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Socioeconomic inequalities in out-of-hours primary care use: an electronic health records linkage study

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Background: Low socioeconomic position (SEP) is related to higher healthcare use in out-of-hours primary care services (OPCSs). We aimed to determine whether inequalities persist when taking the generally poorer health status of socioeconomically vulnerable individuals into account. To put OPCS use in perspective, this was compared with healthcare use in daytime general practice (DGP).

Methods: Electronic health record (EHR) data of 988 040 patients in 2017 (251 DGPs, 27 OPCSs) from Nivel Primary Care Database were linked to sociodemographic data (Statistics, The Netherlands). We analyzed associations of OPCS and DGP use with SEP (operationalized as patient household income) using multilevel logistic regression. We controlled for demographic characteristics and the presence of chronic diseases. We additionally stratified for chronic disease groups.

Results: An income gradient was observed for OPCS use, with higher probabilities within each lower income group [lowest income, reference highest income group: odds ratio (OR) ¼ 1.48, 95% confidence interval (CI): 1.45–1.51]. Income inequalities in DGP use were considerably smaller (lowest income: OR¼1.17, 95% CI: 1.15–1.19). Inequalities in OPCS were more substantial among patients with chronic diseases (e.g. cardiovascular disease lowest income: OR¼1.60, 95% CI: 1.53–1.67). The inequalities in DGP use among patients with chronic diseases were similar to the inequalities in the total population.

Conclusions: Higher OPCS use suggests that chronically ill patients with lower income had additional healthcare needs that have not been met elsewhere. Our findings fuel the debate how to facilitate adequate primary healthcare in DGP and prevent vulnerable patients from OPCS use.

Introduction

Out-of-hours primary care services (OPCSs) are intended for acute, but non-life-threatening healthcare needs that cannot wait to be attended in daytime general practice (DGP).[1] Timely access to an OPCS is pivotal for adequate delivery of primary healthcare and prevention of unplanned hospital visits.[2,3] For patients with multiple health problems, the acute health problem focused approach of OPCSs could, however, be disadvantageous. Continuity of care is hampered by limited or lack of knowledge about the patient's medical history at the OPCS. The general practitioner (GP) on duty generally is not one's regular GP and patient information exchange between the patient's DGP and OPCS is challenging. [3–5] Information exchange is crucial in both directions since subsequent to an OPCS contact patients often have follow-up contacts in DGP.6 Additionally, quality of care is challenged by scarcity of time and high workload in an acute care setting.[7] People with a low socioeconomic position (SEP) were found to use more acute and unplanned healthcare services than high SEP individuals,[8] whereas they would particularly benefit from continuity of care in a primary care setting.

Individuals with low SEP more often experience worse health, with higher prevalence of chronic diseases and multi-morbidity, and at younger age, than more prosperous individuals.[9] Moreover, disadvantageous circumstances, such as unfavourable health behaviours and financial strain, more often accumulate among low SEP individuals.[10] Consequently, their healthcare need is often more complex. Socioeconomically vulnerable individuals thus would benefit from the continuity of care and familiarity with the patient's background in DGP.[2,11,12]

However, there lies a paradox in the needs of low SEP patients, with their generally more complex health problems, and the generally limited resources available to them to put these needs into adequate action and benefit from healthcare. The complexity imposed by multimorbidity necessitates skills that low SEP individuals often lack.[13] Moreover, the 'inverse care law' dictates poorer availability of good quality healthcare for the people who need it the most, particularly in strong market competition of healthcare providers.[10]

Although the strong primary healthcare system of the Netherlands does not represent a strong market competition, and fosters equity in healthcare accessibility,[11] low SEP is related to more fragmented and inappropriate use of health and social services.[2] Suboptimal healthcare use may be reflected in higher rates of OPCS use by low SEP individuals. In a previous study, we found that OPCS use was higher in each lower level of neighbourhood socioeconomic status.[14,15] It is unknown whether higher OPCS use of socioeconomically vulnerable individuals reflects worse health and resembles equal care for equal need.[16]

The aim of this study was to determine whether a patient's SEP was associated with OPCS use, taking their health status into account. In addition, we aimed to determine whether the associations were stronger for patients with a chronic disease. To put the use of an acute care service in perspective of a regular healthcare provider, we compared OPCS use with DGP use. We used electronic health record (EHR) data from a large number of DGPs linked to OPCS EHR data,[17] including healthcare use and health status of almost a million Dutch residents enlisted in DGPs.

Methods

Setting

Every citizen in the Netherlands is enlisted in a DGP. The DGP has a gate-keeping role for specialist care and therefore is the first point of contact with the healthcare system. Consequently, the DGP EHRs represent the patient's most comprehensive medical record.[18,19] Acute primary healthcare out of office hours is provided by OPCSs with 50–250 affiliated GPs. Patients generally contact the OPCS by phone, after which a triage nurse assesses the level of urgency paired to action (e.g. consultation, home visit). The use of healthcare in DGP and OPCSs is fully covered by the national basic health insurance scheme and does not require any out-ofpocket payments.[1]

Patient involvement and ethics approval

Patients were not directly involved in this study. This study does not fall within the scope of the Medical Research Involving Human Subjects Act and therefore does not require ethical approval. General practices and Primary Care Cooperatives that participate in Nivel Primary Care Database are contractually obliged to: (i) inform their patients about their participation in Nivel Primary Care Database and (ii) to inform patients about the option to opt-out if patients object to inclusion of their data in the database [42]. Dutch law allows the use of EHRs data for research purposes under certain conditions. According to Dutch legislation, and under certain conditions, neither obtaining informed consent nor approval by a medical ethics committee is obligatory for this kind of observational studies [Dutch Civil Law (BW), Article 7:458; http://www.dutchcivillaw.com/civilcodebook077.htm, Medical Research Involving Human Subject Act (WMO); http://www.ccmo.nl/en/non wmo-research and General Data Protection Regulation (AVG) Article 24 (GDPR)]. This study has been approved by the applicable governance bodies of Nivel Primary Care Database under no. NZR-00317.017.

Study population

Data concerning DGP and OPCS use in 2017 were derived from routine EHRs from DGPs and OPCSs participating in Nivel Primary Care Database.[20] 251 DGPs were included, with 1 013 687 listed patients, located in the catchment areas of 27 OPCSs. DGPs in strongly urbanized regions were slightly overrepresented. We linked DGP enlisted patients with OPCS contact records. DGP enlistment was recorded per quarter of the year. The majority of patients was enlisted the entire year (>90%), data of patients enlisted only part of the year (due to for instance births, deceased and house moving) were linked to OPCS data for the corresponding part of the year. Newborns in 2017 were excluded from the study population since they were not yet included in the population registry data that was used.

The patient sample was linked to population registry data from Statistics Netherlands[21] and included household income, migration background (western vs. non-western) and household composition (living alone vs. not living alone). Patients were excluded from the analyses if they could not be linked to the socio-demographic data (n¼25 674, 2.5%) (Supplementary table S1).

Measures

Outcome measures

OPCS use included claimed OPCS contacts of DGP enlisted patients in (part of) the year 2017. Outcome measures included number of contacts and dichotomized measures reflecting whether the patient had a contact or not during the year/part of the year (yes/no), and whether the patient contacted an OPCS twice or more (yes/no). Assessed urgency was included as at least one high-urgency contact (urgency levels U1–U3: U1¼life-threatening, U2¼acute and U3¼urgent yes/no), and at least one low-urgency contact (urgency levels U4 and U5: U4¼non-urgent and U5¼self-care advice

yes/no). Additionally, contacts for acute health problems and contacts for long-lasting and chronic health problems in OPCS reflected the category of symptoms or diagnoses recorded according to the International Classification of Primary Care-1 (ICPC) code.[18,22]

DGP use included the annual number of contacts and a dichotomous measure indicating whether an enlisted patient had at least one DGP contact in the year/part of the year 2017 (yes¼1/no¼0).

Independent variables

Patient socioeconomic status was measured by net disposable household income, standardized for size and household composition. Patient income was categorized in quintiles ranging from 1 (low income) to 5 (high income), following from standardized percentiles based on the total Dutch population.[23]

Potential confounders

Patient characteristics included age (in age-groups, table 1), sex, living alone (yes/no) and non-Western migration background (yes/no). Non-Western migration background included patients with one or two parents born in Morocco, Turkey, Suriname, The Netherlands, Antilles or other non-Western countries.

Chronic diseases/multimorbidity included the number of chronic irreversible illnesses (none, one, two, three or more)[24] on 1 January 2017, or on the first day in the quarter of the year, the patient was enlisted in general practice. The presence of a chronic disease was derived from the EHR data using a method described elsewhere.[18]

Stratification variables

Data on ICPC-coded chronic diseases from the EHRs of general practices were used to define four subgroups of patients: diabetes mellitus (ICPC-code T90), chronic obstructive pulmonary disease (COPD) and asthma (R91, R95 and R96), cardiovascular disease (CVD) (K74, K76-77, K86-87 and K90-92) and other chronic disease (any other ICPC code from the list of chronic diseases).[18,20]

Statistical analyses

To assess the probability of OPCS and DGP use according to the patient's income group, we conducted logistic regression analyses. To control for clustering of patients within practices, we applied two-level hierarchical models including patients (first level), nested within DGPs (second level). We adjusted the analyses for patient characteristics, e.g. age and sex and number of chronic diseases on patient-level. We additionally conducted stratified analyses for four chronic disease determined groups. We reported age and sex standardized probabilities to evaluate the extent of the reported odds ratios in terms of effect size. All confidence intervals were set at 95% and analyses were conducted using the statistical software package Stata version 15.1.[25]

Additionally, we calculated population attributable fractions (PAF) to determine the proportion of OPCS and DGP use in the study population attributable to having a lower household income (groups 1–4) when compared with the most favourable income group (group 5). The PAF was calculated according to the equation below[26]:

$$\mathrm{PAF} = \frac{P(\mathrm{RR}-1)}{P(\mathrm{RR}-1)+1}$$

where P is the proportion of the population exposed to a level of income (income levels 1–4 vs. income level 5) and RR is the relative risk of DGP/OPCS use summed for the four income groups with income levels 1–4.

[Table 1]

Results

Characteristics of our study population (N¼988 040) are presented in table 1. Regarding age, sex and household income, our population closely resembled the general Dutch population.[23] Individuals with a non-Western immigration background were overrepresented. More people were using healthcare in both OPCS and DGP for each subsequent lower income group. With each lower stratum of income, a higher proportion of individuals suffered from three or more chronic diseases, and from at least one of the specified chronic diseases. The second lowest income had the highest proportion of patients with multimorbidity and CVD. For other chronic diseases, prevalence rates increased with each higher income group.

Healthcare use in OPCS and DGP followed a similar pattern, with higher use rates for each lower income group (table 2). In the second lowest income group, the mean number of yearly DGP contacts was considerably higher compared with the lowest income group. Regarding OPCS contacts, inequalities were observed across all types of contacts, particularly contacts for a chronic health problem and low-urgency contacts. (Please refer to Supplementary table S2 for the mean number of OPC and DGP contacts stratified to chronic diseases.)

In table 3, we quantify the size of socioeconomic inequalities in the probability of having had at least one OPCS contact. Individuals from the lowest income group had a 48% higher probability of at least one OPCS contact than those in the highest income group. The extent of the inequalities was nearly similar for high- and low-urgency contacts, and for contacts for an acute health problem. Inequalities were largest for the probability of two or more OPCS contacts in a year, and for contacts for a chronic health problem. Inequalities between income groups were substantially smaller for the probability of DGP contact in 2017. Compared with the highest income group, individuals with the lowest income had a 17% higher probability.

The probability of contacting an OPCS at least once a year attributable to not being part of the highest income group was reflected in a PAF of 22%. The largest PAF was observed for having had two or more OPCS contacts, with 41% of OPCS use attributable to being part of a lower income group. In comparison, a marginal PAF of 4% was observed for DGP use.

Income inequalities in OPCS use were larger within patient groups with a chronic disease (table 4) compared with the total study population (for instance: lowest income group OR 1.60, CI 1.53–1.67 for CVD patients vs. OR 1.48, CI 1.45–1.51 for the total study population), mainly due to larger inequalities between the lowest and the second lowest income groups.

In table 4, we compare OPCS use with DGP use for patient groups with a chronic disease. Income inequalities regarding DGP use were much smaller than for OPCS use for these patient groups. Compared with the total study population (table 3), income inequalities in DGP use were somewhat larger for patients with COPD/asthma (lowest income group: OR 1.25, CI 1.18–1.33 vs. total study population: OR 1.17, CI 1.15–1.19) and for patients with diabetes. In the group of patients with CVD, inequalities were smaller (OR 1.11, CI 1.04–1.18) compared with the total study population.

The probability of an OPCS contact due to not being part of the highest income group was larger for patients with CVD (PAF 25%) and patients with diabetes (PAF 24%) compared with the total study population. For DGP use, the PAF for patients with a chronic disease was somewhat smaller compared with the total study population.

[Table 2]

Discussion

Key findings

We observed inequalities in both OPCS and DGP use, reflected in higher use rates within every lower stratum of household income. Inequalities for OPCS use were considerably larger than for DGP use. These inequalities persisted when taking the patient's health status into account. Among patient groups with COPD/asthma, CVD or diabetes, income inequalities for OPCS use were larger than in the total population. The extent of inequalities in DGP use between income groups were quite similar for patients with a chronic disease and the total study population.

Study strengths and limitations

The use of routinely recorded EHR data enabled us to study a large nationally representative patient sample. The recorded chronic diseases were either diagnosed by the GP or a specialist and are therefore more reliable indicators than self-reported diseases.[19]

Our study results may have been biased due to limitations of the data and the applied methods. First, the use of household (disposable) income as indicator for socioeconomic status provided us with a robust measure that was routinely registered by tax registries. The use of income, however adequately classifies groups in the productive age bands and may be less adequate for people of younger and older age due to their loose attachment to the labour market. Different measures of SEP each have their advantages and disadvantages. For instance, wealth is a more appropriate measure for older age groups,[27] however less so for younger age groups.[28] The use of household income in this study consequently suboptimally classified both younger and older people.

Secondly, health status was measured by the number and nature of chronic diseases as recorded in DGP. Nevertheless, we were unable to quantify the severity of the generally more complex health problems of socioeconomically vulnerable patients. Our operationalization of health status therefore likely underestimated the healthcare need of low SEP individuals, and the extent to which this could account for the observed inequalities in OPCS and DGP use.

Interpretation of key findings

Our results showed that socioeconomic inequalities in OPCS use could not be explained by differences in health status and that these were larger than inequalities in DGP use. A previous study also indicated that attendance of OPCS was higher in low SEP patients after adjusting for health status.[29] The larger income inequalities for OPCS use compared with DGP use likely ensue from factors additional to, and interacting with, the patient's health status. For instance, limited health literacy, need for reassurance, perceptions of illness and doctor–patient communication likely contribute to inequalities in use-patterns between SEP groups.[30,31] Limited health literacy, for example, may inhibit finding the way through the healthcare system,[32] whereas poorer doctor–patient communication leads to misinterpretation of the patient's care need.[31] Moreover, people with low SES may experience more difficulty in waiting for an appointment in DGP the next working day, and turn to an OPCS for immediate relief of their worries.[5]

The larger income inequalities for OPCS use among patients witha chronic disease suggest a different healthcare need among chronically ill patients with low SEP. Due to the clustering of health and (psycho)social problems, and more severe comorbidity,[12,33] care coordination and continuity of care for these patients in DGP is more challenging.[10,12,13,34] Their care needs likely demand more time than DGPs are able to spend on their patients.[33,34] Additionally, these patients may have difficulty obtaining other healthcare and social services and therefore may experience unmet needs.[2,35,36] The

higher OPCS use therefore may be a reflection of the inverse care law as a result of impeded access of DGP for low SEP individuals.[5,10,13,37]

Implications for research and practice

The results suggest that OPCSs fill a void in healthcare needs, for socioeconomically vulnerable patients, particularly among the chronically ill. As such, OPCSs contribute to equity in healthcare access by providing low threshold care. On the other hand, using OPCS services comes with downsides of acute healthcare, such as lack of continuity.[4] Ideally, from a continuity of care perspective, DGP may be even more sensitive to the more complex care needs of vulnerable patients, to prevent them from care seeking in OPCSs.[35,38] Additionally, coordination and continuity of care between DGP and OPCS should be improved by better information exchange and close involvement of the patient[36] to more adequately address the patient's needs, resources and skills.

The higher OPCS use within lower income groups, as reflected in the PAF, appears to be additional to DGP use. Therefore, overall healthcare use and the workload of GPs increases. Since OPCSs increasingly experience difficulties in fulfilling vacancies and voids in work schedules, the sustainability of accessible OOH primary care is at stake.[7] How to relief the high workload of both OPCS and DGP should be subject of further study. For instance, by studying the effect on workload, by scaling-up OPCS healthcare professional staff by employing nurse practitioners[39] and integration of social support services.[38]

We found substantial income-related inequalities in OPCS use, the more so when compared with inequalities in DGP use, particularly among patients with a chronic disease. These inequalities suggest that OPCS meets a healthcare need of vulnerable groups additional to healthcare provided by DGP, particularly among individuals with low SEP and chronic disease. Optimization of care coordination in DGP and between DGP and OPCS should be considered to address the generally more complex care needs of socioeconomically vulnerable patients and preferably reduce OPCS use.

[Table 3], [Table 4]

Supplementary data

Supplementary data are available at EURPUB online.

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Data sharing statement

Results are based on calculations by the researchers of this paper using non-public microdata from Statistics Netherlands. Under certain conditions, these microdata are accessible for statistical and scientific research. For further information: microdata@cbs.nl.

The unpublished statistical code and raw data files excluding the microdata of Statistics Netherlands are available upon reasonable request from the authors.

Conflicts of interest: None declared

Key points

- SEP is related to worse health, generally following a gradient with less favourable outcomes for each lower level of SEP.
- Low SEP is associated with higher healthcare use rates of OPCSs.
- Income-related inequalities in OPCS appeared to be only partly related to health status.
- Income-related inequalities in OPCS use were particularly large for patients with a chronic disease, and they were larger than inequalities in DGP use.
- These findings suggest that OPCSs address an additional healthcare need of socioeconomically vulnerable patients, particularly among patients with low income and chronic diseases.Kader opsomming 1e niveau

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Tables and figures

Table 1 Characteristics of the study population by household income group in 2017

		Study population					
		Household income group					
	The Netherlands[a]	1 (low)	2	3	4	5 (high)	Total
Patients enlisted in general practice (*n*)[b]	–	158.865	173.469	204.628	220.744	230.334	988.040
Age (mean, SD)	–	38.7 (23.5)	47.5 (25.7)	41.4 (23.4)	40.5 (21.6)	41.4 (20.1)	41.8 (22.9)
Age-group (%)							
0–4 years	5.1	4.8	3.6	4.5	4.1	3.1	4.0
5–17 years	14.8	17.0	14.1	16.6	15.1	13.1	15.1
18–44 years	33.3	37.6	27.2	32.4	34.4	33.4	33.0
45–64 years	28.2	24.5	20.6	25.7	31.3	39.1	29.0
65–74 years	10.7	7.8	16.6	12.7	10.3	8.5	11.1
≥75 years	7.8	8.3	17.9	8.0	4.8	2.8	7.9
Sex (% female)	50.4	53.2	54.2	50.4	49.0	47.8	50.6
Living alone (% yes)	17.3	31.9	22.9	13.9	9.4	6.2	15.6
Non-Western migrant background (% yes)	12.7	42.4	24.0	18.7	15.3	14.6	21.7
Health status on 1 January 2017 (%)[b]							
No chronic disease episodes	–	42.9	35.1	42.7	45.4	47.2	43.1
One chronic disease episode	–	25.6	22.7	26.0	27.2	27.9	26.1
Two chronic disease episodes	–	12.9	13.8	13.5	13.1	13.0	13.2
Three or more chronic disease episode	–	18.6	28.5	17.9	14.3	11.9	17.7
Chronic disease episode on 1 January 2017 (%)[b,c]							
COPD/asthma	–	14.0	14.6	12.0	11.1	10.0	12.1
CVD	–	18.4	29.2	19.5	16.2	14.3	19.1
Diabetes mellitus	–	7.9	10.4	6.1	4.5	3.5	6.2
Other	–	31.9	33.8	34.9	35.4	36.1	34.6

[a]Total population of The Netherlands in 2017: $N = 17.080.340$, derived from Statistics Netherlands.[40]
[b]Or if a patient was enlisted later that year, the first day of the quarter of enlistment.
[c]More chronic disease episodes possible.

Table 2 Mean number of contacts per patient with general practice and out-of-hours primary care services in 2017, totals and according to household income group (n¼988 040)

	Out-of-hours primary care					General practice
	Number of OPCS contacts	Number of high-urgency contacts	Number of low-urgency contacts	Number of contacts for an acute health problem [a]	Number of contacts for a chronic health problem [a]	Number of DGP contacts
	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Overall mean (95% CI)
Income groups						
1 (low)	0.29 (0.29; 0.30)	0.17 (0.17; 0.17)	0.12 (0.12; 0.13)	0.23 (0.22; 0.23)	0.05 (0.05; 0.05)	4.89 (4.85; 4.92)
2	0.26 (0.26; 0.26)	0.16 (0.15; 0.16)	0.10 (0.10; 0.10)	0.20 (0.20; 0.20)	0.04 (0.04; 0.05)	5.39 (5.35; 5.42)
3	0.21 (0.20; 0.21)	0.12 (0.12; 0.12)	0.08 (0.08; 0.09)	0.17 (0.16; 0.17)	0.03 (0.03; 0.03)	4.18 (4.15; 4.20)
4	0.17 (0.17; 0.18)	0.10 (0.10; 0.10)	0.07 (0.07; 0.07)	0.14 (0.14; 0.14)	0.02 (0.02; 0.02)	3.70 (3.68; 3.72)
5 (high)	0.14 (0.13; 0.14)	0.08 (0.08; 0.08)	0.05 (0.05; 0.06)	0.11 (0.11; 0.11)	0.02 (0.02; 0.02)	3.29 (3.27; 3.31)
Total	0.21 (0.20; 0.21)	0.12 (0.12; 0.12)	0.08 (0.08; 0.08)	0.16 (0.16; 0.16)	0.03 (0.03; 0.03)	4.19 (4.18; 4.20)

CI, confidence intervals.
[a]OPCS contacts for acute and chronic health problems, as recorded in the patients' EHR using ICPC-codes, do not add up to the total number of OPCS contacts due to missing ICPC-codes for 4.3% of the OPCS contacts.

Table 3 Standardized probability of general practice and out-of-hours primary care use per patient in 2017 (n¼988 040), associations with household income and population attributable fraction

	Out-of-hours primary care												General practice	
	Total contacts (yes = 1/no = 0)		Two or more contacts in one year (yes = 1/no = 0)		High-urgency contact (yes = 1/no = 0)		Low-urgency contact (yes = 1/no = 0)		Contact for an acute health problem (yes = 1/no = 0)		Contact for a chronic health problem (yes = 1/no = 0)		Total contacts (yes = 1/no = 0)	
	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)
Fixed effects														
Household income														
1 (low)	17.8	1.48 (1.45; 1.51)	5.9	2.06 (1.99; 2.14)	12.3	1.51 (1.47; 1.54)	8.8	1.54 (1.49; 1.58)	15.2	1.46 (1.43; 1.49)	3.7	1.81 (1.73; 1.89)	78.5	1.17 (1.15; 1.19)
2	16.1	1.28 (1.25; 1.30)	4.8	1.64 (1.59; 1.71)	11.0	1.30 (1.27; 1.33)	7.8	1.32 (1.29; 1.36)	13.8	1.27 (1.25; 1.30)	2.9	1.44 (1.38; 1.51)	78.4	1.16 (1.14; 1.18)
3	14.8	1.18 (1.56; 1.20)	4.0	1.43 (1.38; 1.48)	10.0	1.18 (1.16; 1.21)	7.0	1.21 (1.18; 1.24)	12.6	1.17 (1.15; 1.19)	2.5	1.28 (1.22; 1.33)	77.6	1.13 (1.11; 1.14)
4	13.8	1.10 (1.08; 1.12)	3.4	1.21 (1.16; 1.25)	9.1	1.09 (1.07; 1.11)	6.4	1.12 (1.09; 1.15)	11.8	1.10 (1.08; 1.12)	2.1	1.11 (1.07; 1.16)	76.9	1.09 (1.07; 1.10)
5 (high)	12.4	ref	2.8	ref	8.3	ref	5.6	ref	10.6	ref	1.9	ref	75.3	ref
Random effect (ICC/SE)														
Between DGP variance	–	0.01 (< 0.001)	–	0.01 (0.001)	–	0.01 (0.001)	–	0.01 (0.001)	–	0.01 (0.001)	–	0.02 (0.002)		0.01 (< 0.001)
PAF	0.22		0.41		0.24		0.26		0.22		0.33		0.04	

SB, standardized probability by direct standardization for age and sex; OR, odds ratios from multilevel logistic regression analyses; CI, confidence intervals; ICC, the intra-class correlation between daytime general practices: the relative contribution due to clustering of patients in DGP to the variation unexplained by characteristics related to the patient-level; PAF, population attributable fraction for income groups 1–4 vs. the highest income group; Models adjusted for age-groups, sex, living alone, non-Western immigrant background, number of chronic disease episodes and random effect of DGP level.

Table 4 Standardized probability of general practice and out-of-hours primary care use per patient in 2017, associations with socioeconomic status and health status, and population attributable fraction, stratified for patients with chronic disease

	Patients with COPD/asthma (n = 119 592)		Patients with CVD (n = 188 183)		Patients with diabetes mellitus (n = 60 944)		Patients with other chronic disease episodes (n = 342 162)	
	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)	SB (%)	OR (95% CI)
A. Contact out-of-hours primary care (yes = 1/no = 0)								
Fixed effects								
Household income								
1 (low)	24.5	1.54 (1.46; 1.62)	22.5	1.60 (1.53; 1.67)	23.1	1.56 (1.44; 1.69)	17.1	1.44 (1.39; 1.49)
2	21.8	1.30 (1.23; 1.36)	18.8	1.26 (1.21; 1.31)	21.0	1.33 (1.24; 1.44)	15.5	1.24 (1.20; 1.28)
3	20.1	1.19 (1.13; 1.25)	17.1	1.15 (1.11; 1.20)	18.3	1.15 (1.06; 1.25)	14.3	1.15 (1.12; 1.19)
4	18.4	1.08 (1.03; 1.14)	16.2	1.10 (1.05; 1.15)	17.9	1.13 (1.04; 1.23)	13.5	1.09 (1.05; 1.12)
5 (high)	16.5	ref	14.8	ref	16.2	ref	12.5	ref
Random effect (ICC/SE)								
Between DGP variance	–	0.01 (0.001)	–	0.01 (0.001)	–	0.01 (0.001)	–	0.01 (0.001)
PAF	0.21		0.25		0.24		0.18	–
B. Contact with general practice (yes=1/no=0)								
Fixed effects								
Household income								
1 (low)	88.1	1.25 (1.18; 1.33)	91.8	1.11 (1.04; 1.18)	92.0	1.21 (1.09; 1.35)	83.2	1.19 (1.15; 1.22)
2	88.1	1.24 (1.17; 1.31)	92.0	1.14 (1.08; 1.21)	92.4	1.21 (1.10; 1.33)	83.5	1.17 (1.14; 1.21)
3	87.2	1.17 (1.11; 1.24)	91.3	1.07 (1.01; 1.12)	91.7	1.12 (1.01; 1.23)	82.8	1.13 (1.10; 1.16)
4	86.9	1.16 (1.10; 1.22)	91.3	1.09 (1.03; 1.14)	91.5	1.09 (0.98; 1.20)	82.3	1.09 (1.06; 1.12)
5 (high)	85.1	ref	90.5	ref	90.9	ref	81.1	ref
Random effect (ICC/SE)								
Between DGP variance	–	0.01 (0.002)	–	0.03 (0.004)	–	0.04 (0.01)	–	0.01 (0.001)
PAF	0.05		0.02		0.03		0.02	

SB, standardized probability by direct standardization for age and sex; OR, Odds ratios from multilevel logistic regression analyses; CI, confidence intervals; ICC, the intra-class correlation between daytime general practices: the relative contribution due to clustering of patients in DGP to the variation unexplained by characteristics related to the patient-level; PAF, population attributable fraction for income groups 1–4 vs. the highest income group; Models adjusted for age-groups, sex, living alone, non-Western immigrant background, number of chronic disease episodes and random effect of DGP level.