	(34.0-84.1)
	Moderate to bad	61	57	4	90.4	(72.8-97.1)	85.0	(71.8-98.2)
	Total	75	67	8	87.2	(72.0-94.7)	75.7	(57.4-94.1)
Cataract	Good to very good	226	97	129	40.4	(32.0-49.3)	36.0	(28.7-43.4)
	Moderate to bad	344	281	63	81.2	(74.7-86.3)	69.0	(61.9-76.0)
	Total	570	378	192	65.0	(59.2-70.3)	48.0	(40.4-55.5)
Glaucoma	Good to very good	192	77	115	36.2	(26.8-46.8)	32.8	(25.4-40.1)
	Moderate to bad	275	218	57	77.3	(69.6-83.5)	65.8	(58.2-73.4)
	Total	467	295	172	57.2	(50.1-64.1)	44.7	(36.7-52.6)
Cancer	Good to very good	84	50	34	63.9	(47.2-77.8)	52.0	(40.9-63.0)
	Moderate to bad	210	180	30	82.1	(72.4-88.9)	81.0	(74.1-87.9)
	Total	294	230	64	76.6	(68.8-82.9)	69.5	(61.4-77.6)

[1] proxy interviews not included

[2] weighted proportions, taking into account the survey design effects

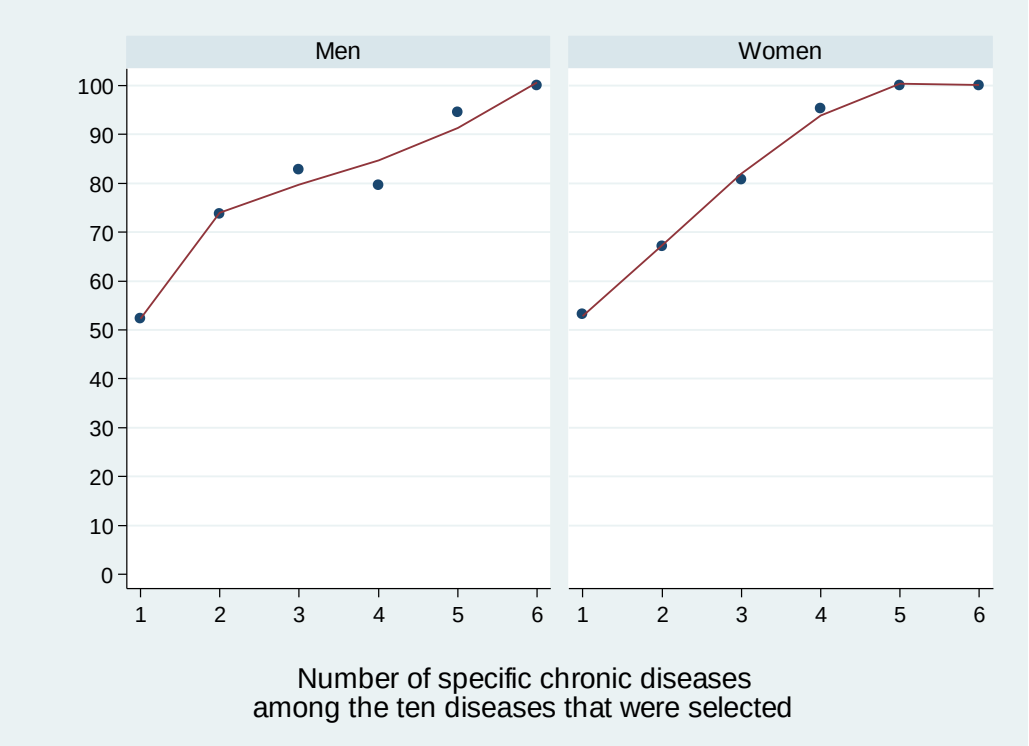
[3] adjustment based on a logistic regression model including age. gender and the listed diseases

Table 5 Factors associated with the sensitivity of the global chronic morbidity measure[§], results from a logistic regression analysis – Health Interview Survey Belgium, 2001-2004 (total n = 4.090)

Factor	OR (95% CI)
Gender (reference: men)	
Women	0.86 (0.72-1.03)
Age (reference: 15-24 yrs)	
25-44 yrs	1.27 (0.74-2.20)
45-64 yrs	1.17 (0.70-1.94)
65 + yrs	1.43 (0.85-2.40)
Education (reference : tertiary)	
Primary	0.81 (0.61-1.08)
Lower secondary	0.88 (0.67-1.16)
Higher secondary	0.87 (0.67-1.13)
Nationality (reference: Belgian)	
Non-Belgian	**0.60 (0.41-0.86)**
Self-rated health (reference: very good to good)	
Moderate to bad	**3.85 (3.17-4.69)**
GHQ-score (reference : 0-3)	
4 or more	**1.34 (1.02-1.75)**
Year (reference: 2001)	
2004	0.93 (0.77-1.13)
Disease (reference: absence of indicated disease)	
Asthma	**3.25 (2.39-4.42)**
Hypertension	0.99 (0.79-1.26)
Serious heart disease or heart attack	**2.50 (1.85-3.36)**
Stroke	**2.98 (1.53-5.81)**
Diabetes	**2.30 (1.69-3.11)**
Epilepsy	**4.70 (2.41-9.16)**
Parkinson's disease	**3.30 (1.18-9.27)**
Cataract	**1.42 (1.02-1.97)**
Glaucoma	1.24 (0.89-1.72)
Cancer	**2.74 (1.69-4.44)**

[§]Suffering from at least one of the following specific chronic diseases: asthma, serious heart diseases, hypertension, stroke, cancer, diabetes , Parkinson's disease, epilepsy, cataract, glaucoma

Figure 1 Sensitivity of the global chronic morbidity measure in function of the number of reported specific chronic diseases



Erratum to: Reliability and validity of a global question on self-reported chronic morbidity
Johan Van der Heyden, Dirk De Bacquer, Jean Tafforeau, Koen Van Herck

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Results

The original version of this article unfortunately contained a mistake. The prevalences reported by GHQ-score category in Table 1 were swabbed. The corrected Table 1 is given below.

Table 1 Estimates[1] and reliability of a general question on self-reported chronic morbidity in HIS and census, population > 14 years, Belgium, 2001

	N	Prevalence self-reported chronic morbidity in HIS	Prevalence self-reported chronic morbidity in census[2]	Reliability
		% (95% CI)	% (95% CI)	Kappa (95% CI)
Gender				
Men	1,408	28.3 (25.2-31.6)	25.4 (22.0-29.2)	0.562 (0.527-0.598)
Women	1,463	28.4 (25.1-32.1)	27.2 (23.8-30.8)	0.555 (0.520-0.590)
Age				
15-24 yrs	358	12.7 (8.6-18.5)	10.1 (6.3-15.8)	0.456 (0.418-0.494)
25-44 yrs	1,083	18.2 (15.2-21.8)	13.1 (10.5-16.4)	0.506 (0.469-0.542)
45-64 yrs	839	32.7 (28.4-37.3)	31.4 (26.9-36.3)	0.540 (0.504-0.576)
65 + yrs	591	50.4 (43.9-56.9)	54.3 (47.1-61.4)	0.474 (0.437-0.511)
Self-rated health				
Very good to good	1,930	15.7 (13.3-18.5)	11.8 (9.5-14.5)	0.367 (0.329-0.407)
Moderate to bad	658	68.0 (63.0-72.5)	68.4 (63.5-73.0)	0.427 (0.389-0.465)
GHQ-score				
0-3	2,197	24.7 (22.1-27.6)	22.5 (19.8-25.5)	0.526 (0.488-0.565)
4 or more	341	47.6 (40.1-55.1)	42.1 (34.6-49.9)	0.631 (0.596-0.667)
Education				
Primary	475	39.4 (32.4-46.9)	49.4 (40.3-58.6)	0.563 (0.527-0.599)
Lower secondary	569	36.2 (30.3-42.5)	32.8 (26.8-39.3)	0.506 (0.469-0.544)
Higher secondary	784	23.7 (19.4-28.6)	19.1 (15.4-23.5)	0.590 (0.555-0.625)
Tertiary	929	21.3 (17.9-25.0)	16.2 (13.1-19.9)	0.523 (0.486-0.560)
Nationality				
Belgian	2,591	28.7 (26.1-31.4)	26.7 (23.9-29.8)	0.574 (0.539-0.609)
Non-Belgian	277	23.4 (17.3-30.9)	20.3 (14.4-27.8)	0.417 (0.379-0.456)
HIS respondent				
Selected person	2,755	28.2 (25.7-30.9)	25.8 (23.2-28.5)	0.559 (0.523-0.594)
Proxy	112	32.3 (19.1-49.2)	39.2 (23.7-57.2)	0.555 (0.519-0.590)
Total	2,871	28.4 (25.9-30.9)	26.3 (23.6-29.2)	0.559 (0.523-0.594)

[1] weighted percentages

[2] calculated among HIS respondents only