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Social Heterogeneity in Self-Reported Health Status and Measurement of Inequalities in Health

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Abstract

This study aims to analyse the impact of the measurement of health status on socioeconomic inequalities in health. A MIMIC model with structural equations is used to create a latent variable of health status from four health indicators: self-assessed health, report of chronic diseases, report of activity limitations and mental health. Then, we disentangle the impact of sociodemographic characteristics on latent health from their direct impact on each heath indicator and discuss their effects on the assessment of socioeconomic inequalities in health. This study emphasises differences in inequalities in health according to latent health. In addition, it suggests the existence of reporting heterogeneity biases. For a given latent health status, women and old people are more likely to report chronic diseases. Mental health problems are over-reported by women and isolated people and under-reported by the oldest people. Active and retired people as well as non manual workers in the top of the social hierarchy more often report activity limitations. Finally, highly educated and socially advantaged people more often report chronic diseases whereas less educated people under-report a poor self-assessed health. To conclude, the four health indicators suffer from reporting heterogeneity biases and the report of chronic diseases is the indicator which biases the most the measurement of socioeconomic inequalities in health.

Key words: inequalities in health – MIMIC – reporting bias – structural equations.

JEL classification: C51 – I10

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1. Introduction

In France as well as in many countries, studies showing very large social inequalities in health are well-documented (Leclerc *et al.*, 2000; Cambois and Jusot, 2007). An important part of these studies looks into the determinants of these inequalities. Nevertheless the inequality measurement itself represents a challenge for public health, especially for policy decisions aiming their reduction (Aïach, 2000). In this context, the 9th of August 2004 law of French public health policy has targeted the need to "identify the best measurement tools for inequalities and racial discriminations" in order to pursue its 34th aim, which is "to reduce inequalities in diseases and mortality with an increase of life expectancy of socially disadvantaged people".

In this context, questions still remain on the measurement of socioeconomic inequalities in health. In particular, we wonder to what extent measurement tools as well as input variables influence the magnitude of socioeconomic inequalities in health. For example, France is the European country having the strongest level of inequalities in health when measured by the relative risk of premature mortality of blue collars workers as compared to white collars workers (Kunst *et al.* 2000), nevertheless France has an average position when inequalities are measured by a concentration index of self-assessed health (van Doorslaer and Koolman, 2004). The measurement of health, the measurement of the social dimension as well as the measurement tool influence the magnitude of socioeconomic inequalities in health (Girard, Cohidon and Briançon, 2000; Leclerc and Chastang, 2000; Couffinhal, Dourgnon and Tubeuf, 2004). This article aims to study the influence of measurements of health on the extent of socioeconomic inequalities in health.

Health status can be measured by many indicators such as mortality, morbidity, functional limitations, etc. We shall limit ourselves to health indicators, which are distinct from mortality indicators since they measure both quality of life and vital status. They refer to one of the three dimensions composing an individual health status: subjective, medical or functional health (Blaxter, 1985; Sermet and Cambois, 2002). The subjective model gathers self-assessed health, symptoms and quality of life indicators. According to the medical or biological model, health can be evaluated by diagnosed or reported diseases and information coming from clinical, physiological or psychiatric examination. Lastly, according to the functional and social model, health is evaluated by functional limitations or inability to carry out normal tasks. Thus, these indicators represent different dimensions of health status. Lastly, in addition to differences due to the dimension of health itself, differences in the nature of the indicator, such as reported or diagnosed information, induce different measurements of health.

Nevertheless, all the indicators do not similarly describe inequalities in health. For instance, inequalities in health over socioeconomic categories and income groups are more important when health is measured by self-assessed health than when measured by functional limitations or incidence of chronic diseases (Devaux *et al.*, 2007) regardless of the inequality

measurement tool, namely concentration index or odds-ratios. Two explanations can be proposed to these differences. Firstly, as these indicators do not refer to the same dimension of health, they necessarily lead to a different measurement of inequalities if socioeconomic differences in health do change according to the considered dimension of health[1]. Secondly, one can consider that each indicator is prone to a socioeconomic reporting heterogeneity, i.e. differences in report according to socioeconomic status at a "given health status".

Some recent studies have been interested in reporting biases related to self-assessed health, which is the most regularly collected measurement of health in household surveys. Even if this indicator is a good predictor of mortality (Idler and Benyamini, 1997) and health care utilisation (DeSalvo *et al.*, 2005), it is also the result of a complex aggregation process of several elements that an individual knows on his health status. Initially, self-assessed health integrates morbidity, which depends not only on diseases and on functional limitations for which he is treated, but also on diagnosed health problems, and thus, on interactions with health professionals. This measurement being subjective, it also integrates personal expectations of good health, which are influenced by social and cultural environments. Several studies have highlighted discordance between health perception and other health indicators considered to be more objective. The literature underlines four sets of factors that can affect individual health judgement and therefore self-assessed health. A first group is related to the nature of pathologies from which the individual suffers. For example, Van Doorslaer and Gerdtham (2003) observe that hypertensive men report a better health than women at a given death risk. Age and gender also influence reports: women would report a poorer health status than men for similar levels of incapacities. Moesgaard *et al.* (2002) explain it by the fact that women would have higher expectations of good health. In addition, Baron-Epel and Kaplan (2001) show that old people more favourably judge their health status than youngest people. Reporting biases related to socioeconomic status are also found. In France, self-assessed health is affected by optimism biases for both rich people and the poorest people for a given clinical health (Etilé and Milcent, 2006). Lastly, health perception seems to depend on cultural characteristics: an Australian study shows that indigenous population declares being in better health than general population in spite of higher incidence rates of serious health problems (Mathers and Douglas, 1998).

Other reported health indicators also suffer from cultural and social reporting biases. A traditional example is that of Kerala region in India where reported morbidity is more important than anywhere else in India while at the same time, this region has the weakest mortality rate and the highest literacy rate (Murray and Chen, 1992). Several analyses highlight an under-report of diseases in poorly educated groups, in lower income levels and in lower social categories (Mackenbach *et al.*, 1996, Elstad, 1996, Murray and Chen, 1992). In the same way, using Israeli data, Shmueli (2002; 2003) shows heterogeneity in health reports which is related to age, gender, education, ethnic origin and religious faith according to the health

[1] For example, one can assume some socioeconomic groups to have specific risks of functional limitations but not to have a higher risk to suffer from a chronic disease.

indicator: analogical visual scale (HR-QOL), quality of life (SF-36), self-assessed health and chronic diseases.

These reporting biases related to socioeconomic, demographic, pathological or cultural characteristics are recognized like an important obstacle for inter-individual comparisons of reported health levels (Bound, 1991) and for the analysis of socioeconomic inequalities in health (Elstad, 1996; Mackenbach *et al*., 1996; Jusot *et al*., 2005; Etilé and Milcent, 2006). In France, few studies were interested in this question: only reporting biases in self-assessed health related to income have been studied (Etilé and Milcent, 2006). Therefore, reporting biases affecting other health indicators remain to be studied especially because recent articles stress their importance in national contexts (Etilé and Milcent, 2006; Dourgnon and Lardjane, 2007). To study reporting biases, the most widespread approach consists in assuming that some indicators are more objective than others and trying to measure "true health". Reporting biases correspond then to the difference between health, as measured by the indicator considered to be "subjective" and health, as measured by the more "objective" indicator (Elstad, 1996; Mackenbach *et al*., 1996; Van Doorslaer and Gerdtham, 2003; Etilé and Milcent, 2006, Tubeuf and Perronnin, 2008). As this approach requires assuming one or several indicators to be more objective, this approach does not take into account the multidimensional concept of health, which can only be approached when considering all the dimensions of health. An alternative approach, suggested by Shmueli (2002; 2003), consists in building a health score using several indicators, ignoring their relative objectivity, and then, in analysing reporting biases as discordance between that score and each health indicator that it relies on. Shmueli (2003) underlines the need to reproduce this analysis with other health indicators to test the sensitivity of these estimates.

Following this second approach, this article proposes to analyse reporting heterogeneity related to socioeconomic and demographic characteristics, affecting several health indicators in France. This study outperforms other analyses on that subject by leading a sensitivity analysis of the estimation model to various health indicators. It emphasises differences in inequalities in health according to the latent health indicator. In addition, it suggests the existence of reporting heterogeneity biases. For a given latent health status, health reports will depend on household composition, demographic and socioeconomic characteristics. Our study shows that the four health indicators suffer from reporting heterogeneity biases but that the report of chronic diseases is the indicator which biases the most the measurement of socioeconomic inequalities in health.

The analysis relies on the 2002-2003 INSEE National Health Survey which is described in the next section. Section 3 presents our methodology. Results are described in section 4 and a comprehensive discussion ends this study.

2. Data

2.1 The 2002-2003 National Health Survey

The data come from the 2002-2003 National Health Survey. This survey investigation, which belongs to a set of surveys carried out by INSEE every ten years since 1960. A representative sample of households is randomly selected from the data of the population census. Everyone living in the household is interviewed. The sample is approximately composed of 40 000 people.

2.2 Measurement of health status

The 2002-2003 National Health Survey includes many questions about health status. For this study, we initially use the three health questions of the Mini European Health Module[2] (MEHM) concerning self-assessed health, chronic diseases and functional limitations. We then use questions related to diseases' nature, questions related to deficiencies and incapacities, like, the SF-36[3] and CESD-D[4]quality of life questionnaires. From these questions, we select eight health indicators being able to be classified according to the typology suggested by Blaxter (1985). The first two indicators put forward a measure of subjective health: self-assessed health of the Mini European Health Module (MEHM) and the SF-36 general health score. Four indicators permit appreciating health according to the medical model. Among those, two indicators aim at measuring the fact of suffering from a chronic disease (the chronic diseases indicator from the Mini European Health Module and the report of at least one chronic disease); two other indicators measure mental health (the SF36 mental health indicator and the CES-D depression score). Finally, two indicators allow us appreciating functional health: the activity limitations indicator of the Mini European Health Module and the report of at least one activity restriction or deficiency.

2.2.1 Subjective health indicators

Self-assessed health indicator of the MEHM corresponds to the question: "How is your health in general?" and the possible answers are: "very good", "good", "fair", "bad" and, "very bad". This indicator is dichotomised opposing individuals assessing a very poor, poor or average health status to those reporting a good or very good health. Individuals reporting a health status lower than average health represents 22.3% of the sample.

Another indicator of subjective health is built starting from the SF-36 general health (GH) score. The GH score equals on average 67.9 out of 100. This score is dichotomised with the

2 http://ec.europa.eu/health/ph_information/dissemination/reporting/diagramme_ehss_en.pdf

3 SF-36 is a measurement scale of the quality of life made up of 36 questions, gathered in eight dimensions. Each dimension is synthesised by a score; the higher the score, the better health is on this dimension.

4 Centre for Epidemiologic Studies Depression Scale.

first quartile to oppose individuals having a poor GH score to those having a better GH score. In this context, individuals having a score lower than 57 are considered in poor health.

2.2.2 Chronic diseases indicators

One of the two indicators of chronic diseases comes from the MEHM and comes from the question: "Do you have any longstanding illness or longstanding health problem?[5]" 39.8% of the sample positively answered to that question. The other chronic diseases indicator uses the extended report of diseases from the 2002-2003 National Health Survey, coded according to the International Classification of the Diseases of WHO (ICD-10th revision). We gather diseases in 21 chapters according to this same classification.

All the diseases recorded are then considered as regard to a specific classification generated by physicians from IRDES in order to distinguish short-term and long-term acute diseases, chronic diseases, unsettled and undetermined term diseases. We thus generate a variable "having reported at least one chronic disease" using the question about the nature of diseases and excluding short-term acute diseases and other pathologies which are not chronic diseases such as disorders of refraction, decays and dental prostheses. According to this definition, 62.3% of the population have at least one chronic disease.

(Table 1 about here)

2.2.3 Mental health indicators

One of the indicators of mental health used is generated from the SF-36 score of mental health, noted MH. Individuals have an average score of 66.7 out of 100. This score is dichotomised at the first quartile: the quarter of the individuals having a score lower than 56 which is the value of the first quartile, is in poor health.

Another indicator of mental health is generated from the CES-D questionnaire which is a scale of mental health made up of 20 questions (Radloff, 1977). The CES-D score is evaluated on 60 and the average score of our sample is 10.3: the higher the score the poorer the mental health of the individual. Individuals having a score higher than the third quartile, which equals 14, are considered in poor health.

2.2.4 Functional health indicators

One of the two indicators of functional health that we use is the activity limitations indicator of the MEHM. It corresponds to the question: "For at least the past six months, to what extent have you been limited because of health problem in activities people usually do?" and 11.4% of the individuals state to be limited.

[5]By longstanding, they mean illnesses or health problems which have lasted, or are expected to last for 6 months or more

The second indicator of functional health is defined from the report of deficiencies and incapacities. We consider the difficulties to carry out a daily life activity without the support from others or from equipment. Difficulties met with uncorrected sight problems are not considered as incapacities, but those met with corrected sight problems are incapacities. Nearly a quarter of the population have at least one deficiency or incapacity.

2.3 Measurement of socioeconomic status

Many socioeconomic individual characteristics are available in the survey, we consider in our analysis age, gender, household composition, education level, household income, social occupation, and finally, activity status. Age is gathered in six classes: 18-24 years; 25-39 years; 40-49 years; 50-59 years; 60-74 years; 75-85 years. Education level is measured by the highest diploma obtained and is described in four categories: people without diploma, people having a diploma lower than general or technical A-level, people having a diploma equivalent to the general or technical A-level and people having a higher education diploma. Household income per consumption unit corresponds to the total income reported within the household (resulting from an exact report or an imputed amount from income categories), divided by the number of consumption units of the household. The equivalence scale used is the OECD scale which gives a weight of 1 to the first member of the household, a weight of 0.5 for any other adult and a weight of 0.3 for any child of less than 14 years. Household income per consumption unit is modelled in four groups corresponding to the four income quartiles per consumption unit.
Social occupation is measured by either the current occupation or the last occupation. Six social classes are distinguished: farmers, self-employed workers, managers, clerks, employees, workers, and homemakers.

2.4 Analysis sample

This analysis is carried out on a sample of 20 145 individuals, restricted to adults aged 18 to 85 years and having answered all the questions about health. The exclusion of younger people is explained by the will to study people who have their own socioeconomic situation and who have answered themselves to the survey questions about health. The exclusion of elderly people comes from their specific health status and their lower reliability of reported data on their health. Table 2 shows some descriptive statistics of the sample.

(Table 2 about here)

3. Methodology

This analysis relies on the use of a model with structural equations to create a latent variable; a MIMIC (Multiple Indicators Multiple Index Causes) modelling type is used as it is adapted to the study of multidimensional concepts such as health (Jones, 2002). According to the methodology suggested by Shmueli (2002; 2003), we assume the existence of a latent health variable explaining four health indicators: self-assessed health, activity limitations, chronic diseases and mental health. The use of a MIMIC model permits showing to what extent these health indicators reflect one and only one latent health variable generated from responses to each indicator, then it permits analysing reporting heterogeneity by separating the effects of sociodemographic variables on latent health from their direct effect on each health indicator. Indeed, this method allows us highlighting social differences in report if we assume that the contribution of sociodemographic characteristics to the explanation of latent health concerns the determinants of the health, whereas for a given latent health, the direct effects of these characteristics on health indicators can be interpreted as reporting differences.

3.1 Construction of a synthetic index of health

The construction of this model initially requires a factor data analysis in order to generate a continuous health score using four selected health indicators representing several dimensions of health: self-assessed health, chronic diseases and functional limitations of the MEHM and the SF-36 mental health score (model 1). The factor analysis empirically determines the number of relevant factors summarising the information of these health indicators, i.e. the number of subjacent latent health variables using the minimum criterion of the eigenvalue. In this context, the factor must have an eigenvalue equal at least to 1 to be selected.

3.2 Analysis of report heterogeneity

When only one factor is selected, we estimate a simultaneous equations model. The first equation estimates the effects of socioeconomic characteristics on latent health summarised by the health score. The other equations explain reports to the health indicators according to latent health. The health score is thus used both as an explanatory variable of reports to the health indicators and as a dependent variable explained by various determinants of health. Testing the existence of the social reporting heterogeneity of health is therefore equivalent to testing the existence of an effect of socioeconomic variables on individual reports to indicators, independently of their effect on the latent health variable. We call thereafter direct effects on the health indicators “reporting bias”.

More formally, the MIMIC model with only one latent factor can be formalised as follows.

$$(1)\ \eta = \Gamma' Z + \zeta$$

$$(2)\ Y = \Lambda\eta + \beta' Z + \varepsilon$$

The synthetic health score (η) is a continuous variable. The vector ($Y' = (Y_1, Y_2, Y_3, Y_4)$) is composed of four dichotomous health indicators[6]. Socioeconomic characteristics are represented by ($Z = (Z_1, Z_2 \ldots)$). The vector ($\Lambda' = (\lambda_1, \lambda_2 \ldots)$) corresponds to contributions of the synthetic health indicator (η) to reports to health indicators (Y_i). The vector (Γ) represents the effects of socioeconomic variables (Z) on latent health (η), which can be interpreted as determinants of "true" health. The vector (β) corresponds to direct effects of socioeconomic variables (Z) on health indicators (Y), which are in fact social reporting biases. Finally we assume that the two error terms (ζ) and (ε) are uncorrelated but measurement errors ($\varepsilon = (\varepsilon_1, \varepsilon_2 \ldots)$) are such that ($\varepsilon_i$) and ($\varepsilon_j$) with ($i, j = 1, 2 \ldots$ and $i \neq j$) can be correlated. The potential correlation of measurement errors (ε_i) and (ε_j) permits incorporating reporting biases that could be common to some indicators and independent from socioeconomic characteristics.
This modelling strategy allows us separating the contribution of sociodemographic variables to the explanation of the latent health variable, from their contribution to each health indicator and can be schematically represented as follows.

(Figure 1: Modèle MIMIC about here)

Equations (1) and (2) are simultaneously estimated using M-Plus software. The estimated parameters in Eq. (1) are linear regression coefficients, the health score being a continuous variable, and the coefficients of Eq. (2) are coefficients from a Probit model because Yi are categorical variables. The adjustment of the model to the data is evaluated using the RMSEA (Root Mean Square Error of Approximation) criterion according to which the satisfaction threshold is below 0.05.

3.3 Sensitivity analysis

In order to test the robustness of the results as regard to the selected indicators, we compare the results of the model previously presented, called model 1, with results obtained in successive models replacing each four indicator of health by another indicator exploring the same dimension of health. Four models are successively studied: in model 2, the SF-36 mental health indicator is replaced by the CES-D mental health indicator; in model 3, the activity limitations indicator of the MEHM is replaced by the indicator "having reported at least an incapacity" ; in model 4, the chronic diseases indicator of the MEHM is replaced by the

[6] Y_1 is an indicator of poor self-assessed health, Y_2 is an indicator of reported chronic diseases, Y_3 is an indicator of reported activity limitations report and Y_4 is an indicator of poor mental health.

indicator “having reported at least a chronic disease, and finally, in model 5, self-assessed health of the MEHM is replaced by the SF-36 general health indicator.

4. Results

4.1 Construction of a synthetic index of poor health

The exploratory factor analysis relying on model 1 emphasises the existence of a unique latent factor summarising health according to the minimal criterion of eigenvalue. It represents 62% of total inertia. The confirmatory factor analysis confirms the good adequacy with the data of one latent factor model as indicator RMSEA equals 0.031.
The latent variable highlighted corresponds to a continuous synthetic indicator measuring poor health. It is positively correlated with the following indicators of health: “self-assessing a poor health status”, “reporting a chronic disease”, “reporting an activity limitation” and “having a poor mental health”. The MIMIC model is then estimated and leads to a satisfactory adjustment with a RMSEA criterion equal to 0.007. Two series of results are emphasised, the first one is related to the determinants of latent health, and the second one concerns reporting biases affecting reports of various health indicators.

4.2 Determinants of latent health status

The column "latent health" in table 3 presents the estimates of the linear regression of the latent poor health variable as explained by several individual socioeconomic characteristics. The four other columns present the Probit estimated coefficients associated to the four health indicators explaining latent health. In that context, a negative estimated coefficient shows a positive impact on good health regardless of the health indicator. Gender, age, household composition, education level, income and social status significantly influence latent health. Indeed, poor health increases with age, and men are in better health than women. People living alone are in worse health than couples without children, but couples without children are in worse health than those with children. Poor health decreases with a higher education level, with a higher income level and a higher social position. Lastly, unemployed people, retired people, inactive people and homemakers are in worse health than employed people.

(Table 3 about here)

4.3 Reporting biases

The second series of results is related to the determinants of the four health indicators (columns 3 to 7 of table 3). Results presented in the line "latent health" show that latent health significantly contributes to the way the health indicators are reported when self-assessed

health is the reference health indicator: chronic diseases reports (coef = 0.609), activity limitations reports (coef = 0.756) and mental health (coef=0.54).

Our results shed light on the existence of various reporting biases affecting health indicators. On one hand, the negative and significant correlation of the measurement errors attached to the mental health indicator and the chronic disease report suggest a specific reporting bias related to these two health indicators independently of sociodemographic characteristics. On the other hand, the direct effects of some characteristics on health indicators for a given latent health, suggest the existence of reporting biases related to demographic, economic and social characteristics. Therefore, it appears that for a given latent health, women report more chronic diseases and more mental health problems than men. As for old people, they report more chronic health problems and a better mental health. People living alone or in single-parent family report more mental health problems as compared to couples; they also self-assess a worse health status. Conversely, non-nuclear families report to have less chronic diseases than couples. Education and income levels significantly influence health variables for a given latent health. Having A-level or less than A-level is significantly related to a better self-assessed health. In parallel, individuals having a diploma higher than A-level report more chronic diseases and activity limitations. Income level has a direct and positive effect on the chronic diseases indicator: the higher the level of income, the more likely it is to report chronic diseases. As for social activity, clerks or managers report more chronic diseases and activity limitations than others for a given latent health variable. Lastly, students report less general health problems than employed people whereas retired people and inactive people report more activity limitations.

4.4 Stability of the model and strength of results

We successively test the robustness of our results as regard to the choice of health indicators. Results obtained in various tested models are coherent if regardless of the model, socioeconomic variables have the same effects on the synthetic latent health indicator, and if direct effects have comparable impacts on health indicators. We test then four different models where one dimension of health is changed one after the other. Detailed results are presented in tables 4 to 7.

This analysis confirms the under-report of poor health by students and the over-report of single-parent families; the higher report of chronic diseases by older people, the most educated people and the richest people. As for the report of functional health problems, retired people, inactive people and the most educated people are those who report the most. Finally, people living alone, single-parent and women over-report mental health problems whereas older people under-report them. If the majority of the identified reporting biases are common to the various models, some direct effects appear or disappear according to the health indicator involved. We present complete results of the models in appendix.

In model 2, we replace the SF-36 mental health score by the CES-D score. Results are presented in table 4. The effect of latent health on mental health remains stable: 0.56 for the CES-D score against 0.54 with the SF-36 mental health score. Direct effects of sociodemographic variables on the health indicators, which were observed in model 1 are the same, except the effect of gender on chronic diseases.
However, new reporting biases appear on each of the four health indicators. People aged 18-24 years, unemployed people and students over-estimate poor mental health (CES-D). The activity limitations indicator observes an under-reporting bias of women and of farmers. Moreover, self-employed people, employees, clerks and managers over-estimate their report of chronic diseases. Lastly, self-assessed health is overestimated by people aged 60 and more, and under-estimated by homemakers.

In model 3, we replace the activity limitations indicator of the MEHM from model 1 by the variable “having at least one incapacity or one deficiency”. Results are presented in table 5. Model 3 is unstable: although many reporting biases are common to model 1, some new biases appear and some others disappear. Among new biases, we notice an over-reporting bias of activity limitations by old people and an under-reporting by students. People having a diploma equal or lower than A-level over-report chronic diseases. Lastly, people aged 60-74 years old over-report poor self-assessed health.

The fourth model uses the variable “having reported at least one chronic disease” instead of the chronic diseases indicator of the MEHM. Results are presented in table 6. The majority of reporting biases are the same. However, several effects are not observed anymore, namely over-reports of chronic diseases and activity limitations by clerks. On the contrary, several new effects appeared: over-report of poor mental health by unemployed people, over-report of activity limitations by homemakers, under-report of chronic diseases by couples having children, and finally, over-report of self-assessed health by people who have not informed their job and by inactive people.

Self-assessed health of the MEHM is replaced by the SF-36 general health score (GH) in model 5. Results are presented in table 7. The majority of reporting biases is the same. Nevertheless, there is no more over-report of chronic diseases and activity limitations by managers and clerks. On the other hand some new reporting biases appear: under-report of poor self-assessed health by single people and of activity limitations by old people as well as under-report poor mental health by people having high incomes. We also observe over-report of poor mental health by unemployed people and students.

5. Discussion

The objective of this study was to analyse social biases affecting health reports and being able to affect the measurement of social inequalities in health. All our results confirm social differences in latent health. Moreover, our results show reporting heterogeneity for a given latent health. Indeed, women and old people more often report chronic diseases. Mental health problems are over-reported by women, single people and under-reported by the oldest people. Inactive and retired people more frequently report activity limitations as well as clerks. Lastly, the most educated people, people having higher incomes, clerks and managers more frequently report chronic diseases while poorly educated people under-report poor self-assessed health.

The approach suggested by Shmueli (2002; 2003) has allowed us generating a synthetic latent health indicator using four health indicators and disentangling the association between sociodemographic characteristics and health indicators into the contribution of these characteristics to the explanation of latent health and their direct contribution to reports to each health indicator.

This method makes thus possible to highlight specific reporting biases insofar as the contribution of sociodemographic characteristics to the explanation of latent health can be interpreted as coming from determinants of health. On the contrary, direct effects of these characteristics on health indicators can be interpreted as social differences in health reports. Nevertheless, the methodology as well as the way to interpret results can be discussed.

This method relies on the assumption of the existence of a single latent health variable explaining individual reports of various health indicators. The exploratory factor analysis on the four health indicators emphasises a unique latent factor summarising health and thus confirms that health could satisfactorily be represented by a unique variable. However, this factor represents only 62% of total inertia. Therefore the latent variable generated by this method does not permit having a complete representation of health, which is a largely multidimensional concept. This first assumption induces to interpret the direct effects of sociodemographic characteristics on health indicators as health reporting biases. However, these effects can be reporting biases but also effects of individual characteristics on some particular health dimensions and thus determinants of health. For example, the particular effect of gender on the SF-36 mental health score can be due to over-report of mental health problems by women, but can also come from a strong association between gender and this health dimension as regard to other dimensions of health. Indeed, there is a strong difference of prevalence of depression between women and men (Grigoriadis *et al.*, 2007).

This method thus allows us identifying specific biases affecting each indicator but does not allow us identifying common biases affecting the set of health indicators. Therefore, an optimism or pessimism bias affecting reports of the four indicators and correlated to a particular sociodemographic characteristic will not be identified as a bias but will be mistaken

with the effect of this characteristic on latent health. However, the assumption of a potential correlation between measurement errors of each health indicator allows us highlighting a specific reporting bias, such as the relation between the mental health indicator and the chronic disease indicator.

The latent health variable has been generated from information common to the four indicators involved in the construction. The synthetic latent health indicator thus depends by definition on the selected health indicators. In order to test the stability of our results, we have change one after the other each of the four indicator by another health indicator available in the survey, which refers to the same dimension of health: self-assessed health has been replaced by the SF-36 general health, chronic diseases of the MEHM has then been measured using the list of reported chronic diseases, functional health has been measured by activity limitations of the MEHM and then by reports of incapacities and deficiencies. Finally mental health comes at first from the SF-36 mental health score and then from the CES-D score. This sensitivity analysis has shown the instability of the results to the construction of the model. We observe appearances of mew biases and disappearances of biases in the various tested models. However, the majority of biases highlighted in model 1 proved to be stable. In particular, the sensitivity analysis has confirmed under-report of poor self-assessed health by students and over-report by single-parent; higher report of chronic diseases by old people, the most educated people and the richest people; higher report of functional problems by retired people, inactive people and highly educated people; and finally, over-report of mental health problems by women, single or single-parent people and under-report by old people.

This analysis has emphasised various results already shown in the literature and suggests the existence of reporting biases which have little been discussed. Moreover, we show social inequalities in health in accordance with many studies describing a deterioration of health with social status, education level and income when health is measured by the latent health indicator (Leclerc *et al.*, 2000; Cambois and Jusot, 2007). We then evidence biases affecting health reports according to four indicators: chronic diseases, activity limitations, self-assessed health and the SF-36 mental health score.

The great number of direct effects affecting the chronic diseases indicator suggests that this indicator provides a particularly biased health measurement according to individual sociodemographic characteristics. As Moesgaard *et al.* (2002), we show that women over-report chronic diseases. This effect of gender on diseases report may be explained by a more frequent health care utilisation for a similar health status, a greater care to health problems, a better knowledge of health problems that can be partly explained by a poorer latent health of women as regard to men. Following Shmueli (2003), our results also suggest over-report of chronic diseases by old people. This phenomenon can also be explained by a better knowledge of personal chronic diseases due to a more frequent health care use. The most educated people, people having the highest incomes as well as clerks and managers more often report chronic diseases for a given health. These social differences in report have already been evidenced by Mackenbach *et al*. (1996) and Elstad (1996) and can again be

explained by better medical information related to a more frequent health care utilisation or by a greater care paid to health by higher social groups. In addition, one can wonder whether the concept of chronic diseases is well-understood in any social group.

The activity limitations indicator also reveals reporting biases related to education level and activity status. Individuals having a diploma higher than A-level, clerks and managers report more activity limitations than working classes even though they have a better latent health. This over-report may be explained by a lower tolerance towards functional limitations and activity restrictions for these social groups. Moreover, we observe over-report of activity limitations by retired and inactive people. This result corresponds to the justification bias as proposed by Bound (1991) according to which people would justify their exit from labour market because of their poor health. However, one can also say that inactive or early-retired people experience a specific risk to suffer from activity limitations, which mainly explains their anticipated exit (Barnay and Debrand, 2006; Blanchet and Debrand, 2007). Several biases affecting self-assessed health have also been highlighted. Individuals having an intermediate education level less frequently report poor health as compared to the most educated people or people without diploma. This optimism bias compared to the most educated individuals could be explained by higher expectations for health when people are more educated as suggested by Mackenbach *et al*. (1996) or Elstad (1996). On the other hand, students report a better self-assessed health whereas they have a worse latent health than employed people due to allergies, depression and anxiety. Perhaps this optimism bias suggests that they do not take into account chronic health problems or mental health in their appreciation of their general health status. Lastly, single-parent people more frequently report a poor self-assessed health for a given latent health. This over-declaration may reflect health complaint or express a social difficulty within health problem report.

Results related to the SF-36 mental health score suggest over-report of this type of health problems by women, in accordance with the results of the analysis carried out in Israel by Shmueli (2003). However, this result can also be due to a specific gender effect on this health dimension of health, the risk of depression or anxiety being more widespread among women (Grigoriadis *et al*., 2007). We also confirm the under-report bias of mental health problems by old people shown by Shmueli (2003). This effect may be explained by lower expectations in terms of mental health of old people because of the numerous health problems related to ageing. Nevertheless, this effect may also not be related to reporting bias but to a less marked age effect on mental health than on other dimensions of health. Lastly, we show over-report of mental health problems by single or single-parent people undoubtedly partly due to the specific influence of isolation on this dimension of health (Wang, 2004).

This analysis thus underlines the existence of reporting heterogeneity related to sociodemographic characteristics affecting the set of considered health indicators. Among these indicators, chronic diseases report suffers from many biases and particularly from a pessimism bias related to education, social status and income. Consequently, this indicator cannot be regarded as a good measurement tool for social inequalities in health as it would

underestimate their magnitude. On the contrary, self-assessed health, activity limitations and mental health seems to be less biased indicators. These indicators represent various dimensions of health; they can thus advantageously be used according to the objectives of the analysis. Aiming an overall monitoring of social inequalities in health within the framework of the August 9, 2004 law related to the French public health policy, self-assessed health finally seems to be a good health measurement tool.

6. References

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7. Appendix

Figure 1: Modèle MIMIC

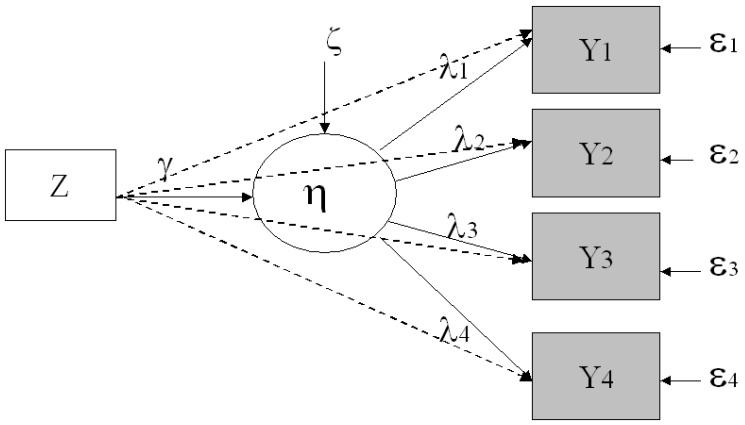

Table 1 : Descriptive statistics per disease chapters

Chapter	Title	Freq.	%
I	Certain infectious and parasitic diseases	567	2.8%
II	Neoplasm	677	3.4%
III	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	165	0.8%
IV	Endocrine, nutritional and metabolic diseases	2925	14.5%
V	Mental and behavioural disorders	848	4.2%
VI	Diseases of the nervous system	1103	5.5%
VII	Diseases of the eye and adnexa	1053	5.2%
VIII	Diseases of the ear an mastoid process	2043	10.1%
IX	Diseases of the circulatory system	4123	20.5%
X	Diseases of the respiratory system	1519	7.5%
XI	Diseases of the digestive system	2467	12.2%
XII	Diseases of the skin and subcutaneous tissue	925	4.6%
XIII	Disease of the musculoskeletal system and connective tissue	3517	17.5%
XIV	Diseases of the genitourinary system	1430	7.1%
XV	Pregnacy, childbirth and puerperium	18	0.1%
XVI	Certain conditions originating in the perinatal period	0	0%
XVII	Congenital malformations, deformations and chromosomal abnormalities	94	0.5%
XVIII	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	66	0.3%
XIX	Injury, poisoning and certain other consequences of external causes	1273	6.3%
XX	External causes of morbidity and mortality	83	0.4%
XXI	Factors influencing health status and contact with health services	128	0.6%

Table 2: Sample description

Variables	Freq.	Prop.
Gender		
Female	10662	52,9%
Male	9483	47,1%
Age classes		
18-24	2326	11,5%
25-39	5879	29,2%
40-49	4261	21,2%
50-59	3586	17,8%
60-74	3153	15,7%
75-85	940	4,7%
Household composition		
Single	2725	13,5%
Couple without children	6144	30,5%
Couple with children	9407	46,7%
Single-parent family	1097	5,4%
Non nuclear family	772	3,8%
Education level		
No diploma	2709	13,4%
Diploma lower than A-level	8677	43,1%
A-level	3445	17,1%
Diploma higher than A-level	5314	26,4%
Houshold income		
1st income quartile	4224	21,0%
2nd income quartile	4983	24,7%
3rd income quartile	5286	26,2%
4th income quartile	5652	28,1%
Social occupation		
Farmer	667	3,3%
Self-employed	1047	5,2%
Manager	2853	14,2%
Clerk	4410	21,9%
Employee	5355	26,6%
Worker	4207	20,9%
Unknown occupation	1606	8,0%
Activity status		
Employed	11898	59,1%
Unemployed	1246	6,2%
Student	1253	6,2%
Retired	3879	19,3%
Homemaker	1417	7,0%
Inactive	452	2,2%
Self-assessed health		
Reported poor self-assessed health	4486	22,30%
Poor general health status (SF36 General Health score)	5143	25%
Reported morbidity		
Reported chronic disease problem	8022	39,80%
At least one reported chromic disease	12551	62,3%
Functional health		
Reported functional limitations	2292	11,40%
At least one reported activity limitation	4979	24,20%
Mental health		
Poor mental health (SF36 Mental Health score)	5143	25%
Having a depression risk (CES-D score)	5143	25%

Table 3: Determinants of poor latent health determinants and probability to report a poor health status as regard to each indicator (model 1)

Individual characteristics	Poor latent health		Poor self-assessed health		Having one chronic disease		Having one activity limitation		Poor mental health	
	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test
Gender										
Female	Ref.	Ref.			Ref.	Ref.			Ref.	Ref.
Male	0,087	3,734			0,05	2,293			0,296	13,371
Age classes										
18-24	-0,262	-5,697								
25-39	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
40-49	0,284	9,911							-0,07	-2,429
50-59	0,503	15,227			0,113	3,666			-0,174	-5,289
60-74	0,53	9,51			0,335	6,22			-0,31	-5,426
75-85	0,88	13,32			0,301	4,427			-0,273	-3,979
Household composition										
Single	0,071	2,336							0,204	6,662
Couple without children	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Couple with children	-0,054	-2,157								
Single-parent family	-0,088	-1,466	0,149	2,401					0,243	4,748
Non nuclear family	0,024	0,456			-0,145	-2,804				
Education level										
No diploma	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Diploma lower than A-level	-0,1	-2,993	-0,119	-3,682						
A-level	-0,237	-5,469	-0,108	-2,498						
Diploma higher than A-level	-0,468	-11,477			0,185	4,691	0,18	3,48		
Houshold income										
1st income quartile	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2nd income quartile	-0,074	-2,563			0,068	2,443				
3rd income quartile	-0,194	-6,452			0,124	4,226				
4th income quartile	-0,23	-6,981			0,156	4,839				
Social occupation										
Farmer	-0,1	-1,918								
Self-employed	-0,149	-3,332								
Manager	-0,298	-6,754			0,163	3,946	0,112	2,093		
Clerk	-0,171	-4,995			0,124	3,802	0,112	2,786		
Employee	-0,077	-2,723								
Worker	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unknown occupation	-0,199	-3,046								
Activity status										
Employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	0,314	7,849								
Student	0,251	2,769	-0,357	-3,521						
Retired	0,246	5,155					0,198	3,605		
Homemaker	0,173	4,214								
Inactive	0,942	14,875					0,547	8,898		
Threshold/ Intercept			0,709	14,816	0,567	13,122	1,367	24,345	0,592	13,252
Latent health			1	0	0,609	36,355	0,756	39,859	0,54	33,692
R^2	0,246		0,888		0,402		0,568		0,314	
Chi 2 (WLSMV)	73,244									
P-value	0,0005									
RMSEA	0,007									
Correlation between chronic disease and mental health	-0,051	-4,012								

Table 4: Results of model 2

Individual characteristics	Latent health		Self-assessed health		Chronic disease		Activity limitation		CESD mental health	
	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test
Gender										
Female	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Male	0,128	5,771					-0,073	-2,706	0,297	12,795
Age classes										
18-24	-0,279	-5,716							0,109	2,304
25-39	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
40-49	0,28	9,886							-0,108	-3,572
50-59	0,498	15,166			0,107	3,441			-0,153	-4,457
60-74	0,373	4,463	0,22	2,734	0,423	6,427			-0,166	-2,491
75-85	0,722	7,42	0,216	2,331	0,386	4,809			-0,226	-2,837
Household composition										
Single	0,07	2,336							0,37	11,846
Couple without children	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Couple with children	-0,06	-2,4								
Single-parent family	-0,086	-1,477	0,148	2,43					0,431	8,423
Non nuclear family	0,03	0,564			-0,149	-2,898				
Education level										
No diploma	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Diploma lower than A-level	-0,086	-2,652	-0,134	-4,188						
A-level	-0,228	-5,452	-0,117	-2,767						
Diploma higher than A-level	-0,457	-11,249	0	0	0,187	4,711	0,184	3,555		
Houshold income										
1st income quartile	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2nd income quartile	-0,08	-2,836			0,074	2,634				
3rd income quartile	-0,197	-6,629			0,129	4,391				
4th income quartile	-0,23	-7,065			0,16	4,937				
Social occupation										
Farmer	-0,048	-0,907					-0,129	-1,979		
Self-employed	-0,191	-4,022			0,134	2,803				
Manager	-0,299	-6,739			0,17	4,018	0,121	2,232		
Clerk	-0,175	-5,103			0,13	3,927	0,12	2,969		
Employee	-0,092	-3,117			0,073	2,49				
Worker	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unknown occupation	-0,173	-2,728								
Activity status										
Employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	0,293	7,174							0,178	4,218
Student	0,175	1,765	-0,28	-2,566					0,179	2,111
Retired	0,26	5,504					0,181	3,306		
Homemaker	0,244	5,15	-0,112	-2,357						
Inactive	0,96	15,437					0,507	8,34		
Threshold/ Intercept			0,709	14,816	0,567	13,126	1,367	24,342	0,824	17,84
Latent health			1	0	0,628	37,201	0,783	41,088	0,56	33,671
R^2	0,237		0,865		0,414		0,575		0,344	
Chi 2 (WLSMV)	42,791									
P-value	0,1183									
RMSEA	0,004									
CFI	0,998									
Correlation between chronic disease and CESD	-0,069	-5,264								

Table 5: Results of model 3

Individual characteristics	Latent health		Self-assessed health		Chronic disease		Disability		SF36 MH score	
	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test
Gender										
Female	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Male	0,116	6,135							0,274	12,502
Age classes										
18-24	-0,244	-6,227								
25-39	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
40-49	0,258	9,732					0,254	7,326	-0,071	-2,42
50-59	0,511	16,961					0,26	6,612	-0,209	-5,924
60-74	-0,036	-0,385	0,628	6,572	0,685	7,896	0,963	12,005		
75-85	0,972	16,085					0,929	12,075	-0,384	-5,089
Household composition										
Single	0,078	2,908							0,195	6,35
Couple without children	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Couple with children	-0,055	-2,505								
Single-parent family	-0,051	-1,088	0,111	1,961					0,226	4,596
Non nuclear family	0,038	0,784			-0,162	-2,894				
Education level										
No diploma	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Diploma lower than A-level	-0,208	-7,789			0,116	3,696				
A-level	-0,359	-10,313			0,161	3,937				
Diploma higher than A-level	-0,466	-12,666			0,284	6,42				
Houshold income										
1st income quartile	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2nd income quartile	-0,067	-2,503			0,079	2,615				
3rd income quartile	-0,19	-6,782			0,163	5,101				
4th income quartile	-0,234	-7,636			0,208	5,944				
Social occupation										
Farmer	-0,103	-1,973			0,135	2,147				
Self-employed	-0,212	-4,862			0,187	3,699				
Manager	-0,288	-7,315			0,22	5,007				
Clerk	-0,174	-5,644			0,163	4,73				
Employee	-0,111	-4,057			0,108	3,45				
Worker	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unknown occupation	-0,215	-3,451			0,189	2,811				
Activity status										
Employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	0,26	7,374								
Student	0,19	2,355	-0,303	-3,01			-0,216	-2,108		
Retired	0,258	6,22								
Homemaker	0,139	3,919								
Inactive	0,847	14,415					0,244	3,743		
Threshold/ Intercept			0,709	14,814	0,566	13,096	0,929	18,759	0,592	13,251
Latent health			1	0	0,825	24,765	0,737	22,61	0,602	25,387
R^2	0,265		0,709		0,5		0,521		0,292	
Chi 2 (WLSMV)	38,074									
P-value	0,2892									
RMSEA	0,002									
CFI	0,999									
Correlation between chronic disease and MH	-0,076	-4,682								
Correlation between self-assessed health and MH	0,088	3,967								
Correlation between chronic disease and disability	-0,115	-5,997								

Table 6: Results of model 4

Individual characteristics	Latent health		Self-assessed health		Reported chronic disease		Activity limitation		SF36 MH score	
	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test
Gender										
Female	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Male	0,092	3,824			0,184	8,284			0,299	13,715
Age classes										
18-24	-0,258	-5,382								
25-39	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
40-49	0,261	8,648			0,177	6,661				
50-59	0,518	15,338			0,434	13,295			-0,151	-4,734
60-74	0,552	9,687			0,691	11,313			-0,289	-5,155
75-85	0,915	13,509			0,821	9,484			-0,241	-3,58
Household composition										
Single	0,069	2,165							0,21	6,919
Couple without children	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Couple with children	-0,052	-1,877			-0,077	-2,892				
Single-parent family	-0,084	-1,226	0,144	2,051					0,236	4,586
Non nuclear family	0,025	0,449			-0,178	-3,234				
Education level										
No diploma	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Diploma lower than A-level	-0,086	-2,223	-0,134	-3,648						
A-level	-0,239	-4,796	-0,106	-2,16						
Diploma higher than A-level	-0,479	11,495			0,157	3,757	0,15	2,881		
Houshold income										
1st income quartile	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2nd income quartile	-0,077	-2,569			0,121	4,168				
3rd income quartile	-0,203	-6,501			0,192	6,408				
4th income quartile	-0,24	-7,019			0,201	6,017				
Social occupation										
Farmer	-0,109	-1,956								
Self-employed	-0,191	-4,043								
Manager	-0,245	-5,842								
Clerk	-0,143	-4,3					0,08	2,029		
Employee	-0,1	-3,369								
Worker	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unknown occupation	-0,427	-4,865	0,249	2,959						
Activity status										
Employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	0,279	6,597							0,087	2,2
Student	0,413	4,093	-0,525	-4,822						
Retired	0,239	4,765					0,224	4,056		
Homemaker	0,135	3,103					0,159	3,075		
Inactive	1,183	10,145	-0,267	-2,52			0,461	5,783		
Threshold/ Intercept			0,708	14,812	0,14	3,108	1,366	24,322	0,592	13,251
Latent health			1	0	0,536	27,86	0,675	29,201	0,483	30,446
R^2	0,234		0,975		0,441		0,526		0,288	
Chi 2 (WLSMV)	59,087									
P-value	0,009									
RMSEA	0,006									
CFI	0,997									
Correlation between chronic disease and activity limitation	0,143	7,57								

Table 7: Results of model 5

Individual characteristics	Latent health		GH		Chronic disease		Activity limitation		SF36 MH score	
	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test	Estim.	T-test
Gender										
Female	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Male	0,044	2,266			0,073	3,353			0,317	15,035
Age classes										
18-24	-0,2	-5,24								
25-39	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
40-49	0,187	7,48			0,063	2,264				
50-59	0,369	13,247			0,166	4,851			-0,119	-3,724
60-74	0,386	8,161			0,392	6,784			-0,251	-4,499
75-85	0,83	12,566			0,269	3,249	-0,265	-3,105	-0,285	-4,018
Household composition										
Single	0,05	1,588	-0,113	-3,097					0,213	6,501
Couple without children	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Couple with children	-0,053	-2,452								
Single-parent family	-0,024	-0,63							0,209	4,753
Non nuclear family	0,008	0,167			-0,136	-2,623				
Education level										
No diploma	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Diploma lower than A-level	-0,079	-2,83	-0,066	-2,185						
A-level	-0,211	-6,709								
Diploma higher than A-level	-0,37	-9,459			0,153	3,578	0,198	3,391		
Houshold income										
1st income quartile	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2nd income quartile	-0,06	-2,386			0,065	2,273				
3rd income quartile	-0,131	-4,944			0,096	3,15			-0,063	-2,187
4th income quartile	-0,125	-4,332			0,101	3,021			-0,093	-2,927
Social occupation										
Farmer	-0,093	-2,013								
Self-employed	-0,133	-3,457								
Manager	-0,155	-4,522								
Clerk	-0,067	-2,449								
Employee	-0,06	-2,434								
Worker	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unknown occupation	-0,144	-2,567								
Activity status										
Employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	0,222	6,329							0,092	2,333
Student	0,101	1,543							0,166	2,255
Retired	0,263	6,383								
Homemaker	0,149	4,183								
Inactive	0,871	13,618					0,382	5,326		
Threshold/ Intercept			0,567	13,123	1,367	24,342	0,481	10,733	0,592	13,251
Latent health			1	0	0,687	19,043	1,005	29,642	0,59	24,561
R^2	0,244		0,368		0,643		0,642		0,267	
Chi 2 (WLSMV)	89,717									
P-value	0									
RMSEA	0,008									
CFI	0,991									
Correlation between MH and GH	0,203	11,354								
Correlation between activity limitation and GH	-0,061	-2,125								

Social Heterogeneity in Self-Reported Health Status and Measurement of Inequalities in health

Sandy Tubeuf (Leeds Institute of Health Sciences, Academic Unit of Health Economics),
Florence Jusot (Legos-Leda, Irdes), Marion Devaux (Irdes), Catherine Sermet (Irdes)

This study aims to analyse the impact of the measurement of health status on socioeconomic inequalities in health. A MIMIC model with structural equations is used to create a latent variable of health status from four health indicators: self-assessed health, report of chronic diseases, report of activity limitations and mental health. Then, we disentangle the impact of sociodemographic characteristics on latent health from their direct impact on each heath indicator and discuss their effects on the assessment of socioeconomic inequalities in health. This study emphasises differences in inequalities in health according to latent health. In addition, it suggests the existence of reporting heterogeneity biases. For a given latent health status, women and old people are more likely to report chronic diseases. Mental health problems are over-reported by women and isolated people and under-reported by the oldest people. Active and retired people as well as non manual workers in the top of the social hierarchy more often report activity limitations. Finally, highly educated and socially advantaged people more often report chronic diseases whereas less educated people underreport a poor self-assessed health. To conclude, the four health indicators suffer from reporting heterogeneity biases and the report of chronic diseases is the indicator which biases the most the measurement of socioeconomic inequalities in health.

Hétérogénéité sociale de déclaration de l'état de santé et mesure des inégalités de santé

Sandy Tubeuf (Leeds Institute of Health Sciences, Academic Unit of Health Economics),
Florence Jusot (Legos-Leda, Irdes), Marion Devaux (Irdes), Catherine Sermet (Irdes)

Cette recherche explore l'impact de l'instrument de mesure de l'état de santé, sur l'ampleur des inégalités sociales de santé. Un modèle MIMIC d'équations structurelles est utilisé pour créer une variable latente d'état de santé à partir de quatre indicateurs : la santé perçue, les limitations d'activité, les maladies chroniques et la santé mentale. Nous séparons ensuite la contribution des variables sociodémographiques à l'explication de la santé latente, de leur contribution directe à chacun des indicateurs de santé et discutons leur effet sur l'évaluation des inégalités sociales de santé. Les résultats confirment des différences sociales d'état de santé latent mais aussi l'existence de biais de déclaration. A santé latente donnée, les femmes et les personnes âgées déclarent plus souvent des maladies chroniques. Les problèmes de santé mentale semblent sur-déclarés par les femmes et les personnes isolées et sous-déclarées par les plus âgées. Les inactifs et les retraités déclarent plus souvent des limitations d'activité, de même que les cadres. Enfin, les personnes les plus éduquées, aux revenus élevés, les cadres et les professions intermédiaires déclarent plus souvent des maladies chroniques tandis que les personnes peu éduquées sous-déclarent la mauvaise santé perçue. Si les quatre indicateurs explorés souffrent de biais, l'indicateur de maladies chroniques est celui qui biaise le plus la mesure des inégalités sociales de santé.

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