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The validity of self-reported use of health care across socioeconomic strata: a comparison of survey and registration data

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Background	Socioeconomic differences in health and in use of health care are well known. Most data on socioeconomic differences in health care utilization are based on retrospective self-report in community surveys, but the evidence on the validity of self-reported utilization of health care across socioeconomic groups is limited. The aim of this study was to assess the validity of self-reported utilization of health care across socioeconomic groups in the general population.
Methods	We compared the concordance of self-reported and registered hospitalization (one year, n = 1277), and utilization of physiotherapy (one year, n = 1302) and use of prescription drugs (3 months, n = 899), by socioeconomic group (educational level, income, occupational status). Data came from a face-to-face health interview survey in Amsterdam and a health insurance register, and were limited to native Dutch and lower and middle income groups.
Results	Concordance between reported and registered utilization was generally good to excellent; kappas (agreement adjusted for chance agreement) and percentage accurately reporting ranged from 0.60 and 80% (drugs) to 0.80 and 96% (hospitalization). They differed little, and without statistical significance, between people of low socioeconomic status and others. Assessment of socioeconomic groups in more detail yields somewhat more variation, but no systematic trend in concordance by higher socioeconomic status.
Conclusion	Self-report offers a reasonably valid estimate of differences in utilization of health care between socioeconomic groups in the general population, at least for lower and middle income groups.

Keywords	Socioeconomic status, health care, health surveys, reproducibility of results, validation study
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Socioeconomic (SE) differences in health[1–7] and in use of health care[8–19] are well known. In most countries people of low socioeconomic status (SES) have poorer health and higher mortality whereas their utilization of health care may be either higher or lower, depending on country and type of care. Van der Meer summarizes the available evidence on industrialized countries, which shows a clear distinction between the US and other countries such as Canada, Norway, the UK and the Netherlands.[15] In the US, people of high SES have relatively more physician contacts, whereas people of low SES visit the emergency room more frequently. In the other countries, people of low SES visit primary care physicians relatively frequently, which is partly due to their poorer health status. As for more specialized care, people of low SES mostly use it less than others, especially when taking their (poorer) health status into account. Most recent data generally confirm this pattern,[9,14,16,18] although in the UK emergency admissions also seem to occur relatively frequently among deprived people,[17] and in some studies (in Canada and the Netherlands Antilles) health status more or less accounts for SE differences in general practitioner (GP) utilization.[12,13,19]

Most data on SE differences in health care utilization are based on retrospective self-report in community surveys,[9,12,13,18,19] with a possible risk that SE differences in recall and reporting

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may affect comparisons of utilization across SE groups. Suppose, for instance, that the recall of people of low SES is poorer or that they consider their utilization to be socially undesirable. Both may result in underreporting. An actually higher utilization among low SES people would then remain hidden or an actually similar utilization across SE groups would result in a lower self-reported utilization among low SES groups.

Evidence on the validity of self-reported utilization of health care across SE groups is limited.[18,20–24] The available studies mostly used predefined cohorts in which utilization had already been registered and self-reported use of health care was investigated retrospectively.[20–24] The remainder are confined to specific groups or specific types of care.[18,22,24,25] No studies are available on the validity of self-reported utilization of various types of health care across SE groups in the general population. This study therefore examines the validity by comparing data on utilization from a survey with data from registration in a general population sample and across several types of care.

Methods

This study is based on linkage of data from a previously performed survey and a health insurance fund (HIF) register, in Amsterdam, the Netherlands, and is restricted to respondents born in the Netherlands.

Subjects

The survey covered a random sample of the Amsterdam population register consisting of residents aged ⩾16 years, excluding people living in institutions. Registration in this population register is obligatory. The present study concerns respondents who were born in the Netherlands, could be linked to an HIF record and had HIF insurance for the entire study period (1992 and 1993) (Figure 1). They were personally asked by trained interviewers about their health and use of health care in the 3 or 12 months preceding the interview. Details of fieldwork,[26–28] non-response,[27,29] and linkage procedure[29,31] have been reported previously.

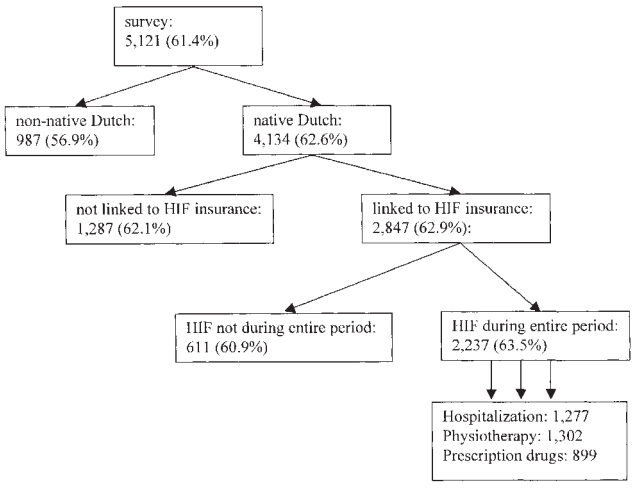

Figure 1 Number of people excluded in each step of the procedure (original sample: 8335 people; response rates per group between brackets)

Respondents who had been born outside the Netherlands were excluded because a previous study showed that concordance between registration and self-report tends to be lower among non-native respondents. This may be explained by cultural differences and language problems.[30] Inclusion of non-native respondents would therefore confound the present analysis on SE differences, especially as they mostly belong to the low SES group.[27]

As HIF insurance is obligatory for and limited to those with (relatively) lower incomes (for the whole of the Netherlands this applies to 63% of the population, for Amsterdam to 66%), the analyses are limited to the lower and middle income groups. There were only two reasons for insurance by a particular HIF to be stopped: movement out of its catchment area or an increase in income. The number of people excluded at each step as well as the associated response percentages are presented in Figure 1.

Data

The data on health care utilization concerned the types of care on which information could be extracted from the HIF register, were fully covered by it, and were quite common (prevalence >5%). Moreover, they had to be mentioned in the survey in the same way as they were registered by the HIF. (Overnight) hospitalization and use of (ambulatory) physiotherapy in the year preceding the interview met these criteria, as did the use of prescription drugs by the interviewed men in the 3 months preceding the interview. (Use of GP care was asked about in the survey but the number of contacts with GPs was not registered by the HIF, due to the fact that Dutch GPs receive a yearly remuneration for HIF insured patients irrespective of the number of visits). The questions included in the interview are shown in the Appendix. Information was extracted from the register data for the same period as covered by the interviews. However, even then time frames may differ somewhat. For instance, people may use prescription drugs at some time after they were provided.

For all three types of care, the analysis was limited to people who responded to the questions in the interview (in all cases: >98%); regarding registered data, no missing values occurred. The analyses regarding hospitalization and use of physiotherapy were restricted to people interviewed in 1993, as the information from the HIF did not cover 1991 (and that year was included if we looked back one year from 1992). Furthermore, with regard to hospitalization, women who had given birth to a child in the preceding year (n = 13) were excluded because short-term overnight stays in maternity clinics were not registered as hospitalizations but had been asked about as such in the survey. For prescription drugs, the analysis was restricted to men because oral contraceptives had not been asked about in the survey and could not always be identified as separate drugs in the HIF register. The remaining numbers of respondents for each type of care are presented in Figure 1 and Table 1.

Socioeconomic status was measured by its traditional indicators: income, occupational status and educational level.[32,33] In most analyses, we dichotomized categories of each indicator by comparing the most unfavourable category with all others. In this way, we tried to maximize the power of our study to detect a lower validity of self-report among people of low SES (among whom we expected a lower validity to be most likely), and to limit the number of comparisons.

Table 1 Estimated utilization rates (95% CI) of hospitalization, physiotherapy and prescription drugs on the basis of registration data and of self-report and concordance between registration and self-report

	Educational level				Income				Occupational status				Overall	
	Primary school		Higher		Social minimum		Higher		Semi- or unskilled		Higher			
	Est.	(95% CI)	Est.	(95% CI)	Est.	(95% CI)	Est.	(95% CI)	Est.	(95% CI)	Est.	(95% CI)	Est.	(95% CI)
Hospitalization (one year)														
Reported prevalence of use (%)	12.9	(10.1–15.8)	10.3	(8.0–12.6)	14.7	(11.3–18.2)	10.7	(8.4–12.9)	12.6	(9.0–16.1)	11.3	(9.1–13.6)	11.5	(9.8–13.3)
Registered prevalence of use (%)	11.3	(8.7–14.0)	7.7	(5.7–9.7)	11.1	(8.0–14.1)	8.9	(6.8–10.9)	10.8	(7.5–14.1)	8.5	(6.6–10.5)	9.4	(7.8–11.0)
Kappa[a]	0.78	(0.69–0.86)	0.81	(0.73–0.89)	0.81	(0.73–0.90)	0.77	(0.69–0.85)	0.77	(0.66–0.88)	0.77	(0.70–0.85)	0.80	(0.74–0.85)
Accurate, over- and underreporting (%)		95.2/3.2/1.6		96.9/2.9/0.3		95.8/3.9/0.2		96.0/2.9/1.1		95.2/3.3/1.5		95.9/3.4/0.7		96.2/3.0/0.9
No.[b]	564		699		407		723		334		761		1277	
Physiotherapy (one year)														
Reported prevalence of use (%)	26.3	(22.5–30.2)	21.8	(18.7–24.8)	23.9	(19.8–28.0)	22.3	(19.3–25.3)	25.3	(20.6–29.9)	21.8	(18.9–24.7)	23.7	(21.3–26.0)
Registered prevalence of use (%)	26.0	(22.2–29.8)	19.4	(16.5–22.3)	23.2	(19.1–27.3)	20.1	(17.2–23.0)	23.5	(19.0–28.0)	20.6	(17.8–23.5)	22.3	(20.0–24.5)
Kappa[a]	0.71	(0.65–0.78)	0.70	(0.64–0.77)	0.71	(0.63–0.79)	0.71	(0.64–0.77)	0.69	(0.60–0.78)	0.72	(0.66–0.78)	0.71	(0.66–0.76)
Accurate, over- and underreporting (%)		88.9/5.7/5.4		90.3/6.0/3.7		89.6/5.6/4.8		90.2/6.0/3.8		88.7/6.5/4.8		90.6/5.3/4.1		89.7/58/4.5
No.[b]	577		712		414		735		336		776		1302	
Prescription drugs (3 months)														
Reported prevalence of use (%)	60.3	(54.7–65.8)	47.5	(43.5–51.6)	61.9	(55.9–68.0)	50.1	(45.9–54.3)	53.0	(46.1–60.0)	51.0	(47.0–54.9)	52.2	(48.9–55.5)
Registered prevalence of use (%)	61.6	(56.1–67.1)	44.0	(40.0–48.0)	57.5	(51.3–63.7)	47.7	(43.6–51.9)	53.0	(46.1–60.0)	48.9	(45.0–52.8)	49.8	(46.5–53.1)
Kappa[a]	0.55	(0.45–0.64)	0.62	(0.55–0.68)	0.59	(0.49–0.69)	0.59	(0.52–0.66)	0.51	(0.39–0.63)	0.64	(0.57–0.70)	0.60	(0.55–0.65)
Accurate, over- and underreporting (%)		78.5/10.1/11.4		80.9/11.3/7.8		80.2/12.1/7.7		79.6/11.4/9.0		75.8/12.1/12.1		81.7/10.2/8.1		79.9/11.2/8.9
No.[b]	297		591		247		553		198		630		899	

[a] None of the differences in kappa by socioeconomic position is statistically significant (all $P > 0.05$).

[b] Number of people included in the analysis; numbers across categories of an indicator of socioeconomic status (SES) do not add up to the total number at 'Overall' because of missing values.

Income was defined as household income at four levels, adjusted for household size (single person equivalents: <Dfl 1400; Dfl 1400–1899; Dfl 1900–2749; >Dfl 2750); in most analyses this was dichotomized as: social minimum or below (<Dfl 1400 for 1 person, <Dfl 1900 for ≥2)/higher. Occupational status was measured using present or last occupation of people classified into five groups (un/semiskilled manual; skilled manual; farmer/self-employed; routine non-manual; professionals/managers);[34] it was dichotomized as: semi- or unskilled work/higher. Educational level referred to the highest level reached and was classified into four groups (≤basic education/junior secondary or vocational/senior secondary or vocational/vocational colleges or university);[33] it was dichotomized as: only primary education/higher.

Analysis

Socioeconomic differences in the validity of self-reported use of health care were estimated by comparing SE groups regarding utilization rates on the basis of self-report and of registration, and regarding concordance of self-report and registration. The latter was measured by (Cohen's) kappa (agreement adjusted for chance agreement)[35,36] and the proportions of actual agreement.[37] In these comparisons, the lowest SE group was compared with all others.

Next, all the analyses were repeated using hierarchical log-linear analyses, because of the sensitivity of kappa for differences in prevalence.[38–40] All log-linear models included reported and registered use of health care, and SES. Socioeconomic differences in the concordance of reported and registered use of health care were measured by the second order interaction term between these variables and SES, in models already containing all main effects and first order interactions.[38,39,41] Subsequently, the most parsimonious models were selected in an exploratory backward elimination process (with *P*-out set at 0.05). These analyses were performed for the dichotomized indicators of SES and for the more detailed categorizations.

Third, we computed kappas between odds ratios (OR) for reported and registered utilization including all categories of the combinations of SE indicators and types of care for which the previous analysis yielded statistically significant results.

Finally, we computed OR for utilization by each (detailed) SES measure, on the basis of both self-report and registration. All analyses were performed with the SPSS 10.0 for Windows statistical package.[42]

Results

The differences between utilization rates on the basis of self-report and of registration were similar for all SE groups studied, although self-report was generally higher (Table 1). The overall concordance between reported and registered use of care was good to excellent[35] for all three types of care: kappa varied from 0.60 to 0.80. Regarding hospitalizations and physiotherapy, kappas were very similar across SE groups. Regarding prescription drugs, however, they were somewhat lower for respondents of low educational and occupational status, but without statistical significance.

Hierarchical log-linear analyses regarding the dichotomized indicators of SES gave results broadly similar to those for kappa. Inclusion of more detailed categorizations of SES in these models yielded similar results except in one case. Regarding hospitalization, the second order interaction with occupational status in five levels contributed to the model ($P = 0.025$). Regarding this combination, kappa was relatively low for the 'skilled manual workers' category and the ratio of reported versus registered utilization also differed from all the others. Furthermore, occupational status contributed to the prediction of hospitalization in the crude model for reported use whereas it did not for registered use (Table 2).

The OR for utilization by each (detailed) SES measure, also differed relatively little between self-report and registration and there was no systematic trend regarding differences in OR across SE categories. As an example of these differences, we therefore only present OR comparing the lowest with the highest level and the ratio of the OR based on self-report and registration, and overall *P*-values (Table 3). In two instances, SES contributed to the prediction of registered utilization, but in no case of reported utilization. Comparisons of the lowest SE category with all others yielded similar results. However, differences between OR regarding self-report and registration were smaller (range of

Table 2 Concordance between registration and self-report estimated by Cohen's kappa, and odds ratios (OR, 95% CI) for reported and registered utilization, regarding hospitalization by occupational level

				Reported				Registered				Ratio of OR	
				Crude		Age/gender adjusted		Crude		Age/gender adjusted		(Reported/registered)	
Occupational level	**No.[a]**	**Kappa**	**(95% CI)**	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	Crude	Adjusted
Un/semiskilled manual workers	334	0.77	(0.66–0.88)	0.83	(0.50–1.39)	0.84	(0.47–1.49)	0.97	(0.55–1.72)	0.94	(0.50–1.79)	0.86	0.89
Skilled manual workers	190	0.65	(0.49–0.81)	1.09	(0.61–1.95)	1.21	(0.65–2.25)	0.91	(0.46–1.80)	0.98	(0.47–2.02)	1.20	1.24
Self-employed (including farmers)	158	0.75	(0.60–0.90)	0.47	(0.25–0.89)	0.54	(0.27–1.08)	0.53	(0.26–1.07)	0.62	(0.29–1.34)	0.88	0.87
Routine non-manual workers	227	0.83	(0.68–0.98)	0.55	(0.28–1.04)	0.72	(0.36–1.43)	0.66	(0.32–1.33)	0.90	(0.43–1.91)	0.83	0.80
Professionals and managers	186	0.93	(0.83–1.00)	1		1		1		1			
P-value for addition of SES[b]					0.033		0.150		0.258		0.745		

[a] No. of people included in the analysis.

[b] Socioeconomic status.

Table 3 Odds ratios (OR, 95% CI) for utilization of the lowest socioeconomic (SE) category compared to the highest (detailed) one, after adjustment for differences in age and gender

	Educational level		Income		Occupational status	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Hospitalization (one year)						
OR (95% CI) reported utilization	1.37	(0.57–3.31)	1.23	(0.56–2.68)	1.17	(0.62–2.20)
OR (95% CI) registered utilization	1.20	(0.46–3.13)	1.11	(0.45–2.74)	1.04	(0.53–2.07)
Ratio of reported/registered OR	1.14		1.11		1.12	
P-value reported[a]	0.465		0.418		0.164	
P-value registered[a]	0.452		0.819		0.710	
Physiotherapy (one year)						
OR (95% CI) reported utilization	0.91	(0.54–1.54)	1.24	(0.69–2.23)	0.90	(0.58–1.40)
OR (95% CI) registered utilization	1.07	(0.61–1.89)	0.91	(0.50–1.66)	0.84	(0.53–1.34)
Ratio of reported/registered OR	0.85		1.36		1.06	
P-value reported[a]	0.531		0.346		0.556	
P-value registered[a]	0.694		0.481		0.022	
Prescription drugs (3 months)						
OR (95% CI) reported utilization	1.40	(0.80–2.43)	1.43	(0.79–2.58)	1.22	(0.78–1.93)
OR (95% CI) registered utilization	2.49	(1.40–4.42)	1.09	(0.61–1.96)	1.24	(0.79–1.95)
Ratio of reported/registered OR	0.56		1.31		0.99	
P-value reported[a]	0.148		0.357		0.783	
P-value registered[a]	0.000		0.701		0.791	

[a] *P*-values for the inclusion of *all* categories of the (detailed) socioeconomic status (SES) measures into a logistic model already containing age, gender, and their interaction (likelihood ratio test).

ratios: 0.77–1.22) and SES did not contribute to the prediction of utilization.

Discussion and Conclusion

The results of our study show that the concordance between reported and registered utilization of health care is generally good to excellent and differs relatively little between people of low SES and others (i.e. the lower and middle income groups). If SE groups are assessed in more detail, differences in concordance are still mostly without statistical significance and systematic trends, though variation is somewhat larger.

Our results indicate that self-report offers a reasonably valid estimate of SE differences in utilization of health care, though it may add some measurement error if one compares it with registration data and may yield somewhat different risk estimates. Concordance between self-report and registration is rather similar across SE categories and does not vary more than could be expected on the basis of chance. Perfect agreement can seldom be expected because of real differences between the phenomena that are reported and registered. For instance, the provision of a prescribed drug does not imply its immediate use and the reverse also applies. Regarding physiotherapy, registration of payment for a treatment does not always correspond with actual use. This probably also contributes to the generally higher utilization of care on the basis of self-report that we found. However, imperfect recall probably lowers concordance too, especially if it concerns a less intrusive type of care. The relatively low kappas for prescription drugs offer some indication for this, as such use of drugs has almost certainly less impact than a hospitalization. Other, spurious, causes of a lower concordance, such as erroneous linkage and incomplete registration are unlikely.[30]

The results of most other studies fit with our results regarding the fairly high concordance between self-reported and registered use of medical and of hospital care among the general population.[20–23] Regarding hospitalization in New Zealand, Norrish *et al*. found no differences in recall of admissions during a 4-year period by social class.[20] In the US, Roberts *et al*. generally found high agreement between self-report and registration over a one-year period without differences by SES.[21] Also in the US, Weissman *et al*. did not find differences by SES either.[22] Finally, Bergmann *et al*. assessed the validity of self-reported diagnoses associated with hospitalization, again in the US.[23] They report better validity among those with a high educational level but do not present data regarding overall utilization rates.

Contrary to our health survey, the majority of these studies were prospective or concerned at least predefined cohorts.[20–24] The validity of self-report may in general be expected to be better in this case, as people have volunteered to participate in a more demanding design. The reverse of this is that the response rate in our study was only 61.4%. This may have influenced our results, for instance because the least motivated people did not respond at all but would have been discordant more often if they had been respondent. However, a formal analysis of the non-response in this study does not show major differences in utilization and in the association of utilization with background characteristics between respondents and non-respondents.[29]

Only Cleary and Jette,[25] and Bellon and coworkers[18] have compared registered data on health care utilization with self-report from cross-sectional studies among the general population. Cleary and Jette found that in the US the reporting errors regarding use of outpatient medical care in the preceding year were inversely associated with income but not with educational level and occupational status, in a study of 908 people. After adjustment for age, the association with income disappeared.[25]

Bellon and coworkers assessed the validity of self-reported utilization of primary care over a range of reporting periods (2 weeks–1 year) among 656 people in Spain. They found that this was not associated with employment status, although both the under- and overreporting was somewhat higher for those without schooling (though in only one out of the eight combinations that they assessed with statistical significance).[18] Bellon *et al.*,[18] as well as Glandon *et al.*,[24] and Cleary and Jette,[25] found some tendency for overreporting among people with a poor health status. This might have contributed to a lower concordance among those with low SES (as these people more often have a poor health status), and offer an explanation for this, but its overall effect appeared to be limited. Evidence on the other types of care studied, such as physiotherapy and further use of prescription drugs, is completely lacking.

Our study covered native Dutch with HIF insurance only, which may have influenced our results in two ways. Firstly, this may explain the relatively small SE differences in utilization, smaller than those found in previous Dutch studies, because of three mechanisms.[11,43] As mentioned earlier, HIF insurance covers lower and middle income groups, i.e. the lowest 63% of incomes in the Netherlands. Thus, the variation in income in our study is about half of that in the total Dutch population: in 1998, the mean yearly net incomes of households in the 1st (the lowest), 6th, and 10th (the highest) decile of the Dutch income distribution were about Dfl 9000, 49 000, and 112 000, respectively.[44] If utilization decreases as income increases, this will lead to smaller SE differences in our study than in previous ones. Next, type of insurance is associated both with income and with utilization.[43,45,46] It partially mediates the relation of the latter in the Netherlands, in such a way that SE differences are largest if type of insurance is not adjusted for.[43,45,46] Finally, non-native Dutch mostly have a low SES and use some types of care relatively frequently.[27,31] Because of these factors, SE differences in utilization may be expected to be smaller in this study than in previous ones.[43,45,46]

The second question, because of the restriction of our study to native Dutch with HIF insurance, is whether our results can be generalized to other studies on SE differences in utilization of care. With regard to the range of incomes that are included, our study shows no systematic differences in concordance by increasing SES, over quite a broad range of incomes. This makes it rather unlikely that concordance will be better for higher income groups, but we cannot rule this out. Regarding country of birth, the results as presented are limited to native Dutch. Previous analyses have shown a somewhat lower concordance among some non-native Dutch in our original sample, especially among Turks and Moroccans.[30] If these had been included in the present analysis study, concordance would have been lower among the low SES group, because of the lower mean SES of this group. Regarding the generalizability of our results, however, the proportion of immigrants is much higher in the population of Amsterdam than in the general population of any large country in the European Union or the US (for instance, in 1995, 27% of the population of Amsterdam was born outside the Netherlands, and 9% of the total Dutch population).[27] Therefore, results covering only the native Dutch can be generalized better to these countries than if non-natives had been included, even though this leads to the exclusion of a part of our original sample, however, it covers only the lower and middle income groups.

In conclusion, self-reports in population health surveys mostly appear to give valid estimates of SE differences in utilization of health care. This conclusion is corroborated by the findings from the single community-based study that assessed differences across SE groups in utilization, based on registered utilization and self-reported SES.[14] This study found very similar results to a previous, also Canadian, community-based study that was based on self-reported utilization and SES.[9] Its results also fit into the picture of previous studies on specific groups and types of care.[18,20–25] Future studies are needed to confirm the validity across SE groups of self-reported utilization of various types of care in general population samples from other countries, and across the entire income range.

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KEY MESSAGES

- Socioeconomic differences in self-reported use of health care are well known.
- Evidence on the validity of self-reported utilization of health care across socioeconomic groups is limited.
- This study shows that concordance between reported and registered utilization is generally good to excellent, for native Dutch with low or middle incomes.
- For these people, concordance differed little between those with a low socioeconomic status and others.
- Self-report offers a reasonably valid estimate of differences in utilization of health care between socioeconomic groups, at least for lower and middle income groups.

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Appendix

Questions included in the interview

Have you been admitted to a hospital during the preceding year (i.e. the past 12 months)? [no/yes] If yes, how often? [number of times]

Have you used the following services in the past year (i.e. the past 12 months)? A physiotherapist or masseur (not counting hospital admissions). [no/yes] If yes, how often? [number of times]

Have you taken any medication prescribed by a doctor (other than the 'pill') in the past three months? [no/yes]