Equity in prevention and health care

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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 inequality 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 utilization 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 inequality was measured by the Halami index, which is the difference between use or 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. The objective of promoting equal access to preventive care was targeted by the “Health For All” agenda and by several OECD countries such as Canada, France, the United Kingdom, and the United States.

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.

Similar inequality prevails for cholesterol screening. There have been fewer studies carried out on socioeconomic disparities in adult immunisation, the only one we found was carried in a hospital setting. 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. 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. 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.

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 GPs. 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. 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.

Needs for immunisation and screening were defined as the expected use according to known risk factors and prevention guidelines. 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 or bad; age of 65 or more; diabetes; working in the health sector. The GHQ is a 12 item scale tracking symptoms of anxiety and depression. Both scales are very widely used in epidemiology.

**Equity**

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

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 $C_n$) and unequal needs (index $C_u$). 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. The inequity index ($HI_{wvp}$ index) is the difference between Cu and Cn, it has a minimum value of −1 in the case of inequity favouring the poor (all health services and household characteristics). Each person’s socioeconomic status was assigned a Nam-Powers socioeconomic score made of his or her own income, educational, and occupational ranking. 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 housewives, retired people, or students. There were 4.9% missing cases for income and less than 1% for education or occupation.

**Table 1**

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

*Among women only.

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quintile had a smaller likelihood of being immunised against health (OR=1.5). The bottom and third socioeconomic immunised. Immunisation increases for poor subjective health workers did not have a higher propensity for being disease (OR=1.8), and chronic pulmonary disorder (OR=1.7).

Flu vaccination is one preventive service, table 2 provides the multivariate 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 R² 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 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).

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

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Flu vaccination</th>
<th>Cholesterol screening</th>
<th>Mammography</th>
<th>Pap test†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95%CI</td>
<td>OR 95%CI</td>
<td>OR 95%CI</td>
<td>OR 95%CI</td>
</tr>
<tr>
<td>Subjective health (fair to bad)</td>
<td>0.829** 0.769 to 0.948</td>
<td>1.022 0.929 to 1.191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker in the health sector</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney disease</td>
<td>1.079 0.695 to 1.675</td>
<td>1.548** 1.344 to 1.779</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disorder</td>
<td>1.253 0.705 to 2.227</td>
<td>1.653*** 1.431 to 1.911</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart disease</td>
<td>1.687*** 1.374 to 2.072</td>
<td>1.687*** 1.374 to 2.072</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>2.307*** 1.751 to 3.040</td>
<td>2.424*** 1.832 to 3.205</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 65+†</td>
<td>6.575*** 5.74 to 7.54</td>
<td>4.789*** 3.949 to 5.774</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>1.079 0.695 to 1.675</td>
<td>1.548** 1.344 to 1.779</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary lifestyle</td>
<td>1.253 0.705 to 2.227</td>
<td>1.653*** 1.431 to 1.911</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight (BMI &gt;25)</td>
<td>0.829** 0.769 to 0.948</td>
<td>1.022 0.929 to 1.191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
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<td></td>
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<td>1.687*** 1.374 to 2.072</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 35–65† (male)‡</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 45–65† (female)‡</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 50–69† (female)‡</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 25–64† (female)‡</td>
<td>1.516*** 1.309 to 1.756</td>
<td>1.384 1.281 to 1.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES 1st quintile</td>
<td>0.683*** 0.551 to 0.847</td>
<td>0.723*** 0.586 to 0.901</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES 2nd quintile</td>
<td>0.825 0.694 to 1.04</td>
<td>0.809** 0.688 to 0.951</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES 3rd quintile</td>
<td>0.785* 0.637 to 0.967</td>
<td>0.929</td>
<td>0.792** 0.637 to 0.967</td>
<td></td>
</tr>
<tr>
<td>SES 4th quintile</td>
<td>0.842 0.685 to 1.035</td>
<td>0.912</td>
<td>0.777** 0.610 to 0.964</td>
<td></td>
</tr>
<tr>
<td>SES 5th quintile</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>likelihood ratio</td>
<td>12.13</td>
<td>3.72</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Generalised R²</td>
<td>0.248</td>
<td>0.161</td>
<td>0.116</td>
<td>0.202</td>
</tr>
</tbody>
</table>

†Female only. Significant at *p<0.05; **p<0.01; ***p<0.001 0 Versus opposite. All age groups are chosen in relation with the recommendations.
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 (index $C_u$), and the inequity index (index $HI_{inc}$) 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 $HI_{inc}$: a positive value indicates a concentration favouring the less privileged social strata, while a positive value indicates a concentration favouring the less privileged social strata.

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.
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[11] and cholesterol screening.[12] 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,[14] cancer screening may be concerned by family history or at risk sexual practice.[15]

Thirdly, there is more inequity disadvantage the poor in the specialty sector than in general practice. Such results are consistent with a previous Belgian study[16] and with cross national comparisons in OECD countries.[17] Belgian pro-poor GP care can be explained by the much lower co-payments for GP care for some needy groups.[11] Moreover, a few GPs are organised in primary care centres mostly located in deprived areas, targeting economically deprived groups.[18] 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.[19] Referral by the GP to the specialists does not turn out to be linked to socioeconomic status, either in within country studies[20, 21] or in cross national comparisons.[22] 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.[23] 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[24] 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.[25] 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.[26]

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.[27] 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.[28]

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 and is higher in the specialty sector where most cancer screening is carried out. Practically, cancer screening carries an additional adverse psychological burden in relation to the possibility of a false positive or early recall.

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. Qualitative studies of cancer screening suggested that the difference between screening and diagnosis is still problematic for some women. 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. Qualitative studies suggested that people may vary significantly in how much information they want and that those from lower socioeconomic background have a smaller propensity to seek information. 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 provide 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. More research is needed regarding such topic.

Socioeconomic inequality 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 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. At the micro level, physician stance toward 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. 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. However, lower SES groups are at higher risk of cervical cancer because of their riskier sexual behaviours. 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. Inclusion of assets helps to achieve a better stratification among elderly; this is crucial when measuring inequity, for example, in flu immunisation. A sensitivity analysis indicates that there is slightly less inequity when using more specific indicator such as education, although the results remain broadly the same.

Thus, 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. 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. 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 and may generate a underestimation of needs and, hence, of inequity.

Finally, we assumed here that cervical 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 testing was prescribed by cardiologists or other specialists. Assuming that the GPs' 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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