Inconsistencies in self-reported health conditions: results of a nationwide panel study

Heidi Amalie Rosendahl Jensen[1] · Michael Davidsen[1] · Anne Illemann Christensen[1] · Ola Ekholm[1]

Introduction

Self-reported data on health conditions are frequently used in epidemiological studies since such information often cannot be gathered by other means (Barber et al. 2010). Thus, it is of utmost importance that surveys provide accurate and reliable estimates. Previous studies have indicated that inconsistencies in self-reported morbidity over time vary across health conditions (Beckett et al. 2000; Klabunde et al. 2005; Cigolle et al. 2018). However, the studies are few and have mainly been carried out in specific populations, which makes it difficult to generalize to the entire adult population. The aim of the study was to examine the inconsistencies in 18 health conditions using data from two surveys 4 years apart.

Methods

The Danish Health and Morbidity Surveys have been carried out regularly since 1987, aiming to describe the status and trends in health and morbidity in the adult Danish population and factors that influence health status (Jensen et al. 2019). In 2013, a random sample of 25,000 adults (≥ 16 years) were drawn using the Danish Civil Registration System (Pedersen 2011). All invited individuals were sent a postal questionnaire, but it was also possible to complete an identical Web questionnaire. In all, 14,265 individuals (response rate: 57%) completed the self-administered questionnaire. A nationally representative

subsample of 3147 respondents were re-invited to the survey wave in 2017 using the same methods as in 2013. A total of 161 were lost to follow-up due to death or emigration and 689 were lost due to non-response, leaving 2297 individuals, out of which 59.5% preferred the paper questionnaire in 2013. In both waves, health problems were assessed with a standard checklist that included the health conditions shown in Table 1 (in the same order as presented). The three possible response categories were: 'No, I have never had this'; 'Yes, I have this now'; and 'Yes, I have had this previously.'

Two types of inconsistencies were examined. The first type of inconsistent response was defined as when a respondent answered affirmatively to currently (i.e., in 2013) having a health condition, but then reporting never having had the condition in the subsequent wave. The second type of inconsistent response was defined as when a respondent answered affirmatively to currently having or previously had a health condition, but then reporting never having had this condition in the subsequent wave. The inconsistencies are presented as percentages with 95% confidence intervals (CI). The confidence intervals were calculated using the Wilson score method. Both surveys were approved by the Danish Data Protection Agency.

Results

Table 1 shows the baseline characteristics of the individuals who completed the questionnaire in both survey waves. The most prevalent (current) health conditions at baseline were osteoarthritis (21.1%), allergy (21.0%) and hypertension (20.6%). These three health conditions, together with migraine or frequent headache, were also the most prevalent conditions when looking at the lifetime

✉ Ola Ekholm
  oek@sdu.dk

[1] National Institute of Public Health, University of Southern Denmark, Studiestræde 6, 1455 Copenhagen K, Denmark

Table 1 Baseline characteristics of the study population (*n* = 2297) (Denmark, 2013–2017)

	Current prevalence (%)	Women (%)[a]	Mean age (SD)[a]	Lifetime prevalence (%)[b]	Women (%)[a]	Mean age (SD)[a]
Asthma	6.3	62.3	50.2 (16.3)	12.5	62.6	46.8 (16.8)
Allergy	21.0	58.8	46.4 (15.2)	30.5	59.6	47.3 (15.5)
Diabetes	5.6	41.1	65.2 (10.5)	6.4	43.1	63.3 (12.2)
Hypertension	20.6	49.6	63.8 (10.7)	28.1	49.4	61.9 (12.6)
Myocardial infarction	0.3			2.7	23.1	67.0 (12.2)
Angina pectoris	0.9			3.1	38.3	62.7 (13.7)
Stroke	0.3			2.7	49.2	64.0 (12.5)
Chronic obstructive pulmonary disease	3.6	47.9	64.6 (9.2)	4.8	50.0	62.8 (10.9)
Osteoarthritis	21.1	60.5	61.4 (11.4)	22.6	58.7	61.7 (11.6)
Rheumatoid arthritis	4.6	50.6	56.7 (13.0)	5.4	51.0	56.1 (14.0)
Osteoporosis	3.1	80.3	67.7 (9.0)	3.6	78.6	66.4 (10.8)
Cancer	0.9			6.0	62.1	60.8 (13.3)
Migraine or frequent headache	11.9	69.3	45.3 (14.7)	24.2	69.4	47.9 (15.9)
Mental disorder < 6 months	2.2	70.7	42.4 (16.5)	8.0	68.2	46.9 (16.9)
Mental disorder > 6 months	4.5	68.6	44.7 (15.3)	8.6	70.7	45.6 (16.3)
Herniated disk or other back disorder	8.5	49.1	54.8 (12.6)	17.8	48.7	56.7 (13.4)
Cataract	3.6	57.1	69.0 (12.0)	8.6	55.1	70.4 (11.6)
Tinnitus (howling or singing in the ears)	13.3	35.4	56.3 (14.8)	15.5	37.3	56.4 (15.6)

Percentages and means not calculated for fewer than 25 cases

[a]Among individuals with self-reported health conditions at baseline

[b]Currently have or previously had the health condition

prevalence. The table also shows that 6.0% reported that they currently have or previously had cancer (i.e., individuals with a cancer history) and 17.8% reported that they currently have or previously had a herniated disk or other back disorder.

Inconsistency percentages for each health condition are shown in Table 2, according to whether currently having the health condition (i.e., in 2013) or currently having or previously had the health condition, respectively (the conditions are sorted by the frequency of inconsistency). For example, 48.8% of the individuals who reported that they currently had a mental disorder (for less than 6 months) answered that they never had this condition in the subsequent survey (in 2017). A high proportion of inconsistent responses was also observed for those reporting currently having rheumatoid arthritis (34.5%). Relatively low inconsistencies were observed for diabetes (6.5%) and hypertension (6.8%). Please note that angina pectoris, stroke, myocardial infarction and cancer were omitted from this part of the data analyses due to few cases (< 25).

When looking at those who reported that they currently have or previously had a health condition at baseline but denying a lifetime presence of the condition in 2017, the highest proportions of inconsistent responses were observed for a mental disorder for less than 6 months (51.7%), angina pectoris (48.3%) and rheumatoid arthritis (35.3%). The lowest proportions of inconsistent responses were observed for osteoporosis (8.6%), diabetes (8.9%) and cancer (9.5%). The level of inconsistency did not seem to vary by sex or educational level. However, in 14 out of the 18 health conditions, the mean age was lower among individuals with an inconsistent response.

Discussion

The results show that the inconsistencies vary greatly across health conditions. The highest levels of inconsistency were observed for having a mental disorder (< 6 months), angina pectoris and rheumatoid arthritis, and the lowest levels were observed for osteoporosis, diabetes, cancer and hypertension. A study of older individuals also

Table 2 Inconsistent response frequencies and percentages with 95% confidence intervals (CI) for 18 health conditions by the presence of a specific health condition (Denmark, 2013–2017)

	Current health condition			Current or previous health condition		
	Cases with current health condition in 2013	Inconsistent cases in 2017 (n)	Inconsistency % (95% CI)	Cases with current or previous health condition in 2013	Inconsistent cases in 2017 (n)	Inconsistency % (95% CI)
Mental disorder < 6 months	41	20	48.8 (34.3–63.5)	151	78	51.7 (43.7–59.5)
Angina pectoris				60	29	48.3 (36.2–60.6)
Rheumatoid arthritis	87	30	34.5 (25.3–44.9)	102	36	35.3 (26.7–44.9)
Chronic obstructive pulmonary disease	71	15	21.1 (13.2–32.0)	94	28	29.8 (21.5–39.7)
Mental disorder > 6 months	86	18	20.9 (13.7–30.7)	164	47	28.7 (22.3–36.0)
Stroke				51	14	27.5 (17.1–40.9)
Migraine or frequent headache	231	50	21.7 (16.8–27.4)	467	128	27.4 (23.6–31.6)
Herniated disk or other back disorder	167	39	23.4 (17.6–30.3)	349	90	25.8 (21.5–30.6)
Tinnitus (howling or singing in the ears)	260	48	18.5 (14.2–23.6)	303	65	21.5 (17.2–26.4)
Allergy	405	56	13.8 (10.8–17.5)	589	111	18.9 (15.9–22.2)
Osteoarthritis	420	71	16.9 (13.6–20.8)	450	80	17.8 (14.5–21.6)
Asthma	122	11	9.0 (5.1–15.4)	243	38	15.6 (11.6–20.7)
Cataract	70	12	17.1 (10.1–27.6)	167	21	12.6 (8.4–18.5)
Myocardial infarction				52	6	11.5 (5.4–23.0)
Hypertension	413	28	6.8 (4.7–9.6)	565	63	11.2 (8.8–14.0)
Cancer				116	11	9.5 (5.4–16.2)
Diabetes	107	7	6.5 (3.2–12.9)	123	11	8.9 (5.1–15.3)
Osteoporosis				70	6	8.6 (4.0–17.5)

Percentages not calculated for fewer than 25 cases in 2013

found higher levels of inconsistency for arthritis than for hypertension and diabetes (Beckett et al. 2000). A relatively high level of inconsistency for arthritis was also observed in a cohort study of prostate cancer survivors (Klabunde et al. 2005). It has been suggested that the consistency depends on the severity and type of health condition (i.e., nonfatal health conditions are reported with lower consistency than more serious conditions) (Beckett et al. 2000). In addition, it seems plausible to assume that health conditions that require ongoing monitoring by a physician or medical treatment are more accurately reported in surveys. However, relatively high levels of inconsistency levels have also been observed in studies of diabetes (Sheikh et al. 2016) and cancer (Zajacova et al. 2010).

There are several possible explanations for the observed inconsistent responses such as (1) recall bias, (2) unwillingness to report a health condition, (3) the patient misunderstood the physician, (4) misdiagnosis and (5) misunderstanding of the condition term (e.g., stroke) at baseline.

Among the strengths of the present study are that it is covering a wide number of health conditions and that it is based on a nationally representative sample of the general adult population. The most obvious limitation is the small number of cases for some conditions (which also makes stratification by, e.g., sex difficult).

The present study revealed high levels of inconsistency across health conditions. Careful attention should be paid to the questionnaire design in order to, e.g., minimize the potential impact of recall bias on survey estimates.

Compliance with ethical standards

Ethical approval No ethical approval is required for survey-based studies according to Danish legislation.

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