Equity in prevention and health care

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Accepted for publication
17 October 2001
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Study objective: There is an increasing body of evidence about socioeconomic inequality in preventive use, mostly for cancer screening. But as far as needs of prevention are unequally distributed, even equal use may not be fair. Moreover, prevention might be unequally used in the same way as health care in general. The objective of the paper is to assess inequity in prevention and to compare socioeconomic inequity in preventive medicine with that in health care.
Design: A cross sectional Health Interview Survey was carried out in 1997 by face to face interview and self administered questionnaire. Two types of health care utilisation were considered (contacts with GPs and with specialists) and four preventive care mostly delivered in a GP setting (flu vaccination, cholesterol screening) or in a specialty setting (mammography and pap smear).
Setting: Belgium.
Participants: A representative sample of 7378 residents aged 25 years and over (participation rate: 61%).
Outcome measure: Socioeconomic inequity was measured by the HI_{wvp} index , which is the difference between use inequality and needs inequality. Needs was computed as the expected use by the risk factors or target groups.
Main results: There was significant inequity for all medical contacts and preventive medicine. Medical contacts showed inequity favouring the rich for specialist visits and inequity favouring the poor for contacts with GPs. Regarding preventive medicine, inequity was high and favoured the rich for mammography and cervical screening; inequity was lower for flu immunisation and cholesterol screening but still favoured the higher socioeconomic groups. In the general practice setting, inequity in prevention was higher than inequity in health care; in the specialty setting, inequity in prevention was not statistically different from inequity in health care, although it was higher than in the general practice setting.
Conclusions: If inequity in preventive medicine is to be lowered, the role of the GP must be fostered and access to specialty medicine increased, especially for cancer screening.

Since the late 1970s equal access to prevention has been identified as a public health priority by the World Health Organisation through the Alma-Ata declaration.[1] The objective of promoting equal access to preventive care was targeted by the "Health For All" agenda[2] and by several OECD countries such as Canada, France, the United Kingdom, and the United States.[3 5]

An increasing body of literature is revealing socioeconomic inequality in the use of preventive medicine. Considering prevention among adults, the bulk of such studies have focused on cancer screening, although a few studies have contemplated cardiovascular prevention. In most cases, such work shows that better off social groups have a higher utilisation rate of preventive medicine than underprivileged groups. The case seems particularly strong for mammography and cervical smears.[6 9] Similar inequality prevails for cholesterol screening.[10 11] There have been fewer studies carried out on socioeconomic disparities in adult immunisation, the only one we found was carried in a hospital setting.[12]

These studies can hardly reach conclusions on inequity of prevention as such. Three main issues are at stake here. Firstly, most OECD countries have some degree of health care inequity, particularly for specialty care where most cancer screening is carried out.[13] It is thus unclear whether preventive medicine is unequally used as such or whether its unequal use reflects inequity in health care delivery in general. Prevention might be used unequally in the same way as other health care.

Secondly, disparity in preventive use may be exacerbated by the unequal distribution of needs among the population. As some primary or secondary prevention interventions are recommended for specific groups, it makes little sense to measure socioeconomic disparities in use without taking into consideration the distribution of needs. For example, flu immunisation is recommended for people aged 65+ or having chronic obstructive pulmonary disease; breast cancer screening is recommended for women aged 50 and over; it is thus important to control for need when measuring unequal use of preventive medicine. This may help shift the investigation from inequality to inequity.

Lastly, the issue of the reference group is also worth mentioning. It is not only people with needs who use preventive medicine. The case is, for example, well illustrated for cancer screening, where some studies have shown that women aged below 50 used as much (and occasionally more) mammography as women aged 50 and above.[14] If measurement of equity in cancer screening relies only on women aged 50 and over, it will produce a downward bias in that higher social groups use more preventive medicine than required. Equity must be measured over the whole population using or needing the preventive medicine.[15]

The aim of this paper is to compare inequity in prevention with inequity in general health care, considering some preventive care available in general practice (flu immunisation, cholesterol screening) or in specialty care (mammography and, to a large extent in Belgium, cervical smear). Such comparisons may provide useful insights into the inequalities of prevention use.

METHODS

This study is based on the cross sectional household Health Interview Survey carried out in Belgium in 1997. The participants were selected through a multistage stratified sample of

non-institutionalised resident people. The participation rate was 61%, yielding a sample group of 10 225 people. We restricted the analysis to the 7378 people aged at least 25. The questions about health status and health care use were collected through face to face interviews, whereas the questions related to lifestyle and prevention use were recorded through a self administered questionnaire.

Health service use

The following four preventive services were considered: breast and cervical cancer screening, flu immunisation, and cholesterol screening. The variables studied here were: mammography in the past two years; a pap test in the past three years; flu vaccination in past year; and a cholesterol control in the past five years. In the case of mammography, we excluded women having breast cancer (19 cases) or mammography after an anomaly found by a physician (114 cases). We had no information about women who had hysterectomy. Lacking information about the setting where such preventive service, we assumed that flu immunisation and cholesterol screening were mostly carried out in a general practice setting while mammography and cervical smear were mainly executed in a specialty setting. Unpublished data from the Belgian National Institute for Health Insurance indicate that about 87% of pap smears were carried out by specialists while 82% of cholesterol screening were prescribed by GP.[16] Preventive medicine were compared with two types of health care: number of contacts with a GP and number of contacts with a specialist in the past two months.

Needs

According to the Equity Project methodology, needs were defined as use (health care or prevention) predicted by health status or sex-age group.[15] This implies estimating a relation between use (health care or prevention) and health status. For each individual i need is then computed as the expected value of use. Logistic regression was used for estimating need of prevention while a two part linear model was applied for health care, using the Heckman two step method.[17]

Needs for immunisation and screening were defined as the expected use according to known risk factors and prevention guidelines.[18] For flu immunisation the following risk factors were considered: chronic pulmonary or cardiovascular disorder; age of 65 or more; diabetes; working in the health sector. Subjective health (grouped in two categories, either very bad to fair, either good to very good) was also included to control for other unmeasured conditions (like haemoglobinopathy or immunosuppression). Need for cholesterol control was related to important risk factors for cardiovascular diseases: smoking cigarette, hypertension, heart disease, diabetes, and overweight obesity (body mass index $\geqslant 25$), age 35–65 for men, age 45–65 for women and sex.[18][19] Needs for a pap test and mammography were only related to age (25–65 and 50–69 years respectively) as this is the main screening indication.[18]

Needs for health care were related to the following health status variables: age, sex, the SF-36 physical functioning score, the GHQ-12, subjective health, and the number of self reported diseases. The SF-36 physical functioning score is a generic health status measure, assessing the limitations in performing activities of daily life (bathing, dressing, lifting, climbing, . . .).[20] The GHQ is a 12 item scale tracking symptoms of a wide range of common psychological disorders, mainly anxiety and depression.[21] Both scales are very widely used in Health Interview Surveys, in relation with health care use.[22] Among respondents, non-response rates were low (5.2% for the SF-36, 4% for the subjective health and 0.5% for the GHQ). Additional dummies were added for self reported diseases that were significantly related to health care use (see table 2).

Socioeconomic status

Considering recent reviews on social class and public health, socioeconomic stratification was estimated from both personal and household characteristics.[23][24] Each person's socioeconomic status was assigned a Nam-Powers socioeconomic score made of his or her own income, educational, and occupational ranking.[25] The score is computed on the available non-missing answers. Retired people were assigned their previous occupational category. A similar procedure was used to evaluate household socioeconomic status with the following variables: net disposable equivalent income of the household; mean educational level; proportion of low occupation level; housing ownership. People were then assigned a socioeconomic index, which was the mean of their individual and household socioeconomic status. Socioeconomic status (SES) was then standardised by 12 sex-age groups, in order to avoid any spurious relation between socioeconomic status and health care use or need (for example, elderly people have a smaller educational status but higher rate of flu immunisation). This methodology permits capturing the stratification at both the individual and household level and to analyse the large proportion of people that do not have a paid work, such as housewifes, retired people, or students.[23] There were 4.9% missing cases for income and less than 1% for education or occupation.

Equity

In health care, equity has a wide range of theoretical backgrounds and definitions that have been discussed elsewhere.[26] We focus here on horizontal equity—the extent to which equal needs receive equal treatment.[27] This definition is increasingly applied in the evaluation of equity in health care.[13][28][29]

The extent of socioeconomic equity is measured by the Health Inequity index devised by Wagstaff, Van Doorslaer, and Paci (HI_{wvp} index), which is the difference between unequal use (index C_u) and unequal needs (index C_n).[28] The needs concentration (C_n) represents the cumulative percentage of excess of needs (cumulative % of needs − cumulative % of the population) when population is ranked by increasing socioeconomic status. The use concentration (C_u) is the cumulative proportion of excess of care use (or preventive service) when population is ranked by increasing SES status. C_n and C_u range from −1 (need/use are favouring the rich) to 1 (favouring the poor). Because the inequity index (HI_{wvp} index) is the difference between C_u and C_n, it has a minimum value of −1 in the case of inequity favouring the poor (all health services

Table 1 Prevention use, health care use, and health status

Variable	Mean	Standard error
Prevention use		
Flu vaccination (%)	19	0.005
Cholesterol screening (%)	38	0.006
Pap smear (%)*	52	0.008
Mammography (%)*	30	0.008
Health care use		
Number of GP contacts	0.78	0.013
Number of specialist contacts	0.34	0.009
Health status		
SF-36 physical score	85.77	0.287
GHQ-12 score	1.36	0.035
Subjective health (very bad to fair)	0.26	0.005
Pulmonary chronic disorder (%)	9	0.003
Heart disease (%)	5	0.003
Hypertension (%)	15	0.004
Diabetes (%)	4	0.002
Kidney disease (%)	1	0.001
Number of diseases/chronic disorders	1.28	0.019
Worker of the health sector (%)	3	0.002
Current smoker (%)	24	0.005

*Among women only.

Table 2 Use of preventive medicine, risk factors, and socioeconomic status

Risk factor	Flu vaccination		Cholesterol screening		Mammography		Pap test†	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Subjective health (fair to bad)	1.516***	1.309 to 1.756						
Worker in the health sector	1.079	0.695 to 1.675						
Kidney disease	1.253	0.705 to 2.227						
Chronic obstructive pulmonary disorder	1.687***	1.374 to 2.072						
Heart disease	1.790***	1.409 to 2.274						
Diabetes	2.307***	1.751 to 3.040						
Age 65+‡	6.575***	5.74 to 7.54						
Male			0.829**	0.769 to 0.948				
Smoking			1.052	0.929 to 1.191				
Sedentary lifestyle			1.239**	1.113 to 1.379				
Overweight (BMI ⩾25)			1.548***	1.394 to 1.719				
Hypertension			1.653***	1.431 to 1.91				
Diabetes			2.424***	1.832 to 3.205				
Heart disease			2.498***	1.962 to 3.179				
Age 35–65 (male)‡			1.328***	1.145 to 1.541				
Age 45–65 (female)‡			1.524***	1.319 to 1.761				
Age 50–69 (female)‡					3.436***	2.949 to 4.004		
Age 25–64 (female)‡							6.275***	5.233 to 7.524
SES 1st quintile	0.683***	0.551 to 0.847	0.723***	0.613 to 0.852	0.426***	0.335 to 0.541	0.301***	0.239 to 0.378
SES 2nd quintile	0.85	0.694 to 1.04	0.809**	0.688 to 0.951	0.471***	0.374 to 0.592	0.461***	0.368 to 0.578
SES 3rd quintile	0.785*	0.637 to 0.967	0.929	0.792 to 1.089	0.676***	0.537 to 0.85	0.608***	0.483 to 0.765
SES 4th quintile	0.842	0.685 to 1.035	0.912	0.777 to 1.069	0.664***	0.532 to 0.828	0.825***	0.659 to 1.032
SES 5th quintile (ref)	1.0		1.0		1.0		1.0	
Likelihood ratio	1213		917		312		600	
Generalised R^2	0.248		0.161		0.116		0.202	

†Female only. Significant at *α=0.05; **α=0.01; ***α=0.001.0 ‡Versus opposite. All age groups are chosen in relation with the recommendations.

are used only by the poorer, for equal needs) and a maximum value of 1 for inequity favouring the rich (all health services are used only by the richer, for equal needs). The method of Kakwani *et al* was used to compute these indices and their standard error, using ordinary least square.[30]

RESULTS
About 19% of this adult population (n=7378) have been immunised against the flu during the preceding year, while 38% have undergone a cholesterol screening within the past five years (table 1). A little more than half of women got a pap test within the past three years and one third underwent a mammography within the past two years. Overall, in the past two months, particpants had used about 0.8 GP consultations or visits and 0.3 contacts with specialists. Table 1 also shows health status assessed by the SF-36 score (0 to 100), GHQ-12 score (0 to 12) as well as the prevalence of morbid conditions.

Preventive services and socioeconomic status
For each preventive service, table 2 provides the multivariate odd ratios (OR) of the five socioeconomic quintiles (when ranking on SES) controlling for the relevant risk factors. Flu immunisation significantly increased with known risk factors, particularly for age 65+ (OR=6.6), diabetes (OR=2.3), heart disease (OR=1.8), and chronic pulmonary disorder (OR=1.7). Health workers did not have a higher propensity for being immunised. Immunisation increases for poor subjective health (OR=1.5). The bottom and third socioeconomic quintile had a smaller likelihood of being immunised against influenza compared with the higher SES group.

Cholesterol screening significantly increased (table 2) for overweight persons (OR=1.5) as well as for people having a heart disease (OR=2.5), hypertension (OR=1.7), or diabetes (OR=2.4). Uptake of cholesterol screening increased for men aged 35–65 and women aged 45–65. There was no significant relation with other known risk factors such as smoking or sex. Men underwent less cholesterol screening (OR=0.83) than women (a finding in contradiction with the higher risk of coronary heart disease of the former). Controlling for these risk

factors, the two lowest socioeconomic quintiles had a lesser likelihood of undertaking a cholesterol screening (ORs of 0.7 and 0.8 respectively).

Table 2 shows that mammography and pap tests increased in the recommended age group. Women aged 25–64 were six times more likely to undergo a pap test, while women aged 50–69 were three times more likely to undertake a mammography. Regarding socioeconomic status and cancer screening, there was a significant, monotonic, strong, and increasing gradient of use: the higher the SES level the higher the likelihood of using such preventive services. Among women, the lowest socioeconomic quintile was less likely to undergo a mammography (OR=0.43) or a pap test (OR=0.3).

It is interesting to note that the relations between prevention use and target age group show significant differences. Flu shot, pap smear, and mammography have the strongest relation with age (ORs of 6.6, 6.3, and 3.4 respectively) while cholesterol screening has a weaker relation with age (OR=1.3 for men and 1.5 for women).

Health care and socioeconomic status
Table 3 provides the unstandardised β coefficients of the regression of the health care use—that is, the number of contacts with a GP or a specialist—on various health status variables. Most coefficients are significant and in the expected direction (the poorer the health status, the higher the consultation rate) with the exception of the obesity (for GP and specialist) and age (for specialist). Contacts with GPs have stronger relations with health status than contacts with specialists: the difference is more pronounced for age, subjective health, morbid conditions, and the SF-36 physical score. As a corollary, the R^2 is much higher for the number of contacts with GPs.

The number of contacts with GPs is higher in the intermediate SES groups, particularly for the second quintile (β=0.11) whereas contacts with specialists decrease in the lower SES groups.

Inequity
The socioeconomic concentration indices—for health care and preventive medicine—are given in table 4. The first row

Table 3 Health care use

	Number of contacts with GP¶		Number of contacts with specialist¶	
Variable†	β§	95% CI	β§	95% CI
Intercept	0.949	0.78 to 1.117***	0.58084	0.446 to 0.716***
Sex (female)	0.072	0.026 to 0.117***	0.08755	0.051 to 0.124***
Age (y)	0.007	0.005 to 0.009***	−0.00301	−0.004 to −0.002***
Number of diseases/chronic disorders	0.108	0.093 to 0.123***	0.06586	0.054 to 0.078***
SF-36 physical score	−0.010	−0.011 to −0.009***	−0.00209	−0.003 to −0.001***
GHQ-12 score	0.021	0.013 to 0.029***	0.01323	0.007 to 0.02***
Subjective health (very bad to fair)	0.254	0.192 to 0.316***	0.11959	0.07 to 0.17***
Obesity (BMI ≥30)	0.027	−0.043 to 0.097	−0.04259	−0.099 to 0.014
SES 1st quintile	0.077	0.007 to 0.148*	−0.1702	−0.227 to −0.113***
SES 2nd quintile	0.110	0.039 to 0.18***	−0.12475	−0.181 to −0.068***
SES 3rd quintile	0.093	0.023 to 0.162***	−0.12005	−0.176 to −0.064***
SES 4th quintile	0.041	−0.028 to 0.111	−0.07572	−0.132 to −0.02***
F	219		44	
R²	0.25		0.06	

¶Probit results and inverse mill ratio not shown. †Coefficients of the disease specific dummies are not shown. At the α=5% level the following disease dummies are significant for (1) GP: asthma, chronic bronchitis, heart disease, hypertension, chronic bladder infection, diabetes, thyroid gland disease, depression, arthrosis, stomach ulcer. (2) Specialist: asthma, chronic bronchitis, allergy, heart disease, hypertension, kidney disease, chronic bladder infection, epilepsy, migraine, cancer. §Unstandardised coefficients. *Significant at α=0.05; **at α=0.01; ***at α=0.001.

Table 4 Socioeconomic concentration indices

	All health care		Preventive health care	
Setting	C_n	95%CI	C_n	95%CI
Socioeconomic concentration of needs				
General practice	−0.074***	−0.083 to −0.064	−0.030***	−0.038 to −0.023
Speciality practice	−0.043***	−0.052 to −0.035	−0.009	−0.005 to 0.004
	C_u	95%CI	C_u	95%CI
Socioeconomic concentration of use				
General practice	−0.088***	−0.106 to −0.069	0.004	−0.012 to 0.020
Speciality practice	0.041*	0.009 to 0.074	0.100***	0.083 to 0.118
	HI_{wvp}	95%CI	HI_{wvp}	95%CI
Socioeconomic inequity				
General practice	−0.014	−0.030 to 0.002	0.034***	0.020 to 0.048
Speciality practice	0.085***	0.054 to 0.116	0.109***	0.092 to 0.126

*Significant at α=0.05; **at α=0.01; ***at α=0.001.
C_n is the concentration index of needs (or expected use); C_u is the concentration index for use; Hi_{wvp} is the inequity index.

provides results for those services delivered in a general practice setting, while the second row refers to a specialty care setting. For each health care or preventive service, table 4 provides an index of socioeconomic inequality in needs (index C_n), an index of socioeconomic inequality in use (C_u), and the inequity index (index Hi_{wvp}) with their corresponding 95% confidence intervals. A negative value (C_n or C_u) implies a concentration favouring the less privileged social strata, while a positive value indicates a concentration in the better off social groups. The opposite applies to HI_{wvp}: a positive value indicates an inequity favouring the well off.

Most indices of health care and preventive services have a negative index of concentration of needs, indicating that needs are more prevalent in the lower SES groups. In the GP setting, there is 7% more needs of GP care in the lower SES groups and 3% more needs of preventive care (flu vaccination or cholesterol screening). Turning to the specialty setting, there is 4% more needs in the less well off but no concentration of needs for preventive medicine. This is because, for mammographies and pap smears (delivered in a specialty care setting) the target group is defined in relation to age, which is controlled for.

Socioeconomic concentration of use in the general care setting favours greater use by the less well off, especially for health care (C_u=−0.09). The reverse is observed in the specialty setting, where there is 4% more use of specialty care,

and 10% more use of preventive services delivered in the specialty setting, in the higher SES groups.

There is significant inequity by SES for specialty health care and for the four preventive procedures considered. There is inequity of up to 3% favouring the higher SES groups in preventive services delivered in the general practice setting. Within the specialty setting, inequity is more marked, reaching 9% of specialty care and 11% of preventive services.

In the GP setting, the inequity in preventive services is higher than inequity in health care although the difference reached a borderline significance (p=0.03). In the specialty sector, inequity in preventive medicine is not statistically different from the inequity in health care (p=0.19).

Figure 1 shows the inequity curves for the four health services considered here. Only the GP care has an inequity curve below the horizontal line, indicating an inequity favouring the lower SES groups (needs < use). In the preventive services and the contacts with specialists, the inequity curves lie above the horizontal line, thus favouring the higher SES groups (needs > use). It is worth noting that the curves related to the specialty setting increase steadily up to the median socioeconomic group, indicating that inequity is widespread throughout the whole socioeconomic stratification. This is not the case for GP care or prevention. The GP care inequity curve is more irregular.
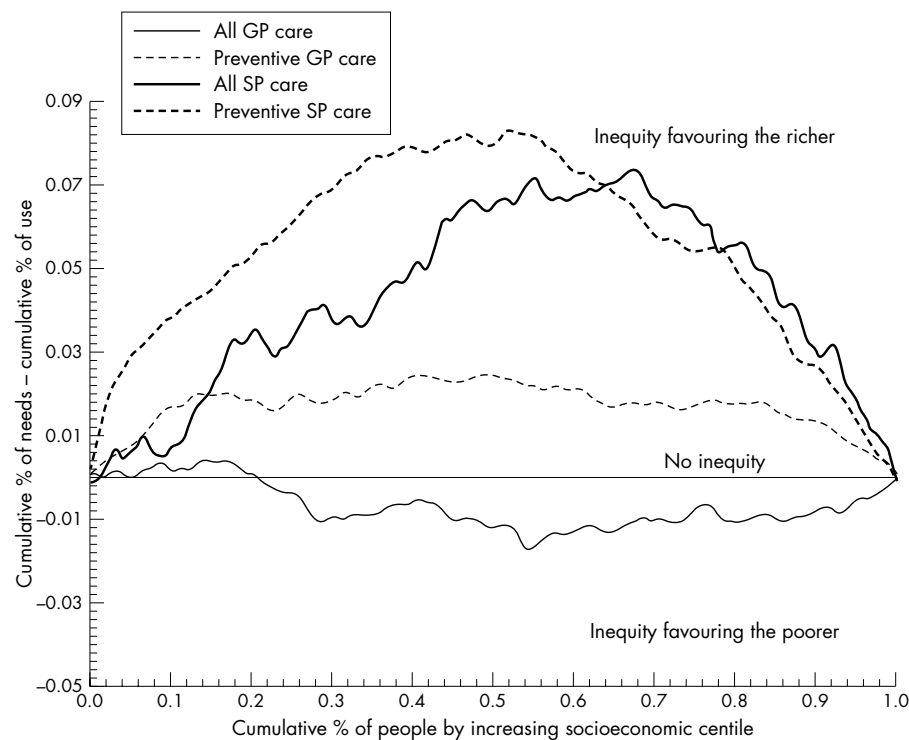
Figure 1. Inequity curves. Along increasing socioeconomic status centile (horizontal axis), each curve provides the inequity (that is, the cumulative percentage of the difference between needs and use); a positive value indicates a shortfall in health service use (use < needs) while a negative value indicate an excess of health service use (use > needs). The continuous lines are related to all care (GP care for the thin line and specialist care for the thick line) while the dashed lines are related to preventive services (GP care for the thin dashed line and specialist care for the thick dashed line). For example, at the median socioeconomic centile, there is an 8% shortfall in use of preventive services delivered by specialists, whereas there is a 2% excess of all GP care use.

Key points

- Important preventive medicine procedures delivered in a general practice setting or in specialty care show some degree of socioeconomic inequity.
- Inequity is higher in the specialty setting.
- For a given setting, preventive medicine is more inequitable than health care.
- Overlooking difference in need for prevention leads to an underestimation of inequity.
- If equity is not recognised as a public health objective, promoting screening will increase health inequalities.

DISCUSSION

This study has yielded four interesting results. Firstly, four preventive services studied here are inequitably used, favouring the higher socioeconomic groups. These results are consistent with previous studies on cancer screening in women[14 31] and cholesterol screening.[11] In this paper, we also show inequity for flu immunisation.

Secondly, the incorporation of needs introduces differences: although there is no socioeconomic gradient in the use of cholesterol screening or flu immunisation, the incorporation of needs reveals a significant inequity gradient. Ignoring the distribution of needs for preventive medicine may conceal inequity. Equality of use, in prevention as well as in health care, understates inequity when needs are concentrated among the less well off. This has been shown previously in health care,[13] and should be considered in preventive medicine. It would be useful to extend the analysis with additional health needs indicators. For instance, needs of cholesterol screening should consider individual global cardiovascular risk,[19] cancer screening may be concerned by family history[18] or at risk sexual practice.[32]

Thirdly, there is more inequity disadvantaging the poor in the specialty sector than in general practice. Such results are consistent with a previous Belgian study[29] and with cross national comparisons in OECD countries.[13 33] Belgian pro-poor GP care can been explained by the much lower co-payments for GP care for some needy groups.[13] Moreover, a few GPs are

organised in primary care centres mostly located in deprived areas, targeting economically deprived groups.[34] The pro-rich inequity for specialty care is a puzzling issue not only in Belgium, but also in other countries such as Sweden and Denmark, counting with universal and comprehensive coverage with little co-payment for outpatient visits.[13] Referral by the GP to the specialists does not turn out to be linked to socioeconomic status, either in within country studies[35 36] or in cross national comparisons.[13] Possible explanations may be rooted in the help seeking process. Lower SES people seem less willing to be involved in the decision making process and to take responsibility of the treatment choice.[37] As far as consulting a specialist requires greater decision making abilities than consulting a GP, low SES people may be less likely to be seeking specialty care. Furthermore, studies show that people of low SES first turn to sources close to them or those contacted usually[38] making them more likely to address their complaints to the "family" physician. In Belgium as well as in other OECD countries, specialty medicine covers an increasing share of overall medical supply and activity.[39] If access to specialty medicine by the lower socioeconomic groups is not given adequate attention, this trend towards more specialised medicine may increase inequity in care as well as in prevention.[40]

Finally, this study shows a trend for greater inequity in preventive medicine than in health care when the setting is controlled, especially in the general practice setting. Inequity for the preventive services delivered in the specialty setting is within the range of inequity in specialty care as such. A previous Dutch study reached a similar conclusion, showing that the rate of consulting was higher in the lower SES group while the reverse applied to cervical cytology.[41] An interesting conclusion of our study is that part of the inequity in cancer screening is accounted for by the setting in which it is mostly delivered. Increasing the role of the general practitioner in prevention may thus be a useful but not sufficient way to improve equity in prevention. Using performance based financial incentives might be a way to improve coverage in general practice.[42]

Several factors may explain such inequitable use of preventive medicine. In the first instance, financial barriers may limit access to cancer screening: cost sharing has a significant

negative effect on the use of mammography[43] and is higher in the specialty sector where most cancer screening is carried out. Secondly, cancer screening carries an additional adverse psychological burden in relation to the possibility of a false positive or early recall.[44 45]

Socioeconomic differences in use of preventive services may also be accounted by differences in beliefs, help seeking and information seeking processes. For cancer screening, it has been suggested that people of very low socioeconomic status may not perceive the usefulness of asymptomatic screening.[46] Qualitative studies of cancer screening suggested that the difference between screening and diagnosis is still problematic for some women.[47] In a broader perspective, people of low socioeconomic status have different ways of gathering information: they seek information only when it is needed; they rely, first, on their own knowledge; they assess information on how it helps them and not on its credibility.[38] Qualitative studies suggested that people may vary significantly in how much information they want[48] and that those from lower socioeconomic background have a smaller propensity to seek information.[37 49] Hence, we can wonder whether such differences in beliefs and information gathering abilities make cancer screening more inaccessible to lower SES groups: screening relies on a barely understandable idea of risk, requires recourse to an unfamiliar specialty setting, requires a more proactive stance in information seeking and does not provides immediate benefits to health. There is still little evidence that socioeconomic inequality in prevention is explained by such differences in help seeking, information gathering, and beliefs. Regarding immunisation, Prislin showed that beliefs and attitudes explained the lower immunisation status of children from low socioeconomic backgrounds.[50] More research is needed regarding such topic.

Socioeconomic inequity in preventive medicine may, finally, also be rooted in the supply, at both macro or micro level. Belgium does not have clear public health objectives[51] nor does it recognise preventive services within its fee for service scheme. Receiving flu immunisation often requires three contacts with the health care system: one with a physician in order to receive a prescription for an influenza vaccine, a second one to buy the vaccine in a pharmacy, and a third to get the flu vaccine injected. Defining explicit public health targets may help to mobilise resources to increase the coverage and equity of preventive medicine, as shown by the 1990 contract for UK general practice.[52] At the micro level, physician stance towards lower SES people may also contribute to the unequal cancer screening coverage. It has been recently shown that lower SES groups reported less screening recommendation by their physician.[53] Thus, part of the SES gradient in mammography use might also be accounted by a less active stance of the physician when attending lower SES patients. If equity is not given sufficient attention in the public health agenda, promoting screening will, all else being equal, increase health inequalities.

Our results may be limited by several factors. Firstly, the results may be biased in so far as unobserved needs may be linked to socioeconomic status. In the case of breast cancer, several studies have shown that higher SES groups have an increased incidence of breast cancer.[54] However, lower SES groups are at higher risk of cervical cancer because of their riskier sexual behaviours.[32] Ignorance of the former may lead to over-estimations of inequity, while overlooking the latter may underestimate inequity.

A second limitation may arise from the methodology used for assessing needs and socioeconomic status. If poor overall delivery of preventive services reduced the relation between use and ill health, we would underestimate the concentration of needs and, thus, inequity. For most preventive services, however, this is not the case as all risk factors have the expected relation with the corresponding preventive service. The only exception is smoking, which has a weak, non-significant, relation with cholesterol screening. This may be because smoking is more prevalent among young adults who are infrequently screened for cholesterol. Yet computing the need for cholesterol screening as the sum of those risk factors does not affect the results.

The use of a complex indicator aims at achieving a better measurement of socioeconomic status, in particular, regarding health status, to challenge the volatility of income, the poorer sensibility of education, and the heterogeneity of occupation.[55] Inclusion of assets helps to achieve a better stratification among elderly[56]; this is crucial when measuring inequity, for example, in flu immunisation. A sensibility analysis indicates that there is slightly less inequity when using more simple indicator such as education, although the results remain broadly the same.

Thirdly, this work may be limited by the moderate participation rate to the study or by under-reporting. The Belgian Health Interview Survey collected comparatively little information on the non-participants, making it difficult to assess any bias related to socioeconomic status.[57] Analysis of non-participation indicates that it is higher in Brussels (compared with Flanders and Wallonia); non-participation increases in household counting with a non-Belgian or female head of household, or with a smaller household size.[58] As far as socioeconomic deprivation is higher in Brussels and in single parent households, the first Belgian Health Interview Survey may have under-represented lower SES groups. We also found that low SES groups have a higher non-response rate to the cancer screening and to subjective health items, which may thus lead to a slight underestimation of inequity in preventive medicine, as far as their uptake rate and health status are poorer. Under-reporting or high non-response rate of morbidity in the lower socioeconomic groups has been evidenced in some epidemiological studies[59] and may generate an underestimation of needs and, hence, of inequity.

Finally, we assumed here that cervix screening was carried out in the specialty setting meanwhile flu vaccination and cholesterol screening were delivered in the general practice setting. The data from the National Institute for Health Insurance support this hypothesis, although it has been explained that a small proportion of pap smear testing was carried out by GPs while a small share of cholesterol screening was prescribed by cardiologists or other specialists. Assuming that the GP's cervical screening is more attended by lower SES women while cardiologist's cholesterol screening target higher SES groups, this may make the GP setting to be a slightly more equity-performer compared with the specialty setting.

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