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Self-Report as an Indicator of Incident Disease

TUULA OKSANEN, MD, MIKA KIVIMÄKI, PHD, JAANA PENTTI, BS,
MARIANNA VIRTANEN, PHD, TIMO KLAUKKA, PHD, AND JUSSI VAHTERA, MD, PHD

PURPOSE: Epidemiological studies use self-reports from repeated surveys to ascertain incident disease. However, the accuracy of such measurements remains unknown, as validity studies have typically relied on data from prevalent, rather than incident, disease. This study examined the validity of self-reports in the detection of new-onset disease with measurements at baseline and follow-up conditions.
METHODS: We conducted a prospective cohort study of 34,616 Finnish public-sector employees. Data from self-reported, physician-diagnosed diseases from two surveys approximately 4 years apart were compared with corresponding records in comprehensive national health registers used as the validity criterion.
RESULTS: There was a considerable degree of misclassification for self-reports as a measure of incident disease. The specificity of self-reports was equally high for the prevalent and incident diseases (range, 93%–99%), but the sensitivity of self-reports was considerably lower for incident than for prevalent diseases: hypertension (55% vs. 86%), diabetes (62% vs. 96%), asthma (63% vs. 91%), coronary heart disease (62% vs. 78%), and rheumatoid arthritis (63% vs. 83%).
CONCLUSIONS: This study suggests that the sensitivity of self-reports is substantially worse for incident than for prevalent diseases. Results from studies on self-reported incident chronic conditions should be interpreted with caution.
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KEY WORDS: Cohort Studies, Incidence, Questionnaires, Registries, Sensitivity, Specificity.

INTRODUCTION

In epidemiological studies, the prevalence of a disease (i.e., the proportion of people with a disease in a population) and its incidence (i.e., the proportion of new disease cases during a follow-up in an initially disease-free population) can be established in many ways, including questionnaires, interviews, clinical screening, and medical records. While prevalent diseases are often determined through a clinical examination in large cohort studies, this is not necessarily the case for incident events, which may be, in part, determined by self-reports. Furthermore, because of feasibility, economy, and convenience, many large-scale studies and health interview surveys have entirely relied on self-administered questionnaires (1–5).

Validation studies have supported the accuracy of self-reports as a measure of prevalent chronic diseases (1, 3, 6, 7). However, less is known about the accuracy of self-reports in ascertaining incident disease despite their frequent use in epidemiological studies (8–12). The measurement of prevalent disease needs to correctly identify the disease at one point in time only. By contrast, the accuracy of self-reported information on incident diseases is actually affected by the accuracy of self-report at two stages: baseline and follow-up. Thus the assessment of incident disease with self-reports may be more open to measurement error than the self-report assessment of prevalent disease, primarily because the measurement requires both an accurate determination of the disease-free population at baseline and an accurate detection of new-onset disease at follow-up.

The aim of our study was to examine the accuracy of self-reports as the sole source of information in detecting new cases of common chronic diseases of public health importance: hypertension, diabetes, asthma, coronary heart disease, and rheumatoid arthritis. Survey methods are typically used to study these chronic diseases. We compared self-reports from two repeated surveys to records from national health registers (considered as independent gold standard) in a large occupational cohort of Finnish public sector workers.

MATERIAL AND METHODS

The Finnish Public Sector Study

Data were derived from the Finnish Public Sector Study (13, 14). The baseline survey in 2000–2002 was agreed to answer by 48,598 employees (response rate 68%). The follow-up survey targeted 46,414 identifiable employees who were still

From the Centre for Expertise in Work Organisations, Finnish Institute of Occupational Health, Helsinki (T.O., M.K., J.P., M.V., J.V.); Department of Epidemiology and Public Health, University College London, London, UK (M.K.); Research Department, Social Insurance Institution of Finland, Helsinki (T.K.); and the Department of Public Health, University of Turku and Turku University Hospital, Turku, Finland (J.V.).
Address correspondence to: Tuula Oksanen, MD, Finnish Institute of Occupational Health, Lemminkäisenkatu 14-18 B, FI-20520 Turku, Finland. Tel: +358 30 4747 544. Fax: +358 4747 556. E-mail: tuula.oksanen@ttl.fi.
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AEP Vol. 20, No. 7
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Selected Abbreviations and Acronyms

CI = confidence interval
DDD = defined daily dosage
ICD = *International Classification of Diseases*
PPV = positive predictive value

in the service of the target organizations and alive in 2004 through 2005 and 35,914 (77%) of them responded. We excluded those with missing data on the selected self-reported physician-diagnosed diseases in either of the surveys (n = 1,298). Thus, the final cohort included 34,616 identifiable participants. Information of sex, age, and socioeconomic status were obtained from the employers' registers. Socioeconomic status was categorized according to the occupational classification of Statistics Finland, which is based on the International Standard Classification of Occupations (ISCO-88) (15), and was further divided into the following four groups: senior officials and managers, technicians and associate professionals, clerks and service workers, and manual workers. The mean follow-up time was 3.6 years (standard deviation [SD], 0.9). The ethics committee of the Finnish Institute of Occupational Health approved the study.

The sample did not substantially differ from the eligible population at follow-up in terms of sex (82% women in the sample vs. 81% in the eligible population), mean age (48.8 vs. 48.3 years), and socioeconomic status (proportion of manual workers 15% vs. 18%). At baseline, only hypertension was slightly more common in the sample than in the eligible population, 11.1% versus 10.6%; no differences in the prevalence of the other diseases were detected.

Ascertainment of the Diseases in the Questionnaires

For this study, we used the responses to the selected diseases from a list of different chronic conditions and diseases (13, 14). An affirmative response to the appropriate question in the survey "Have you ever been told by a physician that you have or have had …" was considered as self-reported hypertension, diabetes, asthma, coronary heart disease (myocardial infarction or angina), or rheumatoid arthritis. Those participants who answered positively to the question at follow-up among those participants who answered "no" to the same question in the baseline survey were considered as self-reported incident cases.

Ascertainment of the Diseases in the Registers

We used the unified personal identification code system that covers all Finnish citizens to enable the reliable linkage to administrative registers and good coverage. We compiled data from three comprehensive national health registers to identify the cases: the Drug Reimbursement Register and the Drug Prescription Register from the Social Insurance Institution of Finland and the Hospital Discharge Register from the National Institute for Health and Welfare. The identification of the cases was based on the clinical diagnosis of the treating physician (for hospitalization or reimbursement for medicine costs) or detailed information of medication. These national health registers have been found to be highly reliable for the purposes of epidemiological studies (16–18). The validity of these registers has been found to be high, that is, numerically correct and having few missing data (17, 18).

In Finland, the national sickness insurance scheme applies to all permanent residents of the country regardless of sex, age, or occupational title. The Drug Reimbursement Register of the Social Insurance Institution of Finland contains information about persons entitled to special reimbursement that provides compensation of 72% to 100% of the costs of medication for certain chronic and severe diseases by contrast to the current basic reimbursement of 42% generally received for filled prescriptions.

Patients who apply for special reimbursement must attach a detailed medical certificate prepared by the treating physician, who also provides data to confirm the diagnosis. The application is then reviewed by a physician in the Social Insurance Institution as to whether the uniformly defined requirements for each disease are met (see Appendix 1). False-positive cases in the drug reimbursement registers are likely to be rare because the Social Insurance Institution grants financial benefits in relation to chronic diseases and conditions and medical treatment only after a strict evaluation process (19).

We used prescription data to assess continuous treatment for the selected diseases. The Drug Prescription Register comprises outpatient data of filled prescriptions classified according to the anatomical therapeutic chemical classification code of the World Health Organization and the corresponding defined daily dosages (DDD) (20). We identified only the purchases of disease-specific medication (not frequently used for other purposes) since the register does not include diagnoses for prescriptions. The dates of all purchases of the classes C02 (antihypertensives), C03 (diuretics), C07 (beta-blocking agents), C08 (calcium channel blockers), or C09 (agents acting on the renin-angiotensin system) drugs for hypertension, A10 (drugs used in diabetes) for diabetes, R03 (drugs for obstructive airway diseases) for asthma, or M01C (specific antirheumatic agents) for rheumatoid arthritis (e.g., gold therapy) were reviewed. The participants were considered to have continuous treatment for the disease in question when they made at least three purchases covering at least 240 DDDs of the disease-specific medication during any year, except for rheumatoid arthritis that was identified with any purchase of class M01C drug. Another exception was year 2005, when only 120 DDDs were required to include the mid-year commencements.

The Hospital Discharge Register gathers data on all inpatient hospital admissions. This register comprises countrywide information on virtually all hospitalizations (16). We obtained the discharge dates and the corresponding main diagnoses for hospitalization due to hypertension (*International Classification of Diseases, Ninth Revision* [ICD] [ICD-9] codes 401–405; ICD-10 [*Tenth* Revision] codes I10–I15 for hypertensive disease), diabetes (ICD-9 250; ICD-10 E10–E14 for diabetes mellitus), asthma (ICD-9 493; ICD-10 J45 for asthma), coronary heart disease (ICD-9 410–414; ICD-10 I20–I25 for coronary heart disease), and rheumatoid arthritis (ICD-9 714 for rheumatoid arthritis and other inflammatory polyarthropathies; ICD-10 M05 for seropositive rheumatoid arthritis, M06 for other rheumatoid arthritis, and M08 for juvenile arthritis).

Validation studies show the hospital discharge register to contain about 95% of all the discharges and most central information is recorded correctly in at least 95% of the discharges compared to the corresponding medical records (21). The coronary heart disease events documented in the hospital discharge register data have been shown to be accurate when defined according to the strict criteria of the 2003 American Heart Association (16, 17).

We used personal identification numbers to obtain records from the registers covering the period between 1 January 1994 and 31 December 2005. A participant was classified as having a register-confirmed disease when the diagnosis was verified by at least one of the three data sources. Preexisting or current register-confirmed disease refers to disease that was recorded by the time of the baseline survey. Incident diseases were first documented after the baseline survey and before the end of 2005.

Statistical Analysis

The accuracy of self-reports was assessed against recorded information with several indicators. Kappa statistics are appropriate for testing whether agreement (herein, between self-reports and register data) exceeds chance levels (22, 23). Kappa indicates here how the ratings from the survey and the registers fall into the same category (yes/no). Sensitivity describes how well the survey detects the persons who actually have the disease. Specificity, in turn, describes the accuracy of the test in detecting those who are actually healthy. Positive predictive value (PPV) is the probability of disease among survey positives. This test parameter depends on the prevalence of the respective disease because both "the health" and "the ill" are taken into account and can greatly vary by disease severity and population sizes.

First, we calculated all these measures of agreement for prevalent disease by comparing the information from the baseline questionnaire with register data from 1994 to the time of the baseline survey. In the second step, we estimated sensitivity and specificity for self-reported incident disease measurement simply based on the sensitivity and specificity of self-reported prevalent disease measurement; that is, assuming that repeating the survey gives similar estimates of incident diseases. Thus we mimicked a situation similar to that one may encounter in practical research when repeating the experiment with real people and assuming statistical independence of the two measurements. Third, we examined the "true" sensitivity and specificity with the use of questionnaire information from both the baseline and follow-up surveys and register data before and after the baseline survey. We considered those who reported no disease at baseline but reported disease at follow-up to be correctly classified as incident cases if the register data matched the self-reports, whereas if self-report showed the disease at baseline or did not show the disease at follow-up, the participants were considered misclassified. All of the statistical analyses were performed with SAS 9.1.3 statistical software (SAS Institute Inc., Cary, NC).

RESULTS

As shown in Table 1, our cohort included 28,545 women and 6,071 men, of whom 488 (1.4%), 3,833 (11.1%), and 1403 (4.1%) fulfilled the set register-criteria for diabetes, hypertension, and asthma, respectively, at baseline. Coronary heart disease and rheumatoid arthritis were less frequent, 273 (0.8%) and 224 (0.7%) cases, respectively. Table 1 also indicates that 1% to 3% of the diabetes, hypertension, and asthma cases were documented in the Hospital Discharge registers. As expected, for the cases of coronary heart disease and rheumatoid arthritis, this proportion was larger, 18% and 32%, respectively. The proportion of cases in medication-related registers varied between 32% and 96%, depending on the specific disease. The proportions of cases that were found in all register sources ranged from 4% (hypertension) to 50% (coronary heart disease).

Accuracy of Self-report for Prevalent Disease

Table 2 presents the accuracy of the self-reports in detecting prevalent disease when compared with the register data. The kappa statistics showed moderate to substantial agreement for the diseases. The sensitivity of the self-reports varied from 78% (coronary heart disease) to 91% (asthma) and 96% (diabetes). The specificity of the self-reports was high for all of the diseases, ranging from 96% to 99%. The PPVs ranged from 33% to 70%, being highest for hypertension (70%), a condition with the highest prevalence (11%), and lowest for rheumatoid arthritis (33%), a condition with the lowest prevalence (0.7%). When the prevalence of disease approaches zero, PPV drops and is virtually useless. Thus, the interpretation of PPVs varies according to the

AEP Vol. 20, No. 7
July 2010: 547–554

TABLE 1. Baseline characteristics of the cohort, the Finnish Public Sector Study

	No.	%
All	34,616	
Sex		
Male	6,071	18.0
Female	28,545	82.0
Mean age, yr (SD)	48.8 (9.2)	
Socioeconomic status		
Senior officials and managers	10,304	29.9
Technicians and associate professionals	9,152	26.6
Clerks and service workers	9,944	28.8
Manual workers	5,023	14.6
Recorded disease in registers		
Diabetes	488	1.4
Hospital admission*	5	
Medical treatment†	303	
Both*,†	180	
Hypertension	3,833	11.1
Hospital admission*	23	
Medical treatment†	3,674	
Both*,†	136	
Coronary heart disease	273	0.8
Hospital admission*	49	
Medical treatment†	87	
Both*,†	137	
Asthma	1,403	4.1
Hospital admission*	42	
Medical treatment†	1,206	
Both*,†	155	
Rheumatoid arthritis	224	0.7
Hospital admission*	71	
Medical treatment†	92	
Both*,†	61	

SD = standard deviation.
*National Hospital Discharge Register.
†National Drug Reimbursement Register or National Drug Prescription Register by the time of the baseline survey in 2000–2002.

prevalence of disease, making comparisons between diseases difficult. Overall, the participants reported more diseases than were recorded in the national health registers. For example, there were 4,602 self-reported cases of hypertension compared with 3,778 recorded cases.

Accuracy of Self-report for Incident Disease

Table 3 displays data on consistency between the self-reports of the diseases at baseline and at follow-up compared with the corresponding information of the diseases in registers divided into four categories depending on the existence of the diseases at baseline (yes/no) and at follow-up (yes/no). Table 3 shows that when the register records were used as the validity criterion, a considerable degree of misclassification was found for self-reports as a measure of incident disease. Only 55% to 63% of the register-confirmed incident cases (no/yes) were also self-reported as incident disease (no/yes). The misclassified self-reports of the new onset of the diseases were the result of no entry of the disease in the records during the study period (no/no group in the records) or of recorded disease already at baseline (yes/yes group in the records). For all incident diseases, the observed specificity remained high and in the same level as for prevalent diseases, from 93% to 98%. Because of the small number of new-onset cases, all predictive values were small (data not shown). The estimated sensitivity and specificity for incident disease based on sensitivity and specificity of prevalence measures suggested only slightly decreased sensitivity (77% to 95%) compared to prevalence rates and a preserved high specificity (92% to 98%).

DISCUSSION

The accuracy of self-reported hypertension, diabetes, asthma, coronary heart disease, and rheumatoid arthritis was examined in a large occupational cohort by using records in comprehensive national health registers as an external reference. Data from repeated surveys showed equally good specificity but lower sensitivity for self-reported disease incidence at follow-up compared to self-reported prevalence at baseline. The sensitivity rates for incident diseases ranged from 55% to 63%, and these figures were substantially lower than the corresponding figures of 78% to 96% for prevalence rates. Based on our findings of sensitivity, self-report may show considerable misclassification of new occurrences of diseases. In contrast, we found high specificity in repeated surveys, which suggests that self-reports of incident disease rarely give false-positive results. When self-report is used as a sole source of information in a cohort study, errors in reporting the disease at baseline and follow-up may accumulate.

Our findings on prevalent disease are in line with the results of previous studies showing 1) good accuracy for the lifetime history of physician-diagnosed hypertension (7, 24–27), diabetes (4, 7, 24–28) and asthma (24); 2) at least moderate agreement for coronary heart disease (7, 25, 29–32), and 3) at best moderate agreement for rheumatoid arthritis (3, 28). Our results are also in keeping with the two previous studies that have examined the accuracy of self-reports in ascertaining incident heart attack and stroke. However, they were limited to middle-aged men or a small sample size (2, 33). Recently, a Korean multicenter study found that self-reported incident cancer cases were ascertained with high specificity (99%), but low sensitivity (40%) (34). In line with our study, these findings indicate modest sensitivity.

The present findings show that on the basis of sensitivity and specificity estimates for prevalent disease, sensitivity and specificity for self-reported incident disease would be overestimated. We found that only 55% to 63% of new occurrences of the diseases in the records were also self

TABLE 2. Sensitivity, specificity, positive predictive value and kappa coefficients (95% confidence interval)*

Self-report of physician-diagnosed disease	No. of participants	No. of cases in register	No. of non-cases in registers	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	κ	κ 95% CI
Diabetes				96	99	62	0.75	0.72–0.78
Yes	740	462	279					
No	33,379	20	33,359					
Total	34,120	482	33,638					
Hypertension				86	96	70	0.74	0.73–0.75
Yes	4,602	3,243	1,359					
No	29,609	535	29,074					
Total	34,211	3,778	30,433					
Coronary heart disease				78	99	47	0.58	0.54–0.62
Yes	450	210	240					
No	33,950	60	33,890					
Total	34,400	270	34,140					
Asthma				91	97	60	0.71	0.69–0.73
Yes	2,129	1,273	855					
No	32,141	125	32,016					
Total	34,269	1,398	32,871					
Rheumatoid arthritis				83	99	33	0.47	0.43–0.51
Yes	545	181	364					
No	33,600	38	33,562					
Total	34,145	219	33,926					

CI = confidence interval.
*National Hospital Discharge Register, National Drug Reimbursement Register, or National Drug Prescription Register.

reported as incident diseases. Based on prevalence estimates one would expect this figure to range between 77% and 95%, depending on the disease outcome. For example, a major source of error is when a respondent reports a prevalent disease at baseline but at follow-up reports never having the disease.

Factors related to both the respondent and the measurement may have contributed to the discrepancy between self-report and the external reference. As regards hypertension, asthma, and diabetes, the survey respondents may have misunderstood or forgotten the diagnosis reported by the physician, may have been unwilling to report it, or may have lacked the awareness that a given condition was a definite disease (3, 6, 7). It is also possible that less serious or transient conditions are related to less appropriate reporting, as suggested previously (24, 26).

Accurate reporting is more likely for diseases with clear and unambiguous criteria, a well-defined diagnosis that is easily communicated to the patient or required hospitalization (1, 4, 6, 8, 26, 33). In the present study, agreement between self-reports and register data was highest for prevalent diabetes, a condition which is diagnosed on the basis of blood glucose levels. In contrast, the lowest coefficients for agreement were found for coronary heart disease and rheumatoid arthritis. The patients' confusion with terminology between various cardiovascular diseases, the physician's inaccurate communication of the diagnosis, the presence of other cardiovascular conditions, or the experience of pain and anxiety may have contributed to misreporting of coronary heart disease (2). The mismatch between the self-reports and register records in regard to rheumatoid arthritis may partly be accounted for by the disease activity, or some individuals, incorrectly attributing their pain and stiff joints to "rheumatism" or "arthritis:, may have given false-positive answers regarding rheumatoid arthritis (3, 28). In line with this reasoning, a history of rheumatoid arthritis was over-reported to a greater extent than, for example, hypertension and diabetes. The lack of a standard case definition for rheumatoid arthritis is a source of misreporting, and because of missing data on rheumatoid arthritis diagnosis in the Drug Reimbursement Register prior to 2000, we may have inaccurately determined the baseline situation in some cases.

It is possible that the decreased sensitivity is accounted for by the low reliability of self-report, that is, the extent to which repeated measurement of a phenomenon at different times yields similar results. If the reliability of self-reports were very high, then the sensitivity of self-report for incident cases would simply be the product of sensitivity and specificity of the prevalence condition. In such cases, the sensitivity would be higher, as was demonstrated by our projections. However, in reality two self-reports from repeated surveys are not independent observations, but related over time. The amount of time allowed between the surveys is critical and a long gap may reduce the reducibility. In the current study, the sensitivity

AEP Vol. 20, No. 7
July 2010: 547–554

TABLE 3. Sensitivity and specificity of incident self-reported physician-diagnosed disease as compared with incident disease based on register data ("observed rates") and as estimated based on sensitivity and specificity of prevalent self-reported disease in Table 2

	No. of participants	Recorded disease at baseline – at follow-up*			Observed,† %		Estimated,‡ %	
		No – Yes§	No – Yes	Yes – Yes‖	Sensitivity	Specificity	Sensitivity	Specificity
Self-reported disease at baseline – at follow-up								
Diabetes								
No – Yes§	490	179	294	17	62	99	95	98
No – No	32,889	38	32,848	3				
Yes – Yes	636	71	114	451				
Yes – No	105	2	92	11				
Total	34,120	290	33,348	482				
Hypertension								
No – Yes§	2,192	949	950	293	55	93	83	92
No – No	27,417	419	26,756	242				
Yes – Yes	4,050	342	579	3,129				
Yes – No‖	552	28	410	114				
Total	34,211	1,738	28,695	3,778				
Coronary heart disease								
No – Yes§	342	116	203	23	62	99	77	98
No – No	33,608	58	33,513	37				
Yes – Yes	296	11	93	192				
Yes – No	154	1	135	18				
Total	34,400	186	33,944	270				
Asthma								
No – Yes§	661	189	388	84	63	96	88	94
No – No	31,480	60	31,379	41				
Yes – Yes	1,748	48	477	1,223				
Yes – No	380	2	328	50				
Total	34,269	299	32,572	1,398				
Rheumatoid arthritis								
No – Yes§	308	67	224	17	63	98	82	98
No – No	33,292	20	33,251	21				
Yes – Yes	355	18	164	173				
Yes – No	190	1	181	8				
Total	34,145	106	33,820	219				

*First entry in any of the registers (Hospital Discharge Register, Drug Reimbursement Register, or Drug Prescription Register).
†In relation to incident disease with register data as the gold standard.
‡Derived from estimation based on sensitivity and specificity of prevalent diseases (Table 2).
§Incident disease.
‖No cases in the Yes – No category in the registers.

estimates were obtained from two surveys taken approximately 4 years apart.

Strengths and Limitations

This large-scale prospective study is apparently the first to show the limited accuracy of self-report in indicating incident disease. The use of records in national health registers as a validity criterion has several strengths, but also some limitations. The fact that the registers have good coverage about the medical treatment and hospital admissions and strict diagnostic criteria for the entry increases the specificity and reliability of the records and makes them an appropriate reference source for defining the accuracy of self-reported diseases. However, it is known that medical records may contain omissions and errors (1, 31, 35, 36) and lack cases that do not require continuous medical treatment, hospitalization, or supervision (26, 28); the use of other data sources that are presumably more objective may be warranted (27, 31). We used records that included physician-diagnosed cases who had been prescribed continuous medication or had been hospitalized, or both, but not those at the monitoring and surveillance phase prior to continuous medication. As part of the latter cases were likely to be identified with self-reports, our results may provide an underestimate of the sensitivity of self-reports as an indicator of incident disease. Many incorrect self-reports of incident disease could also be due to an inaccurate determination of the follow-up situation, if the self-reported incident cases had had no entry in the records by the end of

the follow-up. Another limitation is that the study population consisted of public sector employees from a highly developed European country, which influences the generalizability of the findings in other populations.

CONCLUSIONS

Given the widespread use of self-administered questionnaires in epidemiology, it is important to understand the extent to which self-reports validly determine the prevalence and incidence of a given disease. Our prospective study indicates that the sensitivity of self-reports is substantially worse for incident than prevalent diseases. The low sensitivity (55% to 63%) of self-reports in determining incident disease is an important source of bias in epidemiological studies leading potentially both underestimation and overestimation of risk factor–incident disease relationships. This study extends the literature by illustrating that a considerable degree of misclassification is possible when self-reports are used as a measure of the incidence of diseases. The findings further suggest that caution is to be exercised when interpreting questionnaire information on incident physician-diagnosed hypertension, diabetes, asthma, coronary heart disease, and rheumatoid arthritis. Future studies that specifically aim to collect self-reported information on incidence of specific disease entity for a period of time are warranted to find better ways to identify incident cases with the use of self-reported questionnaire.

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APPENDIX

The Diagnostic Criteria for Qualifying for Special Reimbursement

Diabetes

• Insulin-dependent diabetes needs to be diagnosed in specialized health care. In type 2 diabetes, disease-specific symptoms and repeated plasma glucose levels of >7.0 mmol/L are required.

Hypertension

• Documentation of repeated blood pressure measurements of >200 mm Hg systolic or >105 mm Hg diastolic, or >95 mm Hg diastolic with signs of complications or cardiovascular comorbidities are required for hypertension.

Coronary heart disease

• Diagnosis should be based on examinations in specialized health care or documentation of the presence of definite chronic angina, myocardial infarction, or coronary artery bypass is needed.

Asthma

• The treating physician should report a long-term and adequate reduction of pulmonary functions, or the diagnosis needs to be based on examinations by a specialist in the field.

Rheumatoid arthritis

• For rheumatoid arthritis (RA), comprehensive examinations in specialized health care are required.

Special reimbursement for diabetes, hypertension or asthma can be granted only after 6 months of continuous and effective pharmacotherapy. In addition, in cases of obese persons with type 2 diabetes or hypertension without signs of complications, a 6-month transition period with lifestyle counseling and monitoring needs to precede the start of medication. We took into account the fact that, at the time of the survey, the participants may have been in this 6- to 12-month phase, during which a physician had diagnosed the disease but the criteria for eligibility for special reimbursement had not yet been filled; we allowed extra time until the end of the subsequent year for the eligibility to be recorded due to hypertension, diabetes, or asthma. The data on special reimbursement due to rheumatoid arthritis are exact only after the beginning of the year 2000 since, earlier, the Register did not include the diagnosis of the *International Classification of Diseases* for new cases, and the group of rheumatic diseases not only included rheumatoid arthritis but also some other similar diseases. In this study, we included only the definite diagnoses of rheumatoid arthritis.