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Background

This research has been carried out in collaboration with the Institute of Public Economics, as part of the Drees-Mire, Inserm, InVS, INCa, RSI program on social inequalities in health (2005).

This analysis relies on the French part of the SHARE survey (Survey of Health, Ageing and Retirement in Europe) carried out in 2004-2005. For the first time in France, this survey permits to compare individual health status with living conditions in childhood and parental health status.

It will be followed up by an analysis of a specific module on childhood circumstances included in the 2006 IRDES survey of Health and Social Protection.

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Inequality of opportunities in health: the influence of parents' social status and health status

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We may consider the role of social and familial determinism among the range of causes of inequality of opportunity in health. Health status in adulthood is affected by an individual's social background. Two hypotheses are proposed in the literature: the direct effect of living conditions during childhood on adult health; the indirect effect of the family background on the future socio-economic status. We propose a third hypothesis in our study: the health status transmission from one generation to the next, based on a common genetic inheritance, and copying parental behaviours (health preferences, risky behaviours).

These three hypotheses are tested for the first time on French data from the 2004-2005 SHARE survey. The results suggest that health status in adulthood is directly affected by the mother's social status, and that father's social status has an indirect effect given its influence on childhood socioeconomic status. Without disregarding the effect of social background, the health status of both parents has a direct effect on the descendant's health in adulthood. Finally, the role of education is of importance as education level has a significant effect on social inequalities in health in adulthood.

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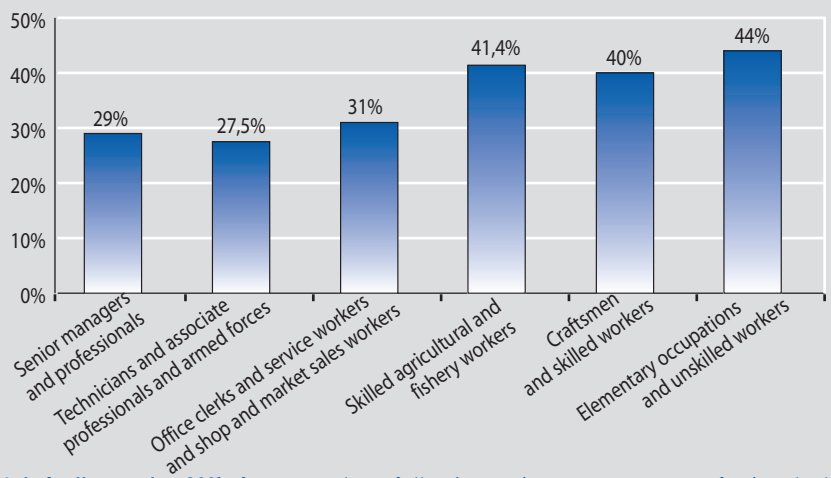
Proportion of individuals reporting a poor health according to their father's social status



Note for the reader: *29% of persons whose father is a senior manager or a professional self-report a poor health, compared to 44% of the offspring of unskilled workers.*

Source: *SHARE 2004-2005*

In 2006 the government declared that inequality of opportunity was an issue of national concern. This is understood as: "the chance for every citizen – whatever their origin, their sex, their beliefs or their way of life – to value who they are, what they can do, and their merits so that they are able to progress in society". This stated objective also relates to the idea that while some inequalities, resulting from decisions taken by individuals themselves, are not necessarily unjust, those resulting from circumstances over which individuals have no control, such as gender, ethnic origin or social origin, are unjust and hence merit interventions to be reduced.

While many studies have assessed the existence of inequality of opportunity in education, employment, housing or income distribution (Lefranc *et al.*, 2004), fewer have addressed inequality of opportunity in health[1]. This study aims to evaluate the relationship between inequalities of opportunity in health and social and familial determinism in France. It presents a simultaneous analysis of the influence of social background and of parental health status on their descendant's health in adulthood, based on the SHARE survey (see the box below).

Latency, pathway and transmission: presentation of the 3 hypotheses tested

Many British studies of longitudinal epidemiological cohorts have shown that childhood living conditions, and particularly social background, influence health status in adulthood (Marmot and Wilkinson, 1999; Goldberg *et al.*, 2002; Blane, 1999).

Essentially, 2 hypotheses have been tested to explain this phenomenon:

- according to the latency hypothesis, living conditions during childhood (housing, nutrition etc.) have a direct effect on health in adulthood (Barker, 1996). Thus, there is a strong relationship between childhood conditions and health in adulthood, which can be compared to a biological programming of a disease during the fetal period and childhood, which expresses itself later in adulthood;

- according to the pathway hypothesis, childhood living conditions have an indirect effect on health through the influence of socio-economic status of the descendant (Case *et al.*, 2005)[2].

[1] *Boarini et al's report (2006) addresses this question in the context of a theoretical and empirical analysis of social justice norms in the area of health in several European countries. Unlike our analysis, this research does not propose any analysis of inequalities of opportunity in health in France.*

[2] *Apart from material living conditions, several studies have suggested that stressful events encountered during childhood (violence, family break-up, isolation etc.) also have long-term health effects (Menahem, 2004, Cambois and Jusot, 2006). This hypothesis, which is not tested here, may possibly take into account the relationship between social background and health in adulthood if these events are more frequent in poor environments.*

Data sources: the SHARE survey which provides data on social background and health status

The study is based on data from the 2004-05 SHARE survey. The sample used consists of 2 695 individuals aged 49 and over, living in France, for whom we have data on social background, current social situation and the health status of parents.

Social background and current social situation

The SHARE survey contains data on current and previous social status of respondents and their parents.

These occupations are coded using ISCO (International Standard Classification of Occupations), which is based on the skill levels of different jobs and makes it possible to identify different groups

The father's occupation is divided into 6 groups:

- (i) senior managers and professionals (15.5%);
- (ii) technicians and associate professionals and armed forces (10.4%);
- (iii) office clerks and service workers and shop and market sales workers (7.4%);
- (iv) skilled agrigultural and fishery workers (23.3%);
- (v) craftsmen and skilled workers (36.2%);
- (vi) elementary occupations and unskilled workers (7.2%).

The mother's occupation is divided into 8 groups:

- (i) senior managers (53.4%);
- (ii) professionals and technicians (4.9%);
- (iii) office clerks (5.2%);
- (iv) service workers and shop and market sales workers (5.5%);
- (v) skilled agricultural and fishery workers (13.8%);
- (vi) craft and related trades workers (8.3%);
- (vii) elementary occupations and unskilled workers (9.5%);
- (viii) housemakers (47.7%).

We created ten groups for respondent's social status:

- (i) senior managers (6.2%);
- (ii) professionals (11.6%);
- (iii) technicians and associate professionals and armed force (20.8%);
- (iv) office clerks (10.9%);
- (v) service workers and shop and market sales workers (11.2%);
- (vi) skilled agricultural and fishery workers (6.2%);
- (vii) craft and related trades workers (10.9%);
- (viii) plant and machine operators and assemblers (6.4%);
- (ix) elementary occupations and unskilled workers (9.9%);
- (x) housemakers (5.9%).

In addition we analysed the education level as measured by the highest qualification obtained, with five different levels:

- (i) elementary level diploma;
- (ii) secondary level diploma;
- (iii) baccalaureat;
- (iv) no diploma;
- (v) another diploma.

A subjective measure of respondent's health status

We use the indicator of self-perceived health as a measure of the health status of respondents, constructed from the question recommended by WHO Europe, «Would you say that your health is...»: «very good», «good», «fair», «poor», «very poor».

In our analysis, we take this indicator as a dichotomous variable opposing persons reporting very good or good health to those reporting other health states.

In fact, independently of social background, socio-economic status has a significant effect on health status.

However, this correlation between social background and health status in adulthood may be explained by another phenomenon, not explored until now: the health status of parents. In fact, if there are social inequalities in health status in the parents' generation and if parents' health status is correlated with that of their descendant(s), one may wrongly conclude that social background affects the health status of the descendant. Hence, parental health status may be a confusion variable[3] when assessing the influence of social background on health inequalities.

We therefore propose to test a third hypothesis which we call the "health transmission hypothesis" in order to address this potential confusion variable. This is related to health capital models (Grossman, 1972) in which health is regarded as a capital which evolves over time according to age and individual health behaviours, but stays influenced by its initial level. This initial capital is partly related to parental health status through a common genetic inheritance[4]. Furthermore, an individual's behaviour throughout his life may also be affected by his parents through the transmission of health-related behaviours.

Experimentation with French data using four successive models

In France, the effect of social background on health in adulthood has only been shown for male employees of EDF-GDF, by using the epidemiological GAZEL cohort (Hyde et al., 2006). In this study, social background is derived from the father's social group. However, this effect has never been studied in the general population, mainly because of the lack of information on parental social status in most general health surveys. Furthermore, the influence of parental health status on health in adulthood has never been analysed.

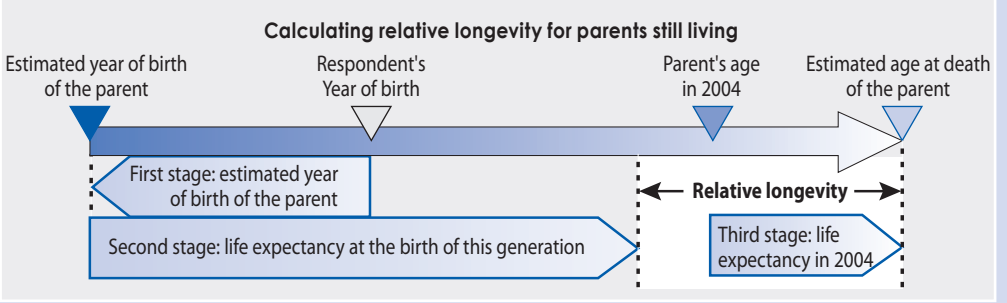
Considering the double analysis of the effect of social status and of parental health on the health of their descendants in adulthood, this research aims to complement the existing literature from various angles. First, it proposes to test the latency and the pathway hypotheses for the first time in France using data from the SHARE survey. Then it expands the definition of social

3 If a variable a is correlated with each of variables b and c, we may infer an association between b and c which does not in fact exist. Hence a is called a confusion variable.

4 In Grossman's model (Grossman, 1972) the initial level of health capital may also be interpreted as a person's health status at the end of childhood. Hence it depends not only on the child's initial genetic inheritance but also on living conditions throughout childhood affects health (accommodation, health education, dietary habits etc.).

Construction of an indicator of parental health status based on relative longevity

The SHARE survey does not include data on parental health status for all respondents, but gathers data on age at death for deceased parents and age at the time of survey for parents still living. Based on this information, we have constructed an indicator of parental health status based on their longevity relative to their life expectancy at birth. We suppose that those persons living longer than average for their generation have enjoyed better health during their lives. This indicator corresponds to the difference between the actual (for deceased parents) or expected (for living parents) age at death and the life expectancy at birth for this generation. To construct this indicator, we need to know the year of birth for each parent in order to determine their life expectancy at birth, and their actual or expected age at death. We performed this estimation in three stages, because this information was not available in all cases:- Stage 1: because we did not know the age at birth of deceased parents, this was estimated by subtracting from the age at birth of the survey respondent, the average age at maternity or paternity in the year of the respondent's birth. This estimation was modified to take into account birth order: for first-borns, we used the average age at first child rather than the average age of maternity. Data on average age of maternity or of paternity as well as age at first baby are provided by INSEE each year (Daguet, 2002). The same method was used for parents still living to avoid bias, and in order to work with similar population samples.- Stage 2: having estimated year of birth for parents we could determine life expectancy at birth using mortality tables for their generation (Vallin and Meslé, 2001).- Stage 3: finally, the expected age at death at the time of the survey was estimated for living parents. We calculated this by adding their current age, and their life expectancy at this age, available from mortality tables for the years 2004 and 2005 (Vallin and Meslé, 2001)



background by using information on the mother's as well as the father's social status. It also introduces the hypothesis of health transmission, which to our knowledge has never been used to explain the influence of social background on health in adulthood.

This study is based on the French part of the SHARE data (Survey of Health, Ageing and Retirement in Europe) carried out in 2004/2005 (Blanchet and Dourgnon, 2004). It aims to compare an individual's self-reported health with his social background, based on final social status of his parents, and with parental health status based on an indicator of relative longevity (see box, p. 3).

Our approach is based on logistic regressions estimations and consists of modelling the determinants of the probability of reporting a good health, controlling for age and sex. The determinants are introduced one by one in four successive models (see box opposite):

- in the first model, we test the influence of social background on an individual's health status in adulthood, by analysing the effect of the social status of the mother and the father on self-reported health, controlling for age and sex;

- in the second model, we add the descendant's social status in order to determine whether social background has a direct effect on health status in adulthood (the latency hypothesis) or an indirect influence going through the descendant's social status (the pathway hypothesis);

- the health status of the parents is introduced in the third model in order to test the health transmission hypothesis status and to establish that the effect of social background does not reflect an effect of parental health status on a descendant's health;

- finally, in the fourth model, we introduce education level of the descendant, in order to test the hypothesis that education reduces the effect of social background on health status.

Method: presentation of the 4 models

The 4 successive models estimate the probability of reporting a good health status Y. F is the logistic distribution function. We note SES, the socio economic status as classified by ISCO. The X variables introduced in the models are, on one hand, the social characteristics of parents, SES_{father} and SES_{mother} and their health status H_{father} and H_{mother}, and on the other the social characteristics of the descendant, his social class, $SES_{descendant}$ and his education level $Educ_{descendant}$.

Model 1 :

$$P(Y = 1/X) = F(\beta_1 \times sex + \beta_2 \times age + \beta_3 \times SES_{father} + \beta_4 \times SES_{mother})$$

Model 2 :

$$P(Y = 1/X) = F(\beta_1 \times sex + \beta_2 \times age + \beta_3 \times SES_{father} + \beta_4 \times SES_{mother} + \beta_5 \times SES_{descendant})$$

Model 3 :

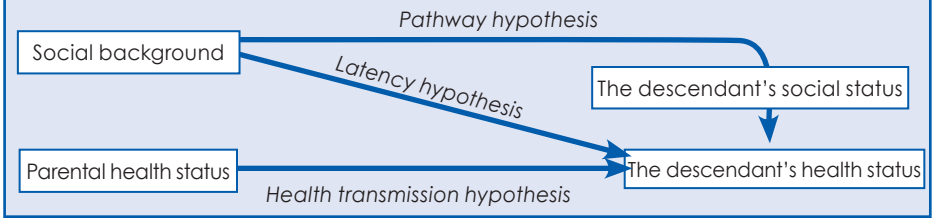
$$P(Y = 1/X) = F(\beta_1 \times sex + \beta_2 \times age + \beta_3 \times SES_{father} + \beta_4 \times SES_{mother} + \beta_5 \times SES_{descendant} + \beta_6 \times H_{father} + \beta_7 \times H_{mother})$$

Model 4 :

$$P(Y = 1/X) = F(\beta_1 \times sex + \beta_2 \times age + \beta_3 \times SES_{father} + \beta_4 \times SES_{mother} + \beta_5 \times SES_{descendant} + \beta_6 \times H_{ather} + \beta_7 \times H_{mother} + \beta_8 \times Educ_{descendant})$$

No difference in health status by sex is observed in any of these analyses. However, age has a very significant effect on self-reported health status, the probability of reporting a very good health status declining with age.

Schematic representation of the 3 hypotheses tested:



The overall results are presented in the table on p. 5.

In the first analysis, the social status of both parents affects the descendant's health in adulthood

According to the first model, the probability of reporting a good health status increases with the level of social background. Hence an individual whose father's social group was " senior managers and professionals", "technicians and associate professionals and armed forces" or "office clerks and service workers and shop and market sales workers", has a significantly greater chance of reporting a good health than an individual whose father's group was "elementary occupations and unskilled workers", after controlling for age and sex. This result confirms the simple descriptive analysis (see the figure on p. 1): the proportion of persons reporting a poor health in adulthood is greater among persons whose father came from a deprived background. With regard to mothers, a person whose mother's social group was "professionals and technicians", "office clerks" or "service workers and shop and market sales workers" is more likely to report a good health in adulthood than an individual whose mother was a housemaker.

The direct effect of father's social status disappears in favour of an indirect effect

In the second model, we observe firstly that the respondant's social status has a very significant effect on health status, all other things being equal. Individuals belonging to the groups "senior managers and professionals," "technicians and associate professionals and armed forces", "office clerks" and "service workers and shop and market sales workers" are

more likely to self report a good health than "elementary occupations and unskilled workers". Introducing the respondent's social status into the analysis modifies the effect of the parental social status on health in adulthood (see model 3). Hence, the father's social status does not explain an individual's health in adulthood. There is then no direct effect of the father's social status on an individual's health in adulthood; rather there is an indirect effect going through the influence of the father's social status on an individual's social status, which validates the pathway hypothesis.

The direct effect of the mother's social status is confirmed but reduced

However, the mother's social status does have a direct effect on an individual's health status in adulthood. In fact, although it is reduced, the effect remains significant, particularly for individuals born of a mother from the social group "serviceworkers and shop and market sales workers", who are more likely to self-report a good health than those whose mothers were housemakers. Hence, the direct effect of the mother's social status on health status in adulthood would confirm the latency hypothesis. The data available do not enable more precise interpretation. Nevertheless we may suppose that this effect reflects both the direct effect of living conditions during childhood and the mother's education level, on health in adulthood.

Parental health status affects their descendant's health in adulthood but does not undermine the effect of social background

Introducing parental health status in the third model enables us to confirm our "intergenerational health transmission" hypothesis. Generally speaking, individuals whose parents were or are in good health, that is who have lived or will live relatively longer than their generation, have a significantly greater chance of self-reporting a good health. However, parental health does not appear to be a

Odds ratios for the probability of reporting a good health status

Explanatory variables	Model 1	Model 2	Model 3	Model 4
Sex				
Man	Ref.	Ref.	Ref.	Ref.
Woman	1.079	1.111	1.105	1.143
Age				
49-54 years	6.284***	6.494***	7.811***	6.892***
55-59 years	6.435***	6.520***	7.417***	6.682***
60-64 years	4.742***	4.959***	5.691***	5.386***
65-69 years	3.579***	3.774***	4.273***	4.017***
70-74 years	2.391***	2.627***	2.905***	2.853***
75-79 years	1.770**	1.918**	1.908**	1.894**
80-84 years	1.389	1.451	1.406	1.389
>=85 years	Ref.	Ref.	Ref.	Ref.
Father's social status				
Senior managers and professionals	1.734***	1.269	1.233	1.084
Technicians/Assoc. prof./Armed forces	1.858***	1.334	1.332	1.165
Office clerks and service workers	1.665**	1.374	1.353	1.223
Skilled agricultural workers	1.301	1.335	1.399	1.312
Craftsmen and skilled workers	1.163	1.113	1.126	1.082
Elementary occupation/Unskilled workers	Ref.	Ref.	Ref.	Ref.
Mother's social status				
Senior managers	1.068	0.98	0.983	0.944
Professionals and technicians	1.907***	1.536*	1.555*	1.448
Office clerks	1.597**	1.225	1.221	1.182
Service workers/shop/market sales workers	1.805***	1.779***	1.856***	1.819***
Skilled agricultural workers	1.06	1.147	1.114	1.117
Craft and related trades workers	1.16	1.158	1.176	1.13
Elementary occupation/Unskilled workers	0.762*	0.770*	0.8	0.796
Housemakers	Ref.	Ref.	Ref.	Ref.
Father's health status				
Relative longevity of the father			1.010***	1.009***
Mother's health status				
Relative longevity of the mother			1.008**	1.006**
Social status of the descendants				
Senior managers		2.375***	2.299***	1.765**
Professionals		3.752***	3.518***	2.376***
Technicians and associates professionals		3.090***	2.994***	2.327***
Office clerks		1.983***	1.886***	1.593**
Service workers/shop/market sales workers		1.757***	1.759***	1.596**
Skilled agricultural workers		1.409	1.393	1.319
Craft and related trades workers		1.083	1.05	1.012
Plant and machine operators and assemblers		1.167	1.184	1.153
Housemakers		1.395	0.365	1.34
Elementary occupation/Unskilled workers		Ref.	Ref.	Ref.
Education level				
No diploma				Ref.
Elementary level diploma				1.531***
Secondary level diploma				1.666***
Baccalaureat				2.490***
Other diploma				1.023
Quality of model				
Ajusted R^2	0.1295	0.172	0.1803	0.1938
concordant pairs percente	67.80%	71.30%	72.00%	72.70%

*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

Source : SHARE 2004-05

Note for the reader : In model 4, an individual with a baccalaureate is 2.5 times more likely to report a good health than an individual without a qualification, all other things being equal.

confusion factor for the effect of social background on current health status of descendant because the effects of parental social status are similar to those observed in the previous model. Therefore this result suggests that parental health may have a direct effect on the health status of descendants. However the data available on the health status of parents and their behaviour are not sufficient to conclude whether this transmission takes place through a genetic inheritance or copying health-related behaviours.

An individual's education level can limit the influence of social background and parental health status

When an individual's education level is considered in the fourth model, we observe a significant association between education and health status in adulthood, controlling for socio-economic situation and social background. The higher the qualification obtained, the greater the chance of a good self-reported health.

Introducing this variable into the model has little impact on the effects described in the previous model. In particular, the mother's social status, the health status of both parents and the respondent's social status still have a significant effect on health status in adulthood. Nevertheless it should be noted that introducing education level in the model reduces the value of the odds ratios associated with the parental health status, for the mother's social status and for the respondent's social status. This suggests that education can reduce the impact of social characteristics and parental health status, and hence the intergenerational transmission of social inequalities in health. We may suppose for example that a higher education level limits the replication of behaviours harmful to health, or that it improves the use of health care for transmitted health problems.

* * *

These results show overall that health in adulthood is influenced by social background and parental health status. While the mother's social status seems to have a direct, but limited, effect on the health status of descendants, the father's social status has an indirect impact. The father's social status influences the descendant's social status which in turn affects his health status, thereby validating the pathway hypothesis. The direct effect of the mother's social status is in line with the latency model. Furthermore our "health transmission" hypothesis is validated because we observe a direct effect of parental health status on health in adulthood. In addition, our analysis shows that education also seems to reduce the intergenerational transmission of health inequalities.

This analysis also highlights the existence of inequalities of opportunities in health in France, showing once again that there are persistent differences in health status related to social background and parental health status. To the extent that individuals do not choose where they come from, these unjust differences in health status underline the need to implement policies designed to reduce them, such as health education campaigns in schools or screening for health problems during childhood.

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