UNIVERSITÉ PARIS-DAUPHINE

ÉCOLE DOCTORALE DE DAUPHINE

LABORATOIRE D'ÉCONOMIE ET DE GESTION DES ORGANISATIONS DE SANTÉ

Construction des inégalités des chances en santé à travers les modes de vie

THÈSE

Pour l'obtention du grade de Docteur en Sciences Économiques

Présentée et soutenue le 10 décembre 2013

Par Damien BRICARD

Sous la direction de Florence JUSOT

MEMBRES DU JURY

RAPPORTEURS

Andrew CLARK	Directeur de recherche au C.N.R.S. à P.S.E., Ecole Normale Supérieure
Erik SCHOKKAERT	Professeur à l'Université de Louvain-la-Neuve, Belgique

SUFFRAGANTS

Chantal CASES	Directrice de l'I.N.E.D.
Michel GRIGNON	Professeur à l'Université McMaster, Canada
Florence JUSOT	Professeur à l'Université de Rouen
Alain TRANNOY	Directeur d'études à l'E.H.E.S.S., Université Aix-Marseille

L'UNIVERSITÉ PARIS-DAUPHINE n'entend donner aucune approbation ni improbation aux opinions émises dans les thèses ; ces opinions doivent être considérées comme propres à leurs auteurs.

REMERCIEMENTS

Je remercie tout particulièrement ma directrice de thèse, Florence Jusot, pour avoir suscité mon intérêt pour la recherche et pour son encadrement durant cette thèse. Je la remercie également pour son écoute, ses conseils et sa confiance qui ont permis l'accomplissement de ce travail.

Je remercie vivement Andrew Clark et Erik Schokkaert pour avoir accepté de rapporter cette thèse et pour leurs précieux conseils lors de la présoutenance. Je remercie également Chantal Cases, Michel Grignon et Alain Trannoy pour avoir accepté d'examiner ce travail.

La genèse de cette thèse tient beaucoup aux deux premières expériences de recherche que j'ai passées durant ma formation. Je remercie très chaleureusement Florence Jusot et Sandy Tubeuf pour m'avoir accompagné durant ces stages à l'Institut de Recherche et de Documentation en Economie de la Santé (IRDES) et à Leeds et pour m'avoir donné envie de continuer sur cette voie. Leur collaboration avec celle d'Alain Trannoy m'a beaucoup appris et stimulé et je les en remercie très chaleureusement tous les trois. Je remercie également Sandy Tubeuf pour ses relectures attentives.

J'ai réalisé cette thèse au sein du Laboratoire d'Economie et de Gestion des Organisations de Santé (LEGOS) de l'Université de Paris-Dauphine. Je tiens à remercier l'ensemble des membres pour leur accueil et leur dynamisme qui m'ont permis de passer trois années très enrichissantes. Je tiens à remercier particulièrement Brigitte Dormont, Jérôme Wittwer, Maris-Eve Joël, Anne-Laure Samson et Eve Caroli.

Cette thèse n'aurait pas été aussi agréable et stimulante sans la compagnie d'une belle et sympathique équipe de doctorants. Je pense notamment à Roméo Fontaine, Caroline Berchet et Sophie Guthmuller qui ont ouvert la voie. Et je n'oublie pas Louis Arnault, Mathilde Godard, Mathilde Peron, Romain Sibille et Nina Zerrar qui suivront très prochainement.

J'ai aussi profité à plusieurs reprises pendant ma formation de l'environnement de travail de l'IRDES. Je remercie Chantal Cases et Yann Bourgueil, directeurs successifs de l'IRDES, pour leur accueil. Je tiens aussi à remercier particulièrement Paul Dourgnon, Nicolas Sirven, Michel Naiditch, Marc Perronnin et Julien Mousquès pour leurs conseils et leur convivialité.

Je remercie aussi chaleureusement Jeanne, ma famille et mes amis pour leur soutien et leur réconfort ainsi que leurs encouragements au cours de cette thèse.

Cette thèse a bénéficié d'une bourse du GIS-IReSP financée par le Régime Social des Indépendants et a reçu le soutien de la Chaire Santé, placée sous l'égide de la Fondation Du Risque (FDR) en partenariat avec PSL, Université Paris-Dauphine, l'ENSAE et la MGEN.

TABLE DES MATIERES

Introduction générale 1

Chapitre 1: Mediating role of education and lifestyles in the relationship between early-life conditions and health: Evidence from the 1958 British cohort .. 11

1.1. Introduction 14

1.2. The model 16

1.2.1. General health production function 16

1.2.2. Mediating effects identification 19

1.2.3. Health determinants decomposition 23

1.2.4. Statistical inference 24

1.3. The National Child Development Study 25

1.3.1. The sample 25

1.3.2. Health variable 26

1.3.3. Education 26

1.3.4. Lifestyles variables 27

1.3.5. Early-life conditions 28

1.4. Results 29

1.4.1. Random effect dynamic panel Probit results 29

1.4.2. Auxiliary equations estimations 31

1.4.3. Random effect dynamic panel Probit results: mediating specification 32

1.4.4. Decomposition of health inequality 35

1.5. Conclusion 36

1.6. Appendix 39

Appendix A : Supplementary tables 39

Chapitre 2 : Milieu d'origine, situation sociale et parcours tabagique en France 43

2.1. Introduction 45

2.2. Données 47

2.2.1. Le parcours tabagique des enquêtés 48

2.2.2. Milieu d'origine 49

2.2.3. La situation sociale de l'enquêté 49

2.3. Analyse non paramétrique du parcours tabagique 50
2.3.1. Méthode 50
2.3.2. Âge d'initiation 53
2.3.3. Âge de cessation 54
2.4. Analyse semi-paramétrique du parcours tabagique 55
2.4.1. Modèle de Cox stratifié à risque proportionnel 55
2.4.2. Âge d'initiation 57
2.4.3. Âge de cessation 59
2.4.3. Test du biais de sélection pour la cessation tabagique 61
2.5. Discussion 62
2.6. Annexes 65
Annexe B : Figures et tables pour l'analyse non paramétrique 65
Annexe C : Tables des analyses complémentaires selon le genre et le découpage par classes d'âge 71
Annexe D : Tables supplémentaires pour l'analyse semi-paramétrique .. 75
Chapitre 3 : Intergenerational transmission of health care habits in France 79
3.1. Introduction 81
3.2. Data 83
3.2.1. Parental and individual health care habits 83
3.2.2. Individual's children health care use 86
3.2.3. Social background variables 87
3.2.4. Current socio-economic status 87
3.2.5. Other individual variables and accessibility of health care 88
3.3. Determinants of parental and individual health care habits 88
3.3.1. Determinants of parental health care habits during childhood 88
3.3.2. Determinants of individual health care habits during adulthood .. 92
3.4. Empirical strategy 94
3.4.1. Transmission of health care habits across generations 95
3.4.2. Robustness to heterogeneity and socialisation 97
3.4.3. Implications for children's doctor visits 98
3.5. Results 99

3.5.1. Transmission of health care habits across generations 99
3.5.2. Robustness to heterogeneity and socialisation 101
3.5.3. Implications for children's doctor visits 102
3.6. Conclusion 103
3.7. Appendix 105
Appendix E: Supplementary tables 105
Chapitre 4 : Inequality of opportunity in health and the principle of natural reward: evidence from European countries 117
4.1. Introduction 120
4.2. Methods 122
4.2.1. Estimation strategy 123
4.2.2. Inequality measurement 125
4.2.3. Statistical inference and empirical strategy for the international comparison 126
4.3. Data 127
4.4. Results 131
4.4.1. Regression Analysis 132
4.4.2. Inequalities measurement 135
4.5. Discussion 141
4.6. Appendices 145
Appendix F: Auxiliary equations at the European level and across countries 145
Appendix G: Health equations across European countries 159
Appendix H: Unilateral tests 166
Conclusion générale 171
Références bibliographiques 177

Introduction générale

La Commission sur les déterminants sociaux de la santé de l'Organisation Mondiale de la Santé (2009) a proposé d'instaurer l'équité en santé en agissant sur les déterminants sociaux de la santé. L'équité est ainsi parvenue au centre des politiques de santé publique dans la plupart des pays européens, à travers un objectif de réduction des inégalités sociales de santé, au-delà de la promotion de la santé moyenne des populations. Ces inégalités sociales de santé et de mortalité sont en effet particulièrement importantes en France et dans l'ensemble des autres pays développés et on évalue leurs coûts à 20% des dépenses de santé au niveau européen (Mackenbach *et al.*, 2010).

La recherche de l'équité en santé peut conduire à considérer les inégalités de santé dans leur ensemble ou les inégalités sociales de santé. Les inégalités de santé renvoient à l'ensemble des différences d'état de santé existant au sein d'une population. La mesure et la compréhension des inégalités de santé en tant que telles peuvent alors nous intéresser dans la mesure où la santé est une composante fondamentale du bien-être (Murray *et al.*, 1999 ; Peltzman, 2009). Les inégalités sociales de santé renvoient quant à elles aux différences mesurées entre groupes sociaux, en ignorant donc les différences existant au sein de chacun de ces groupes sociaux. Le choix de la caractéristique sociale retenue pour identifier ces inégalités inter-groupes est alors primordial puisqu'il définit une situation jugée injuste. Il informe aussi d'un point de vue plus descriptif sur les canaux par lesquels les inégalités sociales forment les inégalités de santé.

La formation de l'état de santé met en jeu des déterminants de nature très divers (cf. partie infra). En effet, l'étude des déterminants sociaux et comportementaux de l'état de santé a mis en évidence un nombre important de facteurs explicatifs tels que le statut social (revenu, éducation, statut d'activité, etc.), le milieu d'origine et les conditions de vie dans l'enfance, ainsi que les comportements de santé (tabagisme, régime alimentaire, habitudes de soins, consommation d'alcool, etc.). Les différentes études relevant de l'épidémiologie et de l'économie de la santé ne concordent pas sur l'importance des comportements à risque dans la formation de ces inégalités comparativement au statut social et au statut social d'origine.

Cette controverse revêt une plus grande importance lorsque l'on s'intéresse au caractère plus ou moins juste de ces différences de santé. Selon la théorie de l'égalité des

chances (Dworkin, 1981 ; Arneson, 1989 ; Cohen, 1989 ; Roemer, 1998 ; Fleurbaey, 2008), certaines différences de santé sont plus injustes que d'autres. Les différences d'état de santé induites par des facteurs choisis par les individus, comme les comportements à risque par exemple, relèveraient de leur responsabilité et seraient considérées comme légitimes alors que les inégalités attribuables à des facteurs ne relevant pas de la responsabilité individuelle, tel que le milieu d'origine, sont appelées inégalités des chances et doivent être considérées comme illégitimes. Cette théorie est ainsi guidée par deux principes qui sont, d'une part, le principe de compensation des inégalités illégitimes et, d'autre part, le principe de récompense naturelle qui respecte les efforts et la responsabilité des individus. Les inégalités des chances justifieraient ainsi pleinement la mise en œuvre de politiques correctrices alors que de telles politiques ne seraient pas justifiées dans le cas d'inégalités légitimes car cela irait à l'encontre de l'exercice de la liberté individuelle.

Les enjeux à la fois pour la compréhension des inégalités de santé et pour la justice sociale sont que les conditions sociales et les comportements à risque ne sont pas indépendants. Dans cette thèse, nous nous intéressons à la mesure et à la compréhension des inégalités des chances en santé, avec un intérêt spécifique pour la contribution des comportements liés à la santé. Dans cette introduction, nous positionnerons notre travail par rapport à la littérature existante. Dans une première section, nous exposerons les débats sur l'explication des inégalités sociales de santé et la place qu'occupent les conditions de vie dans l'enfance. Dans une seconde section, nous considérerons l'intérêt que peut avoir une approche par les inégalités des chances en santé. Enfin, nous présenterons le plan de cette thèse.

Débat sur l'explication des inégalités sociales de santé

Depuis le rapport Black (1980), offrant un panorama sur les inégalités sociales de santé en Grande Bretagne, les connaissances sur les inégalités sociales de santé ont progressé dans la plupart des pays développés. Ces recherches ont décrit et proposé des explications aux importantes différences de santé observées entre les groupes sociaux. Elles ont montré d'importantes inégalités de santé et de mortalité en faveur des individus les plus instruits, des individus ayant les professions les plus qualifiées et des individus ayant les revenus les plus importants en France et dans les autres pays développés (van Doorslaer et

Koolman, 2004 ; Cutler *et al.*, 2006 ; Mackenbach *et al.*, 2008 ; Lantz *et al.*, 2010). On constate en particulier en France qu'un homme ouvrier aura une espérance de vie à 35 ans de 40,9 années alors qu'elle sera de 47,2 années pour un homme cadre (Blanpain, 2011). Ces inégalités sociales de santé, observées quels que soient les indicateurs socio-économiques et les indicateurs de santé considérés, sont constatées dès le plus jeune âge et vont en s'accentuant au cours du cycle de vie avec toutefois une diminution aux âges plus avancés qui pourrait être due à des effets de sélection (Deaton et Paxson, 1998 ; Case et Deaton, 2005 ; Smith, 2007).

Cependant, les mécanismes expliquant les avantages des plus favorisés dans l'acquisition et le maintien d'une bonne santé au cours de la vie restent encore à explorer. Notamment, il s'agit de comprendre dans quelle mesure ils résultent de différences liées aux conditions sociales (travail, l'environnement économique et social, conditions d'accès aux soins) ou de différences liées à des choix d'investissement en santé (comportements à risque ou modes de vie).

La littérature suggère un effet causal de la situation sociale sur l'état de santé qui expliquerait le gradient social de santé. Selon le modèle de capital santé de Grossman (1972, 2000), l'état de santé évolue comme un capital subissant une dépréciation naturelle avec l'âge qui peut être plus ou moins compensée par des investissements en santé. Ce modèle permet de prédire l'association positive entre la santé et des indicateurs socio-économiques comme l'éducation, le salaire et la richesse. En effet, les individus les plus éduqués sont supposés être des consommateurs et des producteurs de santé plus efficaces car l'efficacité de l'investissement en santé croît avec le niveau de connaissance. Pour les individus les plus riches, ils ont d'abord des capacités plus importantes pour investir dans leur santé. Aussi, le coût d'opportunité lié aux problèmes de santé augmente avec le salaire et la richesse, ce qui rend leur investissement en santé plus rentable. Les prolongements du modèle de Grossman (Galama et Van Kippersluis, 2010, 2013) ont permis de confirmer ces résultats en expliquant à la fois les écarts entre groupes sociaux mais aussi leurs augmentations au cours du cycle de vie jusqu'à un certain âge.

Le modèle de Grossman suggère ainsi un rôle central des comportements à risque dans la mesure où ils caractérisent le plus directement les investissements en santé. De

nombreuses études ont ainsi exploré l'impact des comportements à risque sur les inégalités de santé (Contoyannis et Jones, 2004 ; Mokdad *et al.*, 2004 ; Balia et Jones, 2008 ; Khaw *et al.*, 2008), mais cependant l'influence des comportements à risque pour expliquer les inégalités de santé dans leur ensemble et les inégalités sociales de santé reste discutée. Alors que dans de nombreuses études, les comportements à risque semblent contribuer pour seulement un tiers des inégalités sociales de santé, une étude récente trouve un impact plus important des comportements à risque, notamment lorsqu'ils sont observés de façon longitudinale (Stringhini *et al.*, 2010).

D'un autre côté, de nombreuses recherches empiriques ont cherché à vérifier la relation causale entre le statut social et l'état de santé. Ces recherches ont ainsi mis en évidence que cette causalité pouvait être dans les deux directions. D'une part, un mauvais état de santé pourrait avoir des conséquences sur les caractéristiques socio-économiques des individus telles que le statut d'emploi et le revenu (Smith, 1999). D'autre part, certaines caractéristiques socio-économiques telles que l'éducation notamment pourraient avoir un impact sur l'état de santé (Lleras-Muney, 2005 ; Conti *et al.*, 2010) même si cet effet causal n'a pu être démontré par toutes les études (Albouy et Lequien, 2008 ; Clark et Royer, 2010). En dehors de l'effet causal de la situation sociale, les inégalités sociales de santé pourraient aussi être dues à des facteurs en amont expliquant à la fois les comportements de santé et la situation sociale. Parmi les candidats, on trouve le milieu social d'origine, à côté d'autres facteurs inobservés tels que les préférences individuelles, les normes sociales ou encore des facteurs génétiques et cognitifs (Singh-Manoux et Marmot, 2005 ; Cutler et Lleras Muney, 2010 ; Braakmann, 2011 ; van der Pol, 2011 ; Jusot et Khlat, 2013).

Les pistes de recherche sur l'origine du gradient social de santé se sont ainsi orientées tout particulièrement sur l'influence du milieu d'origine et des conditions de vie dans l'enfance. En effet, les études empiriques ont montré que l'état de santé se construit au cours du cycle de vie et que les conditions de vie dans l'enfance ont une place prédominante dans l'explication des inégalités de santé et des inégalités sociales de santé (Smith, 1999 ; Case *et al.*, 2005 ; Hyde *et al.*, 2006 ; Melchior *et al.*, 2006a; Melchior *et al.*, 2006b). Plusieurs hypothèses ont été proposées pour expliquer l'influence des conditions de vie dans l'enfance sur les différences d'état de santé à l'âge adulte. D'une part, les conditions sociales

dans l'enfance auraient un effet direct sur l'état de santé à l'âge adulte à la suite d'une période de latence (Barker, 1995). D'autre part, les conditions sociales dans l'enfance auraient un effet indirect sur l'état de santé à l'âge adulte à travers une influence sur le statut social à l'âge adulte, par des phénomènes de reproduction sociale par exemple, qui affecte à son tour l'état de santé (Power, 1998 ; Case *et al.*, 2005). Enfin, la corrélation entre l'état de santé des parents et celui de leurs enfants laisse supposer une transmission de la santé entre générations (Ahlburg, 1998 ; Trannoy et al., 2010). Cette transmission, qui jusqu'à présent a été peu étudiée, pourrait être due à des facteurs génétiques communs mais aussi à une transmission des normes de santé et des modes de vie.

Une approche par les inégalités des chances en santé

Ces débats sur les facteurs explicatifs des inégalités de santé et notamment sur l'importance relative des facteurs sociaux et des facteurs comportementaux ont des conséquences du point de vue de l'équité car tous les facteurs ne sont pas considérés de la même manière du point de vue de la justice sociale. Parmi les théoriciens de l'égalité des chances, Roemer (1998) propose un cadre théorique qui partitionne les facteurs explicatifs en facteurs pour lesquels l'individu ne peut être jugé responsable, appelés circonstances, et en facteurs pour lesquels il peut être tenu pour responsable, appelés efforts. Ainsi, les déterminants de l'état de santé ne sont pas équivalents en termes d'équité et les conditions de vie dans l'enfance seraient considérées comme des facteurs totalement illégitimes alors que les comportements à risque, qui résultent d'un choix individuel sont l'objet d'un débat sur la légitimité de leurs conséquences.

Le débat devient notamment plus compliqué si les comportements à risque ne résultent pas d'un choix totalement libre, et s'ils sont influencés eux-mêmes par des facteurs de circonstances tel qu'il est suggéré par l'hypothèse d'une transmission intergénérationnelle des préférences pour la santé et des comportements à risque (Ahlburg, 1998 ; Rosa-Dias, 2010, Trannoy et al., 2010). Deux positions normatives peuvent être relevées dans ce débat (Fleurbaey et Schokkaert, 2011; Jusot et al., 2013). La première considère les individus responsables de leurs préférences même s'il existe une influence des circonstances sur les comportements à risque (Dworkin 1971; Barry 2005). La seconde considère que les individus sont responsables de leurs décisions seulement si elles ne sont pas influencées par

les circonstances et seulement si l'individu a un contrôle sur elles (Arneson, 1989 ; Roemer, 1993). Ce débat normatif sur l'équité dans les facteurs explicatifs des inégalités de santé ainsi que sur la légitimité des efforts corrélés aux circonstances appelle de nouvelles recherches sur les conséquences en termes d'inégalité de santé (Roemer, 1998; Fleurbaey et Schokkaert, 2009).

Quelques études récentes se sont intéressées à l'identification d'inégalités des chances en santé et à leur quantification (Rosa-Dias, 2009, 2010 ; Trannoy *et al.*, 2010 ; Garcia Gomez *et al.*, 2012, Jusot *et al.*, 2013). Ces analyses témoignent de l'existence d'inégalités des chances en santé en France, en Grande-Bretagne et dans les autres pays européens. On constate notamment qu'en France les personnes dont le père est ouvrier sont plus nombreuses à se déclarer en mauvaise santé que celles dont le père est dirigeant ou de profession intellectuelle (44% contre 29%). Ces analyses permettent aussi de mettre en évidence les effets directs du milieu d'origine et les effets indirects passant par des phénomènes de reproduction sociale. La prise en compte dans l'analyse des inégalités légitimes et des différents points de vue normatifs sur la distinction entre inégalités légitimes et inégalités illégitimes n'a été que très peu étudiée (Garcia Gomez *et al.*, 2012, Jusot *et al.*, 2013).

Plan de thèse

Le débat sur les facteurs explicatifs des inégalités de santé pose la question des facteurs sur lesquels agir pour réduire efficacement les inégalités sociales de santé. Ce débat rentre également en résonnance avec le débat normatif en termes d'équité sur les inégalités illégitimes et pose la question des facteurs sur lesquels les politiques publiques doivent agir. Nous proposons dans cette thèse une approche par les inégalités des chances en santé dans la mesure où nous nous intéressons aux facteurs sociaux les plus exogènes pour l'individu qui sont les conditions de vie dans l'enfance et leurs relations avec les choix des individus en termes de comportement de santé.

L'objectif de cette thèse est double. D'une part, elle s'intéresse au processus de formation des préférences en santé, depuis l'enfance jusqu'à l'âge adulte, en s'intéressant tout particulièrement au tabagisme et aux habitudes de soins. D'autre part, elle a pour but

de mesurer les conséquences de l'influence des circonstances sur les comportements à risque dans la mesure des inégalités des chances en santé.

Cette thèse s'articule autour de trois parties distinctes. Une première partie s'intéresse à la quantification des effets directs et indirects des conditions de vie dans l'enfance sur les inégalités de santé en considérant leurs effets indirects passant par l'éducation et les comportements à risque à l'aide des données d'une cohorte britannique. Une seconde partie s'intéresse plus particulièrement à la formation des préférences pour la santé en considérant la transmission du tabagisme et des habitudes de soins en France. Une troisième partie s'intéresse aux différences entre pays au niveau européen dans la mesure des inégalités des chances en santé en considérant les deux points de vue normatifs concernant le statut de la corrélation entre efforts et circonstances.

Les analyses empiriques combinent des données prospectives d'une cohorte britannique ainsi que des données rétrospectives issues d'une enquête française et d'une enquête européenne. Dans un premier temps, nous mobilisons les données de la cohorte britannique National Child Development Study (NCDS) qui est une enquête longitudinale multi-disciplinaire suivant des individus nés lors d'une même semaine de mars 1958 en Angleterre, Ecosse et au Pays de Galles. Les premières vagues de l'enquête auprès des parents nous fournissent des informations sur le milieu d'origine et les conditions de vie dans l'enfance. Ensuite, nous utilisons le suivi longitudinal à l'âge adulte pour évaluer l'état de santé, le niveau d'éducation et les comportements à risque des enquêtés. De telles données n'existent pas pour la France. Cependant, nous mobilisons pour la France des données rétrospectives issues d'un module spécifique de l'Enquête Santé et Protection Sociale (ESPS). Ce module "Descendance" décrit le milieu d'origine et les conditions de vie du répondant principal de chaque ménage lorsque celui-ci avait 12 ans. Il a d'abord été introduit en 2006, puis en 2010 avec des questions relatives aux habitudes de soins pendant l'enfance. En 2010, les données peuvent aussi être appariées avec l'Echantillon des bénéficiaires afin de recueillir des informations relatives aux consommations de soins. Au niveau européen, nous utilisons les données de l'enquête Survey of Health, Ageing and Retirement in Europe (SHARE) et plus particulièrement le questionnaire rétrospectif SHARELIFE sur l'histoire de vie.

Les données utilisées dans les analyses pour mesurer les comportements de santé et la santé peuvent souffrir de certains biais car elles sont déclarées par les enquêtés. Notamment, nous utilisons un indicateur de santé perçue ou auto-évaluée. Celui-ci est néanmoins un bon prédicteur de la mortalité, de la morbidité et des consommations de soins futures et nous permet plus facilement de comparer la santé aux différents âges de la cohorte que des indicateurs de maladies chroniques. L'utilisation de données rétrospectives concernant le milieu d'origine peut aussi nous confronter à des biais de mémoire mais nous permet de prendre en compte dans les analyses différentes caractéristiques du milieu d'origine comme le statut socio-économique des parents mais aussi leur état de santé ou leur longévité et leurs comportements de santé.

Cette thèse comprend quatre chapitres. Le premier chapitre de la thèse vise à explorer les effets à long terme des conditions de vie dans l'enfance, de l'éducation et des comportements à risque sur l'état de santé à l'âge adulte. Les effets directs et indirects des conditions de vie dans l'enfance sur la santé à l'âge adulte sont mesurés à l'aide de régressions linéaires auxiliaires de l'éducation et des comportements à risque. Nous adoptons une spécification en panel de la santé à l'aide de modèles à effets aléatoires pour prendre en compte l'hétérogénéité individuelle inobservée. L'importance des différents facteurs en jeu que ce soit de façon directe ou indirecte est évaluée à l'aide de méthodes de décomposition de la variance.

Le second chapitre étudie l'influence du milieu d'origine et du statut social sur le parcours tabagique. Nous reconstruisons les parcours tabagiques des enquêtés à partir d'informations rétrospectives sur les âges à l'initiation et à la cessation recueillis dans l'enquête ESPS 2006[1]. Ainsi, nous étudions que ce soit pour l'initiation ou la cessation tabagique l'influence du milieu d'origine et du tabagisme des parents, au-delà des caractéristiques socio-économiques usuelles. L'apport principal de ce chapitre est l'étude de

[1] Il ne nous a malheureusement pas été possible d'étendre l'analyse à l'enquête ESPS 2010 dans la mesure où les modalités des questions rétrospectives sur le parcours tabagique ont changé entre les deux enquêtes.

l'influence du tabagisme des parents sur la cessation tabagique tout en tenant compte des différences sociales de tabagisme dans la génération des parents.

Le troisième chapitre s'intéresse à la transmission intergénérationnelle des habitudes de soins. Plus précisément, nous proposons d'étudier l'influence des habitudes de soins des parents dans l'enfance sur les habitudes de soins des individus à l'âge adulte, ainsi que les différences induites en termes de consultation de médecin pour leurs propres enfants. Pour cela, nous utilisons une variable spécifique d'habitudes de soins qui a été introduite dans l'enquête ESPS 2010 et qui mesure la tendance à consulter le médecin des individus et de leurs parents pendant l'enfance de ceux-ci.

Enfin, le dernier chapitre a pour objectif de mesurer et de comparer les inégalités des chances en santé et les inégalités légitimes entre les pays européens. Deux positions normatives concurrentes quant au traitement de la corrélation entre effort, mesuré par les comportements à risque, et circonstances, mesurées par les conditions de vie dans l'enfance, défendues par Barry et Roemer sont étudiées. Cette étude propose des analyses de régression et plusieurs mesures d'inégalités des chances. Les analyses sont conduites à partir des données de l'enquête rétrospective SHARELIFE qui s'intéresse au parcours de vie des européens de 50 ans et plus.

Chapitre 1

Mediating role of education and lifestyles in the relationship between early-life conditions and health: Evidence from the 1958 British cohort

This chapter has been published in Tubeuf S., Jusot F., Bricard D. (2012). "Mediating role of education and lifestyles in the relationship between early-life conditions and health: Evidence from the 1958 British cohort", *Health Economics*, 21, S1: 129-150.

RÉSUMÉ

Ce chapitre s'intéresse aux effets à long terme des conditions de vie dans l'enfance en comparaison des comportements à risque et de l'éducation sur l'état de santé. Utilisant le suivi longitudinal aux âges 23, 33, 42 et 46 ans, nous construisons un modèle dynamique pour déterminer l'influence de chaque déterminant sur la santé et le rôle de médiateur de l'éducation et des comportements à risque dans la relation entre les conditions de vie dans l'enfance et la santé à l'âge adulte. Les effets directs et indirects des conditions de vie dans l'enfance sur la santé à l'âge adulte sont mesurés à l'aide de régressions linéaires auxiliaires de l'éducation et des comportements à risque et de spécifications en panel de la santé à l'aide de modèles Probit à effets aléatoires pour prendre en compte l'hétérogénéité individuelle inobservée. Cette étude montre que les conditions de vie dans l'enfance sont des déterminants importants de la santé à l'âge adulte représentants 20% de l'inégalité de santé observée quand les effets indirects sont identifiés. La contribution des comportements à risque réduit de 32% à 25% quand les effets indirects des conditions dans l'enfance sont mesurés. Il faut souligner que l'absence de père à la naissance et l'expérience de difficultés financières pendant l'enfance sont les facteurs les plus importants des effets directs sur la santé. L'obésité à l'âge de 16 ans influence la santé directement et indirectement à travers les comportements à risque.

ABSTRACT

This chapter focuses on the long-term effects of early-life conditions with comparison to lifestyles and current socioeconomic factors on health status in a cohort of British people born in 1958. Using the longitudinal follow-up data at age 23, 33, 42 and 46, we build a dynamic model to investigate the influence of each determinant on health and the mediating role of education and lifestyles in the relationship between early-life conditions and later health. Direct and indirect effects of early-life conditions on adult health are explored using auxiliary linear regressions of education and lifestyles and panel Probit specifications of self-assessed health with random effects addressing individual unexplained heterogeneity. Our study shows that early-life conditions are important parameters for adult health accounting for almost 20% of explained health inequality when mediating effects are identified. The contribution of lifestyles reduces from 32% down to 25% when indirect effects of early-life conditions and education are distinguished. Noticeably, the absence of father at the time of birth and experience of financial hardships represent the lead factors for direct effects on health. The absence of obesity at 16 influences health both directly and indirectly working through lifestyles.

1.1. Introduction

Numerous literature references have agreed the important role played by current individual social characteristics, such as income, education level, wealth, and social status (e.g. van Doorslaer and Koolman 2004, Cutler et al. 2006, Lantz et al. 2010) in the explanation of health inequalities. More recently, several studies have also found early-life conditions as a relevant determinant of health inequalities with a large range of social background factors, such as low parental socioeconomic status (e.g. Currie and Stabile 2003, Case et al. 2005, Lindeboom et al. 2009, Rosa-Dias 2009, Jusot et al. 2010, Trannoy et al. 2010); family issues, such as living in a single parent family or experiencing marital discord (Case and Katz 1991, Francesconi et al. 2010); parents' health status (Trannoy et al. 2010) or health-risk lifestyles (Anda et al. 2002, Gohlmann et al. 2010, Jusot et al. 2010). However, the importance of lifestyles in the magnitude of health inequalities is less clear. Whereas epidemiological literature concluded until recently that lifestyles make a relatively minor contribution to the social gradient in health (Khang et al. 2009, Lantz et al. 2010, Skalicka et al. 2009, Van Oort et al. 2005), health economists have shown that differences in lifestyles can explain a relevant part of health and mortality inequalities (Contoyannis and Jones 2004, Häkkinen et al. 2006, Balia and Jones 2008) and a few recent epidemiological studies (Laaksonen et al. 2008, Menvielle et al. 2009, Strand and Tverdal 2004, Stringhini et al. 2010) have also confirmed that the impact of lifestyles on health and mortality disparities would be larger than it was previously estimated, particularly if lifestyles are observed longitudinally.

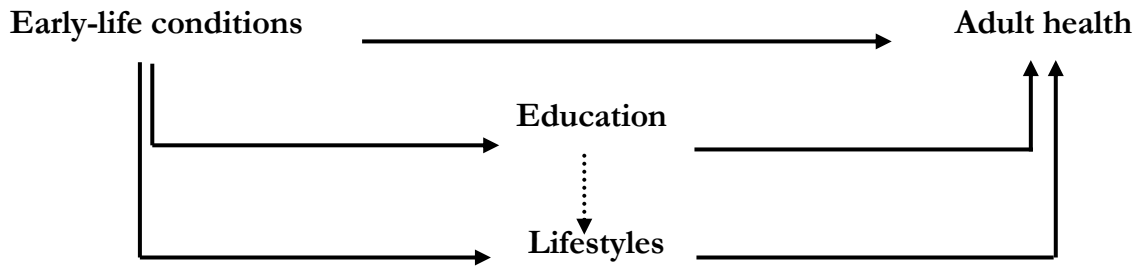
The issue at stake is that early-life conditions, education, and lifestyles cannot be considered as independent.

Several studies provide evidence on the transmission of socioeconomic status over different generations such as social class, education level or income level (e.g. Marmot et al. 2001, Case et al. 2005, Trannoy et al. 2010). Moreover, parents' lifestyles and social status as well as early-life conditions would also be associated with health-related behaviours in later life such as smoking (Rosa-Dias 2009; Göhlmann et al. 2009; Francesconi et al. 2009), alcohol consumption (Anda et al. 2002); obesity (Power et al. 2005; Laitinen et al. 2001; von Hinke Kessler Scholder 2008). In the sense that early-life conditions such as parents'

lifestyles, socioeconomic status as well as childhood economic conditions are individual characteristics from childhood, one would agree that they are causal factors of adult education and lifestyles. The sense of causality between education and lifestyles in adulthood is less straightforward. Poor lifestyles in adolescence such as heavy drinking, cannabis and other drugs consumption have been found to affect achieved education (Van Ours and Williams 2009; Staff et al 2008; Koivusilta et al. 1998); but studies uncovering mechanisms through which education affects lifestyles are much more numerous. In particular, education has been largely found to affect smoking decisions (Kenkel 1991; Grimard and Parent 2007; de Walque 2007; Reinhold and Jürges 2010; Etilé and Jones 2011; Kemptner et al. 2011; Kjellsson et al. 2011; Frisvold and Golberstein 2011; Jürges et al. 2011). The causal effect of education has also been found on obesity (Webbink et al 2010; Reinhold and Jürges 2010; Frisvold and Golberstein 2011; Kemptner et al. 2011) and exercise (Kenkel 1991, Park and Kang 2008).

Relying on the literature, we consider an empirical analysis of the interplay between these three broad determinants (see Figure 1.1). The objective of this study is to explore the long term effects of social and health-related early-life conditions, education, and lifestyles on health and to evaluate their respective contribution to the magnitude of health inequalities. Based on a dynamic model of health status over the life-cycle, our empirical analysis aims to investigate the effect of each determinant on overall health inequality and determines whether early-life conditions influence health directly or indirectly, that is via affecting education and lifestyles.

Figure 1.1: Early-life conditions, education, lifestyles and later-life health status



Our findings provide new elements on the determinants of health inequalities which are relevant for policy makers and that remained to be empirically assessed. Firstly, the role of early-life conditions is explored in direct and indirect terms with a larger set of indicators

than previous analyses, including parental social and health conditions in addition to the individual's initial health status. Secondly, this research analyses the evolution of unhealthy lifestyles, their changes over an extended period of time and their association with health status. Finally, the longitudinal dimension of those data allows using dynamic panel analysis in order to control for unexplained individual heterogeneity and explain impact of past health status.

The structure of the chapter is as follows. Section 1.2 describes the model that is empirically tested. Section 1.3 presents the National Child Development Study (NCDS) data and the variables of interest. Section 1.4 presents the empirical results and section 1.5 concludes.

1.2. The model

1.2.1. General health production function

In contrast with Jusot et al. (2010), who focused on a reduced-form model of childhood circumstances and lifestyles, we use a full model specification including individual educational attainment. Our approach also differs from Contoyannis and Jones (2004), Häkkinen et al. (2006), and Balia and Jones (2008), as our health production function includes early-life conditions as a potential determinant for health in addition to education and lifestyles. Furthermore, we built a dynamic model of health using longitudinal data.

The individual health status H can be written using the following health production function:

$$H = f(C, E, L, D, e) \qquad \text{(Eq. 1.1)}$$

The vector of early-life conditions C consists of a set of variables beyond individual control which may be related to health status. The literature on health determinants suggests an influence of childhood conditions and family background on health status in adulthood (see for example Currie and Stabile 2003, Case et al. 2005, Rosa-Dias 2009, Lindeboom et al. 2009, Trannoy et al. 2010). Moreover, initial health such as birth weight

and health problems during childhood and adolescence also significantly influence health in adulthood and the most adverse health risks in adulthood tend to be experienced by people in poor health in childhood and adolescence (Moser et al. 2003, Case et al. 2005). The vector E represents individual's education level and is not a time-variant variable. Researchers in many countries have found a relevant and persistent association between education and health as measured by various health measures (Grossman 2006) and several recent studies have found a causal effect of education on health status (Oreopoulos 2006, Silles 2009, Kemptner et al. 2011). The vector of health-related behaviours L captures individual decisions to invest in health capital, such as lifestyles (Balia and Jones 2008, Contoyannis and Jones 2004, Häkkinen et al. 2006, Rosa-Dias 2009, Jusot et al. 2010). The vector D represents demographic characteristics which are biological determinants of health status, only captured by gender in cohort data. Finally, the residual term e represents unobserved heterogeneity related to other random factors, which cannot be captured by observed determinants.

More concretely, let us assume that health of individual i at wave t is measured by a continuous latent variable H_{it}^{*} which is proxied using a binary variable H_{it} as follows:

$$H_{it}^{*} \geq 0 \text{ when } H_{it} = 1$$

$$H_{it}^{*} < 0 \text{ when } H_{it} = 0$$

The general health production model can be written as follows:

$$H_{it}^{*} = a_1 C_i + a_2 D_i + b_1 E_i + c L_{it-1} + u_i + v_{it}$$

with $i = 1, \ldots, N$ and $t = 1, \ldots, T_i$ (Eq. 1.2, model 1a)

We include lagged values of lifestyles into the model $L_{i,t-1}$ as past lifestyles are more likely to be important for health status than just acquired lifestyles. The time variant individual specific error term is captured by v_{it}, which is assumed to be normally distributed and uncorrelated across individuals and waves. The individual time invariant unobserved effect is captured by u_i ; it captures unobserved individual characteristics, such as genetics and personality traits. We firstly estimate a static model with random effects

assuming that the errors are independent over time and uncorrelated with the explanatory variables. This model provides us with base estimates, with which we can compare results from models that incorporate unobserved heterogeneity and state dependence.

Model 1a does not allow us to address several important issues with relevant impact on the health determinants. Firstly, we do not know whether the model variables appropriately account for any unobserved individual characteristics that also influence time-variant variables. Especially, if the past lifestyles are correlated with u_i, we would expect to overestimate the effect of lifestyles in model 1a. Secondly, early-life conditions, education, and past lifestyles may affect current health directly but also indirectly, namely through affecting past health. If this is true, we would expect past health to influence current health, and the direct effects of early-life conditions, education, and past lifestyles on current health to weaken or even disappear. Finally, the initial health state is likely to be not randomly assigned to the individual. To address the first issue, we use a random effect Probit specification allowing u_i and v_{it} to be correlated and introduce lifestyles averaged over time $\bar{L}_i$ as a set of controls for unobserved heterogeneity (Mundlak 1978). We now estimate the effects of changing lagged lifestyles on health but holding the average fixed[2] in the model 1b. While this model addresses part of the problem of unobserved heterogeneity, a dynamic model of health that incorporates both past health and unobserved effects is required to address the remaining issues. The inclusion of a rich set of early-life conditions in the model can be interpreted as a particular specification of the individual component. A well-explained vector strongly contributes to the reduction of the correlation between individual effects and initial conditions as it minimises unobserved time-invariant characteristics affecting individual outcomes at each point of time. Nevertheless, we need to account the potential endogeneity bias related to the respective correlations between early-life conditions, lifestyles and education with past health, which can be ruled out using a dynamic specification and introducing past health $H_{i,t-1}$ into the health production

[2] Lifestyles could therefore be regarded both as a measure of lifestyles shocks on health via the past lifestyle variables and as a measure of long-term or "permanent" lifestyles on health via the average lifestyle. Nevertheless, from our point of view the follow-up of lifestyles being limited to four points of time and to the use of binary lifestyle variables does not justify to interpret the effects of lifestyles on health in terms of permanent and transitory effects.

function. The introduction of past health status in our empirical model allows us to capture the state dependence in health reports and strongly reduces the impact of individual heterogeneity. In a dynamic context, initial health $H_{i,0}$ is likely to be correlated with unobserved heterogeneity u_i affecting H_{it} and if $H_{i,0}$ is considered exogenous this will lead to inconsistent estimators. We follow the alternative approach suggested by Wooldridge[3] (2002), which requires to specify the distribution of u_i given $H_{i,0}$ and other exogenous variables and so, include at least the first value of the independent variable, $H_{i,0}$.

The ultimate latent health model that we estimate can be written as follows:

$$H_{it}^{*} = a_1 C_i + a_2 D_i + b_1 E_i + c_1 L_{it-1} + c_2 \bar{L}_i + d_1 H_{it-1} + d_2 H_{i0} + u_i + v_{it}$$

with $i = 1, \dots, N$ and $t = 1, \dots, T_i$ (Eq. 1.3, model 1c)

In this model, the three broad determinants of health are in some aspects considered as independent therefore; we complement this primary specification with a mediating specification incorporating interdependent relationships between early-life conditions, education, and lifestyles.

1.2.2. Mediating effects identification

The mediating specification aims to identify whether explanatory variables influence health directly or indirectly, that is by affecting or being affected by another explanatory variable.

[3] Two other methods to address initial conditions problems could have been considered: Heckman (1981) and Orme (2001). The former suggests approximating the reduced form $f(H_{i,0}|x_i, u_i)$ and then specifying $f(u_i|x_i)$; $f(H_{i0}, \dots, H_{iT}|x_i)$ is then given by integrating out u_i (where x_i includes all the regressors). The two main difficulties with this method are specifying the distribution of initial health, and computing time. As for Orme (2001), he suggested a two-step bias corrected procedure that is locally valid when the correlation between H_{i0} and H_{it} is approximated to zero. A couple of recent works compared the relative performance of the three methods. Whereas Miranda (2007) concluded that the Heckman method delivers estimators that are hardly subject to bias and that are estimated with high precision; Arulampalam and Stewart (2009) concluded that none of the three estimators dominates the other two in all cases. Moreover, the authors found that it is advantageous to allow for correlated random effects using the approach of Mundlak (1978).

Let us firstly consider a more general case where individual health status H is defined according to a set of variables C, such as her early-life conditions, and a set of variables M, such as her education or lifestyles.

$$H = F(C, M, \varepsilon) \quad \text{(Eq. 1.4)}$$

We consider that M potentially mediates the relationship between C and H. For example, mother's educational qualification may affect adult health through an effect on individual's educational attainment as exhibited in the *pathway model* that has been well-studied in both economic and epidemiological studies (Marmot et al. 2001, Case et al. 2005, Trannoy et al. 2010). We aim to evaluate the full effect of C on H such as follows

$$H = \alpha_1 C + \varepsilon_1 \quad \text{(Eq. 1.5a)}$$

However, as we are in a full model specification we cannot ignore the role played by M on H:

$$H = \alpha_2 C + \beta M + \varepsilon_2 \quad \text{(Eq. 1.5b)}$$

The total effect of C on H is measured by α_1 whereas the direct effect of C on H is measured by α_2. The difference between α_1 and α_2 represents the mediating effects of C on H that work through M. Moreover, the mediating effects can be written using the following auxiliary equation, where φ captures the effect of C on M:

$$M = \varphi C + \omega \quad \text{(Eq. 1.6)}$$

Using a linear model to estimate the relationship between M and C, we can rewrite (Eq. 5b) as follows:

$$H = \alpha_2 C + \beta(\varphi C + \omega) + \varepsilon_2$$

$$H = (\alpha_2 + \beta.\varphi)C + \beta.\omega + \varepsilon_2 \quad \text{(Eq. 1.5c)}$$

Where $\beta.\varphi$ represents the mediating effect, namely the indirect effect of C on H working through M. Prior to the estimation of equation (Eq. 1.5c), estimated residuals $\widehat{\omega}$ must be estimated from the auxiliary equations (Eq. 1.6).

Following Bernt Karlson et al. (2012) and Bernt Karlson and Holm (2011), we can express the respective direct, mediating and total effects of C on H as follows[4]:

Direct effects	α_2
Mediating effects	$\beta.\varphi$
Total effects	$\alpha_1 = \alpha_2 + \beta.\varphi$

Let us now consider our present study, using Figure 1, the set of variables C represents early-life conditions and the set of variables M is both education and lifestyles. In this context, the mediating specification aims to describe whether early-life conditions influence health directly or indirectly, that is via affecting education and lifestyles.

In addition, the dashed arrow in Figure 1 suggests that the set of variables C could represent both early-life conditions and education, and the set of variables M be lifestyles only. Relying on numerous studies showing the causal impact of education on lifestyles it is likely that a share of the impact of education on adult health is mediated via lifestyles. Our empirical analysis thus distinguishes two layers of mediating effects: mediating effects of early-life conditions on health working through education and lifestyles (mediating specification 1), and mediating effects of education on health working through lifestyles (mediating specification 2).

The second specification ignores potential reverse causality link of lifestyles on education achievement. As mentioned in the Introduction, our motivation for ignoring reverse causality is based on the enhanced literature on the causal effect of education on lifestyles. Nevertheless we also use the panel dataset thoughtfully to address econometrically this matter.

[4] The introduction of the estimated residuals from the auxiliary equations into the main equation ensures that the total effect is equal to the sum of the direct and mediated effects (see Bernt Karlson et al. 2012)

The two different mediating specifications will be tested and compared. In concrete terms, (Eq. 1.5b) corresponds to the general health production function (Eq. 1.3, model 1c presented earlier) whereas the mediating specification is a two-step estimation based on auxiliary equations and then the estimation of the health production function described in (Eq. 1.5c). The sets of auxiliary equations being estimated can be written as follows:

$$E_i = \varphi_1 C_i + \varphi_2 D_i + e_i \qquad \text{(Eq. 1.6a)}$$

$$L_{it}^1 = \varphi_1^a C_i + \varphi_2^a D_i + l_i^1 \qquad \text{(Eq. 1.6b, } \textit{mediating specification 1}\text{)}$$

$$L_{it}^2 = \varphi_1^a C_i + \varphi_2^a D_i + \varphi_3^a E_i + l_i^2 \qquad \text{(Eq. 1.6b, } \textit{mediating specification 2}\text{)}$$

$$\overline{L_i^1} = \varphi_1^b C_i + \varphi_2^b D_i + \overline{l_i^1} \qquad \text{(Eq. 1.6c, } \textit{mediating specification 1}\text{)}$$

$$\overline{L_i^2} = \varphi_1^b C_i + \varphi_2^b D_i + \varphi_3^b E_i + \overline{l_i^2} \qquad \text{(Eq. 1.6c, } \textit{mediating specification 2}\text{)}$$

If we replace the respective auxiliary equations of the two mediating specifications into the main equation (Eq. 1.3, model 1c), the health production function in the mediating specification becomes[5]:

$$H_{it}^* = (a_1 + \psi_1)C_i + (a_2 + \psi_2)D_i + b_1\hat{e}_i + c_1\hat{l}_{it}^1 + c_2\overline{\hat{l}_i^1} + d_1 H_{it-1} + d_2 H_{i0} + u_i + v_{it}$$

with $i = 1, \dots, N$ and $t = 1, \dots, T_i$ (Eq. 1.7, *mediating specification 1*)

$$H_{it}^* = (a_1 + \psi_1)C_i + (a_2 + \psi_2)D_i + (b_1 + \psi_3)\hat{e}_i + c_1\hat{l}_{it}^2 + c_2\overline{\hat{l}_i^2} + d_1 H_{it-1} + d_2 H_{i0} + u_i + v_{it}$$

with $i = 1, \dots, N$ and $t = 1, \dots, T_i$ (Eq. 1.7, *mediating specification 2*)

where, $\hat{e}_i$, $\hat{l}_{it}^1$, $\overline{\hat{l}_i^1}$ (respectively $\hat{l}_{it}^2$, $\overline{\hat{l}_i^2}$ in mediating specification 2) represent the estimated residuals in each auxiliary equation and can be written as follows:

$$\hat{e}_i = E(e_i | C_i, D_i) \qquad \text{(Eq. 1.7a, } \textit{mediating specification 1}\text{)}$$

[5] Let us consider the mediating specification 1, if we replace (Eq. 1.6a), (Eq. 1.6b) and (Eq. 1.6c) in (Eq. 1.3, model 1c), we obtain: $H_{it}^* = a_1 C_i + a_2 D_i + b_1(\varphi_1 C_i + \varphi_2 D_i + \hat{e}_i) + c_1(\varphi_1^a C_i + \varphi_2^a D_i + \hat{l}_i) + c_2(\varphi_1^b C_i + \varphi_2^b D_i + \overline{\hat{l}_i}) + d_1 H_{it-1} + d_2 H_{i0} + u_i + v_{it}$ therefore we have $H_{it}^* = (a_1 + b_1\varphi_1 + c_1\varphi_1^a + c_2\varphi_1^b)C_i + (a_2 + b_1\varphi_2 + c_1\varphi_2^a + c_2\varphi_2^b)D_i + b_1 e_i + c_{11} l_i + c_{22}\overline{l}_i + d_1 H_{it-1} + d_2 H_{i0} + u_i + v_{it}$. If we assume $\psi_1 = b_1\varphi_1 + c_1\varphi_1^a + c_2\varphi_1^b$, $\psi_2 = b_1\varphi_2 + c_1\varphi_2^a + c_2\varphi_2^b$, then we obtain (Eq. 1.7) for the mediating specification 1.

$\hat{l}_{it}^{1} = E(l_i^1 | C_i, D_i)$ (Eq. 1.7b, *mediating specification 1*)

and $\hat{l}_{it}^{2} = E(l_i^2 | C_i, D_i, E_i)$ (Eq. 1.7b, *mediating specification 2*)

$\hat{\bar{l}}_{i}^{1} = E\left(\bar{l}_i^1 \middle| C_i, D_i\right)$ (Eq. 1.7c, *mediating specification 1*)

and $\hat{\bar{l}}_{i}^{2} = E\left(\bar{l}_i^2 \middle| C_i, D_i, E_i\right)$ (Eq. 1.7c, *mediating specification 2*)

These estimated residuals are estimated as linear probability models for time-invariant outcomes and pooled linear probability models otherwise. The estimated residuals are then introduced in the health equation (Eq. 1.7) in replacement of the actual explanatory variables as done in (Eq. 1.5c). In (Eq. 1.7), we can express the respective direct, mediating (indirect) and total effects of early-life conditions and education on health as follows:

Direct effects of early-life conditions on health	a_1
Total mediating effects of early-life conditions on health	$\psi_1 = b_1\varphi_1 + c_1\varphi_1^a + c_2\varphi_1^b$
Mediating effects via education	$b_1\varphi_1$
Mediating effects via lifestyles	$c_1\varphi_1^a + c_2\varphi_1^b$
Mediating effects of education on health via lifestyles	$\psi_3 = c_1\varphi_3^a + c_2\varphi_3^b$

1.2.3. Health determinants decomposition

The second part of our empirical analysis inquires to which extent the account of mediating effects influences the contribution of each determinant to health disparities. Shorrocks (1982) showed that if we are interested in an absolute measure of inequality, the variance is a good index and its natural decomposition presents the desired properties. The alternative model specifications of the health production function we considered in sections 1.2.1 and 1.2.2 are based on strictly identical regressors and so, they have the same variance. The variance of both models is estimated using bootstrap method (see statistical inference sub-section).

In a linear case, the share of variance explained for example by early-life conditions C_i simply consists in the share of the R^2 of the model which is explained by C_i. In a non linear context it is not straightforward as H_{it}^{*} can only be measured as a prediction and, ω_i and ε_{it} are defined as independent of the set of K explicative variables. A variance estimated from

the data is attributed to the time invariant individual error term ω_i whereas the time variant individual error term ε_{it} has a variance normalised to be equal to 1 in the case of a Probit model. We use the pseudo R^2 proposed by McKelvey and Zavoina (1975) in order to measure the share of variance explained by the variable X^k having an associated coefficient η^k, which is based on predictions of the latent endogenous variables:

$$\widehat{H}_{it}^{*} = \sum \eta^k X_{it}^k \qquad \text{(Eq. 1.8)}$$

Assuming that the variance of the error term u_i and v_{it} follows a normal distribution in this random effect Probit model, we can write:

$$R^2 = \frac{V(\widehat{H}^*)}{V(\widehat{H}^*)+\sigma_u+1} \qquad \text{(Eq. 1.9)}$$

Given the longitudinal data, the variance of the latent health variable can either be decomposed directly using the explained variance of the latent health variable, as measured by the pseudo-R² based on all the waves. The share of inequality associated to the variable X^k at time t can thus be written as:

$$I(X^k) = \frac{cov(\widehat{H^*},\eta^k X^k)}{V(\widehat{H^*})} = \frac{cov(\widehat{H^*},\eta^k X^k)}{\sum_{k=1}^{K} cov(\widehat{H^*},\eta^k X^k)} \qquad \text{(Eq. 1.10)}$$

1.2.4. Statistical inference

All our random effect Probit models have been bootstrapped to test the robustness of our estimated coefficients using 300 replications and this provides us with standard errors.

This is particularly relevant for the two-step estimation needed for the mediating specification which is likely to introduce uncertainty because estimated residuals from the auxiliary equations are introduced in the main health equation. From those we produce standard errors for the direct and total effects. Whereas the significance level of the estimated indirect effects is tested using the statistical test generated by Kohler et al. (2011) and available as the *khb* command in Stata.

The health inequality decomposition results are also tested using the same statistical inference where the whole analysis (auxiliary equations, health equation and the

decomposition) is replicated 300 times. This provides us with standard errors and confidence intervals based on the percentile method for the health inequality decomposition by sources.

1.3. The National Child Development Study

The National Child Development Study (NCDS) is a continuing, multi-disciplinary longitudinal study which focuses on all the people born in one week in March 1958 in England, Scotland and Wales. Information was gathered from almost 17,500 babies. Following the initial birth survey in 1958, there have been seven attempts to trace all members of the birth cohort in order to monitor their physical, educational, social and economic development. These were carried out in 1965, 1969, 1974, 1981, 1991, 1999/2000 and 2004. For the birth survey, information was obtained from the mother and from medical records by the midwife. For the purpose of the first three NCDS surveys, information was obtained from parents, head teachers and class teachers, the schools health service and the subjects themselves (who completed tests of ability and, latterly, questionnaires). In the 1981 and later surveys, information was gathered by professional survey research interviewers. In 1981 information was obtained from cohort members and from the 1971 and 1981 Censuses. In the 1991 survey there was a professional interview with the cohort member along with self-completion questionnaires from NCDS subjects and husbands, wives, and cohabiters. For the 1999-2000 sweeps, information was obtained from cohort members by interviewer and self-completion using CAPI. The 2004 survey was administered by telephone.

1.3.1. The sample

For the purpose of our study, we focus on the four last sweeps of the cohort (t= 0, ..., 3) in order to have repeated measures of both lifestyles and health status as an adult. Data collected before age 23 are used to inform individual early-life conditions (see in Appendix A Table A.1). We have excluded cohort members who missed at least one of the four first sweeps in order to ensure a description of childhood conditions with a limited non response. The balanced sample for which individuals have fully informed health status and lifestyles in all the sweeps 4 to 7 contains 4,480 individuals whereas the unbalanced sample

contains between 5,900 and 7,900 individuals. A description of the distribution of relevant variables in the balanced sample at t=0 is available in appendix (see in Appendix A Table A.2).

1.3.2. Health variable

The NCDS includes only one repeated measure of the respondent's health in the cohort, namely self-assessed health (SAH). Respondents are asked to rate their own health on a four or five point categorical scale ranging from poor (sweeps 4, 5 and 6) or very poor (wave 7) to excellent health status. Given the changes in scale in the variable over the different waves, we use SAH as a binary variable[6] which takes the value one if the individual rates her health as good health or higher, and zero if she rates her health less than "good". Self-assessed health has been shown to be a good predictor of mortality, morbidity and subsequent use of health care (Idler and Benyamini 1997). The distribution of health status in the balanced sample shows the age effect on health status over the life-cycle (see Table A.III). Whereas good health represents 92.7% of respondents at 23 years old, the proportion of respondents reporting a good health declines to 78.3% at 46 years old. Between the first three sweeps the mean is declining by a constant rate of 4 percentage points. There is a break with a decrease of 6 percentage points between the two last sweeps despite they are separated by four years only. This difference could be explained by an increasing effect of ageing on health when the cohort member enters her forties. This shift could also come from the change in the categorical scale of self-assessed health between sweep 6 and sweep 7 and this latter issue is minimised by the dichotomisation of health.

1.3.3. Education

The NCDS provides several current social characteristics such as income or professional status, but to prevent us from endogeneity that may be observed between social characteristics with either health and lifestyles; we only consider educational

[6] Dichotomisation was also required as the necessary condition on the proportional odds assumption for ordinal Probit models turns out not to be valid.

qualification in the analysis. We particularly focus on a binary measurement of education based on whether the cohort member has at least being awarded an O-level or not. O-level is a subject-based qualification conferred as part of the General Certificate of Education (GCE) and it is designed for 14-16 year olds pupils. Therefore, educational qualification is measured during adolescence and so, as described in Figure 1.1, it is expected that lifestyles in adulthood will be affected by educational level in this context and not the reverse causal link. About one fifth of respondents have an educational qualification strictly lower than O-level.

1.3.4. Lifestyles variables

The NCDS includes a longitudinal follow-up of lifestyles and health records at age 23, age 33, age 42 and age 46. We consider five lifestyles binary variables (presented in Appendix A Table A.4). Exercising indicates whether the cohort member is regularly doing exercise or sports; it equals one if the cohort member report exercising and zero otherwise. Non smoking informs whether the cohort member is a current smoker at the time of the wave; it equals one if she does not currently smoke and zero otherwise. Drinking prudently is a gender-specific indicator based on the number of units of alcohol drinks taken the week before the interview. Males are considered to drink prudently if they drank between 0 and 21 units of alcohol whereas it is between 0 and 14 units a week for females (Working Party of the Royal College of Physicians UK 2001, Balia and Jones 2008). The binary variable takes the value one if the respondent drinks prudently and zero otherwise. The absence of obesity is the fourth lifestyle that we consider. Obesity may appear as a genetic outcome of health and not a pure lifestyle. Given that we can control the genetic and the family transmitted effect on obesity using the respondent's obesity status when she was 16, the absence of obesity will thus captures aggregated effects of lifestyles. Absence of obesity is constructed using the reported height and weight and calculating individuals' body mass index (BMI[7]). The absence of obesity is a binary variable taking the value one if the cohort member's BMI is strictly lower than 30 and zero otherwise. Furthermore we consider the

[7] BMI in kg/m2= weight/height^2

frequency of eating fruits or vegetables as processed, raw, cooked, canned or in salads. Diet information was only collected at age 33, 42 and 46 in the cohort. Therefore, we assume that diet at age 23 was the same as age 33 and consider a binary variable taking the value one if the respondent reports that she eats at least one fruit or one vegetable once per week and zero otherwise.

1.3.5. Early-life conditions

The vector of early-life conditions that we consider has three main types of variables: social conditions in childhood, parents' health and health-related behaviours, and child and adolescence health. Social conditions in childhood include the father's social class at the time of birth, the father and the mother's education level, and parental reports of financial hardships when the cohort member was 16. Father's social class is described in three large categories: a top class (I/II) including professional and managerial or technical workers, a middle class (III) including skilled workers and armed services, and a low class (IV/V) including partly skilled and unskilled workers and a fourth category is added if the mother reported no male figure in the household at the time of birth. Parental education consists in a two categories variable: parents who dropped out from school before or at the minimum age (14-15 years depending on the year of birth) and parents who were still at school after this age. Parents' health is measured by parental report of chronic illness when the cohort member was 16 years old. Regarding parents' health related lifestyles, we used a smoking indicator for each parent taking the value 1 if reported to be a smoker. Respondent's health in childhood and adolescence are used as control variables but also as achievement variables since they may represent health-related difficulties from the living environment during childhood. We use the same approach as Case et al. (2005) who considered the report of at least one chronic condition at 16 as well as a birth weight below 2.5kg as health indicators before adulthood using the same dataset. Furthermore, we include obesity at 16 years old. We have computed BMI using medical assessment of height and weight and evaluated obesity level using gender-specific thresholds values found to be a good predictor of obesity at 18 (Lahti-Koski and Gill 2004).

1.4. Results

1.4.1. Random effect dynamic panel Probit results

The results of the random effect panel Probit of the general specification are presented in Table 1.1. Three different models are reported: model 1a and model 1b are static models with random effect with model 1b including the average individual lifestyles over the studied period; whereas model 1c is a dynamic random effects Probit model.

The results show that several early-life conditions have a statistically significant effect on the probability to report good health regardless of the model. Individuals whose father belonged to the lowest social class, namely partly skilled and unskilled workers as well as individuals who had no father at the time of their birth are significantly less likely to report good health. Similarly, the experience of financial hardship during childhood has a significant and negative effect on reports of good health. The mother's education level is also found as a statistically significant determinant of poor health reports whereas the father's education is not significant in any of the models. This may be explained by father's social class being significant and so, absorbing the effect of father's education on descendant's health. Unlike mother's illness, father's illness significantly reduces the probability to report good adult health. Mother's smoking behaviour appears to be significant for descendant's report of good health but the significant level weakens in the dynamic model. Individual education level is also found statistically and significantly associated with health: low educational attainment is negatively associated with the report of a good health. Regarding lifestyles variables, the five lagged lifestyles are significantly associated with reports of good health in model 1a (at the 10% level for drinking prudently). However as soon as average lifestyles are added to the model, the lagged lifestyles are not significantly associated with health anymore. The average behaviours in exercise, absence of obesity, consumption of fruits and vegetables and to a lesser extent the absence of smoking are found strongly and significantly associated with reports of good health, whereas the average behaviour towards drinking is significant at the 10% level only.

Table 1.1: Random effect Probit models results with estimated coefficients (with bootstrapped standard errors)

	Model 1a *Static model*			Model 1b *Mundlak specification*			Model 1c *Dynamic model*		
Variables	**Coef.**		**S.E.**	**Coef.**		**S.E.**	**Coef.**		**S.E.**
Gender Male	0.115	**	0.050	0.094	*	0.052	0.070		0.047
Early-life conditions									
Fathers' social class (Ref.: I and II - Professional and managerial/technical)									
III - Skilled	-0.103		0.076	-0.087		0.076	-0.064		0.066
IV and V - Partly skilled and unskilled	-0.275	***	0.091	-0.255	***	0.092	-0.206	***	0.076
No male head	-0.510	***	0.141	-0.492	***	0.143	-0.383	***	0.109
Financial hardship (Ref.: None)									
Yes	-0.347	***	0.090	-0.340	***	0.091	-0.253	***	0.070
Non response	0.057		0.165	0.080		0.166	0.102		0.149
Father's education (Ref.: beyond the min age)									
Before or at the min age	-0.092		0.071	-0.069		0.072	-0.046		0.061
Mother's education (Ref.: beyond the min age)									
Before or at the min age	-0.172	**	0.068	-0.152	**	0.069	-0.143	**	0.061
Parental illness (Ref.: None)									
Father's illness	-0.229	**	0.091	-0.218	**	0.092	-0.165	**	0.078
Mother's illness	-0.158		0.108	-0.142		0.109	-0.120		0.092
Parental smoking (Ref.: None)									
Father's smoking	0.087		0.054	0.113	**	0.054	0.076	*	0.048
Non response	0.024		0.105	0.023		0.106	-0.009		0.093
Mother's smoking	-0.142	***	0.052	-0.127	**	0.053	-0.077	*	0.044
Non response	-0.113		0.138	-0.108		0.139	-0.064		0.126
Chronic condition at 16 (Ref.: None)									
Yes	-0.114		0.075	-0.090		0.076	-0.016		0.065
Non response	0.190		0.154	0.157		0.155	0.113		0.131
Low birth weight	-0.124		0.110	-0.131		0.111	-0.074		0.089
Obesity at 16 (Ref.: Yes)									
No	0.062		0.203	-0.281		0.213	-0.316	*	0.194
Non response	-0.197		0.138	-0.171		0.138	-0.153		0.118
Educational qualification									
Strictly lower than O-level	-0.298	***	0.062	-0.191	***	0.063	-0.169	***	0.054
Lifestyles									
Lagged lifestyles									
Exercising once in the last 4 weeks	0.159	***	0.042	-0.033		0.049	-0.045		0.046
Non smoking	0.308	***	0.047	0.080		0.074	0.070		0.074
Drinking prudently	0.101	*	0.059	0.031		0.072	0.033		0.071
Non obese	0.361	***	0.065	-0.027		0.085	-0.052		0.087
Consumption of fruit/veg. once per week	0.324	***	0.067	0.095		0.091	0.072		0.096
Mean lifestyles									
Exercising once in the last 4 weeks				0.689	***	0.098	0.524	***	0.093
Non smoking				0.326	***	0.097	0.205	**	0.090
Drinking prudently				0.223	*	0.133	0.211	*	0.119
Non obese				0.924	***	0.141	0.771	***	0.129
Consumption of fruit/veg. once per week				0.422	***	0.135	0.318	***	0.123
Lagged health status							0.306	***	0.076
Initial conditions (Health status at 23)							0.997	***	0.101
Time dummies (Ref.: t=3)									
t=1	0.670	***	0.045	0.666	***	0.047	0.578	***	0.049
t=2	0.347	***	0.040	0.384	***	0.040	0.340	***	0.038
$V(\widehat{H}^*)$	0.247			0.342			0.367		
σ_ω	1.110			1.113			0.636		
$\rho^{\#}$	0.526			0.527			0.389		
R^2 (McKelvey and Zavoina)	0.105			0.139			0.183		

$^{\#}$ Share of individual unexplained heterogeneity measured by the share of σ_ω in the total unexplained variance ($\sigma_\omega + 1$)

This first table of results emphasises the relevance of a dynamic model; past health status and initial health in model 1c are significantly associated with reports of good health and the share of individual unexplained heterogeneity addressed by the model equals 37% of the unexplained heterogeneity. Furthermore, when past and initial health variables are introduced a reduction in the magnitude of the model's estimated coefficients is observed.

1.4.2. Auxiliary equations estimations

Prior to the mediating specification, the auxiliary equations are estimated. The results are presented in Appendix A (Table A.5). Education is estimated as a linear regression model of the probability to report an educational qualification lower than O-level. Having an educational qualification lower than O-level is actually found positively and significantly associated with low father's social class and absence of a male head at the time of birth, experience of financial hardship, both parents' having left school before or at the minimum legal age and both parents' being smokers; presence of a chronic disease at 16 years old, obesity at 16, and low birth weight. The five lifestyles are estimated as OLS models on the pooled sample. Exercising is significantly and negatively associated with reports of chronic disease at 16, father's low social class, both parents' low education and experience of financial hardship. When educational attainment is controlled (Appendix A, Table A.5, model b), educational qualifications is found significantly and negatively associated with regular exercise. Moreover, it weakens the significant effect of financial hardships, father's social class and parental education. With regard to smoking behaviour, the absence of smoking is strongly and negatively associated with both parents' smoking, financial hardship at 16, father's low social class and the absence of male head at the time of birth. When introduced in the model, educational qualification lower than O-level appears to be negatively correlated with the absence of smoking (Appendix A, Table A.5, model b). Moreover, the inclusion of individual education absorbs the effect of father's social class and weakens the impact of financial hardship and mother's smoking. Drinking prudently is strongly higher among female and found negatively and significantly correlated with father's smoking. Noticeably, having a father who was in lower social class and a low birth weight appear to be positively associated with prudent drinking. Educational qualification is found to be negatively associated with drinking prudently when education is introduced in the

auxiliary equation (Appendix A, Table A.5, model b). The absence of obesity at 16 is statistically associated with non obesity in adulthood; in addition, mother's smoking, father's SES and mother's low education are found statistically significant for the reduction of the absence of obesity. When education is included within the auxiliary equation (Appendix A, Table A.5, model b), it appears to be significantly and negatively associated with the absence of obesity. Moreover, the introduction of education erases the significant effect of parents' education which was previously observed. Finally, eating fruits and vegetables is found negatively and significantly correlated with father's qualification, mother's education, and father's smoking (Appendix A, Table A.5, models a and b), and respondent's education level (Appendix A, Table A.5, model b).

1.4.3. Random effect dynamic panel Probit results: mediating specification

The results of the mediating specifications of the health production function are presented in Table 1.2. They have been obtained by replacing actual variables of education and lifestyles by the estimated residual terms of the different auxiliary equations whose results were described in the previous section. The two mediating specifications are presented.

Noticeably, the estimated coefficients associated to education and lifestyles in mediating specification 1 and to lifestyles only, in mediating specification 2 are strictly identical with the estimated coefficients in model (1c) (see Table 1.1) as expected when comparing (Eq. 1.3) and (Eq. 1.7). The results of the mediating specification permit confirming the existence of indirect effect of early-life conditions variables on health over the lifecycle in addition to their direct effect previously shown by the initial specification. There is a clear increase in the magnitude of all the estimated coefficients associated to early-life conditions in the mediating specification compared to the results of model (1c). The effect of early-life conditions is magnified when mediating effects with other health determinants such as education and lifestyles are disentangled. The mediating specification 2 also emphasised that education level has both a direct and an indirect effect on health as the estimated coefficients associated to the education variables are larger. The mediating specifications allow us to evaluate the magnitude of the direct and indirect effects of early-life conditions on adult health, working through education and lifestyles.

Table 1.2: Random effect Probit models coefficients of the mediating specifications (with bootstrapped standard errors)

	Mediating specification 1		Mediating specification 2	
Variables	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Gender Male	0.086 **	0.044	0.086 **	0.045
Early-life conditions				
Fathers' social class (Ref.: I and II - Professional and managerial/technical)				
III - Skilled	-0.102	0.066	-0.102	0.066
IV and V - Partly skilled and unskilled	-0.279 ***	0.077	-0.279 ***	0.077
No male head	-0.465 ***	0.115	-0.465 ***	0.115
Financial hardship (Ref.: None)				
Yes	-0.348 ***	0.072	-0.348 ***	0.072
Non response	0.056	0.158	0.056	0.158
Father's education (Ref.: beyond the min age)				
Before or at the min age	-0.091	0.060	-0.091	0.060
Mother's education (Ref.: beyond the min age)				
Before or at the min age	-0.197 ***	0.062	-0.197 ***	0.062
Parental illness (Ref.: None)				
Father's illness	-0.191 **	0.080	-0.191 **	0.080
Mother's illness	-0.142	0.095	-0.142	0.095
Parental smoking (Ref.: None)				
Father's smoking	0.022	0.049	0.022	0.049
Non response	-0.026	0.095	-0.026	0.095
Mother's smoking	-0.124 ***	0.045	-0.124 ***	0.045
Non response	-0.080	0.132	-0.080	0.132
Chronic condition at 16 (Ref.: None)				
Yes	-0.059	0.065	-0.059	0.065
Non response	0.149	0.136	0.149	0.136
Low birth weight	-0.093	0.093	-0.093	0.093
Obesity at 16 (Ref.: Yes)				
No	0.183	0.189	0.183	0.189
Non response	-0.217 *	0.123	-0.217 *	0.123
Educational qualification				
Strictly lower than O-level	-0.169 ***	0.054	-0.326 ***	0.056
Lifestyles				
Lagged lifestyles				
Exercising once in the last 4 weeks	-0.045	0.046	-0.045	0.046
Non smoking	0.070	0.074	0.070	0.074
Drinking prudently	0.033	0.071	0.033	0.071
Non obese	-0.052	0.087	-0.052	0.087
Consumption of fruit/veg. once per week	0.072	0.096	0.072	0.096
Mean lifestyles				
Exercising once in the last 4 weeks	0.524 ***	0.093	0.524 ***	0.093
Non smoking	0.205 **	0.090	0.205 **	0.090
Drinking prudently	0.211 *	0.119	0.211 *	0.119
Consumption of fruit/veg. once per week	0.318 ***	0.123	0.318 ***	0.123
Lagged health status	0.306 ***	0.076	0.306 ***	0.076
Initial conditions (Health status at 23)	0.997 ***	0.101	0.997 ***	0.101
Time dummies (Ref.: t=3)				
t=1	0.579 ***	0.047	0.579 ***	0.047
t=2	0.338 ***	0.038	0.338 ***	0.038
$V(\widehat{H}^*)$	0.367		0.367	
σ_ω	0.636		0.636	
$\rho^{\#}$	0.389		0.389	
R^2 (McKelvey and Zavoina)	0.183		0.183	

Share of individual unexplained heterogeneity measured by the share of σ_ω in the total unexplained variance ($\sigma_\omega + 1$)
Significance levels: *** 1%, **5%, *10%.

Table 1.3 presents the magnitude of direct and indirect effects of each of the variables within the vector of early-life conditions. The absence of male head at the time of birth has the highest direct effect on adult health. The experience of financial hardships during childhood is also an important early-life condition influencing adult health directly. The absence of obesity at 16 years old has both relevant direct and indirect effects on adult health. As an indirect effect, it essentially works through lifestyles. The indirect effect of both parents' smoking also appears to work mainly through lifestyles but not significantly. Finally, individual educational attainment influences adult health both directly and indirectly through lifestyles.

Table 1.3: Direct and indirect effects of early-life conditions and education on adult health

Variables	Direct Effect a_1			Indirect effect via education $b_1\varphi_1$			Indirect effect via lifestyles $c_1\varphi_1^a + c_2\varphi_1^b$			Total Effect $a_1 + \psi_1$		
Early-life conditions												
	Coef.		**SE**	**Coef.**		**SE**	**Coef.**		**SE**	**Coef.**		**SE**
Fathers' social class												
III – Skilled	-0.064		0.066	-0.005		0.013	-0.033		0.054	-0.102		0.066
IV and V - Partly skilled and unskilled	-0.206	***	0.076	-0.022		0.014	-0.052		0.055	-0.279	***	0.077
No male head	-0.383	***	0.109	-0.019		0.014	-0.063		0.055	-0.465	***	0.115
Financial hardship												
Yes	-0.253	***	0.070	-0.036	**	0.017	-0.059		0.055	-0.348	***	0.072
Non response	0.102		0.149	-0.013		0.013	-0.033		0.054	0.056		0.158
Father's education												
Before or at the min age	-0.046		0.061	-0.012		0.013	-0.034		0.054	-0.091		0.060
Mother's education												
Before or at the min age	-0.143	**	0.061	-0.015		0.013	-0.038		0.054	-0.197	***	0.062
Parental illness												
Father's illness	-0.165	**	0.078	-0.001		0.013	-0.025		0.054	-0.191	**	0.080
Mother's illness	-0.120		0.092	-0.001		0.012	-0.021		0.054	-0.142		0.095
Parental smoking												
Father's smoking	0.076	*	0.048	-0.005		0.013	-0.049		0.054	0.022		0.049
Non response	-0.009		0.093	0.001		0.013	-0.018		0.054	-0.026		0.095
Mother's smoking	-0.077	*	0.044	-0.013		0.013	-0.034		0.054	-0.124	***	0.045
Non response	-0.064		0.126	-0.010		0.013	-0.006		0.054	-0.080		0.132
Chronic condition at 16												
Yes	-0.016		0.065	-0.011		0.013	-0.032		0.054	-0.059		0.065
Non response	0.113		0.131	-0.010		0.013	0.045		0.055	0.149		0.136
Low birth weight	-0.074		0.089	-0.016		0.013	-0.003		0.054	-0.093		0.093
Obesity at 16												
No	-0.316	*	0.194	0.018		0.014	0.481	***	0.081	0.183		0.189
Non response	-0.153		0.118	-0.002		0.013	-0.061		0.055	-0.217	*	0.123
Educational qualification												
Strictly lower than O-level	-0.169	***	0.054				-0.158	***	0.056	-0.326	***	0.056

1.4.4. Decomposition of health inequality

Table 1.4 presents the results of the decomposition of the variance of the predicted latent health within the longitudinal panel data analysis for the alternative specifications (model 1c, specification 1 and specification 2).

Table 1.4: Decomposition of health inequality (with bootstrapped standard errors and 95% confidence intervals using bootstrap percentiles method)

	Health inequality over the full period		
Variables	**Share**	**SE**	**[95% Conf. Int]**
Baseline specification			
Demographics	16.55	2.21	[12.30 ; 21.24]
Early-life conditions	12.79	2.46	[9.40 ; 19.54]
Social background	10.15	2.23	[6.24 ; 14.96]
Parent's health and lifestyles	2.40	1.23	[0.96 ; 5.73]
Initial health	0.24	0.68	[-0.39 ; 2.08]
Lifestyles	31.97	3.22	[25.83 ; 37.32]
Education	4.03	1.56	[1.21 ; 7.47]
Health state-dependence	34.66	3.35	[27.25 ; 39.87]
Mediating specification 1			
Demographics	16.67	2.17	[12.51 ; 21.25]
Early-life conditions	19.17	2.71	[15.24 ; 25.91]
Social background	14.11	2.46	[9.68 ; 19.31]
Parent's health and lifestyles	3.68	1.40	[1.88 ; 7.28]
Initial health	1.37	0.83	[0.39 ; 3.46]
Lifestyles	27.13	2.95	[21.85 ; 32.51]
Education	2.37	1.07	[0.60 ; 4.84]
Health state-dependence	34.66	3.35	[27.25 ; 39.87]
Mediating specification 2			
Demographics	16.67	2.17	[12.51 ; 21.25]
Early-life conditions	19.17	2.71	[15.24 ; 25.91]
Social background	14.11	2.46	[9.68 ; 19.31]
Parent's health and lifestyles	3.68	1.40	[1.88 ; 7.28]
Initial health	1.37	0.83	[0.39 ; 3.46]
Lifestyles	24.92	2.80	[20.04 ; 30.43]
Education	4.58	1.41	[2.24 ; 7.24]
Health state-dependence	34.66	3.35	[27.25 ; 39.87]

The decomposition in the baseline specification shows that the most important contribution to health inequalities comes from the state dependence of health and the initial health, which would explain 35% of the variance in the predicted health. Lifestyles are directly explaining 32% of health inequalities, which confirm that they are important determinants of health inequalities. Early-life conditions explain about 13% of health inequalities. If we add their indirect contributions to health inequalities, as done in the mediating specification, the relative contribution of early-life conditions increases and would represent 19.2% of health inequalities. This increase underlines the existence of

mediating effects of early-life conditions with education and lifestyles. On the contrary, the contribution of lifestyles on health inequalities reduces and would represent 27% of inequalities. Lifestyles are thus influenced by early-life conditions and to a lesser extent by educational level as their contribution to health inequalities slightly decreases down to 25% in the mediating specification 2. Comparison between the decompositions of the general specification and the mediating specifications suggest that the correlation between early-life conditions, and respectively lifestyles and education, is important. When we purge the contribution of lifestyles to health inequalities from their mediating effect with early-life conditions and education, we reduce their contribution to health inequalities and emphasise the importance of early-life conditions for health inequalities over the life cycle.

We thoroughly studied the share of early-life conditions in health inequalities and explore the relative contribution of social background, parent's health and lifestyles, and initial health to this vector. The decomposition in the general specification model suggests that social background variables are the leading contributing factor, representing about 79.4% of the share of early-life conditions in health inequalities[8]. Parent's health and lifestyles represent about 19.3%.

1.5. Conclusion

In this chapter, we developed a model to evaluate the contribution of several essential determinants of health to health inequalities using a representative cohort of individuals born in 1958 and a unique follow-up of health status, lifestyles as well as a good description of early-life conditions. Our results showed the indirect effects of early-life conditions variables on health over the life cycle in addition to their direct effects. Early-life conditions have a larger contribution to health inequality when their indirect role on education achievement as an adult and lifestyles are taken into account representing almost 20% of overall explained health inequality. This latter result underlines the relevance of mediating effects between the determinants of health and outperforms previous works excluding

[8] Social background represents 10.15% of overall health inequality within the share of 12.79% represented by early-life conditions, so it represents 79.4% of the health inequality explained by early-life conditions.

early-life conditions as a relevant determinant of health inequalities along with socioeconomic factors and lifestyles. Among early-life conditions, social background seems to be the most important determinant of overall health inequalities. Lifestyles show an impressive contribution to health inequalities, namely 32% in the general specification but appear to be largely determined by both early-life conditions and education as their contribution reduced down to 25%. This confirms previous results which have underlined social determinism along with the existence of an accumulation of risk on causal pathways in the life course (Kuh et al. 2003).

The study exhibits among the early-life conditions those which influence adult health directly, indirectly and both directly and indirectly. The absence of father at the time of birth and experience of financial hardships represent the lead factors for direct effect on health. The absence of obesity at 16 influences health both directly and indirectly working through lifestyles. Indirect effects increase the relative contribution of early-life conditions to health inequalities and inversely decrease the contribution of lifestyles in the mediating model.

Finally, the dynamic panel analysis permits controlling a large part of individual unexplained heterogeneity as well as the important effect of health state dependence over time. Our study has some limitations. The inequality measure is based on the explained part of the variance that is allowed by the model specifications. According to the pseudo-R^2 that is built using the variance of the latent variable, we would be able to explain about 18%. Therefore the unexplained health inequality remains very large. The panel data perspective also presents several limits. The first problem is the presence of attrition due to mortality in the cohort that we have ignored in the analysis. This leads us to an underestimation of the effect of early-life conditions, adult socioeconomic factors and lifestyles on health inequality as we worked on a selected sample of British people still alive at 46 years old. We did investigate mortality in our data and we found that mortality rate appears to be more important before age 23 than between age 23 and age 46. Finally, the NCDS cohort has a singular structure as the different waves are not equidistant in time. In particular there is a four year interval between the two last sweeps whereas there were about ten years between the past sweeps. We tried to catch this effect by introducing a year

dummy into the models. Therefore, the estimated coefficients in the models can be interpreted as a mean of the effects of lifestyles, education, and early-life conditions over time.

The study of the social determinants of health inequality together with lifestyles and the evaluation of their respective contribution to the magnitude of health inequality is particularly relevant for policy makers. The legitimacy of policies to tackle health inequalities is related to the relative contribution of each broad factor. Early-life conditions, which are factors that cannot be chosen by the individual, appear to be relevant factors of health disparities. They are also considered as the most illegitimate sources of health inequalities by social justice philosophers such as Roemer (1998) and Dworkin (1981). Therefore, our results appear to orientate policy interventions towards the compensation of individual for unequal opportunities in health.

1.6. Appendix

Appendix A : Supplementary tables

Table A.1 The original NCDS sample and the study sample

Year	1958	1965	1969	1974	1981	1991	1999/00	2004
Cohort member age	Birth	7	11	16	23	33	42	46
Cross-sectional original sample	17,416	15,051	14,757	13,917	12,044	10,986	10,979	9,175
		Early-life conditions			***t=0***	***t=1***	***t=2***	***t=3***
Unbalanced selected sample					7,874	6,956	6,999	5,990
Balanced selected sample						4,480		

Table A.2 Descriptive statistics in the balanced sample at t=0

Variables	N=4480	Proportion	
Gender			
Male	2065	46.09	%
Female	2415	53.91	%
Early-life conditions			
Fathers' social class			
I/II - Professional and managerial/technical	854	19.06	%
III – Skilled	2651	59.17	%
IV/V - Partly skilled and unskilled	827	18.46	%
No male head	148	3.30	%
Financial hardship			
Yes	322	7.19	%
No	4055	90.51	%
Non response	103	2.30	%
Father's education			
Minimum schooling age and below	3460	77.23	%
Beyond the min age	1020	22.77	%
Mother's education			
Minimum schooling age and below	3464	77.32	%
Beyond the min age	1016	22.68	%
Parental illness			
Father's illness	314	7.01	%
Mother's illness	218	4.87	%
Parental smoking			
Father's smoking	2432	54.29	%
Non response	292	6.52	%
Mother's smoking	1962	43.79	%
Non response	148	3.30	%
Chronic condition at 16			
Yes	523	11.67	%
No	3475	77.57	%
Non response	482	10.76	%
Low birth weight	214	4.78	%
Obesity at 16			
Yes	59	1.32	%
No	3818	85.06	%
Non response	610	13.62	%
Educational qualification			
O-level and higher	3607	80.51	%
Strictly lower than O-level	873	19.49	%

Table A.3 Distribution of health status in the balanced sample

	Age 23 *t=0*	**Age 33** *t=1*	**Age 42** *t=2*	**Age 46** *t=3*
Excellent	45.85%	35.51%	31.54%	32.08%
Good	46.88%	53.21%	53.19%	46.21%
Good health	**92.72%**	**88.73%**	**84.73%**	**78.28%**
Fair	6.70%	10.09%	12.77%	14.98%
Poor	0.58%	1.18%	2.50%	5.07%
Very poor				1.67%
Poor health	**7.28%**	**11.27%**	**15.27%**	**21.72%**

Table A.4 Descriptive statistics of lifestyles variables in the balanced sample

	Lifestyles		
	Age 23 *t=0*	Age 33 *t=1*	Age 42 *t=2*
Exercising	49.51	79.93	75.56
No smoking	64.08	71.52	74.24
Drinking prudently	87.61	92.57	84.98
No obesity	97.37	89.87	85.65
Eating fruit & vegetable	91.79	91.79	90.49

Table A.5: Estimated coefficients of auxiliary equations (OLS model)

	Education	Exercising		Non smoking		Drinking prudently		Non obese		Eating fruit and veg.	
Variables	**Before O-level**	**(a)**	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**
	-0.057***	0.095***	0.088***	0.014	0.004	-0.088***	-0.088***	0.011*	0.009	-0.076***	-0.079***
Gender Male	(0.011)	(0.009)	(0.009)	(0.012)	(0.012)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)
Early-life conditions											
Fathers' social class (Ref.: I and II - Professional and managerial/technical)											
	0.032*	-0.012	-0.009	-0.017	-0.011	0.011	0.011	-0.019**	-0.017**	-0.029***	-0.027***
III – Skilled	(0.017)	(0.013)	(0.013)	(0.016)	(0.016)	(0.010)	(0.010)	(0.008)	(0.008)	(0.009)	(0.009)
IV and V –	0.128***	-0.052***	-0.036**	-0.048**	-0.011	0.025**	0.025**	-0.012	-0.007	-0.030**	-0.022**
Partly skilled and unskilled	(0.021)	(0.016)	(0.016)	(0.021)	(0.016)	(0.012)	(0.012)	(0011)	(0.011)	(0.012)	(0.012)
	0.110***	-0.040	-0.027	-0.147***	-0.128***	0.011	0.011	0.001	0.005	-0.017	-0.010
No male head	(0.034)	(0.026)	(0.026)	(0.038)	(0.38)	(0.020)	(0.020)	(0.018)	(0.018)	(0.020)	(0.020)
Financial hardship (Ref.: None)											
	0.212***	-0.044**	-0.018	-0.087***	-0.050*	0.008	0.008	-0.013	-0.005	-0.018	-0.005
Yes	(0.023)	(0.019)	(0.018)	(0.026)	(0.026)	(0.012)	(0.012)	(0.014)	(0.014)	(0.015)	(0.015)
	0.077**	-0.027	-0.018	-0.021	-0.008	-0.022	-0.022	-0.022	-0.019	0.017	0.022
Non response	(0.038)	(0.028)	(0.028)	(0.040)	(0.038)	(0.027)	(0.027)	(0.022)	(0.022)	(0.020)	(0.020)
Father's education (Ref.: beyond the min age)											
	0.069***	-0.039***	-0.030**	-0.009	0.003	0.009	0.009	-0.014*	-0.011	-0.013	-0.008
Before or at the min age	(0.016)	(0.012)	(0.012)	(0.016)	(0.016)	(0.010)	(0.010)	(0.008)	(0.008)	(0.009)	(0.009)
Mother's education (Ref.: beyond the min age)											
	0.089***	-0.039***	-0.028**	-0.013	0.003	0.010	0.010	-0.017**	-0.013*	-0.018**	-0.012
Before or at the min age	(0.015)	(0.011)	(0.011)	(0.015)	(0.015)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)
Parental illness (Ref.: None)											
	0.006	-0.001	0.000	-0.029	-0.028	0.012	0.012	-0.019	-0.019	-0.014	-0.014
Father's illness	(0.022)	(0.018)	(0.018)	(0.025)	(0.024)	(0.012)	(0.012)	(0.014)	(0.014)	(0.015)	(0.015)
	0.003	-0.018	-0.018	-0.041	-0.040	-0.005	-0.005	0.004	0.005	-0.008	-0.008
Mother's illness	(0.026)	(0.021)	(0.020)	(0.029)	(0.029)	(0.016)	(0.016)	(0.014)	(0.014)	(0.017)	(0.018)
Parental smoking (Ref.: None)											
	0.031**	-0.017*	-0.013	-0.081***	-0.075***	-0.021***	-0.021***	-0.008	-0.007	-0.019**	-0.017**
Father's smoking	(0.012)	(0.009)	(0.009)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
	-0.007	0.015	0.014	-0.078***	-0.079***	-0.030*	-0.030*	0.014	0.014	-0.017	-0.018
Non response	(0.025)	(0.019)	(0.018)	(0.027)	(0.027)	(0.016)	(0.016)	(0.013)	(0.013)	(0.015)	(0.015)
	0.079***	-0.006	0.004	-0.044***	-0.030**	-0.008	-0.008	-0.020***	-0.017**	-0.007	-0.002
Mother's smoking	0.012	(0.009)	(0.009)	(0.013)	(0.013)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
	0.061*	-0.025	-0.018	-0.007	0.003	0.021	0.021	0.008	0.011	-0.007	-0.004
Non response	(0.032)	(0.025)	(0.024)	(0.036)	(0.034)	(0.017)	(0.017)	(0.017)	(0.017)	(0.022)	(0.022)

Chronic condition at 16 (Ref.: None)											
	0.067***	-0.061***	-0.053	-0.004	0.008	0.018*	0.018*	-0.010	-0.007	0.005	0.009
Yes	0.018	(0.014)	(0.014)	(0.019)	(0.019)	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)
	0.059	0.047	0.054	0.030	0.020	0.022	0.022	-0.009	-0.006	0.039	0.043
Non response	(0.037)	(0.030)	(0.029)	(0.043)	(0.042)	(0.022)	(0.022)	(0.019)	(0.019)	(0.026)	(0.027)
	0.094***	-0.021	-0.010	-0.006	0.011	0.030**	0.030**	0.009	0.013	-0.014	-0.008
Low birth weight	(0.026)	(0.021)	(0.021)	(0.029)	(0.029)	(0.013)	(0.013)	(0.015)	(0.015)	(0.017)	(0.017)
Obesity at 16 (Ref.: Yes)											
	-0.104**	0.001	-0.012	0.083	0.065	-0.027	-0.027	0.640***	0.636***	0.011	0.005
No	(0.049)	(0.035)	(0.036)	(0.053)	(0.055)	(0.027)	(0.027)	(0.043)	(0.043)	(0.033)	(0.034)
	0.014	-0.051*	-0.049	-0.071*	-0.071*	-0.016	-0.016	0.007	0.007	-0.045*	-0.044*
Non response	(0.034)	(0.027)	(0.027)	(0.039)	(0.038)	(0.021)	(0.021)	(0.017)	(0.017)	(0.024)	(0.025)
Educational qualification											
			-0.123***		-0.173***		0.000		-0.038***		
Strictly lower than O-level			(0.012)		(0.017)		(0.008)		(0.010)		
Time dummies (Ref.: t=3)											
		-0.260***	-0.260***	-0.102***	-0.102***	0.026***	0.026***	0.117***	0.117***	0.013***	0.013***
t=1		(0.009)	(0.009)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
		0.044***	0.044***	-0.027***	-0.027***	0.076***	0.076***	0.042***	0.042***	0.013***	0.013***
t=2		(0.008)	(0.008)	(0.006)	(0.005)	(0.006)	(0.006)	(0.004)	(0.004)	(0.005)	(0.005)

Significance levels: *** 1%, **5%, *10%.

(a) Regression including early-life conditions (b) Regression including early-life conditions and education

Chapitre 2

Milieu d'origine, situation sociale et parcours tabagique en France

Ce chapitre a fait l'objet d'une publication, Bricard D., Jusot F. (2012). "Milieu d'origine, situation sociale et parcours tabagique en France", *Économie publique/Public economics*, 28-29 - 2012/1-2 : 169-195.

RÉSUMÉ

Cet article étudie l'influence du milieu d'origine et de la situation sociale sur le parcours tabagique. Cette étude s'appuie sur un échantillon de 4 473 individus ayant répondu aux questions sur le milieu d'origine introduites dans l'Enquête santé et protection sociale en 2006. Les résultats d'une analyse non paramétrique et de l'estimation de modèles de Cox stratifiés montrent tout d'abord que le tabagisme des parents augmente le risque d'initiation et réduit les chances de cessation. Ils révèlent ensuite une inversion du gradient social entre l'initiation et la cessation. Alors que les enquêtés les plus éduqués et issus d'un milieu favorisé présentent un risque d'initiation plus élevé, ils ont plus de chances de connaître une cessation précoce, tout comme les enquêtés ayant une situation sociale actuelle favorable. Les enfants d'agriculteurs ont enfin moins de risque de commencer à fumer et plus de chances de s'arrêter.

ABSTRACT

This article explores the influence of social background and social situation on the smoking career. This study is based on a sample of 4,473 individuals who answered the 2006 French Health, Health Care and Insurance Survey. The results of a non-parametric analysis and of a stratified Cox model show an increase of the risk of initiation and a decrease of the risk of cessation with parental smoking. They also emphasize a reversion of the social gradient between initiation and cessation. Individuals with high social background and high socioeconomic status have both a higher risk of initiation and a higher risk of cessation. Finally, being son of farmers is protective for both initiation and cessation.

2.1. Introduction

Les comportements à risque et, en particulier, le tabagisme sont des causes importantes de morbidité et de mortalité dans la population française. Les cancers constituent la première cause de décès en France et expliquent 30 % des décès. Les tumeurs du larynx, de la trachée, des bronches et des poumons sont les premières causes de décès au sein des cancers (Insee, 2011). Le tabagisme contribue également aux inégalités sociales de santé (Balia et Jones, 2008 ; Balia et Jones, 2011 ; Laaksonen *et al.*, 2008 ; Mackenbach *et al.*, 2011 ; Menvielle *et al.*, 2009 ; Strand et Tverdal, 2004 ; Stringhini *et al.*, 2010 ; Tubeuf *et al.,* 2012 ; Woodward *et al.*, 2003). Plusieurs travaux ont ainsi mis en évidence que le tabagisme était plus fréquent parmi les personnes les moins éduquées et appartenant aux groupes sociaux défavorisés en France (Etilé, 2007, Etilé et Jones, 2011 ; Peretti Watel *et al.*, 2009 ; Legleye et *al.*, 2011), comme dans les autres pays européens (Mackenbach *et al.*, 2008) et aux États-Unis (Cutler et Llenas-Muney, 2008). Comprendre les déterminants sociaux du tabagisme constitue donc une étape essentielle de la définition des politiques de réduction du tabagisme et plus généralement de la réduction des inégalités de santé.

La littérature suggère l'existence d'un effet causal de la situation sociale sur le tabagisme (Braakmann, 2011 ; Cutler et Lleras Muney, 2010 ; Pampel, 2009). Selon le modèle de capital santé de Grossman (2000), l'éducation et le salaire auraient tout d'abord un effet protecteur. L'éducation améliorerait ainsi l'efficacité de la production de capital santé, ce qui inciterait les individus les plus éduqués à investir dans leur santé et à réduire leurs comportements à risque. Cette hypothèse suggère notamment que les personnes les plus éduquées sont plus à même d'obtenir et de mobiliser les informations sur les risques induits par la consommation de tabac (Etilé et Jones, 2011). Comme le coût d'opportunité lié aux événements de santé augmente avec le salaire, le tabagisme serait en outre plus coûteux pour les individus les plus aisés, ce qui les inciterait à s'arrêter de fumer plus tôt. Cependant, la demande de tabac pourrait au contraire croître avec le revenu par un simple effet de contrainte budgétaire. Ce dernier effet offre notamment une explication à l'initiation plus fréquente des jeunes disposant d'argent de poche (Etilé, 2007). En dehors de l'effet causal de la situation sociale, les inégalités sociales de tabagisme peuvent enfin être dues à des facteurs expliquant à la fois le tabagisme et la situation sociale. Parmi les

candidats, on trouve le milieu social d'origine, à côté d'autres facteurs inobservés tels que les préférences individuelles, les normes sociales ou encore des facteurs génétiques et cognitifs (Braakmann, 2011 ; Cutler et Lleras Muney, 2010 ; Grignon, 2009 ; van der Pol, 2011).

De nombreux travaux ont montré une association entre le tabagisme et la situation sociale. Alors que certaines études ont mis en évidence un effet causal protecteur de l'éducation face au risque de tabagisme (Balia et Jones, 2008; Balia et Jones, 2011; de Walque ,2007 ; Etilé et Jones, 2011; Frisvold et Golberstein, 2011 ; Grimard et Parent, 2007), d'autres études ne permettent pas de conclure à l'existence de cet effet (Braakmann, 2011; Kemptner, 2011 ; Tenn *et al.*, 2011). L'hypothèse d'un effet du milieu social d'origine sur le tabagisme a également fait l'objet de quelques investigations (Bricard *et al.*, 2011 ; Cutler et Lleras Muney, 2010 ; Etilé, 2007 ; Gohlmann *et al.*, 2010 ; Jefferis, 2004 ; Rosa Dias, 2009 ; Tubeuf *et al.*, 2012). Cependant, l'influence du milieu social d'origine n'a pas été étudiée sur l'ensemble du parcours tabagique. Certains travaux portent essentiellement sur les populations adolescentes et s'intéressent à l'initiation tabagique. D'autres travaux menés en population générale étudient uniquement l'influence du milieu d'origine sur la probabilité d'être fumeur sans distinguer l'initiation et la cessation du tabagisme. Or, il a été démontré, par exemple, que les effets de l'éducation étaient contradictoires sur l'initiation et la cessation (Balia et Jones, 2011 ; Etilé, 2007 ; Legleye *et al.*, 2011). Par ailleurs, il a été démontré que le tabagisme était influencé par le tabagisme des parents (Balia et Jones, 2011 ; Baska *et al.*, 2010 ; Bricard *et al.*, 2011 ; Bricker *et al.*, 2003 ; Gohlmann *et al.*, 2010 ; Rosa Dias, 2009). Or, compte tenu des différences sociales de tabagisme dans la génération des parents, il est important d'étudier simultanément l'influence du milieu social d'origine et du tabagisme des parents.

Cette recherche propose ainsi de compléter les connaissances sur les déterminants sociaux de l'initiation tabagique et de la cessation tabagique en France. L'utilisation d'un questionnaire original introduit dans l'Enquête santé protection sociale (ESPS) en 2006 offre l'opportunité d'explorer, en population générale, l'influence du milieu social d'origine et du tabagisme des parents sur le parcours tabagique, au–delà des caractéristiques socioéconomiques usuelles. L'analyse est menée en deux étapes. Une analyse non paramétrique permet tout d'abord de tester les associations existant entre le milieu d'origine,

la situation sociale et les âges d'initiation et de cessation tabagiques. Une analyse semi-paramétrique fondée sur des modèles de durée stratifiés permet ensuite d'étudier ces relations, toutes choses égales par ailleurs.

2.2. Données

Cette étude s'appuie sur les données de la vague 2006 de l'enquête ESPS menée régulièrement par l'Irdes depuis 1988 (Allonier *et al.*, 2008). L'échantillon, construit à partir de fichiers d'assurés des trois principaux régimes d'Assurance Maladie (CNAMTS, RSI et MSA), est représentatif de 96,7 % des ménages ordinaires vivant en France métropolitaine. Cette enquête fournit des informations sur l'état de santé et les comportements liés à la santé, dont le parcours tabagique, recueillies par auto-questionnaire, ainsi que des informations sur le statut économique et social, dont le niveau d'études, la catégorie socioprofessionnelle et le revenu, recueillies au cours d'un entretien téléphonique ou, lorsque ce n'était pas possible, en face-à-face.

En 2006, un nouveau module, appelé « Descendance », a été introduit pour décrire les conditions de vie du répondant principal de chaque ménage lorsque celui-ci avait 12 ans ainsi que les caractéristiques de ses « parents ». Plus précisément, les questions portent sur l'homme et/ou la femme qui élevai(en)t l'enquêté lorsque celui-ci avait 12 ans, sans qu'il soit précisé s'il s'agit ou non de ses parents biologiques, faute d'autorisation de la Commission nationale informatique et liberté (CNIL). Ces derniers seront néanmoins appelés « parents » par la suite.

L'analyse vise à étudier les influences respectives du milieu d'origine et de la situation sociale de l'enquêté sur son parcours tabagique, défini par l'âge d'initiation et l'âge à la cessation de la consommation de tabac. Afin de pouvoir observer la cessation du tabagisme, l'échantillon d'analyse a été restreint aux personnes âgées de 29 ans et plus. Par ailleurs, n'ont été retenues que les personnes ayant répondu au module « Descendance », ayant renvoyé leur auto-questionnaire sur la santé, et ayant répondu à l'ensemble des questions permettant de reconstruire le parcours tabagique. Au total, l'échantillon est constitué de 4 473 individus. Les statistiques descriptives de cet échantillon sont présentées dans le tableau 2.1.

Tableau 2.1: Statistiques descriptives

	Effectifs	%
Sexe		
Homme	1 844	41,23
Femme	2 629	58,77
Classes d'âge		
30 – 39 ans	1 072	23,97
40 – 49 ans	1 082	24,19
50 – 59 ans	976	21,82
60 – 69 ans	580	12,97
70 et plus ans	763	17,06
Profession du père		
Agriculteur	607	13,57
Artisan/commerçant	371	8,29
Cadre et profession intermédiaire	935	20,9
Employé	428	9,57
Ouvrier	1 906	42,61
Inconnu / Ne sait pas	226	5,05
Niveau d'études du père		
Non scolarisé ou primaire	2 492	55,71
Premier cycle ou second cycle	917	20,5
Etudes supérieures au baccalauréat	367	8,2
Autre / Ne sait pas	697	15,58
Profession de la mère		
Agricultrice	447	9,99
Artisan/commerçant	274	6,13
Cadre et profession intermédiaire	359	8,03
Employée	1 349	30,16
Ouvrière	708	15,83
Inconnue / Ne sait pas	119	2,66
Inactive	1 217	27,21

	Effectifs	%
Niveau d'études de la mère		
Non scolarisée ou primaire	2 878	64,34
Premier cycle ou second cycle	935	20,9
Etudes supérieures au baccalauréat	207	4,63
Autre / Ne sait pas	453	10,13
Episode de précarité		
Précarité pendant l'enfance	250	5,59
Aucun	3 963	88,60
Ne sait pas	260	5,81
Tabagisme des parents		
Père fumeur	2 923	65,35
Mère fumeuse	323	7,22
Niveau d'études de l'enquêté		
Primaire	976	21,82
Premier cycle ou second cycle	2 219	49,61
Etudes supérieures au baccalauréat	1 278	28,57
Profession de l'enquêté		
Agriculteur	202	4,52
Artisan/commerçant	250	5,59
Cadre et profession intermédiaire	1 574	35,19
Employé	1 330	29,73
Ouvrier	1 055	23,59
Inactif	62	1,39
Revenu de l'enquêté		
Premier quintile	716	16,01
Deuxième quintile	850	19,00
Troisième quintile	808	18,06
Quatrième quintile	911	20,37
Cinquième quintile	1 062	23,74
Ne sait pas	126	2,82

2.2.1. Le parcours tabagique des enquêtés

La construction du parcours tabagique des enquêtés se base sur les informations rétrospectives fournies par les enquêtés dans l'auto-questionnaire sur la santé. Une première question permet de distinguer les personnes déclarant fumer de façon habituelle au moment de l'enquête des non fumeurs. Pour les fumeurs actuels, il leur est demandé d'évaluer depuis combien d'années ils sont des fumeurs réguliers. Pour les non fumeurs, une seconde question permet de distinguer ceux qui n'ont jamais fumé, de ceux qui ont déjà été fumeurs mais qui ont arrêté. Dans ce cas, il leur est demandé leur année d'arrêt et la durée pendant laquelle ils ont été fumeurs.

Il est ainsi possible d'obtenir directement une variable mesurant la durée de tabagisme des fumeurs et anciens fumeurs et indirectement de construire une variable mesurant l'âge à l'initiation du tabagisme et à la cessation du tabagisme. 53,9 % des personnes de notre échantillon ont été au cours de leur vie fumeur régulier et 23,9 % fument encore au moment de l'enquête. Parmi les personnes qui ont un jour fumé, l'âge moyen d'initiation

était de 22,3 ans et parmi ceux qui se sont arrêtés, l'âge moyen d'arrêt était de 38 ans (Tableau 2.2).

Tableau 2.2: Description des parcours tabagiques

	Effectifs	**%**
Non fumeurs	2 061	46,08
Fumeurs actuels	1 068	23,88
Anciens fumeurs	1 344	30,05
Effectif total	4 473	100%
	Moyenne	**Médiane**
Age initiation parmi les fumeurs actuels et les anciens fumeurs (2 412 individus)	22,32	20
Age cessation parmi les 1 344 anciens fumeurs	38,06	36
Durée de tabagisme parmi les 1 344 anciens fumeurs	15,87	15

2.2.2. Milieu d'origine

Le milieu social d'origine est caractérisé par la profession des parents et leur niveau d'études. Les professions ont été codées selon la classification des professions et catégories socioprofessionnelles de l'Insee à un chiffre, puis regroupées en cinq catégories (agriculteurs ; artisans ou commerçants ; cadres ou professions intermédiaires ; employés ; ouvriers). Une sixième catégorie correspondant aux mères n'ayant jamais travaillé a été ajoutée. Le niveau d'études des parents a été construit en 3 catégories distinguant les parents non scolarisés ou ayant été jusqu'au certificat d'études primaires, les parents ayant réalisé des études de premier cycle ou de second cycle d'autre part, et enfin les parents ayant fait des études supérieures au baccalauréat. Un indicateur de précarité pendant l'enfance a ensuite été construit selon la méthodologie proposée par Cambois et Jusot (2011). Il permet de repérer les personnes déclarant avoir connu, au cours de leur enfance, un ou plusieurs épisodes d'isolement durable et/ou des difficultés d'hébergement liées à des problèmes financiers. Enfin, nous avons retenu deux indicateurs de tabagisme des parents construits à partir de la déclaration des enquêtés relative au fait que ces derniers fumaient lorsque les enquêtés avaient 12 ans.

2.2.3. La situation sociale de l'enquêté

La situation sociale des enquêtés est appréciée par leur niveau d'études, leur profession et le revenu disponible de leur ménage. La classification retenue pour le niveau

d'études de l'enquêté est identique à celle retenue pour le niveau d'études de ses parents[9]. La profession actuelle des enquêtés, ou leur dernière profession, a été regroupée en 5 catégories identiques à celles retenues pour la profession du père, une sixième catégorie permettant de repérer les individus n'ayant jamais travaillé. Le revenu disponible, introduit en quintiles dans l'analyse, correspond au revenu total du ménage, issu d'une déclaration exacte ou d'une déclaration en tranches, divisé par le nombre d'unités de consommation du ménage selon l'échelle d'équivalence de l'OCDE.

2.3. Analyse non paramétrique du parcours tabagique

2.3.1. Méthode

Nous proposons dans un premier temps de comparer les parcours tabagiques selon le milieu d'origine et la situation sociale des enquêtés à l'aide d'une analyse non paramétrique. Que ce soit pour l'âge d'initiation ou l'âge de cessation du tabagisme, nous n'observons les évènements d'initiation et de cessation que jusqu'à l'âge des individus au moment de l'enquête ce qui constitue une censure à droite pour les individus qui s'initieront ou s'arrêteront de fumer effectivement à un âge plus élevé. Ainsi, l'âge d'initiation est observé seulement pour les individus ayant déjà fumé. Les individus n'ayant pas commencé à fumer sont considérés comme à risque – quant au fait de fumer - jusqu'à leur âge au moment de l'enquête. De même, l'âge de cessation du tabagisme n'est observé que pour les individus qui se sont arrêtés de fumer au moment de l'enquête. Pour les autres nous observons une durée censurée.

L'estimateur de Kaplan-Meier permet de prendre en compte ces cas de censure pour le calcul des fonctions de survie sans faire d'hypothèses sur leurs distributions. Appliquée au parcours tabagique, la fonction de survie représente la probabilité de rester non fumeur jusqu'à l'âge *t* dans le cas de l'initiation ou inversement de rester fumeur dans le cas de la cessation.

[9] Les informations disponibles dans l'enquête ESPS ne permettent malheureusement pas de distinguer plus précisément les niveaux d'études supérieurs au baccalauréat.

Soit T, une variable aléatoire mesurant le moment où l'évènement considéré survient, S(t) la fonction de survie de cette variable aléatoire et F(t) sa fonction de répartition. Alors :

$$S(t) = P(T > t) = 1 - P(T \leq t) = 1 - F(t)$$

L'estimateur de Kaplan-Meier de la survie S(t) peut s'écrire :

$$\widehat{S(t)} = \prod_{t_i<t} \frac{n_i - d_i}{n_i}$$

où n_i est le nombre d'individus à risque au temps i et d_i est le nombre d'évènements observés en *i*. Le nombre d'individus à risque au temps *i* correspond alors dans le cas de l'initiation, au nombre de non-fumeurs avant le temps *i* moins le nombre de censure au temps *i* et dans le cas de la cessation, au nombre de fumeurs avant le temps *i* moins le nombre de censure au temps *i*.

En effectuant ces estimations séparément selon le milieu d'origine et la situation sociale des enquêtés, nous pouvons comparer les fonctions de répartition conditionnelles du risque de devenir fumeur et de s'arrêter de fumer en fonction de l'âge. L'égalité de ces différentes distributions peut alors être testée à l'aide du test du *logrank*. Ce test non paramétrique compare les distributions de survie provenant de deux groupes en évaluant les estimations des fonctions de hasard des deux groupes chaque fois qu'un événement a lieu. Il est construit en confrontant le nombre d'événements attendus et le nombre d'événements observés dans un groupe à chaque période, en faisant la somme sur toutes les périodes de cette différence.

Soit Z, la statistique du *logrank* :

$$Z = \frac{\sum_{i=1}^{t}(d_{1i} - e_{1i})}{\sqrt{\sum_{i=1}^{t} V_i}}$$

où d_{1i} est le nombre d'événements observés au temps *i* dans le premier groupe ($d_i = d_{1i} + d_{2i}$);

$e_{1i} = d_i * \frac{n_{1i}}{n_i}$ sous l'hypothèse nulle d'égalité des distributions de survie et des fonctions de hazard, avec n_{1i} le nombre de non-fumeurs (resp. fumeurs) susceptibles de commencer à fumer (resp. arrêter) au temps *i* dans le groupe 1 ($n_i = n_{1i} + n_{2i}$);

et $V_i = \frac{d_i * \left(\frac{n_{1i}}{n_i}\right) * \left(1 - \frac{n_{1i}}{n_i}\right) * (n_i - d_i)}{n_i - 1}$, la variance estimée au temps *i*.

Les résultats de l'estimateur de Kaplan-Meier et du test du *logrank* nécessitant la survenue d'événements (initiation ou cessation) suffisamment nombreux à chaque âge au sein de chaque distribution conditionnelle[10], les âges de la survenue de l'initiation et de cessation n'ont été étudiés que jusqu'à 40 ans. Le seuil de 40 ans a été choisi à la suite de l'analyse des fonctions de hasards empiriques. Parmi les 2 412 personnes ayant déclaré dans l'enquête avoir fumé au cours de leur vie, 95 % avaient déjà commencé à fumer à cet âge. En revanche, parmi les 1 344 personnes s'étant déclarées comme anciens fumeurs au moment de l'enquête, seuls 62,5 % avaient arrêté de fumer à l'âge de 40 ans. Cette analyse permet donc d'étudier les déterminants de l'essentiel des initiations tabagiques. Pour la cessation en revanche, les déterminants ne sont étudiés que pour la cessation survenue avant 40 ans. Cette analyse ne permet donc pas d'apporter des éléments sur la cessation tardive qui pourrait relever d'autres mécanismes.

Afin de prendre en compte les différences potentielles entre les tabagismes féminin et masculin, une première analyse a été effectuée de façon séparée pour les femmes et les hommes. En dépit du problème de puissance lié aux effectifs considérés, cette analyse a mis en évidence des différences de niveau entre les tabagismes féminin et masculin et des déterminants très similaires. L'ordre des courbes de Kaplan-Meier conditionnelles apparaît ainsi très comparable chez les hommes et chez les femmes et ce, pour chacune des dimensions explicatives retenues. Compte tenu de la similitude des résultats chez les hommes et chez les femmes, et compte tenu des problèmes de puissance induits par les

[10] Il est nécessaire d'avoir une puissance statistique suffisante afin d'éviter que les analyses ne soient biaisées par des effets de rattrapage. Ces effets correspondent souvent aux croisements des courbes de survie et des fonctions de hasard en fin de période en raison des retards accumulés dans certains groupes.

analyses séparées, seuls les résultats de l'analyse menée tous sexes confondus sont présentés ici[11].

2.3.2. Âge d'initiation

Les représentations graphiques présentées dans la Figure B.1, en Annexe B, correspondent aux estimations de Kaplan-Meier des fonctions de répartition empiriques de l'initiation tabagique en fonction de l'âge des enquêtés. En adoptant une lecture verticale, nous pouvons dire, par exemple, qu'à 20 ans, 31,2 % des enquêtés dont le père était fumeur avaient commencé à fumer contre 24,6 % chez les enfants de père non fumeur. Le tableau B.1 présenté en Annexe B donne les résultats des tests d'homogénéité des distributions pour l'initiation tabagique. Une p-value inférieure à 5 % signifie que l'on peut rejeter l'hypothèse nulle d'égalité des distributions avec un risque de première espèce inférieur à 5 %. Ainsi, pour le cas du tabagisme du père, l'égalité des distributions est rejetée (p-value<0,0001). Ce qui signifie que, quel que soit l'âge, le risque de commencer à fumer est plus faible chez les enfants de père non fumeur que chez les enfants de père fumeur. Ce risque est en revanche similaire pour les enfants de mère fumeuse et non fumeuse.

Concernant le milieu social d'origine, les enfants de père ou de mère agriculteur ont un risque significativement inférieur de commencer à fumer à chaque âge que les enfants de parents ayant occupé d'autres professions. Les enfants de père cadre, exerçant une profession intermédiaire ou employé, ont au contraire un risque significativement supérieur de commencer à fumer, les enfants ayant eu un père artisan, commerçant, ou ouvrier, ayant un risque d'initiation tabagique intermédiaire. Par ailleurs, les enfants ayant eu une mère n'ayant jamais travaillé ont un risque plus élevé que ceux dont la mère était agricultrice mais plus faible que ceux dont la mère exerce une autre profession. Les enfants de parents peu éduqués ont également une initiation moins fréquente que les enfants de parents ayant un niveau d'études plus élevé. Enfin, les enquêtés qui ont connu des épisodes de précarité durant leur enfance n'ont pas une distribution de l'âge à l'initiation tabagique significativement différente des autres.

[11] Les résultats des analyses séparées selon le sexe pour les analyses semi-paramétriques sont présentés en Annexe C.

S'agissant de la situation sociale de l'enquêté, l'initiation tabagique apparaît nettement moins fréquente chez les enquêtés les moins éduqués. Elle est néanmoins légèrement plus fréquente chez les enquêtés ayant suivi des études de premier cycle et de second cycle que chez les individus ayant réalisé des études supérieures au baccalauréat.

2.3.3. Âge de cessation

Les résultats présentés dans la Figure B.2, en Annexe B, correspondent aux estimations de Kaplan-Meier des fonctions de répartitions empiriques de la cessation tabagique en fonction de l'âge des enquêtés. Par exemple, parmi les fumeurs, 15,1 % des enfants de père fumeur ont cessé de fumer avant l'âge de 30 ans alors qu'ils sont 22,6 % parmi les enfants de père non fumeur. Le tableau B.2 en Annexe B présente les résultats des tests d'homogénéité des distributions pour la cessation tabagique. Pour le tabagisme du père, nous rejetons l'égalité des distributions (p-value<0,0001), ce qui indique que la probabilité d'arrêter de fumer est significativement plus faible chez les enfants de père fumeur quel que soit l'âge. En revanche, il n'y a pas de différences significatives selon le tabagisme de la mère.

S'agissant de la profession du père, les enfants de père cadre ou exerçant une profession intermédiaire ont plus de chances de s'arrêter de fumer que les enfants d'employés et d'ouvriers. Les enfants de père agriculteur et artisan commerçant ont, quant à eux, plus de chances de s'arrêter que les enfants d'ouvriers. Du côté de la mère, les enfants d'*artisanes* ou de commerçantes, de mères cadres ou exerçant une profession intermédiaire et les enfants d'employées s'arrêtent de fumer plus tôt que les enfants d'ouvrières ou d'inactives. Concernant l'éducation des parents, les enfants de père ou de mère non scolarisé ou ayant fait des études de niveau primaire ont moins de chances de s'arrêter de fumer à chaque âge que les enfants de parents plus éduqués. Les personnes ayant connu au moins un épisode de précarité durant leur enfance ont enfin moins de chances de s'arrêter de fumer à chaque âge.

On remarque par ailleurs des différences importantes dans la probabilité de s'arrêter de fumer selon le niveau d'études des enquêtés, qui vont dans le sens inverse de celles observées pour l'initiation : plus le niveau d'études de l'enquêté est élevé, plus la probabilité

de s'arrêter tôt est élevée. Les résultats concernant la profession des enquêtés sont similaires à ceux observés pour la profession des pères, sauf pour l'effet favorable de la profession d'agriculteur lorsqu'il s'agit de l'enquêté. Enfin, les résultats montrent des différences selon le niveau de revenu de l'enquêté, le revenu semblant favoriser la cessation précoce du tabagisme.

Les résultats de l'analyse non paramétrique montrent ainsi une inversion du gradient social entre l'initiation et la cessation. Alors que les enquêtés les plus éduqués et issus d'un milieu favorisé présentent un risque d'initiation plus élevé, ils ont plus de chances de connaître une cessation précoce, tout comme les enquêtés ayant une situation sociale actuelle plus favorable.

2.4. Analyse semi-paramétrique du parcours tabagique

Afin d'approfondir ces premiers résultats, une analyse semi-paramétrique multivariée a été menée pour compléter l'analyse non paramétrique. En effet, l'existence d'inégalités sociales de tabagisme dans la génération des parents et la corrélation entre les variables du milieu social d'origine elles-mêmes avec la situation sociale de l'enquêté suggèrent d'étudier l'influence du milieu d'origine sur le parcours tabagique après contrôle de la situation sociale. L'analyse multivariée permet en outre un ajustement sur des facteurs importants tels que le sexe, la cohorte de naissance et pour la cessation, l'âge d'initiation au tabagisme. Dans le modèle d'initiation, seul le niveau d'études de l'enquêté est retenu pour décrire sa situation sociale puisque l'initiation tabagique a lieu en général à un âge où la profession n'est pas encore définie. Deux modèles ont été estimés pour la cessation du tabagisme. Dans un premier modèle, la situation sociale de l'individu est, là encore, décrite par son niveau d'études. Dans un second modèle, la profession et le revenu de l'enquêté ont été ajoutés pour tenir compte de la situation sociale complète de l'enquêté. Enfin, une dernière analyse est menée pour tester la sensibilité des résultats à un possible biais de sélection pour la cessation tabagique.

2.4.1. Modèle de Cox stratifié à risque proportionnel

Dans la plupart des études, les déterminants du parcours tabagique sont analysés à l'aide de modèles de durée paramétriques à risque accéléré, reprenant le plus souvent la

méthodologie proposée par Forster and Jones (2001). Dans notre étude, nous avons retenu un modèle de Cox à risque proportionnel. Ce modèle a l'avantage de proposer une estimation semi-paramétrique, donc moins restrictive. Il constitue également un prolongement naturel des estimations non-paramétriques précédentes. Ce modèle repose sur l'hypothèse d'un risque proportionnel en fonction de l'âge, ce qui suppose un effet des différentes covariables identique à chaque âge. La pertinence de cette hypothèse a été testée dans une analyse préliminaire des résidus de Schoenfeld. Cette analyse a permis de confirmer le respect de cette hypothèse pour la plupart des covariables, à l'exception du sexe, de la cohorte de naissance et, dans le modèle de cessation, de l'âge à l'initiation. Afin de pallier ce problème, nous avons procédé à une stratification des modèles selon ces 3 variables en les regroupant en classes.

Le modèle de Cox stratifié ainsi obtenu est une extension du modèle à risque proportionnel (Therneau, 2000). Il permet d'avoir un risque de base différent dans chaque strate tout en conservant des risques relatifs entre les autres covariables identiques pour chacune des strates[12]. L'avantage de cette méthode est qu'elle permet un ajustement par les variables de stratification, bien qu'elle ne permette pas d'en estimer les paramètres. Afin de ne pas multiplier les groupes de stratification, 2 groupes ont été retenus pour les cohortes de naissance représentant la génération des moins de 50 ans et celle des 50 ans et plus. Pour l'âge d'initiation, 2 classes ont été définies : une classe correspondant aux initiations survenues entre 10 et 20 ans et une classe pour les initiations survenues à un âge supérieur à 20 ans. Les résultats de l'analyse des résidus de Schoenfeld, reconduite après stratification selon le sexe, l'âge d'initiation et la cohorte de naissance, confirment l'absence de corrélation significative entre les résidus associés à chaque variable explicative et l'âge, ce qui signifie que l'hypothèse de risques proportionnels est respectée (Tableau D.1, en Annexe D).

[12] Des analyses séparées selon le sexe et la cohorte de naissance ont été réalisées afin de relâcher cette hypothèse. Elles sont présentées en Annexe C. Ces analyses présentent des résultats similaires au sein des différentes strates. Compte tenu des problèmes de puissance induits par ces analyses séparées, nous avons choisi de présenter principalement dans ce chapitre les résultats des modèles stratifiés.

L'estimation des paramètres du modèle de Cox à risque proportionnel est obtenue par maximisation de la vraisemblance partielle (Cox, 1975). Nous utilisons la méthode de Breslow (1974) pour prendre en compte la présence d'événements multiples à une même date. Le modèle de Cox stratifié à risque proportionnel s'écrit :

$$h_g(t|X) = h_{0g}(\mathrm{t})\exp(\beta X)$$

où *g* est l'indicateur de la strate, h_{0g} le risque de base pour la strate *g*, X le vecteur des variables explicatives qui satisfont l'hypothèse de risques proportionnels et β le vecteur des paramètres correspondants.

Le rapport des risques proportionnels ("hazard ratio") pour deux individus qui possèdent des vecteurs de covariables X_j et X_k peut s'écrire de la façon suivante :

$$hr(X_j : X_k) = \exp\left[(X_j - X_k)\beta\right]$$

Dans le cas où il s'agit d'une variable indicatrice, l'effet d'une covariable dont le hasard ratio est de 1,2, par exemple, s'interprète comme une augmentation de 20 % du risque que l'événement se produise par rapport au cas où la covariable prend l'autre modalité.

Deux analyses ont été successivement menées pour l'initiation et la cessation. Dans un premier temps, une série de modèles univariés a été estimée pour confirmer les résultats de l'analyse non paramétrique après stratification par le sexe, la cohorte et l'âge d'initiation dans le cas de la cessation. Dans un second temps, l'effet des différentes variables est étudié, toutes choses égales par ailleurs.

2.4.2. Âge d'initiation

Le tableau 2.3 présente les résultats de l'analyse semi-paramétrique du risque d'initiation tabagique. Globalement, ils confirment les résultats de l'analyse non paramétrique et montrent l'importance du milieu d'origine et de l'éducation. En analyse univariée, la plupart des variables décrivant le milieu d'origine sont significativement associées au risque d'initiation tabagique (première colonne du tableau 2.3).

Tableau 2.3 : Déterminants de l'initiation tabagique – Modèle de Cox à risque proportionnel

	Modèle univarié		Modèle multivarié	
	Hazard ratio	p-value	Hazard ratio	p-value
Profession du père (ref : Ouvrier)				
Agriculteur	**0,648**	0,000	**0,814**	0,021
Artisan/commerçant	0,955	0,563	0,893	0,190
Cadre dirigeant et profession intermédiaire	1,032	0,558	0,936	0,309
Employé	1,010	0,184	1,024	0,741
Inconnu / Ne sait pas	1,076	0,442	1,137	0,246
Niveau d'études du père (ref : Non scolarisé ou primaire)				
Premier cycle ou second cycle	**1,275**	0,000	**1,175**	0,008
Etudes supérieures au baccalauréat	**1,303**	0,000	**1,250**	0,023
Autre / Ne sait pas	**1,245**	0,000	1,104	0,203
Profession de la mère (ref : Artisane/Commerçante)				
Agricultrice	**0,578**	0,000	**0,736**	0,020
Cadre dirigeant et profession intermédiaire	0,925	0,473	0,851	0,182
Employée	0,974	0,772	0,919	0,375
Ouvrière	0,928	0,438	0,877	0,197
Inconnue / Ne sait pas	0,839	0,241	**0,755**	0,069
Inactive	**0,804**	0,017	**0,804**	0,024
Niveau d'études de la mère (ref : Non scolarisée ou primaire)				
Premier cycle ou second cycle	**1,227**	0,000	1,090	0,164
Etudes supérieures au baccalauréat	**1,248**	0,020	1,222	0,108
Autre / Ne sait pas	**1,252**	0,001	**1,170**	0,052
Episode de précarité (ref : Aucun épisode de précarité)				
Précarité pendant l'enfance	**1,176**	0,067	**1,177**	0,067
Ne sait pas	1,010	0,913	1,027	0,773
Tabagisme des parents (ref : Père/mère non fumeur)				
Père fumeur	**1,343**	0,000	**1,347**	0,000
Mère fumeuse	**1,249**	0,000	1,103	0,202
Niveau d'études de l'enquêté (ref : Primaire)				
Premier cycle ou second cycle	**1,769**	0,000	**1,649**	0,000
Etudes supérieures au baccalauréat	**1,428**	0,000	**1,282**	0,001

Note : modèle de Cox stratifié selon le genre et la cohorte de naissance

La plupart des effets restent significatifs lorsque les variables sont introduites simultanément dans le modèle (deuxième colonne du tableau 2.3). Cette seconde analyse montre tout d'abord que les enfants dont le père était agriculteur ont 1,2 fois moins de chance de commencer à fumer que les enfants dont le père était ouvrier, les autres professions n'étant pas associées à un risque significativement différent. De même, on note un effet protecteur du fait d'avoir une mère agricultrice et une mère inactive par rapport à une mère artisane ou commerçante. Les enfants de fumeurs ont un risque fortement accru

de commencer à fumer : le tabagisme du père augmente le risque d'avoir commencé à fumer de 34 % en analyse univariée, comme après ajustement par les autres caractéristiques. Le tabagisme de la mère est également associé à un risque accru, mais en analyse univariée uniquement. Les résultats confirment enfin le rôle de l'éducation des parents et de celle de l'enquêté lui-même. Les enfants de parents non scolarisés ou faiblement scolarisés ont moins de risque de commencer à fumer. Enfin, avoir un niveau d'études primaire est lié à une initiation tabagique moins fréquente.

2.4.3. Âge de cessation

Le tableau 2.4 présente les résultats de l'analyse semi-paramétrique du risque de cessation parmi les personnes ayant commencé à fumer. Les résultats de l'analyse univariée confirment là encore les résultats de l'analyse non paramétrique et montrent l'importance du milieu d'origine et de la situation sociale sur les chances de cessation (première colonne du tableau 2.4). En analyse multivariée, en revanche, le nombre de variables significativement associées au risque de tabagisme est plus réduit (deuxième et troisième colonnes du tableau 2.4). Néanmoins, cette seconde analyse montre que la cessation tabagique est influencée par le milieu d'origine ainsi que l'éducation, la profession et le revenu de l'individu.

L'effet du milieu social d'origine sur la cessation tabagique est à présent concentré sur la profession du père. On remarque à nouveau un effet protecteur du fait d'être enfant d'agriculteur, ces derniers ayant un risque de 1,4 fois plus élevé de s'arrêter de fumer que les enfants d'ouvriers. Les enfants de cadres dirigeants ou exerçant une profession intermédiaire ont également plus de chances de s'arrêter de fumer plus tôt que les enfants d'ouvriers. Enfin, les enfants dont le père était fumeur ont un risque significativement réduit de s'arrêter de fumer. On ne note en revanche pas d'effet du tabagisme de la mère.

L'âge à la cessation est ensuite fortement expliqué par le niveau d'études de l'enquêté. Cependant, on note un gradient inverse à celui constaté pour l'initiation : alors que le risque d'initiation est plus élevé parmi les personnes les plus éduquées, avoir un niveau d'études plus élevé est lié à un arrêt plus précoce du tabagisme et, cela, de façon significative avec l'augmentation du niveau d'études.

Tableau 2.4 : Déterminants de la cessation tabagique – Modèle de Cox à risque proportionnel

	Modèle univarié		Modèles multivariés			
	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value
Profession du père (ref : Ouvrier)						
Agriculteur	**1,522**	0,001	**1,381**	0,031	**1,441**	**0,015**
Artisan/commerçant	**1,354**	0,019	1,070	0,644	1,028	0,852
Cadre dirigeant et profession intermédiaire	**1,535**	0,000	**1,226**	0,049	1,147	0,191
Employé	**1,249**	0,064	1,037	0,766	0,983	0,892
Inconnu / Ne sait pas	1,058	0,735	0,996	0,983	0,988	0,954
Niveau d'études du père (ref : Non scolarisé ou primaire)						
Premier cycle ou second cycle	**1,278**	0,004	1,051	0,603	1,100	0,327
Etudes supérieures au baccalauréat	**1,343**	0,010	0,934	0,638	1,004	0,977
Autre / Ne sait pas	0,876	0,211	0,861	0,277	0,902	0,455
Profession de la mère (ref : Ouvrière)						
Agricultrice	**1,417**	0,025	1,178	0,381	1,242	0,247
Artisane/commerçante	**1,439**	0,018	1,184	0,322	1,130	0,481
Cadre dirigeant et profession intermédiaire	**1,322**	0,052	1,046	0,786	0,974	0,873
Employée	**1,277**	0,023	1,138	0,238	1,117	0,314
Inconnue / Ne sait pas	1,288	0,276	1,385	0,171	1,362	0,196
Inactive	1,017	0,888	0,971	0,805	0,973	0,821
Niveau d'études de la mère (ref : Non scolarisée ou primaire)						
Premier cycle ou second cycle	**1,363**	0,000	1,089	0,383	1,037	0,713
Etudes supérieures au baccalauréat	1,157	0,345	0,778	0,198	0,778	0,199
Autre / Ne sait pas	1,081	0,496	1,140	0,316	1,194	0,176
Episode de précarité (ref : Aucun épisode de précarité)						
Précarité pendant l'enfance	0,767	0,103	0,828	0,249	0,906	0,552
Ne sait pas	0,832	0,255	0,883	0,444	0,862	0,360
Tabagisme des parents (ref : Père/mère non fumeur)						
Père fumeur	**0,665**	0,000	**0,683**	0,000	**0,687**	0,000
Mère fumeuse	0,953	0,698	0,969	0,806	1,001	0,996
Niveau d'études de l'enquêté (ref : Primaire)						
Premier cycle ou second cycle	**1,357**	0,016	**1,303**	0,041	1,094	0,496
Etudes supérieures au baccalauréat	**2,506**	0,000	**2,269**	0,000	**1,586**	0,002
Profession de l'enquêté (ref: Ouvrier)						
Agriculteur	0,849	0,601			0,665	0,210
Artisan/commerçant	**1,605**	0,005			**1,367**	0,070
Cadre dirigeant et profession intermédiaire	**2,026**	0,000			**1,340**	0,010
Employé	**1,311**	0,017			1,198	0,123
Inactif	0,560	0,205			0,792	0,614
Revenu de l'enquêté (ref : Premier quintile)						
Deuxième quintile	**1,523**	0,003			**1,475**	0,007
Troisième quintile	**1,749**	0,000			**1,539**	0,000
Quatrième quintile	**2,128**	0,000			**1,755**	0,000
Cinquième quintile	**2,776**	0,000			**1,966**	0,000
Ne sait pas	**1,604**	0,078			**1,450**	0,168

Note : modèles de Cox stratifiés selon le genre, la cohorte de naissance et l'âge à l'initiation tabagique

Lorsque la profession et le revenu de l'enquêté sont introduits dans un deuxième temps, l'effet du niveau d'études de l'enquêté et une partie de l'effet protecteur de la profession du père diminuent, ce qui suggère que la situation sociale actuelle permettrait d'atténuer l'influence du milieu d'origine. Le milieu social d'origine conserve néanmoins un effet sur la cessation précoce. Être enfant d'agriculteur reste favorable à la cessation du tabagisme même après la prise en compte des effets de la reproduction sociale.

Enfin, l'inversion du gradient social entre l'initiation et la cessation, déjà constatée pour le niveau d'études, est à nouveau confirmée : les cadres dirigeants, artisans ou commerçants et les employés ont plus de chance de s'arrêter de fumer que les ouvriers. De même, un revenu plus élevé est associé à une cessation précoce du tabagisme et cela, de façon significative avec l'augmentation du revenu.

2.4.3. Test du biais de sélection pour la cessation tabagique

Dans l'analyse précédente, nous considérons la cessation comme un évènement concernant seulement les individus qui ont commencé un jour à fumer. Nous testons dans cette section la robustesse des résultats à un possible biais de sélection dans l'estimation de la cessation tabagique. Pour ce test, nous utilisons la méthode de correction de Heckman en deux étapes. Contrairement aux analyses précédentes, nous réalisons ce test à l'aide de modèles de durée paramétriques en temps discret (Jenkins, 1995). Pour se rapprocher au plus près de la spécification du modèle semi-paramétrique de Cox, le hazard de base est spécifié à l'aide d'indicatrices par tranches de 2 ans. L'équation de sélection pour l'initiation est un probit en temps discret avec l'ensemble des variables utilisées précédemment pour étudier l'initiation. Cette première étape nous permet de calculer l'inverse du ratio de Mills qui permet de corriger de la sélection en deuxième étape. Nous estimons en deuxième étape un modèle logistique en temps discret. L'inverse du ratio de Mills est ajouté lors de cette étape et nous excluons en revanche les variables du milieu d'origine qui n'étaient pas significatives lors de l'analyse précédente de la cessation.

Le tableau D.2 de Annexe D présente les résultats des deux étapes d'estimation. Le ratio de Mills est significatif dans l'équation de cessation tabagique ce qui signifie qu'il existe des facteurs inobservés communs expliquant à la fois l'initiation et la cessation tabagique.

Cependant, les résultats de l'analyse semi-paramétrique sont confirmés quant à l'influence de la profession du père, du tabagisme du père et du niveau d'études de l'enquêté sur la cessation tabagique. Il faut tout de même remarquer des changements concernant l'association avec la profession de l'enquêté. L'association positive entre la profession de cadre dirigeant et artisan ou commerçant avec la cessation tabagique n'est plus significative et cette association devient significative et positive pour les individus inactifs. L'association avec le revenu de l'enquêté est confirmée.

2.5. Discussion

A partir d'un échantillon de 4 473 personnes âgées de 29 ans et plus et ayant répondu au module « Descendance » introduit dans l'enquête ESPS 2006, cette analyse montre l'existence d'associations entre le milieu d'origine, la situation sociale et les événements d'initiation et de cessation tabagiques survenus avant l'âge de 40 ans.

Les résultats confirment tout d'abord une association entre le tabagisme du père et l'initiation tabagique déjà mise en évidence par d'autres études (Balia et Jones, 2011 ; Baska et *al.*, 2010 ; Bricker *et al.*, 2003 ; Gohlmann *et al.*, 2010). Mais, ils mettent également en évidence que le tabagisme des parents réduit les chances de cessation du tabagisme. Ce résultat va à l'appui de l'hypothèse d'une transmission des comportements entre générations mais peut aussi refléter l'existence d'une cause génétique commune favorisant les risques de dépendance.

Les résultats révèlent ensuite un effet du milieu social d'origine sur l'initiation tabagique, conformément aux travaux précédents (Etilé 2007 ; Gohlmann *et al.*, 2010). Ils montrent également son influence sur la cessation tabagique avant l'âge de 40 ans, ce qui n'avait, à notre connaissance, jamais été démontré. Ainsi, les personnes qui ont connu des épisodes de précarité dans leur enfance ont plus de chances de s'initier au tabagisme, ce qui suggère une influence du stress psychosocial sur l'adoption de comportements à risque (Shaw *et al.*, 1999). En revanche, aucune association entre la précarité et la cessation tabagique n'a été mise en évidence. Les enfants dont les parents étaient éduqués ont par ailleurs plus de chances de commencer à fumer, alors que l'arrêt précoce du tabagisme est au contraire plus fréquent chez les enfants issus des milieux les plus aisés. L'initiation plus

fréquente parmi les enfants des milieux favorisés s'explique sans doute par une plus grande capacité à acheter ses premières cigarettes. L'influence du milieu social d'origine sur la cessation semble, quant à elle, principalement expliquée par un effet de reproduction sociale, bien que son effet subsiste après contrôle par la situation sociale actuelle de l'enquêté. Enfin, les enfants d'agriculteurs semblent à la fois protégés du risque de commencer à fumer et de celui de continuer, ce qui peut être le reflet de normes sociales spécifiques.

De manière cohérente avec les études précédentes, les résultats soulignent également l'existence d'un effet contradictoire de l'éducation du descendant sur l'initiation et la cessation, l'éducation constituant à la fois un risque d'initiation mais favorisant l'arrêt précoce (Balia et Jones 2011 ; Etilé 2007, Legleye *et al.*, 2011). L'effet protecteur de l'éducation sur la cessation précoce va à l'appui de l'effet causal protecteur de l'éducation face au risque de tabagisme déjà mis en évidence par ailleurs (Balia et Jones, 2008; Balia et Jones, 2011; de Walque, 2007 ; Etilé et Jones, 2011; Frisvold et Golberstein, 2011; Grimard et Parent, 2007). L'effet de l'éducation sur le risque d'initiation est, en revanche, plus difficile à interpréter puisqu'il s'agit d'un effet après contrôle par le milieu d'origine et, par conséquent, de la capacité à payer de l'enquêté au moment de son initiation.

Les résultats montrent enfin le rôle protecteur de la situation sociale actuelle de l'individu sur la cessation tabagique, qui permettrait en outre d'atténuer l'effet du milieu social d'origine. Les personnes appartenant aux milieux les plus favorisés et disposant des plus hauts niveaux de revenu ont ainsi plus de chance de s'arrêter précocement de fumer. Ce gradient social dans la cessation tabagique pourrait être expliqué par un effet causal de la situation sociale sur l'arrêt du tabac. Il reste toutefois difficile à interpréter en raison de la potentielle endogénéité de la profession. Quelques travaux ont ainsi mis en évidence une influence du tabagisme sur la situation sur le marché du travail ou la carrière professionnelle (par exemple Ribet *et al.*, 2003, ou Jusot *et al.*, 2008, dans le cas français). Ce phénomène de sélection pourrait conduire à une surestimation du gradient social associé à la cessation tabagique, l'arrêt du tabac pouvant expliquer l'ascension sociale. Ce risque de biais nous semble toutefois limité en raison des nombreux autres déterminants de l'évolution des carrières.

Ces résultats sont issus de deux phases d'analyse : une non-paramétrique et une semi-paramétrique. La première phase a permis de mettre en évidence les facteurs explicatifs des inégalités dans le parcours tabagique, de manière robuste, en évitant d'émettre des hypothèses restrictives sur la forme de la relation existant entre les facteurs. La seconde phase d'analyse a permis d'étudier l'influence de ces facteurs, toutes choses égales par ailleurs, à l'aide d'un modèle de Cox, et après stratification sur le sexe, la cohorte de naissance et l'âge à l'initiation, pour l'analyse de la cessation. Un échantillon plus grand aurait néanmoins permis de compléter ces résultats en effectuant des analyses séparées selon ces variables de stratification. De même, nous avons restreint l'analyse à la cessation précoce par manque de puissance aux âges plus élevés.

Cette étude s'appuie sur des données rétrospectives, tant sur le parcours tabagique que sur le milieu d'origine, qui peuvent donc souffrir de certains biais. Concernant la consommation de tabac, il a été montré que les biais de mémoire et de reconstruction seraient plus faibles chez les gros fumeurs (Kenkel, 2004). Nous ne pouvons néanmoins pas corriger ce biais par manque d'information pour les anciens fumeurs sur le nombre de cigarettes qu'ils avaient l'habitude de fumer. Le report du tabagisme des parents peut enfin souffrir d'un biais de mémoire et ne permet pas de distinguer la durée et l'intensité de leur tabagisme.

En dépit de ces limites, ces résultats mettent en évidence une influence à long terme du milieu d'origine sur le tabagisme, participant à la transmission des inégalités de santé entre les générations. Ces inégalités des chances face au tabagisme viennent ainsi s'ajouter aux inégalités liées à l'éducation ou plus globalement à la situation sociale. Ces résultats appellent donc la mise en place de politiques de prévention et de promotion de la santé, ciblées vers les enfants des milieux les plus modestes et des milieux à risque afin de réduire les inégalités face au tabagisme, en complément d'interventions visant à améliorer l'égalité des chances à l'école et ou, plus globalement, les conditions de vie.

2.6. Annexes

Annexe B : Figures et tables pour l'analyse non paramétrique

Figure B.1: Estimation de Kaplan-Meier des fonctions de répartition de l'âge à l'initiation

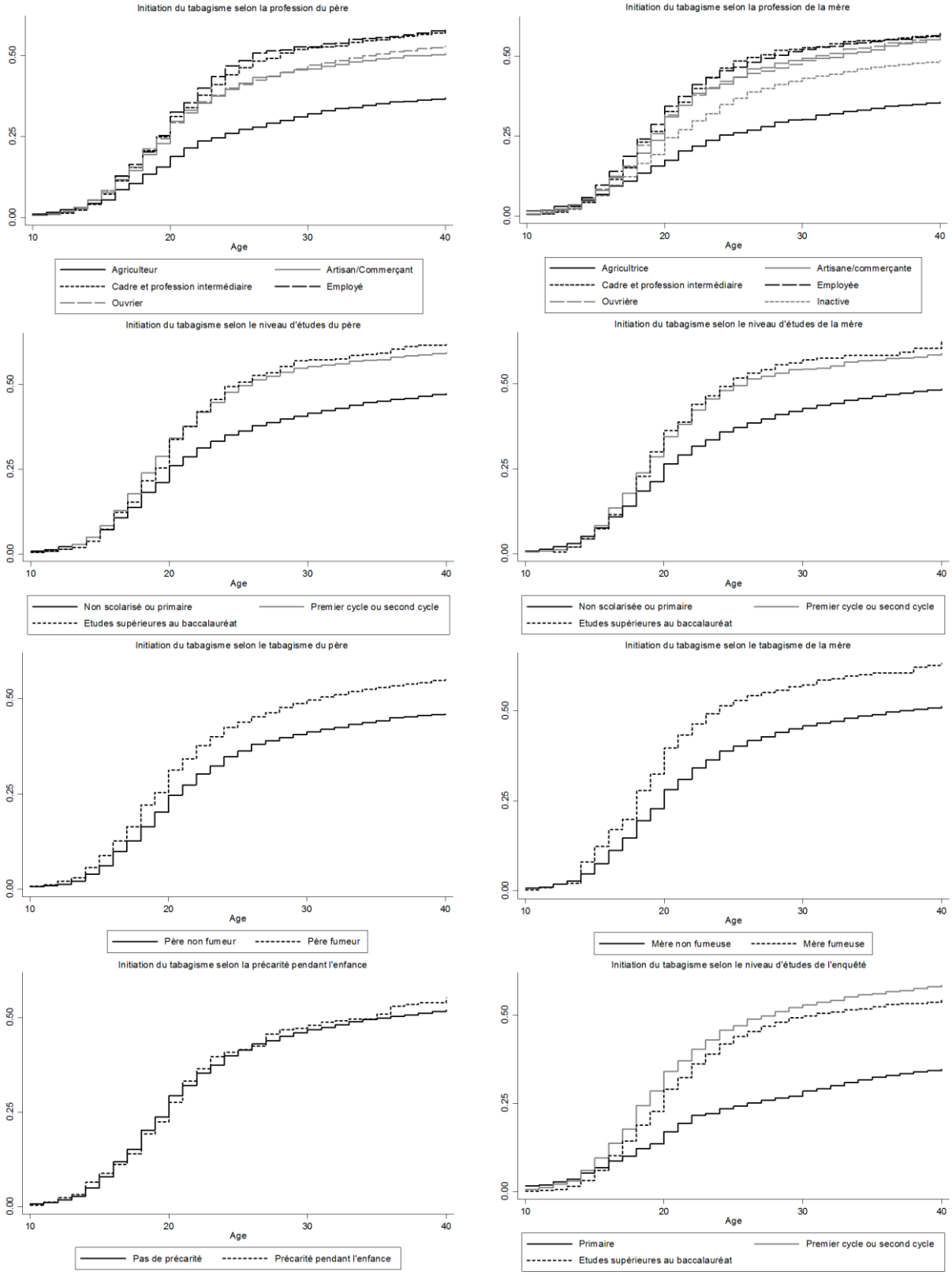
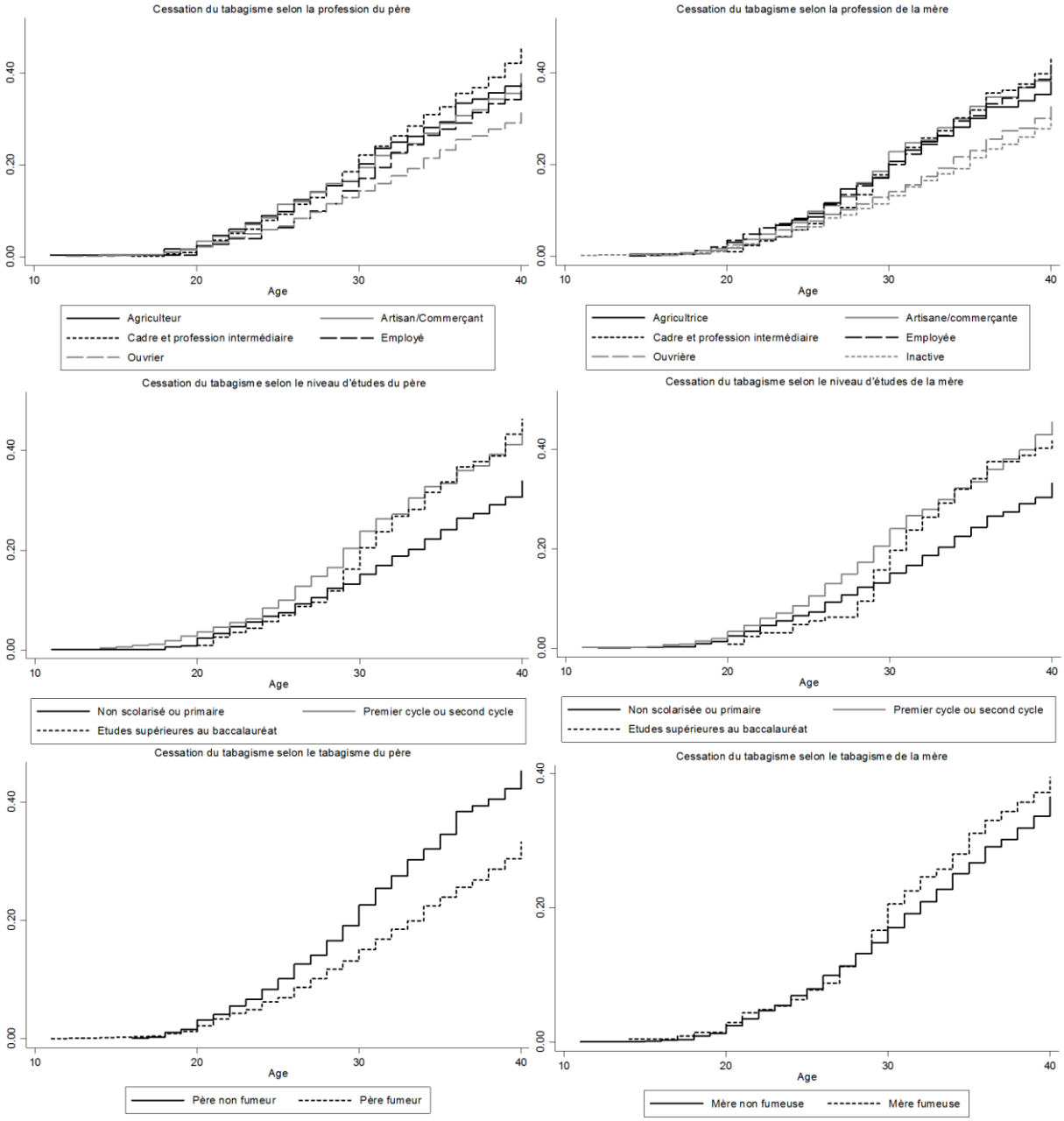


Tableau B.1 : Tests d'homogénéité des distributions de l'âge à l'initiation tabagique (logrank)

	Chi2(1)	p-value
Profession du père		
Agriculteur -- Artisan/commerçant	19,50	0,0000
Agriculteur -- Cadre et profession intermédiaire	60,35	0,0000
Agriculteur -- Employé	46,81	0,0000
Agriculteur -- Ouvrier	44,48	0,0000
Artisan/commerçant -- Cadre et profession intermédiaire	3,85	0,0498
Artisan/commerçant -- Employé	3,60	0,0578
Artisan/commerçant -- Ouvrier	0,39	0,5309
Cadre et profession intermédiaire -- Employé	0,08	0,7828
Cadre et profession intermédiaire -- Ouvrier	4,72	0,0298
Employé -- Ouvrier	3,63	0,0567
Profession de la mère		
Agricultrice -- Artisane/commerçante	29,21	0,0000
Agricultrice -- Cadre et profession intermédiaire	38,96	0,0000
Agricultrice -- Employée	58,02	0,0000
Agricultrice -- Ouvrière	41,91	0,0000
Agricultrice -- Inactive	20,15	0,0000
Artisane/commerçante -- Cadre et profession intermédiaire	0,27	0,6023
Artisane/commerçante -- Employée	0,43	0,5116
Artisane/commerçante -- Ouvrière	0,00	0,9894
Artisane/commerçante -- Inactive	5,55	0,0185
Cadre et profession intermédiaire -- Employée	0,01	0,9030
Cadre et profession intermédiaire -- Ouvrière	0,40	0,5248
Cadre et profession intermédiaire -- Inactive	10,92	0,0010
Employée -- Ouvrière	0,98	0,3224
Employée -- Inactive	24,21	0,0000
Ouvrière -- Inactive	10,34	0,0013
Niveau d'études du père		
Non scolarisé ou primaire -- Premier cycle ou second cycle	45,42	0,0000
Non scolarisé ou primaire -- Etudes supérieures au baccalauréat	29,32	0,0000
Premier cycle ou second cycle -- Etudes supérieures au baccalauréat	0,24	0,6227
Niveau d'études de la mère		
Non scolarisée ou primaire -- Premier cycle ou second cycle	36,94	0,0000
Non scolarisée ou primaire -- Etudes supérieures au baccalauréat	15,45	0,0001
Premier cycle ou second cycle -- Etudes supérieures au baccalauréat	0,29	0,5892
Episode de précarité		
Précarité pendant l'enfance -- Aucun	0,51	0,4769
Tabagisme du père		
Père fumeur -- Père non fumeur	34,63	0,0000
Tabagisme de la mère		
Mère fumeuse -- Mère non fumeuse	22,21	0,0000
Niveau d'études de l'enquêté		
Primaire -- Premier cycle ou second cycle	149,86	0,0000
Primaire -- Etudes supérieures au baccalauréat	87,37	0,0000
Premier cycle ou second cycle -- Etudes supérieures au baccalauréat	7,52	0,0061

Figure B.2: Estimation de Kaplan-Meier des fonctions de répartition de l'âge à la cessation



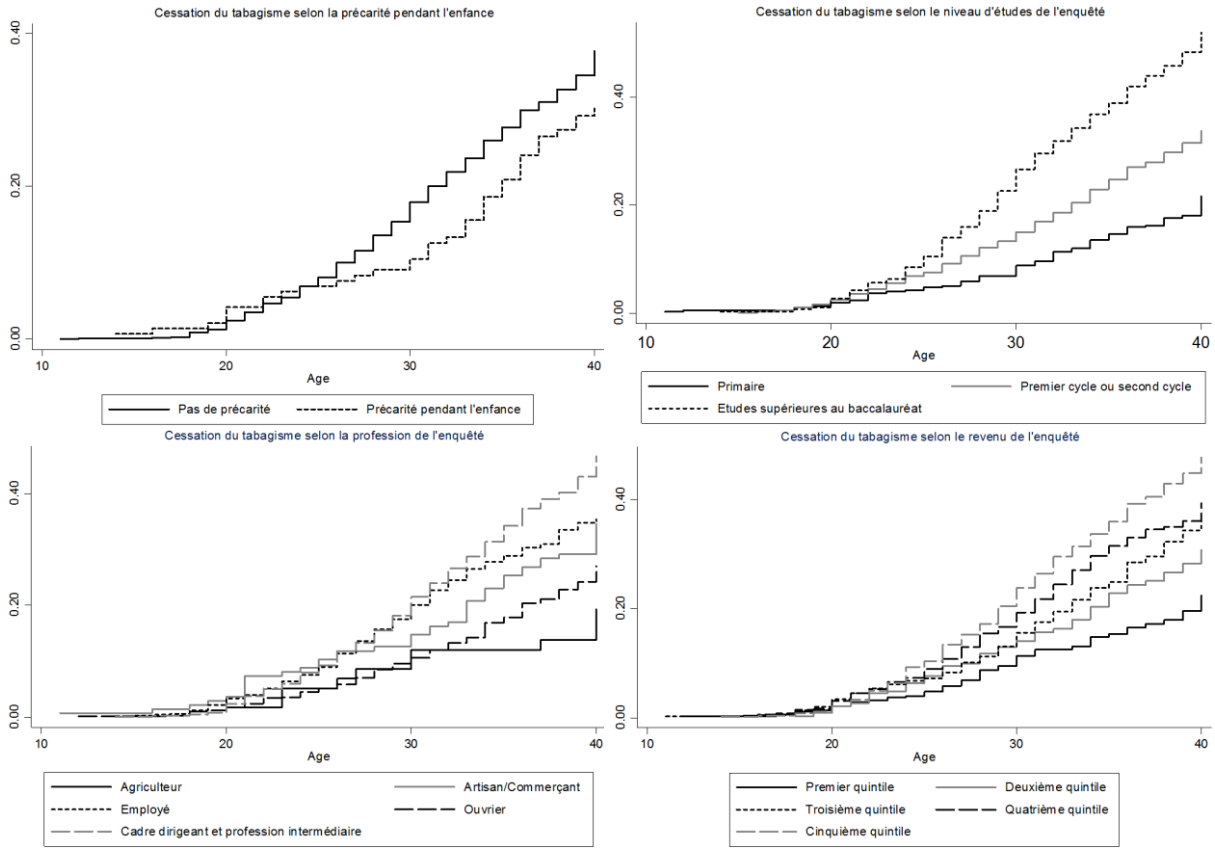

Cessation du tabagisme selon la précarité pendant l'enfance
0.00
0.20
0.40
10
20
30
40
Age
Pas de précarité
Précarité pendant l'enfance
Cessation du tabagisme selon le niveau d'études de l'enquêté
Age
Primaire
Premier cycle ou second cycle
Etudes supérieures au baccalauréat
Cessation du tabagisme selon la profession de l'enquêté
Age
Agriculteur
Artisan/Commerçant
Employé
Ouvrier
Cadre dirigeant et profession intermédiaire
Cessation du tabagisme selon le revenu de l'enquêté
Age
Premier quintile
Deuxième quintile
Troisième quintile
Quatrième quintile
Cinquième quintile

Tableau B.2 : Tests d'homogénéité des distributions de l'âge à la cessation tabagique (*logrank*)

	Chi2(1)	p-value
Profession du père		
Agriculteur -- Artisan/commerçant	0,00	0,9745
Agriculteur -- Cadre et profession intermédiaire	1,71	0,1909
Agriculteur -- Employé	0,32	0,5728
Agriculteur -- Ouvrier	6,25	0,0124
Artisan/commerçant -- Cadre et profession intermédiaire	1,58	0,2092
Artisan/commerçant -- Employé	0,24	0,6241
Artisan/commerçant -- Ouvrier	5,23	0,0222
Cadre et profession intermédiaire -- Employé	3,90	0,0482
Cadre et profession intermédiaire -- Ouvrier	28,44	0,0000
Employé -- Ouvrier	3,29	0,0697
Profession de la mère		
Agricultrice -- Artisane/commerçante	0,18	0,6678
Agricultrice -- Cadre et profession intermédiaire	0,38	0,5358
Agricultrice -- Employée	0,20	0,6570
Agricultrice -- Ouvrière	2,59	0,1076
Agricultrice -- Inactive	5,37	0,0204
Artisane/commerçante -- Cadre et profession intermédiaire	0,02	0,8802
Artisane/commerçante -- Employée	0,02	0,8985
Artisane/commerçante -- Ouvrière	4,65	0,0310
Artisane/commerçante -- Inactive	8,49	0,0036
Cadre et profession intermédiaire -- Employée	0,12	0,7281
Cadre et profession intermédiaire -- Ouvrière	6,47	0,0110
Cadre et profession intermédiaire -- Inactive	11,66	0,0006
Employée -- Ouvrière	8,67	0,0032
Employée -- Inactive	18,64	0,0000
Ouvrière -- Inactive	0,60	0,4400
Niveau d'études du père		
Non scolarisé ou primaire -- Premier cycle ou second cycle	21,08	0,0000
Non scolarisé ou primaire -- Etudes supérieures au baccalauréat	12,86	0,0003
Premier cycle ou second cycle -- Etudes supérieures au baccalauréat	0,03	0,8678
Niveau d'études de la mère		
Non scolarisée ou primaire -- Premier cycle ou second cycle	25,98	0,0000
Non scolarisée ou primaire -- Etudes supérieures au baccalauréat	3,82	0,0505
Premier cycle ou second cycle -- Etudes supérieures au baccalauréat	0,47	0,4929
Episode de précarité		
Précarité pendant l'enfance -- Aucun	3,18	0,0747
Tabagisme du père		
Père fumeur -- Père non fumeur	33,55	0,0000
Tabagisme de la mère		
Mère fumeur -- Mère non fumeur	0,90	0,3420
Niveau d'études de l'enquêté		
Primaire -- Premier cycle ou second cycle	20,02	0,0000
Primaire -- Etudes supérieures au baccalauréat	87,89	0,0000
Premier cycle ou second cycle -- Etudes supérieures au baccalauréat	61,59	0,0000
Profession de l'enquêté		
Agriculteur -- Artisan/commerçant	4,24	0,0395
Agriculteur -- Cadre et profession intermédiaire	13,45	0,0002
Agriculteur -- Employé	5,76	0,0164
Agriculteur -- Ouvrier	1,46	0,2273
Artisan/commerçant -- Cadre et profession intermédiaire	6,17	0,0130
Artisan/commerçant -- Employé	0,17	0,6765
Artisan/commerçant -- Ouvrier	3,50	0,0614
Cadre et profession intermédiaire -- Employé	11,44	0,0007
Cadre et profession intermédiaire -- Ouvrier	59,79	0,0000
Employé -- Ouvrier	14,96	0,0001
Revenu de l'enquêté		
Premier quintile -- Deuxième quintile	6,88	0,0087

Premier quintile -- Troisième quintile	19,06	0,0000
Premier quintile -- Quatrième quintile	27,64	0,0000
Premier quintile -- Cinquième quintile	58,20	0,0000
Deuxième quintile -- Troisième quintile	3,07	0,0796
Deuxième quintile -- Quatrième quintile	8,05	0,0045
Deuxième quintile -- Cinquième quintile	29,13	0,0000
Troisième quintile -- Quatrième quintile	1,23	0,2665
Troisième quintile -- Cinquième quintile	13,16	0,0003
Quatrième quintile -- Cinquième quintile	6,47	0,0109

Annexe C : Tables des analyses complémentaires selon le genre et le découpage par classes d'âge

Tableau C.1 : Déterminants de l'initiation tabagique selon le genre – Modèle de Cox à risque proportionnel

	Tous		Hommes		Femmes	
	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value
Profession du père (ref : Ouvrier)						
Agriculteur	**0,814**	0,021	0,865	0,197	**0,726**	0,033
Artisan/commerçant	0,893	0,190	0,952	0,687	0,823	0,116
Cadre dirigeant et profession intermédiaire	0,936	0,309	0,957	0,636	0,910	0,306
Employé	1,024	0,741	1,103	0,325	0,958	0,684
Inconnu/Ne sait pas	1,137	0,246	1,164	0,328	1,062	0,708
Niveau d'études du père (ref : Non scolarisé ou primaire)						
Premier cycle ou second cycle	**1,175**	0,008	**1,269**	0,006	1,080	0,378
Etudes supérieures au baccalauréat	**1,250**	0,023	1,242	0,123	**1,373**	0,022
Autre/Ne sait pas	1,104	0,203	1,114	0,332	1,129	0,267
Profession de la mère (ref : Artisane/Commerçante)						
Agricultrice	**0,736**	0,020	0,854	0,376	**0,610**	0,014
Cadre dirigeant et profession intermédiaire	0,851	0,182	0,892	0,518	0,773	0,121
Employée	0,919	0,375	1,021	0,881	0,820	0,141
Ouvrière	0,877	0,197	0,966	0,808	0,812	0,155
Inconnue/Ne sait pas	**0,755**	0,069	0,858	0,448	0,689	0,148
Inactive	**0,804**	0,024	0,946	0,686	**0,657**	0,003
Niveau d'études de la mère (ref : Non scolarisée ou primaire)						
Premier cycle ou second cycle	1,090	0,164	1,062	0,498	1,092	0,308
Etudes supérieures au baccalauréat	1,222	0,108	**1,375**	0,071	0,975	0,885
Autre/Ne sait pas	**1,170**	0,052	1,131	0,279	1,208	0,102
Episode de précarité (ref : Aucun épisode de précarité)						
Précarité pendant l'enfance	**1,177**	0,067	**1,277**	0,048	1,114	0,405
Ne sait pas	1,027	0,773	0,838	0,259	1,170	0,170
Tabagisme des parents (ref : Père/mère non fumeur)						
Père fumeur	**1,347**	0,000	**1,291**	0,000	**1,431**	0,000
Mère fumeur	1,103	0,202	0,874	0,253	**1,363**	0,002
Niveau d'études de l'enquêté (ref : Primaire)						
Premier cycle ou second cycle	**1,649**	0,000	**1,286**	0,002	**2,758**	0,000
Etudes supérieures au baccalauréat	**1,282**	0,001	0,857	0,124	**2,613**	0,000

Note : modèles de Cox stratifiés selon la cohorte de naissance

Tableau C.2 : Déterminants de l'initiation tabagique selon le découpage par classes d'âge – Modèle de Cox à risque proportionnel

	Tous		Age<51		Age<61		Age<71	
	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value
Profession du père (ref : Ouvrier)								
Agriculteur	**0,814**	0,021	**0,703**	0,016	**0,797**	0,040	**0,819**	0,045
Artisan/commerçant	0,893	0,190	0,908	0,399	0,918	0,376	0,887	0,185
Cadre dirigeant et profession intermédiaire	0,936	0,309	0,894	0,170	0,934	0,332	0,932	0,294
Employé	1,024	0,741	0,991	0,925	0,994	0,944	1,000	0,997
Inconnu/Ne sait pas	1,137	0,246	1,117	0,441	1,211	0,116	**1,219**	0,085
Niveau d'études du père (ref : Non scolarisé ou primaire)								
Premier cycle ou second cycle	**1,175**	0,008	1,057	0,470	**1,179**	0,011	**1,189**	0,006
Etudes supérieures au baccalauréat	**1,250**	0,023	**1,277**	0,051	**1,270**	0,026	**1,274**	0,016
Autre/Ne sait pas	1,104	0,203	1,118	0,270	1,098	0,281	1,075	0,374
Profession de la mère (ref : Artisane/Commerçante)								
Agricultrice	**0,736**	0,020	0,830	0,343	**0,740**	0,057	**0,753**	0,046
Cadre dirigeant et profession intermédiaire	0,851	0,182	0,832	0,229	**0,806**	0,099	**0,802**	0,075
Employée	0,919	0,375	0,899	0,407	0,897	0,308	0,887	0,227
Ouvrière	0,877	0,197	0,861	0,279	0,864	0,203	**0,836**	0,095
Inconnue/Ne sait pas	**0,755**	0,069	0,726	0,124	**0,690**	0,031	**0,695**	0,025
Inactive	**0,804**	0,024	**0,762**	0,048	**0,794**	0,037	**0,784**	0,017
Niveau d'études de la mère (ref : Non scolarisée ou primaire)								
Premier cycle ou second cycle	1,090	0,164	1,119	0,143	1,098	0,154	1,092	0,161
Etudes supérieures au baccalauréat	1,222	0,108	1,158	0,325	1,220	0,133	1,228	0,103
Autre/Ne sait pas	**1,170**	0,052	1,113	0,306	**1,175**	0,071	**1,186**	0,041
Episode de précarité (ref : Aucun épisode de précarité)								
Précarité pendant l'enfance	**1,177**	0,067	**1,292**	0,029	1,146	0,174	**1,175**	0,084
Ne sait pas	1,027	0,773	1,019	0,874	1,025	0,801	0,986	0,881
Tabagisme des parents (ref : Père/mère non fumeur)								
Père fumeur	**1,347**	0,000	**1,445**	0,000	**1,397**	0,000	**1,402**	0,000
Mère fumeur	1,103	0,202	1,080	0,383	1,060	0,460	1,076	0,341
Niveau d'études de l'enquêté (ref : Primaire)								
Premier cycle ou second cycle	**1,649**	0,000	**1,368**	0,034	**1,327**	0,002	**1,468**	0,000
Etudes supérieures au baccalauréat	**1,282**	0,001	1,006	0,971	1,014	0,892	1,147	0,114

Note : modèles de Cox stratifiés selon le genre

Tableau C.3 : Déterminants de la cessation tabagique selon le genre – Modèle de Cox à risque proportionnel

	Tous		Hommes		Femmes	
	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value
Profession du père (ref : Ouvrier)						
Agriculteur	**1,441**	0,015	**1,671**	0,012	1,207	0,395
Artisan/commerçant	1,028	0,852	1,078	0,730	0,931	0,737
Cadre dirigeant et profession intermédiaire	1,147	0,191	**1,293**	0,094	1,038	0,801
Employé	0,983	0,892	1,253	0,185	0,816	0,278
Inconnu/Ne sait pas	0,988	0,954	1,284	0,369	0,699	0,234
Niveau d'études du père (ref : Non scolarisé ou primaire)						
Premier cycle ou second cycle	1,100	0,327	1,136	0,368	1,080	0,566
Etudes supérieures au baccalauréat	1,004	0,977	0,803	0,334	1,227	0,297
Autre/Ne sait pas	0,902	0,455	0,848	0,411	0,984	0,932
Profession de la mère (ref : Ouvrière)						
Agricultrice	1,242	0,247	1,201	0,485	1,265	0,378
Artisan/commerçant	1,130	0,481	1,332	0,259	0,976	0,920
Cadre dirigeant et profession intermédiaire	0,974	0,873	0,864	0,578	0,944	0,793
Employée	1,117	0,314	**1,315**	0,082	0,940	0,690
Inconnue/Ne sait pas	1,362	0,196	1,548	0,146	1,067	0,875
Inactive	0,973	0,821	0,974	0,873	0,937	0,711
Niveau d'études de la mère (ref : Non scolarisée ou primaire)						
Premier cycle ou second cycle	1,037	0,713	0,844	0,262	1,204	0,170
Etudes supérieures au baccalauréat	0,778	0,199	1,228	0,467	**0,604**	0,068
Autre/Ne sait pas	1,194	0,176	1,151	0,448	1,194	0,351
Episode de précarité (ref : Aucun épisode de précarité)						
Précarité pendant l'enfance	0,906	0,552	0,685	0,137	1,136	0,564
Ne sait pas	0,862	0,360	0,832	0,538	0,923	0,681
Tabagisme des parents (ref : Père/mère fumeur)						
Père fumeur	**0,687**	0,000	**0,689**	0,001	**0,653**	0,000
Mère fumeur	1,001	0,996	1,191	0,370	0,893	0,506
Niveau d'études de l'enquêté (ref : Primaire)						
Premier cycle ou second cycle	1,094	0,496	1,067	0,682	1,295	0,306
Etudes supérieures au baccalauréat	**1,586**	0,002	**1,403**	0,076	**1,960**	0,014
Profession de l'enquêté (ref : Ouvrier)						
Agriculteur	0,665	0,210	0,565	0,121	1,366	0,678
Artisan/commerçant	**1,367**	0,070	**1,618**	0,009	0,467	0,212
Cadre dirigeant et profession intermédiaire	**1,340**	0,010	**1,300**	0,059	**1,645**	0,025
Employé	1,198	0,123	0,961	0,853	**1,530**	0,033
Inactif	0,792	0,614	1,268	0,816	1,010	0,985
Revenu de l'enquêté (ref : Premier quintile)						
Deuxième quintile	**1,475**	0,007	**1,450**	0,059	**1,495**	0,065
Troisième quintile	**1,539**	0,003	1,367	0,110	**1,770**	0,007
Quatrième quintile	**1,755**	0,000	**1,592**	0,016	**1,859**	0,003
Cinquième quintile	**1,966**	0,000	**1,791**	0,002	**2,132**	0,000
Ne sait pas	1,450	0,168	1,437	0,380	1,629	0,183

Note : modèles de Cox stratifiés selon la cohorte de naissance et l'âge à l'initiation tabagique

Tableau C.4 : Déterminants de la cessation tabagique selon le découpage par classe d'âge – Modèle de Cox à risque proportionnel

	Tous		Age<51		Age<61		Age<71	
	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value	Hazard ratio	p-value
Profession du père (ref : Ouvrier)								
Agriculteur	**1,441**	0,015	**1,468**	0,088	**1,337**	0,095	**1,466**	0,016
Artisan/commerçant	1,028	0,852	1,020	0,917	1,017	0,915	1,051	0,744
Cadre dirigeant et profession intermédiaire	1,147	0,191	1,101	0,449	1,155	0,191	1,142	0,214
Employé	0,983	0,892	0,873	0,408	0,955	0,729	0,954	0,707
Inconnu/Ne sait pas	0,988	0,954	0,999	0,996	0,880	0,562	0,927	0,715
Niveau d'études du père (ref : Non scolarisé ou primaire)								
Premier cycle ou second cycle	1,100	0,327	1,202	0,125	1,090	0,401	1,102	0,325
Etudes supérieures au baccalauréat	1,004	0,977	1,020	0,913	0,982	0,911	0,985	0,923
Autre/Ne sait pas	0,902	0,455	0,916	0,612	0,964	0,805	0,946	0,693
Profession de la mère (ref : Ouvrière)								
Agricultrice	1,242	0,247	0,993	0,980	1,148	0,524	1,202	0,350
Artisan/commerçant	1,130	0,481	0,963	0,868	1,116	0,555	1,116	0,532
Cadre dirigeant et profession intermédiaire	0,974	0,873	0,838	0,371	0,929	0,671	0,956	0,787
Employée	1,117	0,314	1,001	0,996	1,044	0,710	1,112	0,340
Inconnue/Ne sait pas	1,362	0,196	1,323	0,353	1,275	0,345	1,290	0,307
Inactive	0,973	0,821	0,943	0,711	0,947	0,677	0,952	0,688
Niveau d'études de la mère (ref : Non scolarisée ou primaire)								
Premier cycle ou second cycle	1,037	0,713	1,100	0,428	1,021	0,838	1,023	0,822
Etudes supérieures au baccalauréat	0,778	0,199	0,913	0,690	0,747	0,161	0,815	0,301
Autre/Ne sait pas	1,194	0,176	1,393	0,045	1,198	0,199	1,188	0,195
Episode de précarité (ref : Aucun épisode)								
Précarité pendant l'enfance	0,906	0,552	0,868	0,519	0,929	0,685	0,933	0,681
Ne sait pas	0,862	0,360	1,105	0,585	0,914	0,591	0,832	0,269
Tabagisme des parents (ref : Père/mère non fumeur)								
Père fumeur	**0,687**	0,000	**0,722**	0,001	**0,698**	0,000	**0,694**	0,000
Mère fumeur	1,001	0,996	0,934	0,639	0,974	0,841	0,992	0,949
Niveau d'études de l'enquêté (ref : Primaire)								
Premier cycle ou second cycle	1,094	0,496	1,055	0,849	1,092	0,614	1,042	0,776
Etudes supérieures au baccalauréat	**1,586**	0,002	**1,783**	0,051	**1,638**	0,009	**1,503**	0,011
Profession de l'enquêté (ref : Ouvrier)								
Agriculteur	0,665	0,210	0,835	0,767	0,675	0,403	0,676	0,328
Artisan/commerçant	**1,367**	0,070	**1,833**	0,013	**1,576**	0,019	**1,516**	0,018
Cadre dirigeant et profession intermédiaire	**1,340**	0,010	**1,398**	0,022	**1,342**	0,017	**1,355**	0,009
Employé	1,198	0,123	**1,285**	0,086	**1,236**	0,090	1,207	0,116
Inactif	0,792	0,614	0,713	0,518	0,891	0,805	0,825	0,678
Revenu de l'enquêté (ref : Premier quintile)								
Deuxième quintile	**1,475**	0,007	**1,521**	0,021	**1,707**	0,001	**1,550**	0,004
Troisième quintile	**1,539**	0,003	**1,661**	0,003	**1,828**	0,000	**1,598**	0,001
Quatrième quintile	**1,755**	0,000	**1,803**	0,001	**2,067**	0,000	**1,850**	0,000
Cinquième quintile	**1,966**	0,000	**1,786**	0,001	**2,139**	0,000	**2,009**	0,000
Ne sait pas	1,450	0,168	0,753	0,513	0,995	0,990	1,183	0,579

Annexe D : Tables supplémentaires pour l'analyse semi-paramétrique

Tableau D.1: Tests de l'hypothèse des risques proportionnels par la méthode des résidus de Schoenfeld

	Initiation		Cessation	
Profession du père (ref: Ouvrier)	rho	p-value	rho	p-value
Agriculteur	-0,009	0,657	-0,023	0,498
Artisan/commerçant	-0,035	0,106	0,001	0,985
Cadre dirigeant et profession intermédiaire	0,008	0,711	0,029	0,390
Employé	-0,007	0,731	0,031	0,358
Inconnu / Ne sait pas	-0,031	0,142	0,051	0,136
Niveau d'études du père (ref: Non scolarisé ou primaire)				
Premier cycle ou second cycle	0,012	0,560	-0,067	0,045
Etudes supérieures au baccalauréat	0,013	0,530	-0,004	0,914
Autre / Ne sait pas	0,022	0,269	-0,070	0,042
Profession de la mère (ref: Ouvrière)				
Agricultrice	-0,018	0,401	0,005	0,876
Artisan/commerçant	0,017	0,429	-0,004	0,913
Cadre dirigeant et profession intermédiaire	-0,017	0,402	-0,015	0,674
Employée	-0,032	0,125	-0,012	0,726
Inconnue / Ne sait pas	0,007	0,729	-0,002	0,948
Inactive	0,010	0,626	-0,013	0,702
Niveau d'études de la mère (ref : Non scolarisée ou primaire)				
Premier cycle ou second cycle	-0,011	0,601	0,009	0,794
Etudes supérieures au baccalauréat	0,006	0,762	0,013	0,710
Autre / Ne sait pas	0,000	0,994	0,073	0,041
Episode de précarité (ref : Aucun épisode de précarité)				
Précarité pendant l'enfance	0,030	0,151	0,017	0,613
Ne sait pas	0,018	0,398	0,004	0,910
Tabagisme des parents (ref : père/mère non fumeur)				
Père fumeur	-0,001	0,965	-0,005	0,885
Mère fumeur	-0,014	0,507	-0,011	0,755
Niveau d'études de l'enquêté (ref : Primaire)				
Premier cycle ou second cycle	0,020	0,339	-0,003	0,927
Etudes supérieures au baccalauréat	0,031	0,128	-0,005	0,877
Profession de l'enquêté (ref: Ouvrier)				
Agriculteur			-0,017	0,615
Artisan/commerçant			-0,035	0,292
Cadre dirigeant et profession intermédiaire			0,037	0,276
Employé			-0,018	0,614
Inactif			0,016	0,635
Revenu de l'enquêté (ref : Premier quintile)				
Deuxième quintile			0,022	0,519
Troisième quintile			0,026	0,443
Quatrième quintile			0,004	0,917
Cinquième quintile			0,009	0,785
Ne sait pas			0,064	0,067
Test global		0,554		0,783

Tableau D.2 : Test du biais de sélection pour la cessation tabagique

	Equation de sélection : Initiation		Cessation	
	Coef.	**p-value**	**Odds Ratio**	**p-value**
Homme	**0,317**	0,000	**0,567**	0,001
Moins de 50 ans	**0,291**	0,000	**1,800**	0,000
Initiation entre 10 et 20 ans			**2,083**	0,000
Profession du père (ref : Ouvrier)				
Agriculteur	**-0,105**	0,004	**1,645**	0,000
Artisan/commerçant	-0,056	0,111	1,064	0,593
Cadre dirigeant et profession intermédiaire	**-0,053**	0,046	1,063	0,440
Employé	-0,003	0,931	0,915	0,402
Inconnu/Ne sait pas	**0,074**	0,100	0,849	0,210
Niveau d'études du père (ref : Non scolarisé ou primaire)				
Premier cycle ou second cycle	**0,085**	0,001		
Etudes supérieures au baccalauréat	**0,089**	0,028		
Autre/Ne sait pas	0,027	0,386		
Profession de la mère (ref : Ouvrière)				
Agricultrice	-0,060	0,181		
Artisan/commerçant	0,010	0,814		
Cadre dirigeant et profession intermédiaire	-0,032	0,442		
Employée	0,013	0,635		
Inconnue/Ne sait pas	-0,068	0,236		
Inactive	-0,035	0,209		
Niveau d'études de la mère (ref : Non scolarisée ou primaire)				
Premier cycle ou second cycle	**0,049**	0,053		
Etudes supérieures au baccalauréat	**0,142**	0,003		
Autre/Ne sait pas	**0,074**	0,027		
Episode de précarité (ref : Aucun épisode de précarité)				
Précarité pendant l'enfance	0,043	0,251		
Ne sait pas	0,017	0,647		
Tabagisme des parents (ref : Père/mère non fumeur)				
Père fumeur	**0,106**	0,000	**0,649**	0,000
Mère fumeur	**0,059**	0,064	0,956	0,671
Niveau d'études de l'enquêté (ref : Primaire)				
Premier cycle ou second cycle	**0,214**	0,000	1,029	0,863
Etudes supérieures au baccalauréat	**0,195**	0,000	**1,481**	0,028
Profession de l'enquêté (ref : Ouvrier)				
Agriculteur			0,707	0,249
Artisan/commerçant			1,086	0,613
Cadre dirigeant et profession intermédiaire			1,108	0,247
Employé			1,072	0,441
Inactif			**1,522**	0,026
Revenu de l'enquêté (ref : Premier quintile)				
Deuxième quintile			**1,227**	0,047
Troisième quintile			**1,264**	0,021
Quatrième quintile			**1,414**	0,001
Cinquième quintile			**1,467**	0,000
Ne sait pas			1,148	0,552

Ratio de Mills			**0,196**	0,003
Période d'observation (ref : Age 38-40)				
Age 10-11	**-0,878**	0,000	**0,007**	0,000
Age 12-13	**-0,731**	0,000	**0,006**	0,000
Age 14-15	**-0,249**	0,000	**0,008**	0,000
Age 16-17	-0,058	0,169	**0,011**	0,000
Age 18-19	**0,077**	0,064	**0,041**	0,000
Age 20-21	**0,144**	0,001	**0,089**	0,000
Age 22-23	0,003	0,940	**0,100**	0,000
Age 24-25	**-0,113**	0,020	**0,152**	0,000
Age 26-27	**-0,259**	0,000	**0,275**	0,000
Age 28-29	**-0,323**	0,000	**0,338**	0,000
Age 30-31	**-0,089**	0,076	**0,494**	0,000
Age 32-33	-0,005	0,917	**0,536**	0,000
Age 34-35	-0,034	0,512	**0,677**	0,000
Age 36-37	-0,001	0,981	**0,642**	0,000
Obs.	92429		65656	
Individus	4473		2412	
Pseudo R^2	0,074		0,171	

Notes : équation de sélection pour l'initiation estimée à l'aide d'un probit à temps discret ; cessation tabagique estimée à l'aide d'un modèle logistique à temps discret

Chapitre 3

Intergenerational transmission of health care habits in France

RÉSUMÉ

Ce chapitre s'intéresse à la transmission intergénérationnelle des habitudes de soins et aux différences en termes d'utilisation des soins au niveau familial. Cette étude est basée sur un échantillon de 4608 individus qui ont répondu à la vague 2010 de l'enquête Santé et Protection Sociale et qui ont renseigné les questions spécifiques concernant les habitudes de soins et les conditions de vie dans l'enfance. Les résultats mettent en évidence une transmission intergénérationnelle des habitudes de soins. Plus précisément, nous montrons une corrélation des habitudes de soins entre générations et une transmission de la tendance à consulter le médecin qui se traduit par des différences en termes de visites chez le médecin pour ses propres enfants. Cette étude montre ainsi l'influence à long terme du milieu social d'origine et des habitudes parentales sur la consommation de soins à l'âge adulte, qui contribue à la transmission entre générations des inégalités de santé.

ABSTRACT

This chapter explores the intergenerational transmission of health care habits and the related differences in terms of health care use at a family level. Our study is based on a sample of 4,608 individuals who answered the 2010 French Health, Health Care and Insurance Survey and completed the specific questions about health care use and living conditions during childhood. Results provide evidence of an intergenerational transmission of health care habits. More precisely, we show a correlation of health care habits across generations and a transmission of the likelihood to visit a doctor which is reflected by differences in doctor visits for the individual's children. This study shows the long term influence of social background and parental habits on adulthood health care use, which contributes to the intergenerational transmission of health inequalities.

3.1. Introduction

Access to health care is considered as a basic right and is promoted in order to achieve equity in health (Fleurbaey and Schokkaert, 2009 ; Fleubaey and Schokkaert, 2011). However, there is large evidence of income-related and education-related inequalities in health care use in France as well as in other European countries (Or et al., 2009 ; Bago d'Uva and Jones, 2009 ; Jusot et al. 2012, Devaux and de Looper, 2012). These inequalities are larger for specialist use and preventive care than for generalist use and are particularly important in France.

Two lines of explanations related to factors influencing individual demand for care have been proposed[13]. First, the results of the ECuity project and more recent studies confirmed the role of direct cost of care since inequalities in health care use, in particular specialists use, increase with the level of co-payment and the lack of health insurance (Bago d'Uva and Jones, 2009 ; Or et al., 2009 ; Jusot et al., 2012). A second explanation, in line with the health capital model theory (Grossman, 2000) is the existence of informational barriers and differences in health preferences between educational and social groups, which may induce differences in health investment decisions (Cutler and Lleras-Muney, 2010).

Whereas preferences are traditionally considered as given in economic theory, a growing literature has studied the endogenous formation of preferences (Akerlof, 1997 ; Becker and Mulligan, 1997 ; Manski, 2000 ; Bisin and Verdier, 2001). Two sources of transmission have been proposed to explain this construction: a vertical transmission ("intergenerational effects") and a horizontal transmission ("contemporaneous effects"). According to the vertical transmission process, preferences may evolve as a result of cultural transmission by which a socialisation process transmits preferences across generations. The horizontal transmission consists in the social diffusion of beliefs, norms and habits among the same generation through peers influence and through an imitation process by which individuals imitate other "successful" individuals.

[13] For determinants related to health care system organisation, see Bago d'Uva and Jones (2009), Or et al. (2009) and Jusot et al. (2012).

In particular, health-related norms or preferences seem to be socially constructed through cultural transmission or social capital influence (Costa-Font and Miladovsky, 2008 ; Marmot and Wilkinson, 2006 ; Kawachi et al. 2008 ; Folland, 2008). A growing body of literature provides evidence of a horizontal transmission of health norms and preferences. Several studies have shown the influence of social capital, as measured by social participation or contextual measures of social relationship, on health status, health-related behaviors and health care use (Islam, 2007 ; Sirven and Debrand, 2008 ; Iversen, 2008 ; Jusot et al., 2008 ; Laporte et al., 2008 ; Scheffler and Brown, 2008 ; d'Hombres et al., 2010). Several studies have also demonstrated the existence of peers' influence on health-related behaviors, such as smoking or obesity (Clark and Etilé, 2006 ; Clark and Loheac, 2007 ; Etilé 2007).

An intergenerational transmission of health has been also hypothesized, in particular to explain the persistence of health inequalities through generations (Ahlburg, 1998). Beyond a common genetic inheritance, the vertical transmission of health seems to be due to a long term effect of social background and childhood conditions on health, to social reproduction phenomena and to the transmission of health-related preferences (Currie and Stabile, 2003; Case et al., 2005; Lindeboom et al., 2009; Trannoy et al., 2010). Among the studies that have previously explored the intergenerational transmission of health some of them have provided evidence of a transmission of health-related behaviors such as exercising, smoking, alcohol consumption and obesity (Rosa-Dias, 2009 ; Jusot et al., 2010 ; Rosa-Dias, 2010 ; Bricard and Jusot, 2012 ; Tubeuf et al., 2012). However, to the best of our knowledge, the transmission of health preferences through health care use has never been explored due to the lack of data.

This chapter proposes to fill this gap and to investigate intergenerational transmission of health care habits, based on a representative health survey, the 2010 French Health, Health Care and Insurance Survey, which has been purposively designed for assessing health care habits of the respondents as well as health care habits of their ascendants. As a starting point, we propose to explore the determinants of parental health care habits during childhood and respondent's health care habits during adulthood. Then, two different steps of analysis are proposed. First, we focus on the long term effect of parental habits during

childhood on health care habits in adulthood to test the transmission of health care habits across generations. Then, we analyse the long term effect of parental habits during childhood on the health care use of their descendants to assess the reproduction of behavior for the next generation.

3.2. Data

This study is based on the 2010 French Health, Health Care and Insurance Survey (ESPS survey). The survey, representative of the French population, is coordinated by the Institute for Research and Information in Health Economics (IRDES) since 1988. It contains data on health status, access to health care services, health insurance and economic and social status of individuals aged 18 years and above. The 2010 survey included several questions on living conditions during childhood and parents' health status and parents' health-related behaviors when the respondent was 12 years old. This set of questions on childhood conditions was previously introduced in the 2006 ESPS survey and a comprehensive description of the questionnaire can be found in Bricard et al. (2010) and Jusot et al. (2013).

In the 2010 version, a focus has been made to explore the intergenerational transmission of health care habits and two specific questions about parental health care habits with regard to the respondent's health as a child and his own health care habits during adulthood are added. Our sample is restricted to the 4.608 individuals who have answered the specific survey on childhood living conditions (see Table E.1 and E.2 in Annex E for Descriptive statistics).

3.2.1. Parental and individual health care habits

We appreciate parental health care habits during childhood using a retrospective question based on the respondent's perception of parental health care behaviors:

"During your childhood, what did your parents do when you first start to feel sick ? ...1. wait and see if the problem did improve by itself ; 2. try to treat yourself with drugs ; 3. go to the doctor immediately ; 4. try to use home remedies or alternative medicine (the individual can choose several answers)*"*.

A second question has been asked to the respondent concerning the perception of his own health care habits in adulthood:

"Personally, what do you do when you first start to feel sick ? ... (then the same list of answers and the individual chooses one of them)".

The first retrospective question is used to proxy the respondent's use of health care during his childhood since this information is not directly observable in our data. Moreover, even if the respondent's use of health care during his childhood was observable, parental preferences would not easily be elicited from his health care use in absence of a full information of his health status during his childhood. Conversely, the subjective question on parental decisions for their child's use of care during childhood permits to appreciate directly parental preferences since the control for the need of care is directly included in the question. The same argument can be applied to the second question, which allows directly assessing respondent's health care habits. More precisely, these health care habits indicators could also be interpreted as determinants of the likelihood to consult a doctor, as it has been used in some studies as psychosocial variables explaining doctor use (Van der Meer and Mackenbach, 1998). The subjectivity of these questions may induce several types of reporting bias, which may, in particular, induce artificially a concordance between their parents' attitudes and their own attitudes. However, regarding the technical difficulties of identifying social interactions from the direct observation of behaviors, using subjective data has been stressed to be valid in the literature (Manski, 2000 ; Senik, 2005). We also rely on the fact that these questions are asked in different parts of the questionnaire which may reduce this bias.

We then assume that the retrospective question gives us information on parental preferences for health care and habits, and that the second question provides information on respondent's own preference and habits in adulthood. Thus, it allows us to explore the association between those two measures in order to analyse the influence of parental habits on individual habits in adulthood for exploring the transmission of health care habits across generations. We will also explore the implications this intergenerational transmission may have on doctor visits in the childhood of the next generation.

The question concerning parental habits during childhood proposes multiple answer items. We consider those as different experiences from childhood for the individual. As a consequence, we would like to distinguish individuals having only one experience from those having several experiences. For this purpose, we will exploit this question creating for each category the share it represents among the possible different answers given by the individual.

Table 3.1: Descriptive statistics of the report of parental health care habits during childhood (4,608 obs.)

	Several possible answers		As a share of individual answers
	Frequency	%	%
Wait before visiting	1 448	31.28	18.53
Self-care behavior	1 431	30.89	17.29
See a doctor right away	2 691	58.23	48.89
Use of alternative medicine	1 290	27.88	15.29

Table 3.1 reports the distribution of the variable concerning parental health care habits in the sample. It shows that more than a half of respondents reported that their parents were more likely to see a doctor right away when they started to feel sick which represents 48.9% of individual experiences during childhood. Any of the other responses are reported by about 30% of the individuals. When considered jointly with other items, each answer item represents a lower share of individuals' experience and 18.5% report that their parents waited before visiting and 17.3% would adopt self-care and just 15.3% would use alternative medicine. This last figure concerning the use of alternative medicine in first place reflects the particular importance of complementary and alternative medicine among health care habits in France (Fisher and Ward, 1994).

Table 3.2: Descriptive statistics of the report of individual health care habits during adulthood (4,608 obs.)

	Individual habits during adulthood (one possible answer)	
	Frequency	%
Wait before visiting	2 120	46.01
Self-care behavior	1 419	30.79
See a doctor right away	839	18.21
Use of alternative medicine	230	4.99

Table 3.2 reports the distribution of individual health care habits during adulthood. In contrast with parental health care habits during childhood, 46% of the respondents report that they are more likely to wait before visiting a doctor when they are feeling sick.

Reporting to see a doctor right away represents 18.2% of answers that is less important than declaring self-care behavior which is reported by 30.8%. Only 5% report using alternative medicine in the first place.

3.2.2. Individual's children health care use

To assess the influence of parental health care habits during childhood on individual use of care, we choose to investigate the individual's children use of care. Health care use is measured by the annual number of visits to a doctor. This information is collected from the matching of administrative data with the 2010 ESPS survey. The data provide detailed health care use of each individual belonging to the respondent's household during the calendar year of the interview. For the purpose of this study, we focus on the annual number of visits to general practitioner and the annual number of visits to a specialist.

To explore the long term effect of inherited health care habits, we use information on health care consumption of respondent's children. Information on doctor visits is available for 1,944 children which belong to 1,099 different households. We include children aged up to 16 years old at the time of the survey as they are more likely to be influenced by the parental choice than when older.

Table 3.3 reports the distribution of the variables of health care use among children. It shows that 92.7% of children have visited a doctor at least once during the past year; 86.4% have visited a GP and a lower percentage of 55.1% have consulted a specialist. The number of visits is in average of 5.68 for any doctor and more precisely 3.99 for GP visits and 1.69 for specialist visits.

Table 3.3: Descriptive statistics of children's use of health care (1,944 obs.)

		Mean
Doctor visits (Total)	Probability of any visit	0.927
	Number of visits	5.677
General Practitioner (GP) visits	Probability of any visit	0.864
	Number of visits	3.987
Specialist visits	Probability of visits	0.551
	Number of visits	1.690

3.2.3. Social background variables

Due to the specific questionnaire on childhood conditions introduced in the 2010 wave of the ESPS survey, social background is measured by a large set of variables. It contains various indicators: parents' socioeconomic status, family economic situation during childhood and parents' health status during childhood. Parents' socioeconomic status is measured by both professional status and education level of both parents. Professional status is measured in six categories for the father, namely farmer, craftsman, manager, associate professional, office worker and elementary occupations. For the mother, professional status is measured by a binary indicator distinguishing working and inactive mother. Four levels are available for education: dropped out or primary school, secondary school 1, secondary school 2 and university degree. In addition, the descendant reported whether he considered the financial situation of his family to be very comfortable, comfortable, difficult, or very difficult when he was 12. Finally, parents' health is measured by the respondent's retrospective report of each of his parents' health status when he was 12 years old. We use a binary indicator that isolates parents suffering from poor or very poor health.

3.2.4. Current socio-economic status

The current socio-economic status of individuals is measured by educational level, professional status, household income by quintile and indicators of family situation. Educational level is measured as follows: drop out or primary school, first level of secondary school, second level of secondary school and university degree. Individual professional status is measured with the same categorical items as the father's professional status. Income is measured as household income (from all sources of income), divided by the OECD equivalent scale (1 for the first household composition, 0.5 for the second and 0.3 for the third and following one). We created income quintile and a sixth category for those who did not provide any income information. This indicator allows us to capture the non linearity in the association with health care variables as well as to control for non response category. We retain two indicators of family situation: living in couple or not, and having children in the household or not.

3.2.5. Other individual variables and accessibility of health care

To take into account for differences in the need for health care, we introduce several indicators to proxy health care needs: age, sex, a self-assessed health (SAH), report of functional limitations, chronic conditions and long term conditions .

We also introduce a control for the supply of general practitioners and medical specialists at the time of the survey. It consists of four density measures of the number of physicians per 100.000 inhabitants at the department level: one for GPs in sector 1[14], one for GPs in sector 2, one for specialists in sector 1 and one for specialists in sector 2. To control for supply of health during childhood, we also introduce physician density variables at the time individuals were 12 years old[15]. The birth region and the region of residence are also measured and correspond to regional development and planning zones (ZEAT).

3.3. Determinants of parental and individual health care habits

As a starting point to the analysis, we explore the determinants of both parental health care habits for the individual during childhood and individual health care habits during adulthood.

3.3.1. Determinants of parental health care habits during childhood

ESTIMATION STRATEGY

In this part, we are exploring parental determinants of health care habits. We consider ${Hab^{par}}_{ij}{}^{*}$ the propensity for parents of individual i to choose the alternative j:

$${Hab^{par}}_{ij}{}^{*} = \alpha_j . {Need^{ind}}_i + \beta_j . {X^{par}}_i + u_{ij}, \qquad j=1, 2, 3, 4 \qquad \text{(Eq 3.1)}$$

[14] There are two types of physicians in France which differ according to their fees. The cost of visits to doctors in sector 1 corresponds to the statutory fee. Thus, the co-payment part is covered by all complementary insurance contracts. Doctors in sector 2 are allowed to have extra fees, which are only covered by some supplementary insurance contracts.

[15] We use historical data for GPs' and specialists' density at a regional level (http://www.ecosante.fr) which permits to go back up to 1971. A dummy variable is added in the case of people born abroad or in non-metropolitan France.

where $Need^{ind}{}_i$ represents demographic variables for individual i, $X^{par}{}_i$ the parental socioeconomic variables that may affect their health care habits and u_{ij} are other unobservables affecting parental habits.

We see in the previous section that individuals may recall different experiences and we propose to sum up this information considering the share they represent among individual experiences. This creates a vector of proportion variables that sum to one and could be explored using a fractional multinomial logit which is an extension of the fractional logit proposed for percent share variables (Papke and Wooldridge, 1996). This model is preferred to several independent probit models or to a multivariate probit model as it permits to deal with the multiple answer items variable using our transformed variables. We also checked for robustness of the results using these alternative solutions and found very similar results.

RESULTS

The results of the fractional multinomial logit model for parental health care habits during childhood are presented in Table 3.4. It corresponds to the marginal effects of determinants to be associated with the corresponding alternative.

Women are found to be report a higher parental use of self-care behavior and a lower parental use of alternative medicine than their male counterparts. We find interesting results concerning differences according to age groups of individuals which have to be interpreted as cohort effect since the parental habits refer to the specific period of childhood for all individuals. It shows that youngest cohorts are less likely to experience parental wait before consultation and parental use of alternative medicine; and are more likely to report that their parents would go to the doctor straight away. Self-care behaviour is not found to vary across birth cohorts.

Most of the parental socioeconomic characteristics are found significantly associated with parental health care habits during childhood. The leading factor explaining parental likelihood to see a doctor is the family financial situation while the respondent was 12. A more comfortable financial situation is associated with an increase in the probability to go

to the doctor rapidly and the probability reaches an increase of 0.25 percentage point for family with very comfortable financial situation comparing to a very difficult financial situation. We also find an effect of maternal education; individuals whose mother had a university degree are more likely to report that their parents waited before visiting or self-cared than to report that their parents were going to the doctor directly or using alternative medicine. This underlines the potential existence of informational barriers and differences in health knowledge explaining health care use. Finally, the results concerning social class are in line with the literature concerning health care expenditures in France which has showed that farmers behave atypically with health care use (Raynaud, 2002); sons of farmers have a lower probability to report that their parents went to the doctor directly than sons of elementary jobs workers. We also find that sons of managers are less likely to report parental use of alternative medicine during their childhood.

As a last point, we find a relatively minor effect of accessibility of care. A greater density of GPs in the birth region is associated with a decrease in the probability of parental use of alternative medicine. Finally, birth region are found to influence parental health care habits which suggests the existence of regional norms concerning health care. Individuals born in the Mediterranean, East, East center, North and South West regions are more likely to report parental use of alternative medicine than individuals born in the Parisian region. Individuals born in the East Center and East are less likely to report that their parents consulted the doctor directly whereas those born in the Mediterranean region are less likely to wait before consulting.

Table 3.4: Marginal effects of parental determinants of health care habits during childhood

	Wait before visiting			Self-care behavior			See a doctor right away			Use of alternative medicine		
Invididual variables	**M.E.**		**S.E.**	**M.E.**		**S.E.**	**M.E.**		**S.E.**	**M.E.**		**S.E.**
Sex (vs: Men): Women	0.008		0.009	0.021	**	0.009	-0.008		0.013	-0.021	***	0.008
Age (ref: more than 70)												
less than 30	-0.112	***	0.033	0.017		0.029	0.164	***	0.042	-0.069	***	0.026
30 – 39	-0.057	**	0.026	0.002		0.024	0.092	***	0.035	-0.036	*	0.021
40 – 49	-0.006		0.018	-0.006		0.017	0.056	**	0.025	-0.044	***	0.015
50 – 59	0.003		0.016	-0.004		0.016	0.033		0.023	-0.033	**	0.013
60 – 69	0.019		0.016	-0.021		0.017	0.012		0.025	-0.010		0.013
Parental variables												
Father's education level (vs primary school or drop out)												
Secondary school 1	0.002		0.015	0.010		0.014	0.023		0.020	-0.035	***	0.013
Secondary school 2	0.030		0.023	-0.008		0.021	-0.036		0.032	0.014		0.022
University degree	0.052	**	0.022	0.024		0.022	-0.071	**	0.033	-0.004		0.022
Other or non response	-0.025		0.019	0.004		0.016	0.015		0.023	0.007		0.013
Father's social class (vs elementary jobs)												
Farmer	0.074	***	0.015	0.029	**	0.014	-0.147	***	0.023	0.043	***	0.012
Craftmen	0.022		0.018	-0.034	*	0.018	0.005		0.025	0.006		0.015
Manager	0.035	*	0.018	0.026		0.017	-0.013		0.026	-0.048	***	0.018
Associate prof.	0.000		0.018	0.019		0.016	-0.013		0.025	-0.007		0.016
Office worker	0.029		0.019	0.027		0.018	-0.022		0.026	-0.034	*	0.018
No male head or non response	0.044	**	0.020	0.000		0.019	-0.033		0.028	-0.011		0.017
Mother's education level (vs primary school or drop out)												
Secondary school 1	-0.006		0.015	-0.008		0.014	0.039	*	0.021	-0.026	**	0.013
Secondary school 2	0.011		0.021	0.027		0.019	0.027		0.029	-0.064	***	0.021
University degree	0.055	**	0.023	0.069	***	0.021	-0.083	**	0.035	-0.042	*	0.023
Other or non response	-0.042	*	0.021	0.009		0.018	0.034		0.027	-0.002		0.016
Mother's activity (vs working)												
Inactive	0.010		0.011	0.014		0.011	-0.030	*	0.016	0.006		0.009
Family financial situation (vs very difficult)												
Very comfortable	-0.114	***	0.026	-0.037		0.024	0.250	***	0.038	-0.099	***	0.024
Comfortable	-0.085	***	0.017	-0.034	*	0.018	0.197	***	0.027	-0.078	***	0.014
Difficult	-0.047	***	0.017	-0.017		0.017	0.131	***	0.027	-0.066	***	0.013
Non response	-0.093	*	0.048	-0.086	*	0.048	0.251	***	0.062	-0.072	**	0.036
Parental health status (vs very good, good, fair)												
Father poor or very poor health	0.007		0.020	-0.012		0.020	-0.015		0.029	0.020		0.016
Mother poor or very poor health	0.032	*	0.019	-0.022		0.020	-0.002		0.028	-0.008		0.016
Childhood physician density												
Density of GP's	0.001	*	0.001	0.000		0.001	0.000		0.001	-0.002	**	0.001
Density of specialists	-0.001		0.001	0.000		0.001	0.000		0.001	0.001	*	0.001
Birth region (ref: Parisian region)												
Bassin parisien	-0.031		0.033	0.024		0.031	-0.022		0.045	0.029		0.030
North	-0.070	*	0.038	0.007		0.036	-0.005		0.052	0.067	**	0.033
East	-0.023		0.032	0.040		0.030	-0.099	**	0.043	0.082	***	0.028
West	0.011		0.033	0.024		0.031	-0.059		0.045	0.025		0.029
South west	-0.037		0.032	0.005		0.030	-0.028		0.044	0.061	**	0.029
East Centre	-0,011		0,029	0,042		0,027	-0,113	***	0,040	0,083	***	0,025
Mediterranean	-0,091	***	0,031	-0,037		0,030	0,036		0,043	0,091	***	0,029
Non Metropolitan France	0,010		0,052	0,047		0,047	-0,112		0,070	0,055		0,043
Obs.	4,608											

Notes: results from fractional multinomial logit model; Significance levels: *** 1%, **5%, *10%.

3.3.2. Determinants of individual health care habits during adulthood

ESTIMATION STRATEGY

In adulthood, we also ask individuals to report their habits concerning health care. We consider ${Hab^{ind}}_{ij}^{*}$ the propensity for individual i to choose the alternative j:

$${Hab^{ind}}_{ij}^{*} = \alpha_j . {Need^{ind}}_i + \beta_j . {X^{ind}}_i + v_{ij} \qquad j=1,2,3,4 \qquad \text{(Eq 3.2)}$$

where ${Need^{ind}}_i$ represents demographic variables and several measures of individual health for individual i, ${X^{ind}}_i$ the individual socioeconomic variables that may affect his health care habits and v_{ij} are other unobservables affecting individual habits.

The general question about health care habits in adulthood is a four categories variable. We model the individual determinants of health care habits as an adult using multinomial logit regression.

RESULTS

The results of the multinomial logit for health care habits in adulthood are presented in Table 3.5. It corresponds to the marginal effect of determinants to be associated with the corresponding alternative.

Women are found to be more likely to report self-care behaviour during adulthood which is in line with what they experienced during childhood. They are also less likely to wait before visiting or to go directly to the doctor. But, contrary to the childhood period, women are more likely to report the use of alternative medicine.

We also find differences according to age. More precisely, we find younger age groups to be less likely to wait before visiting a doctor than the oldest age group except for the youngest one. Younger age group are also less likely to visit rapidly the doctor comparing to the oldest age group. In fact, they are found to seek alternative choice than seeing a doctor by using more self-care behaviour. These age effects essentially capture the differences in need among individuals except for individuals having long term or chronic conditions who are more likely to go to the doctor immediately.

Table 3.5: Marginal effects of individual determinants of health care habits during adulthood

	Wait before visiting		Self-care behavior		See a doctor right away		Use of alternative medicine	
Individual variables	**M.E.**	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Sex (vs: Men) : Women	-0.063 ***	0.017	0.065 ***	0.015	-0.027 **	0.013	0.025 ***	0.008
Age (vs: more than 70)								
less than 30	0.009	0.035	0.071 **	0.033	-0.094 ***	0.027	0.014	0.016
30 - 39	-0.108 ***	0.034	0.136 ***	0.031	-0.050 **	0.024	0.023	0.015
40 - 49	-0.121 ***	0.032	0.142 ***	0.030	-0.042 *	0.023	0.021	0.015
50 - 59	-0.021	0.029	0.051 *	0.028	-0.053 ***	0.020	0.023 *	0.013
60 - 69	0.014	0.028	0.020	0.028	-0.049 **	0.019	0.015	0.013
Self-assessed health (vs: Poor. very poor)								
Very good	0.005	0.041	0.002	0.039	-0.018	0.028	0.010	0.018
Good	0.015	0.037	0.001	0.035	-0.018	0.024	0.002	0.016
Fair	0.035	0.034	-0.004	0.033	-0.029	0.021	-0.002	0.015
Non response	-0.041	0.094	-0.080	0.092	0.120 **	0.053	0.002	0.040
Functional limitations (vs:No)								
Heavy	0.004	0.037	-0.021	0.036	0.028	0.023	-0.010	0.017
Weak	0.003	0.023	-0.014	0.021	0.000	0.016	0.011	0.010
Non response	0.069	0.055	-0.065	0.054	0.006	0.037	-0.010	0.027
Chronic conditions (vs: No)								
Yes	-0.001	0.020	-0.031 *	0.018	0.029 **	0.015	0.003	0.009
Non response	-0.037	0.036	0.025	0.032	-0.004	0.027	0.015	0.014
Long term affection (vs: No): Yes	-0.036	0.023	-0.024	0.022	0.082 ***	0.015	-0.021 *	0.011
Educational level (vs: primary school or drop out)								
Secondary school 1	0.000	0.024	0.028	0.024	-0.015	0.016	-0.013	0.010
Secondary school 2	0.036	0.029	0.062 **	0.027	-0.058 ***	0.021	-0.040 ***	0.013
University degree	0.035	0.032	0.032	0.030	-0.042 *	0.024	-0.025 *	0.014
Other or non response	0.060	0.076	0.088	0.067	-0.086	0.063	-0.062	0.048
Social class (vs: elementary jobs)								
Farmer	-0.047	0.043	0.021	0.041	0.006	0.028	0.020	0.018
Craftmen	0.083 **	0.035	-0.001	0.034	-0.086 ***	0.028	0.003	0.017
Manager	0.016	0.031	-0.009	0.029	0.001	0.023	-0.008	0.016
Associate prof.	-0.006	0.026	0.027	0.023	-0.038 *	0.020	0.017	0.011
Office worker	0.031	0.022	-0.003	0.020	-0.027 *	0.016	-0.001	0.010
Inactive	-0.020	0.039	-0.016	0.037	0.029	0.026	0.007	0.015
Income (vs: 1st quintile)								
2nd quintile	-0.013	0.027	0.070 ***	0.025	-0.053 ***	0.019	-0.004	0.011
3rd quintile	-0.016	0.028	0.067 ***	0.026	-0.044 **	0.020	-0.006	0.012
4th quintile	-0.039	0.029	0.094 ***	0.027	-0.058 ***	0.022	0.003	0.012
5th quintile	-0.018	0.030	0.061 **	0.028	-0.033	0.022	-0.011	0.013
Non response	-0.068 **	0.029	0.067 **	0.027	-0.006	0.020	0.007	0.012
Insurance situation (vs: No complementary health coverage)								
Private complem. health cov.	0.015	0.040	0.013	0.038	0.018	0.029	-0.047 ***	0.013
Means-tested complem. health cov.	-0.006	0.046	-0.036	0.044	0.080 **	0.033	-0.038 **	0.015
Living in couple	-0.010	0.017	0.025	0.016	0.000	0.013	-0.016 **	0.007
Living with children	0.036 *	0.019	-0.010	0.018	-0.028 *	0.015	0.002	0.008
Adulthood physician density								
Dens. of GP's in sector 1	0.001	0.001	-0.001	0.001	0.000	0.001	0.000	0.000
Dens. of GP's in sector 2	0.000	0.003	0.002	0.002	-0.002	0.002	0.000	0.001
Dens. of specialists in sector 1	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000
Dens. of specialists in sector 2	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000
Adulthood region (ref: Parisian region)								
Bassin parisien	-0.064 *	0.038	0.077 **	0.034	-0.005	0.028	-0.008	0.017
North	-0.116 **	0.052	0.089 *	0.048	0.051	0.038	-0.024	0.024
East	-0.075 *	0.045	0.062	0.041	-0.015	0.034	0.028	0.019
West	-0.031	0.041	0.064 *	0.037	-0.027	0.031	-0.006	0.018
South west	-0.053	0.050	0.088 *	0.046	-0.048	0.038	0.013	0.022
East Centre	0.017	0.036	0.020	0.034	-0.049 *	0.028	0.012	0.016
Mediterranean	-0.062	0.053	0.088 *	0.049	-0.047	0.041	0.020	0.023
Obs.					4608			
Pseudo R^2					0.0849			

Notes: results from multinomial logit model; Significance levels: *** 1%, **5%, *10%.

With the educational level, we find similar results to the results found with maternal education as more educated individuals are less likely to use alternative medicines and to go rapidly to the doctor and more likely to self-care. However, we find no effect of education associated with waiting before visiting a doctor. Health care habits are also related to social class categories as craftmen are more likely to wait before visiting than going rapidly to the doctor. Farmers are no longer showing different health care habits than other socioprofessional categories but the effect concerning craftsmen confirms the differences in health care norms for self-employed workers.

Income is related to health care habits in adulthood in a different way than in childhood and richer individuals are more likely to self-care than go rapidly to the doctor in comparison to individuals belonging to the first quintile. Insurance situation is also associated with health care habits as individuals with mean-tested complementary health coverage are more likely to go to the doctor right away than individuals without insurance coverage. Individuals without insurance coverage are consequently more likely to use alternative medicine than those with insurance.

Finally, family situation is linked to habits through the fact that living in couple is associated with a lower probability of using alternative medicine. Individuals with children are also more likely to wait before they visit a doctor than going rapidly to the doctor.

To finish the analysis of the determinants of health care habits, we find no direct effect of supply of health through physician density variables but we find regional disparities such as a lower probability of waiting before visiting a doctor and a higher probability of self-caring for individuals living in the *Bassin parisien* and the North than individuals living in the Parisian region.

3.4. Empirical strategy

Two steps of analysis are proposed to explore the intergenerational transmission of health care habits. In a first step, we study the correlation between parental and individual habits for health care in order to test for an intergenerational transmission of preferences for health care. Then, some robustness tests are done to stress the results. In a second step,

we explore the association between inherited parental preferences and the use of health care for his children to assess the reproduction of health care behaviour in the next generation.

3.4.1. Transmission of health care habits across generations

In this part of the analysis, we are specifically interested in the influence of parental habits during childhood on individual health care habits in adulthood that is interpreted as an intergenerational transmission of health care habits.

We express in equation (Eq 3.3) the possibility of parental habits to influence individual habits. We also keep in mind equation (Eq 3.4) with the determinants of parental health care habits.

$$Hab^{ind}{}_{ij}{}^{*} = \alpha_j . Need^{ind}{}_i + \beta_j . X^{ind}{}_i + \gamma_j . Hab^{par}{}_{ij} + e_{ij} \quad , \text{j=1,2,3,4} \qquad \text{(Eq 3.3)}$$

$$Hab^{par}{}_{ij}{}^{*} = \alpha_j . Need^{ind}{}_i + \beta_j . X^{par}{}_i + u_{ij} \quad , \text{j=1,2,3,4} \qquad \text{(Eq 3.4)}$$

To estimate the correlation between parents' health care habits and descendant's health care habits, we have to be cautious with both observed and unobserved characteristics that could commonly explain individual and parental habits. In particular, the correlation may be due to the share of similar characteristics such as a similar socio-economic situation or environments that are determinant of health care habits as studied in the previous section. This concern is minimised in our study by the introduction in the analysis of a comprehensive set of socio-economic and environment variables concerning both parents and individuals.

The second issue is that the intergenerational correlation may be spurious because of unobserved characteristics explaining both childhood and adulthood health care behaviour. This issue would display a correlation between u_{ij} and e_{ij}. For example, it may come from unobserved health status during childhood that may explain both childhood and adulthood health care behaviours. The use of a large set of health variables such as chronic conditions that may come from childhood minimises this potential problem. This problem is also minimised in our study by the use of a subjective measure of health care habits asking what people do when they are sick. To test for the extent of this problem, we conduct seemingly

unrelated regressions for both parental and individual equations (Eq 3.3 and Eq 3.4) considering each alternative habits separately. Several Breusch-Pagan tests of independence of residuals are conducted (Table 3.6). In our case, we find that it is unnecessary to tackle the correlated unobserved heterogeneity once our set of observable characteristics are taken into account as tests are rejected for each alternative habits. However, we control for observed parental characteristics in the individual equation.

Table 3.6: Breusch-Pagan tests for independency of residuals

Model for alternative :	Correlation	Chi 2	p-value
Wait before	-0.0023	0.025	0.873
Self-care behavior	0.0047	0.101	0.750
See a doctor right away	-0.0028	0.036	0.851
Use of alternative medicine	0.0020	0.019	0.890

Then, health care habits of the individual in adulthood (Hab^{ind}) is written as the following equation:

$$Hab^{ind}{}_{ij}{}^{*} = \alpha_j . Need^{ind}{}_i + \beta_j . X^{ind}{}_i + \gamma_j . Hab^{par}{}_{ij} + \delta_j . X^{par}{}_i + e_{ij}, \quad j=1,2,3,4 \qquad \text{(Eq 3.5)}$$

where $Need^{ind}$ represents demographic variables and several measures of individual health, X^{ind} and X^{par} respectively the individual and parental socioeconomic variables, Hab^{par} the parental health care habits during childhood and e_{ij} are other unobservables affecting individual habits.

To estimate the transmission of health care habits across generations, we rely on the two variables of parental habits we have presented in the descriptive section. The first consists in the raw variable as given by the respondents which means four dummies variables. The second consists in a transformed outcome which is calculated as a share of childhood experiences that each parental habit represents.

For each variable of parental habits, we propose two different ways of measuring the correlation between individual habits. The first rely on four different estimates of multinomial logit including parental variables of habits separately. It gives us a more illustrative result of the correlation of habits across generations. The second is an adjusted version with all parental habits categories included in a unique model.

3.4.2. Robustness to heterogeneity and socialisation

We are interested to stress our previous results according to different sources of heterogeneity and to the possibility of both regional and generational influences.

On the one hand, we look at different sources of heterogeneity. As a starting point, we test the possibility of differences in transmission according to gender of individuals. Then, we would like to test the possibility of heterogeneity in the transmission according to the health status of the individuals in adulthood. We consider a group of sick individuals having at least poor or very poor health, a heavy or weak functional limitation, a chronic condition or a long term condition that we oppose to a group of individuals in good health. We also consider the possibility of differences in the transmission according to environmental changes by comparing individuals living in the same region in adulthood and in childhood and individuals who have moved to a different region. We consider lastly the possibility of generational change in the transmission process and do separated analyses for younger individuals of less than 50 years old and older individuals.

On the other hand, we would like to assess the possibility of both regional and generational norms affecting individual habits and competing with the transmission across generation. In fact, region of residence and birth cohort have been found as important determinants of habits and we may expect other individuals of the same region and cohort to influence the individuals as well. Theories of habit formation often assume that child may be affected by other local role models, in addition to parents (Dohmen et al., 2012). Using the average habits of a reference group to measure social interaction do not permit to identify this effect because of the reflection problem explained by Manski (2000). We propose to minimise this problem using lagged reference group behaviour measured by average parental habits of the reference group. Then, in addition to age in decade and region of residence dummies, we include a variable of average parental habits of individuals living in the same region and born in the same decade. We exclude the parental habits of individual when calculating the individual reference group average.

3.4.3. Implications for children's doctor visits

In this last part of the analysis, we are testing the implications this intergenerational transmission has on the individual use of care for his children. We are directly testing the transmission looking at the use of health care during the childhood of individual's children. Then, the health care demand as an adult is considered from a family perspective as the individual may influence the health care use of his children as a parent (Jacobson, 2000).

We use a similar equation than the one estimating the transmission of health care habits except that we introduce a vector capturing health problems for the individual's child ($Need^{child}$). Then, the propensity to visit a doctor for the child h of the individual i is :

$$Visit^{child}{}_{hi}{}^{*} = \alpha.Need^{child}{}_{h} + \beta.Need^{ind}{}_{i} + \gamma.X^{ind}{}_{i} + \delta.Hab^{par}{}_{ij} + \theta.X^{par}{}_{i} + f_{hi}, \text{ (Eq 3.5)}$$

As for the previous part of the analysis, we are concerned about a control for health factors influencing the demand for health care ($Need^{child}, Need^{ind}$). We are also controlling for individual socio-economic status (X^{ind}) that may impact different aspects of the health care demand: income, professional status, educational level and insurance coverage. Supply side aspects are also considered through the introduction of physician density variables. To control for social background during childhood correlated with parental habits, we also decide to include parental variables (X^{par}).

This last model will help us to have a greater insight on the transmission of health care habits across generations as it measures the association between parental habits of two successive generations.

We are interested in estimating two different outcomes: the probability of any visit and the number of visits. We estimate the probability of any visit using a logit model. To estimate the number of visits, we choose a negative binomial model as the data show overdispersion; the variance of the variable of interest is greater than its expected value.

3.5. Results

3.5.1. Transmission of health care habits across generations

The results from the multinomial logit models are presented as marginal effects of parental habits to be associated with alternative choices in adulthood (Table 3.7). The hypothesis of an intergenerational transmission of health care habits is confirmed by the positive and significant marginal effects of the corresponding parental health care habits during childhood.

Column (1) of Table 3.7 shows an increase in the probability for individual to report any specific health care habits if he had experienced it from his parents during childhood. However, the size of the intergenerational correlation varies across habits. It reaches a 14.9 percentage points increase for the wait before visiting comparing to 11.8 percentage points and 10.1 percentage points for self-care and seeing a doctor right away respectively. The correlation is lower for the use of alternative medicine as it represents a 4.1 percentage points increase.

Column (2) of Table 3.7 shows the results when we adjust to the others experiences the individuals had during childhood. Results are similar except for the intergenerational correlation with regard to seeing a doctor right away which only reaches a 4.6 percentage points increase comparing to 10.1 percentage points in unadjusted results. We can also note as expected that the others experiences the individuals had during childhood are negatively associated with the respective individual habit in adulthood.

Column (3) of Table 3.7 confirms the increase in the probability for individual to report specific health care habits he had experiences during childhood. Results when parental habits are measured as a share are even greater than previously in Column (1). The marginal effect implicitly measures the difference in probability between reporting only a specific habit comparing to not reporting this habit at all. Results change in the size of the intergenerational correlation but not in the ranking between habits. The intergenerational correlation is still greater and waiting before visiting is associated with a 23.9 percentage points increase in the probability of reporting the same habits. Then, the results show a 17.3 percentage points increase and a 11.7 percentage points increase considering self-care and

going to the doctor right away respectively. The use of alternative medicine has the lower intergenerational correlation with an increase of 6.3 percentage points.

Column (4) of Table 3.7 shows results adjusted with the share of other parental habits experienced during childhood. They are not directly comparable as it includes a comparison with a reference category but still they confirm the parental habits experienced during childhood being more likely to be associated with the respective individual habit in adulthood. We present the complete results of this last model in Table E.3 in Appendix E.

Table 3.7: Marginal effects of parental health care habits during childhood on individual habits in adulthood

	Raw variable of parental habits						Share variable of parental habits					
	(1)			(2)			(3)			(4)		
	M.E.		S.E.	M.E.		S.E.	M.E.		S.E.	M.E.		S.E.
Multinomial alternative for individual habit : Wait before visiting												
Parental habit during childhood :												
Wait before visiting	0.149	***	0.015	0.149	***	0.018	0.239	***	0.023	0.229	***	0.023
Self-care behavior				-0.056	***	0.018				-0.020		0.025
See a doctor right away				-0.040	**	0.020				ref.		
Use of alternative medicine				-0.051	***	0.018				-0.023		0.027
Multinomial alternative for individual habit : Self-care behavior												
Parental habit during childhood :												
Wait before visiting				-0.067	***	0.017				-0.087	***	0.023
Self-care behavior	0.118	***	0.014	0.134	***	0.015	0.173	***	0.021	0.159	***	0.021
See a doctor right away				0.008		0.018				ref.		
Use of alternative medicine				0.006		0.016				0.020		0.025
Multinomial alternative for individual habit : See a doctor right away												
Parental habit during childhood :												
Wait before visiting				-0.067	***	0.015				-0.142	***	0.019
Self-care behavior				-0.060	***	0.014				-0.134	***	0.020
See a doctor right away	0.101	***	0.012	0.046	***	0.016	0.117	***	0.012	ref.		
Use of alternative medicine				0.004		0.014				-0.059	***	0.019
Multinomial alternative for individual habit : Use of alternative medicine												
Parental habit during childhood :												
Wait before visiting				-0.015	*	0.008				0.001		0.011
Self-care behavior				-0.019	**	0.008				-0.005		0.012
See a doctor right away				-0.014		0.009				ref.		
Use of alternative medicine	0.041	***	0.007	0.041	***	0.008	0.063	***	0.010	0.062	***	0.010
Obs.	4608			4608			4608			4608		
Pseudo R^2				0.0872						0.0849		

Notes: these results are adjusted with need variables, individual and parental socioeconomic variables such as in Eq 3.5 ; columns (1) and (3) are from four different estimates of multinomial logit including parental habits separately ; columns (2) and (4) are from a multinomial model adjusted with all parental habits categories ; we present full results of model in column (4) in Table E.3 in Appendix E ;
Significance levels: *** 1%, **5%, *10%.

3.5.2. Robustness to heterogeneity and socialisation

Robustness tests for heterogeneity in the transmission of habits across generations show that results are sensible to the change in region of residence from childhood to adulthood. Table 3.8 shows the separated results according to whether the respondent still lives in the same region in adulthood as in his childhood or not. It shows an important reduction in the transmission of habits across generations for all habits for the case of individuals living in a different region. Remarkably, the intergenerational correlation considering self-care only reaches a 10.2 percentage points increase in the case of living in a different region comparing to a 19.7 percentage points increase in the case of living in the same region. These results underline the importance of environmental or supply of health factors explaining health care habits. By contrast, we do not find noticeable differences in the transmission according to gender, sickness status and birth cohort (Table E.4 in Appendix E).

Table 3.8: Heterogeneity in the transmission of health care habits according to change in the region

	Same region			Different region		
	M.E.		**S.E.**	**M.E.**		**S.E.**
Multinomial alternative for individual habit : Wait before visiting						
Parental habit during childhood :						
Wait before visiting	0.243	***	0.029	0.198	***	0.040
Self-care behavior	-0.022		0.031	-0.038		0.042
See a doctor right away	ref.			ref.		
Use of alternative medicine	0.001		0.034	-0.082	*	0.046
Multinomial alternative for individual habit : Self-care behavior						
Parental habit during childhood :						
Wait before visiting	-0.072	**	0.029	-0.125	***	0.038
Self-care behavior	0.197	***	0.026	0.102	***	0.036
See a doctor right away	ref.			ref.		
Use of alternative medicine	-0.009		0.032	0.081	*	0.042
Multinomial alternative for individual habit : See a doctor right away						
Parental habit during childhood :						
Wait before visiting	-0.166	***	0.025	-0.091	***	0.031
Self-care behavior	-0.158	***	0.026	-0.083	**	0.033
See a doctor right away	ref.			ref.		
Use of alternative medicine	-0.060	***	0.023	-0.050		0.033
Multinomial alternative for individual habit : Use of alternative medicine						
Parental habit during childhood :						
Wait before visiting	-0.005		0.015	0.019		0.018
Self-care behavior	-0.017		0.016	0.018		0.017
See a doctor right away	ref.			ref.		
Use of alternative medicine	0.068	***	0.013	0.051	***	0.017
Obs.	3030			1578		
Pseudo R^2	0.0974			0.1314		

Notes: these results are adjusted with need variables, individual and parental socioeconomic variables such as in Eq 3.5 ; from separated estimations on sample of individuals living in the same region in adulthood as in childhood or not using multinomial model such as in column (4) of Table 3.8 using share of parental habits ; Significance levels: *** 1%, **5%, *10%.

Finally, we are concerned about the possibility of regional and generational norms competing with parental transmission. Table 3.9 reports the marginal effects adjusted by the average parental habits of individuals living in the same region and born during the same decade. The results are not affected by the introduction of regional and generational norms except for the use of alternative medicines which is found significantly associated with average parental use of alternative medicine of the reference group. However, it does not change the transmission in the use of alternative medicine.

Table 3.9: The impact of regional and generational parental habits

	Wait before visiting		Self-care behavior		See a doctor right away		Use of alternative medicine	
	M.E.	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Parental habit during childhood:								
Wait before visiting	0.238 ***	0.024	-0.108 ***	0.025	-0.130 ***	0.020	0.000	0.012
Self-care behavior	-0.010	0.027	0.145 ***	0.023	-0.130 ***	0.022	-0.006	0.012
See a doctor right away	ref.		ref.		ref.		ref.	
Use of alternative medicine	-0.035	0.029	0.031	0.027	-0.052 ***	0.020	0.055 ***	0.011
Average parental habit during childhood:								
Wait before visiting	0.312	0.265	-0.291	0.255	-0.037	0.187	0.016	0.122
Self-care behavior	0.559 *	0.311	-0.302	0.291	-0.310	0.237	0.054	0.138
See a doctor right away	ref.		ref.		ref.		ref.	
Use of alternative medicine	-0.004	0.222	-0.076	0.216	-0.084	0.147	0.164 **	0.081
Obs.	4,075							
Pseudo R^2	0.0891							

Notes: these results are adjusted with need variables, individual and parental socioeconomic variables such as in Eq 3.5 ; estimation using multinomial model such as in column (4) of Table 3.8 using share of parental habits ; Significance levels: *** 1%, **5%, *10%.

3.5.3. Implications for children's doctor visits

Lastly, we are interesting in the implications this intergenerational transmission of health care habits has on the individual use of care for his children. Table 3.10 reports the marginal effects of parental health care habits during childhood on the children's doctor visits. These results confirm the hypothesis of a reproduction of health care behavior in the childhood of the next generation. More precisely, we find inherited parental habits to be associated with the probability of any visit to the doctor but not on the number of visits. We find parental habit of waiting before visiting or using alternative medicine to be significantly associated with a decrease in the probability of any visit to any doctor and more particularly to a GP. Parental habit of waiting before visiting is associated with a 6.2 percentage points and a 5.9 percentage point decrease in the probability of visit to any doctor and to a GP respectively. We also find the parental use of alternative medicine

during childhood to be associated with a 4.4 percentage points and 6.4 percentage points decrease in the probability of any visit to a doctor and to a GP respectively. Other effects of parental habits concerning specialist visits confirm these results but are significant at the 10 percent level only.

Table 3.10: Marginal effects of parental health care habits during childhood on the children use of care

	Doctor visits (Total)		General Practitioner (GP) visits		Specialist visits	
	M.E.	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Probability of any visit						
Parental habit during childhood (vs: See a doctor right away)						
Wait before visiting	-0.062 ***	0.021	-0.059 **	0.030	-0.025	0.042
Self-care behavior	-0.028	0.018	-0.013	0.027	-0.069 *	0.040
Use of alternative medicine	-0.044 **	0.020	-0.064 **	0.030	-0.036	0.049
Obs.	1944		1944		1944	
Pseudo R^2	0.1826		0.1279		0.0920	
Number of visits						
Parental habit during childhood (vs: See a doctor right away)						
Wait before visiting	-0.584	0.450	-0.315	0.346	-0.280	0.221
Self-care behavior	-0.336	0.408	-0.315	0.305	0.059	0.230
Use of alternative medicine	-0.596	0.563	-0.157	0.441	-0.420 *	0.249
Obs.	1944		1944		1944	

Notes: Parental habits correspond to the share of experiences during childhood. Probability of any visit estimated using a logit model; Number of visits estimated using a negative binomial model ; Clustered on household membership (1,099 households). Complete results are presented in Table E.5, E.6 and E.7 in Appendix E. Legend: * p<0.1; ** p<0.05; *** p<0.01.

Tables E.5 to E.7 in Appendix E report the marginal effects associated with other determinants related to doctor visits of individual's children. These results globally confirm the determinants of health care habits during childhood found in a previous section of the chapter. However, we can notice that the number of visits to a doctor and specialist visits more globally are primarily related to need variables and insurance situation.

3.6. Conclusion

This study provides evidence of an intergenerational transmission of health care habits. Using a French health survey partly designed for this purpose, our results show a correlation between health care habits across generations. More precisely, we find that descendants are more likely to visit a doctor straight away if his parents behaved similarly during his childhood. We also found that inherited parental preferences are likely to

influence the individual probability to visit a doctor for his children which confirms the hypothesis of a transmission of behaviors across generations.

There are several possible reasons for expecting this positive intergenerational correlation between health care habits across generations. A first explanation is the existence of a transmission of preferences or a social construction of preferences (Manski, 2000, Bisin and Verdier, 2001). It may reflect either intentional or unintentional parental influence (Waldkirch et al., 2004). Parents may intend to invest in the child human capital through health investments (Jacobson, 2000). Individuals observe the choice of their parents during childhood and are influenced by their consumptions or habits. It may also reflect the learning from parental habits of information concerning the health care system such as knowledge of pathways to care. More importantly, it may reflect unintended reasons such as the share of other preferences such as time or risk preferences.

Other explanations may weaken the positive expected correlation or may even lead to a negative correlation. On the one hand, incongruous parental health care habits during childhood may cause health problems in adulthood and may involve a change in the individual health care habits in adulthood. This hypothesis has been tested by looking at the heterogeneity in the transmission according to the presence of sickness. This hypothesis does not change our results. On the other hand, we would expect differences in the transmission according to environmental changes. For example, the individual would be more willing to change his habits if they have moved out from their childhood region when adult because of change in accessibility of health care and social norms. We confirm the relevance of this hypothesis and find a weaker transmission in the case of change in the region of residence. By contrast, we find little evidence of socialisation through an influence of regional and generational norms which is not affecting the parental transmission.

These results suggest a long term influence of social background and parental habits on adulthood health care use that contributes to the intergenerational transmission of health inequalities. It suggests that specific prevention and health promotion policies targeting underprivileged populations are potential avenues to reduce inequalities of opportunity in health, as well as government interventions aimed at improving equality of opportunities in education, or more globally, living conditions.

3.7. Appendix

Appendix E: Supplementary tables

Table E.1: Descriptive statistics for individual variables (4,608 obs)

	Freq.	%
Sex		
Women	2737	59,40
Men	1871	40,60
Age		
less than 30	580	12,59
30 - 39	865	18,77
40 - 49	898	19,49
50 - 59	839	18,21
60 - 69	629	13,65
more than 70	797	17,30
Self-assessed health		
Very good	880	19,10
Good	2121	46,03
Fair	1177	25,54
Poor, very poor	387	8,40
Non response	43	0,93
Functional limitations		
Heavy	345	7,49
Weak	852	18,49
No	3309	71,81
Non response	102	2,21
Chronic conditions		
Yes	1734	37,63
No	2639	57,27
Non response	235	5,10
Long term affection		
Yes	941	20,42
No	3667	79,58
Educational level		
Primary school or drop out	858	18,62
Secondary school 1	1772	38,45
Secondary school 2	838	18,19
University degree	1092	23,70
Other or non response	48	1,04
Social class		
Farmer	168	3,65
Craftmen	246	5,34
Manager	586	12,72
Associate prof.	838	18,19
Office worker	1396	30,30
Elementary jobs	1142	24,78
Inactive	232	5,03
Income		
1st quintile	905	19,64
2nd quintile	742	16,10
3rd quintile	771	16,73
4th quintile	707	15,34
5th quintile	900	19,53
Non response	583	12,65
Insurance situation		
No complementary health coverage	174	3,78
Private complementary health coverage	3918	85,03
Means-tested complementary health coverage	516	11,20
Family situation		
Living in couple	3086	66,97
Living with children	1954	42,40
Adulthood physician density		
Dens. of GP's in sector 1		80,54
Dens. of GP's in sector 2		5,54
Dens. of specialists in sector 1		50,53
Dens. of specialists in sector 2		29,86
Adulthood region		
Parisian region	639	13,87
Bassin parisien	873	18,95
North	348	7,55
East	431	9,35
West	722	15,67
South west	530	11,50
East Centre	583	12,65
Mediterranean	482	10,46

Table E.2: Descriptive statistics for parental variables (4,608 obs)

	Freqency	%
Father's education level		
Primary school or drop out	2332	50.61
Secondary school 1	840	18.23
Secondary school 2	273	5.92
University degree	411	8.92
Other or non response	752	16.32
Father's social class		
Farmer	548	11.89
Craftmen	437	9.48
Manager	606	13.15
Associate prof.	424	9.20
Office worker	324	7.03
Elementary jobs	1872	40.63
No male head or non response	397	8.62
Mother's education level		
Primary school or drop out	2708	58.77
Secondary school 1	812	17.62
Secondary school 2	358	7.77
University degree	284	6.16
Other or non response	446	9.68
Mother's activity		
Working	3313	71.90
Inactive	1295	28.10
Family financial situation		
Very comfortable	258	5.60
Comfortable	2226	48.31
Difficult	1673	36.31
Very difficult	390	8.46
Non response	61	1.32
Father's health status		
Very good, good, fair	4334	94.05
Poor or very poor health	274	5.95
Mother's health status		
Very good, good, fair	4321	93.77
Poor or very poor health	287	6.23
Childhood physician density		
Density of GP's		63.58
Density of specialists		44.02
Birth region		
Parisian region	547	11.87
Bassin parisien	878	19.05
North	417	9.05
East	424	9.20
West	649	14.08
South west	412	8.94
East Centre	455	9.87
Mediterranean	281	6.10
Non Metropolitan France	545	11.83

Table E.3: Multinomial logit marginal effects for health care habits in adulthood

	Wait before visiting	Self-care behavior	See a doctor right away	Use of alternative medicine
Individual variables	**M.E.**	**M.E.**	**M.E.**	**M.E.**
Sex (vs: Men): Women	-0.066 ***	0.060 ***	-0.024 *	0.029 ***
Age (vs: more than 70)				
less than 30	0.030	0.025	-0.060	0.005
30 - 39	-0.100 **	0.099 **	-0.018	0.019
40 - 49	-0.131 ***	0.133 ***	-0.028	0.027 *
50 - 59	-0.028	0.052 *	-0.050 ***	0.027 **
60 - 69	0.005	0.024	-0.046 **	0.016
Self-assessed health (vs: Poor. very poor)				
Very good	0.027	-0.009	-0.032	0.015
Good	0.035	-0.011	-0.030	0.006
Fair	0.049	-0.013	-0.041 *	0.005
Non response	-0.022	-0.095	0.116 **	0.002
Functional limitations (vs:No)				
Heavy	0.000	-0.024	0.032	-0.008
Weak	0.004	-0.016	0.001	0.011
Non response	0.076	-0.059	-0.006	-0.011
Chronic conditions (vs: No)				
Yes	-0.005	-0.031 *	0.033 **	0.004
Non response	-0.036	0.033	-0.008	0.011
Long term affection (vs: No): Yes	-0.036	-0.024	0.081 ***	-0.021 **
Educational level (vs: primary school or drop out)				
Secondary school 1	0.000	0.028	-0.019	-0.010
Secondary school 2	0.031	0.066 **	-0.061 ***	-0.037 ***
University degree	0.019	0.041	-0.033	-0.027 *
Other or non response	0.047	0.096	-0.084	-0.059
Social class (vs: elementary jobs)				
Farmer	-0.042	0.020	0.011	0.010
Craftmen	0.079 **	-0.002	-0.076 ***	-0.001
Manager	-0.001	-0.007	0.016	-0.008
Associate prof.	-0.014	0.034	-0.035 *	0.015
Office worker	0.029	-0.001	-0.024	-0.003
Inactive	-0.015	-0.019	0.029	0.005
Income (vs: 1st quintile)				
2nd quintile	-0.015	0.071 ***	-0.051 ***	-0.004
3rd quintile	-0.026	0.073 ***	-0.042 **	-0.005
4th quintile	-0.037	0.092 ***	-0.057 ***	0.002
5th quintile	-0.021	0.064 **	-0.033	-0.011
Non response	-0.067 **	0.069 **	-0.006	0.004
Insurance situation (vs: No complementary health coverage)				
Private complementary health coverage	0.012	0.013	0.021	-0.046 ***
Means-tested complementary health coverage	-0.009	-0.027	0.074 **	-0.037 **
Living in couple	-0.009	0.025	-0.002	-0.015 **
Living with children	0.038 **	-0.011	-0.031 **	0.004
Adulthood physician density				
Dens. of GP's in sector 1	0.001	-0.001	0.000	0.000
Dens. of GP's in sector 2	0.000	0.001	-0.001	0.000
Dens. of specialists in sector 1	0.000	0.000	0.000	-0.001
Dens. of specialists in sector 2	0.000	0.000	0.000	0.000
Adulthood region (vs: Parisian region)				
Bassin parisien	-0.042	0.089 **	-0.033	-0.013
North	-0.118 *	0.110 *	0.025	-0.018
East	-0.122 **	0.115 **	-0.001	0.008
West	-0.010	0.061	-0.033	-0.019
South west	0.002	0.042	-0.057	0.014
East Centre	0.022	0.015	-0.039	0.002
Mediterranean	-0.053	0.097 *	-0.065	0.021

Parental variables				
Father's education level (vs: primary school or drop out)				
Secondary school 1	0.027	-0.035 *	0.000	0.007
Secondary school 2	0.038	-0.049	0.011	-0.001
University degree	0.020	-0.021	0.002	-0.001
Other or non response	0.034	-0.031	-0.010	0.007
Father's social class (vs: elementary jobs)				
Farmer	-0.001	-0.019	0.009	0.011
Craftmen	-0.022	0.017	0.017	-0.012
Manager	0.010	-0.014	0.001	0.002
Associate prof.	-0.015	0.014	0.012	-0.011
Office worker	0.022	-0.027	-0.011	0.016
No male head or non response	-0.019	0.031	-0.003	-0.010
Mother's education level (vs: primary school or drop out)				
Secondary school 1	-0.015	0.016	0.002	-0.003
Secondary school 2	0.005	0.015	-0.050 *	0.030 **
University degree	0.041	-0.043	-0.024	0.027
Other or non response	-0.003	-0.005	0.012	-0.004
Mother's activity (vs: active): Inactive	-0.004	-0.014	0.015	0.002
Family financial situation (vs: very difficult)				
Very comfortable	-0.043	-0.006	0.055 *	-0.005
Comfortable	0.018	-0.044 *	0.030	-0.004
Difficult	0.028	-0.056 **	0.039 *	-0.010
Non response	-0.090	-0.018	0.131 ***	-0.023
Parental health status (vs: very good. good. fair)				
Father poor or very poor health	0.040	-0.018	-0.026	0.004
Mother poor or very poor health	0.054 *	0.012	-0.054 **	-0.012
Childhood physician density				
Density of GP's	0.001	0.001	-0.001	0.000
Density of specialists	-0.001	0.000	0.000	0.001
Birth region (vs: Parisian region)				
Bassin parisien	-0.094 *	-0.017	0.077 *	0.034
North	-0.050	-0.032	0.061	0.020
East	0.018	-0.073	0.013	0.042 *
West	-0.089	0.000	0.048	0.042
South west	-0.133 **	0.044	0.073	0.016
East Centre	-0.053	0.007	0.020	0.026
Mediterranean	-0.030	-0.050	0.068	0.011
Non Metropolitan France	-0.056	0.018	0.016	0.022
Parental habit during childhood (vs: See a doctor right away)				
Wait before visiting	0.229 ***	-0.087 ***	-0.142 ***	0.001
Self-care behavior	-0.020	0.159 ***	-0.134 ***	-0.005
Use of alternative medicine	-0.023	0.020	-0.059 ***	0.062 ***
Obs.		4608		
Pseudo R^2		0.0849		

Notes: Parental habits correspond to the share of experiences during childhood; Legend: * p<0.1; ** p<0.05; *** p<0.01

Table E.4: Heterogeneity in the transmission of health care habits according to gender, sickness status and birth cohort

	Women		Men		Sick		Not sick		Less than 50 y.o.		More than 50 y.o.	
	M.E.	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Multinomial alternative for individual habit : Wait before visiting												
Parental habit during childhood :												
Wait before visiting	0.240 ***	0.029	0.211 ***	0.037	0.214 ***	0.032	0.238 ***	0.034	0.208 ***	0.035	0.255 ***	0.031
Self-care behavior	-0.007	0.031	-0.038	0.040	0.007	0.036	-0.042	0.034	-0.062 *	0.034	0.028	0.037
See a doctor right away	ref.		ref.		ref.		ref.		ref.		ref.	
Use of alternative medicine	0.020	0.035	-0.081 *	0.042	0.018	0.038	-0.061	0.040	-0.073	0.046	0.013	0.034
Multinomial alternative for individual habit : Self-care behavior												
Parental habit during childhood :												
Wait before visiting	-0.106 ***	0.030	-0.045	0.035	-0.065 **	0.030	-0.106 ***	0.035	-0.080 **	0.036	-0.090 ***	0.030
Self-care behavior	0.151 ***	0.028	0.173 ***	0.033	0.124 ***	0.029	0.191 ***	0.031	0.176 ***	0.031	0.150 ***	0.029
See a doctor right away	ref.		ref.		ref.		ref.		ref.		ref.	
Use of alternative medicine	-0.025	0.034	0.078 **	0.037	-0.023	0.034	0.048	0.038	0.025	0.044	0.019	0.030
Multinomial alternative for individual habit : See a doctor right away												
Parental habit during childhood :												
Wait before visiting	-0.135 ***	0.025	-0.155 ***	0.032	-0.154 ***	0.029	-0.131 ***	0.028	-0.146 ***	0.030	-0.145 ***	0.027
Self-care behavior	-0.137 ***	0.026	-0.128 ***	0.033	-0.138 ***	0.032	-0.138 ***	0.027	-0.137 ***	0.027	-0.135 ***	0.031
See a doctor right away	ref.		ref.		ref.		ref.		ref.		ref.	
Use of alternative medicine	-0.066 ***	0.025	-0.048	0.030	-0.056 *	0.029	-0.054 **	0.025	-0.041	0.029	-0.067 **	0.027
Multinomial alternative for individual habit : Use of alternative medicine												
Parental habit during childhood :												
Wait before visiting	0.002	0.016	-0.010	0.016	0.006	0.015	-0.001	0.017	0.018	0.017	-0.020	0.015
Self-care behavior	-0.006	0.016	-0.007	0.017	0.006	0.016	-0.012	0.017	0.023	0.015	-0.043 **	0.020
See a doctor right away	ref.		ref.		ref.		ref.		ref.		ref.	
Use of alternative medicine	0.070 ***	0.015	0.051 ***	0.013	0.061 ***	0.015	0.067 ***	0.014	0.090 ***	0.016	0.035 ***	0.013
Obs.	2737		1871		2128		2480		2343		2265	
Pseudo R^2	0.0961		0.1236		0.1110		0.0851		0.0983		0.1054	

Notes: Parental habits correspond to the share of experiences during childhood; these results are adjusted with need variables, individual and parental socioeconomic variables such as in Eq 3.5 ; from separated estimations on sub-sample using multinomial model such as in column (4) of Table 3.8 using share of parental habits ; Significance levels: *** 1%, **5%, *10%.

Table E.5: Marginal effects for doctor visits (total) of the individual's child

	Probability of any visit		Number of visits	
Individual's child variables	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Sex (vs: Men): Women	-0.013	0.011	-0.173	0.206
Age	-0.021 ***	0.006	-1.217 ***	0.090
Age-squared	0.001 ***	0.000	0.054 ***	0.005
Self-assessed health (vs: Poor, very poor and fair)				
Very good	-0.053	0.033	-1.559 ***	0.430
Good	-0.025	0.033	-0.587	0.401
Functional limitations (vs:No)				
Yes	0.076 **	0.037	1.735 ***	0.460
Non response	0.066 *	0.040	0.555	0.577
Chronic conditions (vs: No)				
Yes	0.010	0.021	1.202 ***	0.341
Non response	-0.032	0.033	0.680	0.609
Long term affection (vs: No): Yes	0.041	0.055	2.142 ***	0.735
Individual variables				
Sex (vs: Men): Women	0.011	0.016	0.203	0.344
Age (vs: more than 50)				
less than 30	0.013	0.040	1.855 **	0.729
30 - 39	0.002	0.028	0.433	0.595
40 - 49	0.004	0.022	0.226	0.511
Self-assessed health (vs: Poor, very poor)				
Very good	-0.025	0.054	-0.841	0.777
Good	-0.053	0.052	-1.128	0.732
Fair	-0.091 *	0.051	-1.009	0.660
Non response	-0.135 **	0.063	-1.721	1.248
Functional limitations (vs: No)				
Heavy	0.059	0.043	1.433 **	0.662
Weak	0.030	0.020	0.371	0.474
Non response	0.033	0.034	0.275	0.863
Chronic conditions (vs: No)				
Yes	0.010	0.016	-0.037	0.325
Non response	-0.006	0.028	-0.692	0.609
Long term affection (vs: No): Yes	-0.034	0.022	-0.380	0.486
Educational level (vs: primary school or drop out)				
Secondary school 1	-0.012	0.027	-0.686	0.640
Secondary school 2	-0.004	0.029	-0.843	0.685
University degree	-0.002	0.030	-0.803	0.729
Other or non response	-0.073	0.094	1.192	2.088
Social class (vs: elementary jobs)				
Farmer	-0.080 *	0.044	-3.117 **	1.284
Craftmen	-0.061 **	0.030	-0.791	0.762
Manager	-0.011	0.028	-0.019	0.577
Associate prof.	0.004	0.024	0.681	0.444
Office worker	0.000	0.020	0.875 **	0.372
Inactive	-0.010	0.025	-0.296	0.553
Income (vs: 1st quintile)				
2nd quintile	0.022	0.018	-0.100	0.402
3rd quintile	0.000	0.019	-0.003	0.416
4th quintile	0.068 ***	0.026	0.360	0.475
5th quintile	0.048 *	0.026	0.306	0.528
Non response	0.031	0.021	-0.280	0.490
Insurance situation (vs: No complementary health coverage)				
Private complementary health coverage	0.014	0.042	3.719 ***	0.612
Means-tested complementary health coverage	0.054	0.044	4.683 ***	0.655
Living in couple (vs: No): Yes	0.022	0.017	0.311	0.351
Adulthood physician density				
Dens. of GP's in sector 1	-0.001	0.001	0.016	0.019
Dens. of GP's in sector 2	0.000	0.002	-0.003	0.046

Dens. of specialists in sector 1	0.001 ***	0.001	0.004	0.013
Dens. of specialists in sector 2	0.000	0.000	0.013	0.008
Adulthood region (vs: Parisian region)				
Bassin parisien	-0.009	0.030	-0.677	0.698
North	0.006	0.050	0.513	1.043
East	-0.006	0.037	0.194	0.910
West	-0.027	0.032	-0.540	0.768
South west	-0.021	0.042	-0.235	0.893
East Centre	-0.048	0.029	-2.344 ***	0.697
Mediterranean	-0.047	0.044	-1.194	1.040
Parental variables				
Father's education level (vs: primary school or drop out)				
Secondary school 1	-0.033 *	0.017	-0.641 *	0.347
Secondary school 2	0.043	0.032	0.048	0.590
University degree	0.000	0.031	0.287	0.571
Other or non response	0.019	0.022	0.826 *	0.438
Father's social class (vs: elementary jobs)				
Farmer	-0.014	0.023	0.251	0.561
Craftmen	-0.061 ***	0.021	-0.615	0.521
Manager	-0.005	0.023	0.433	0.466
Associate prof.	-0.038 *	0.020	0.076	0.452
Office worker	-0.042 **	0.020	0.018	0.451
No male head or non response	-0.058 **	0.023	-1.378 ***	0.530
Mother's education level (vs: primary school or drop out)				
Secondary school 1	0.038 **	0.017	0.129	0.320
Secondary school 2	0.007	0.024	-0.355	0.504
University degree	0.006	0.029	-0.212	0.584
Other or non response	-0.011	0.021	-0.671	0.483
Mother's activity (vs: active): Inactive	0.018	0.015	0.081	0.317
Family financial situation (vs: very difficult)				
Very comfortable	-0.004	0.028	-0.384	0.755
Comfortable	0.032	0.022	0.238	0.559
Difficult	0.049 **	0.022	0.367	0.547
Non response	-0.079	0.064	0.637	1.701
Parental health status (vs: very good, good, fair)				
Father poor or very poor health	-0.030	0.020	-0.737	0.485
Mother poor or very poor health	0.063 **	0.030	0.081	0.441
Childhood physician density				
Density of GP's	0.000	0.001	0.010	0.018
Density of specialists	0.000	0.001	-0.027 *	0.016
Birth region (vs: Parisian region)				
Bassin parisien	-0.008	0.046	-1.066	0.929
North	0.013	0.057	-1.380	1.095
East	-0.027	0.043	-1.791 *	0.944
West	0.064	0.049	-0.670	0.914
South west	0.017	0.045	-0.805	0.889
East Centre	0.038	0.039	0.385	0.990
Mediterranean	0.094 *	0.051	0.981	0.805
Non Metropolitan France	-0.032	0.066	-2.567 *	1.383
Parental habit during childhood (vs: See a doctor right away)				
Wait before visiting	-0.062 ***	0.021	-0.584	0.450
Self-care behavior	-0.028	0.018	-0.336	0.408
Use of alternative medicine	-0.044 **	0.020	-0.596	0.563
Obs	1944		1944	
Pseudo R^2	0.1826			

Notes: Parental habits correspond to the share of experiences during childhood. Probability of any visit estimated using a logit model; Number of visits estimated using a negative binomial model ; Clustered on household membership (1099 households). Legend: * p<0.1; ** p<0.05; *** p<0.01.

Table E.6: Marginal effects for GP's visits of the individual's child

	Probability of any visit		Number of visits	
Individual's child variables	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Sex (vs: Men): Women	-0.026 *	0.014	-0.270 *	0.156
Age	-0.018 **	0.008	-0.889 ***	0.075
Age-squared	0.001 *	0.000	0.038 ***	0.004
Self-assessed health (vs: Poor, very poor and fair)				
Very good	-0.106 **	0.042	-1.117 ***	0.344
Good	-0.058	0.041	-0.493	0.324
Functional limitations (vs:No)				
Yes	0.073 *	0.041	0.547	0.363
Non response	0.043	0.045	0.245	0.430
Chronic conditions (vs: No)				
Yes	-0.018	0.027	0.460 *	0.267
Non response	-0.023	0.045	0.762	0.487
Long term affection (vs: No): Yes	0.045	0.062	0.454	0.566
Individual variables				
Sex (ref: Men): Women	-0.020	0.022	0.189	0.258
Age (vs: more than 50)				
less than 30	0.040	0.061	1.213 **	0.620
30 - 39	0.037	0.044	-0.009	0.510
40 - 49	0.032	0.035	-0.209	0.437
Self-assessed health (vs: Poor, very poor)				
Very good	-0.048	0.066	-1.194 **	0.585
Good	-0.060	0.064	-1.267 **	0.560
Fair	-0.085	0.062	-1.038 **	0.516
Non response	-0.215 **	0.089	-2.219 **	0.951
Functional limitations (vs:No)				
Heavy	-0.002	0.058	0.700	0.511
Weak	0.027	0.030	-0.064	0.363
Non response	0.105 *	0.054	0.960	0.652
Chronic conditions (vs: No)				
Yes	0.020	0.023	0.266	0.257
Non response	-0.018	0.043	-0.808 *	0.482
Long term affection (vs: No): Yes	-0.031	0.033	-0.433	0.382
Educational level (vs: primary school or drop out)				
Secondary school 1	-0.007	0.040	-0.177	0.486
Secondary school 2	-0.034	0.042	-0.676	0.529
University degree	0.003	0.045	-0.486	0.577
Other or non response	-0.052	0.136	1.385	1.423
Social class (vs: elementary jobs)				
Farmer	-0.189 ***	0.072	-2.543 **	1.014
Craftmen	-0.075 *	0.041	-1.167 *	0.611
Manager	-0.098 ***	0.038	-0.735	0.461
Associate prof.	-0.025	0.032	-0.044	0.364
Office worker	0.012	0.027	0.474 *	0.286
Inactive	-0.003	0.038	-0.235	0.402
Income (vs: 1st quintile)				
2nd quintile	0.032	0.026	-0.172	0.317
3rd quintile	0.037	0.029	-0.149	0.326
4th quintile	0.082 **	0.034	0.228	0.362
5th quintile	0.078 **	0.037	0.479	0.429
Non response	0.046	0.030	0.020	0.376
Insurance situation (vs: No complementary health coverage)				
Private complementary health coverage	0.004	0.067	1.928 ***	0.546
Means-tested complementary health coverage	0.070	0.069	2.864 ***	0.579
Living in couple	0.038	0.023	0.102	0.269
Adulthood physician density				
Dens. of GP's in sector 1	-0.002	0.001	0.017	0.015

Dens. of GP's in sector 2	-0.003	0.003	-0.031	0.035
Dens. of specialists in sector 1	0.002 **	0.001	-0.002	0.010
Dens. of specialists in sector 2	0.000	0.001	0.002	0.008
Adulthood region (vs: Parisian region)				
Bassin parisien	-0.049	0.048	-0.585	0.540
North	-0.020	0.070	0.018	0.791
East	-0.025	0.056	-0.405	0.705
West	-0.055	0.049	-0.593	0.579
South west	-0.083	0.064	-0.513	0.696
East Centre	-0.075 *	0.044	-1.362 **	0.543
Mediterranean	-0.107 *	0.064	-1.476 *	0.775
Parental variables				
Father's education level (vs: primary school or drop out)				
Secondary school 1	-0.066 ***	0.024	-0.564 **	0.284
Secondary school 2	0.020	0.038	0.020	0.428
University degree	-0.011	0.046	0.395	0.452
Other or non response	0.030	0.032	0.910 ***	0.345
Father's social class (vs: elementary jobs)				
Farmer	-0.036	0.037	0.156	0.488
Craftmen	-0.079 ***	0.029	-0.333	0.432
Manager	-0.006	0.032	0.217	0.360
Associate prof.	-0.051 *	0.028	-0.232	0.340
Office worker	0.025	0.030	0.269	0.327
No male head or non response	-0.050	0.035	-0.948 **	0.402
Mother's education level (vs: primary school or drop out)				
Secondary school 1	0.065 ***	0.024	0.289	0.250
Secondary school 2	0.040	0.033	-0.509	0.400
University degree	0.046	0.042	-0.047	0.475
Other or non response	-0.018	0.032	-0.568	0.368
Mother's activity (vs: active): Inactive	0.010	0.022	0.074	0.252
Family financial situation (vs: very difficult)				
Very comfortable	-0.052	0.041	-0.602	0.533
Comfortable	0.018	0.034	0.418	0.432
Difficult	0.016	0.033	0.460	0.418
Non response	-0.084	0.109	0.634	1.257
Parental health status (vs: very good, good, fair)				
Father poor or very poor health	-0.025	0.030	-0.214	0.355
Mother poor or very poor health	0.138 ***	0.041	0.563 *	0.324
Childhood physician density				
Density of GP's	0.000	0.001	0.023	0.014
Density of specialists	-0.001	0.001	-0.037 ***	0.013
Birth region (vs: Parisian region)				
Bassin parisien	-0.028	0.067	-1.419 **	0.720
North	0.000	0.081	-1.399	0.855
East	-0.036	0.062	-1.564 **	0.739
West	0.054	0.067	-1.297 *	0.723
South west	0.078	0.064	-1.152 *	0.697
East Centre	0.008	0.057	-0.947	0.668
Mediterranean	0.084	0.063	0.484	0.647
Non Metropolitan France	-0.041	0.099	-1.906 **	1.076
Parental habit during childhood (vs: See a doctor right away)				
Wait before visiting	-0.059 **	0.030	-0.315	0.346
Self-care behavior	-0.013	0.027	-0.315	0.305
Use of alternative medicine	-0.064 **	0.030	-0.157	0.441
Obs.	1944		1944	
Pseudo R^2	0.1279			

Notes: Parental habits correspond to the share of experiences during childhood. Probability of any visit estimated using a logit model; Number of visits estimated using a negative binomial model ; Clustered on household membership (1099 households). Legend: * p<0.1; ** p<0.05; *** p<0.01.

Table E.7: Marginal effects for specialist visits of the individual's child

	Probability of any visit		Number of visits	
Individual's child variables	**M.E.**	**S.E.**	**M.E.**	**S.E.**
Sex (vs: Men): Women	0.017	0.022	0.068	0.105
Age	-0.007	0.010	-0.311 ***	0.055
Age-squared	0.001	0.001	0.016 ***	0.003
Self-assessed health (vs: Poor, very poor and fair)				
Very good	-0.100 **	0.048	-0.489 **	0.216
Good	-0.024	0.046	-0.087	0.196
Functional limitations (vs:No)				
Yes	0.164 ***	0.059	0.953 ***	0.241
Non response	0.111 *	0.066	0.469	0.323
Chronic conditions (vs: No)				
Yes	0.104 **	0.041	0.758 ***	0.180
Non response	-0.022	0.067	-0.127	0.298
Long term affection (vs: No): Yes	0.193 **	0.086	1.121 ***	0.312
Individual variables				
Sex (vs: Men): Women	0.043	0.032	0.046	0.165
Age (vs: more than 50)				
less than 30	0.101	0.083	0.533	0.444
30 - 39	0.001	0.068	0.256	0.341
40 - 49	-0.043	0.054	0.153	0.264
Self-assessed health (vs: Poor, very poor)				
Very good	0.004	0.092	0.375	0.453
Good	-0.055	0.088	0.206	0.432
Fair	-0.018	0.082	0.183	0.408
Non response	0.156	0.143	1.109	0.739
Functional limitations (vs:No)				
Heavy	0.085	0.073	0.835 **	0.419
Weak	-0.006	0.044	0.337	0.222
Non response	-0.199 **	0.083	-1.078 **	0.500
Chronic conditions (vs: No)				
Yes	-0.050	0.035	-0.260	0.178
Non response	0.013	0.059	0.003	0.255
Long term affection (vs: No): Yes	0.042	0.050	0.139	0.246
Educational level (vs: primary school or drop out)				
Secondary school 1	-0.060	0.063	-0.402	0.337
Secondary school 2	0.019	0.067	-0.095	0.346
University degree	0.026	0.072	-0.187	0.376
Other or non response	-0.065	0.201	-0.631	1.171
Social class (vs: elementary jobs)				
Farmer	0.007	0.123	-0.591	0.621
Craftmen	0.021	0.061	0.294	0.335
Manager	0.110 *	0.058	0.598 **	0.301
Associate prof.	0.063	0.046	0.627 ***	0.225
Office worker	0.082 **	0.037	0.502 ***	0.193
Inactive	-0.052	0.058	-0.199	0.329
Income (vs: 1st quintile)				
2nd quintile	0.049	0.038	-0.014	0.191
3rd quintile	0.014	0.042	0.171	0.218
4th quintile	0.073	0.050	0.237	0.255
5th quintile	0.039	0.058	0.056	0.279
Non response	-0.059	0.046	-0.277	0.247
Insurance situation (vs: No complementary health coverage)				
Private complementary health coverage	0.272 ***	0.079	2.242 ***	0.376
Means-tested complementary health coverage	0.229 ***	0.081	2.089 ***	0.395
Living in couple	0.014	0.036	0.285 *	0.171
Adulthood physician density				
Dens. of GP's in sector 1	0.000	0.002	0.002	0.009
Dens. of GP's in sector 2	-0.002	0.004	0.013	0.021

Dens. of specialists in sector 1	0.001	0.001	0.005	0.006
Dens. of specialists in sector 2	0.002 *	0.001	0.009 **	0.004
Adulthood region (vs: Parisian region)				
Bassin parisien	-0.074	0.067	-0.072	0.351
North	-0.043	0.102	-0.090	0.475
East	-0.029	0.084	0.431	0.442
West	-0.062	0.071	-0.037	0.369
South west	0.010	0.088	0.138	0.441
East Centre	-0.074	0.070	-0.687 *	0.381
Mediterranean	-0.060	0.101	-0.007	0.516
Parental variables				
Father's education level (vs: primary school or drop out)				
Secondary school 1	-0.032	0.035	-0.100	0.175
Secondary school 2	0.003	0.058	-0.071	0.276
University degree	-0.008	0.056	-0.085	0.309
Other or non response	-0.026	0.042	-0.068	0.220
Father's social class (vs: elementary jobs)				
Farmer	0.018	0.049	0.252	0.267
Craftmen	-0.110 **	0.049	-0.287	0.238
Manager	-0.022	0.048	0.242	0.272
Associate prof.	-0.032	0.045	0.149	0.216
Office worker	-0.059	0.051	-0.304	0.243
No male head or non response	-0.108 **	0.048	-0.633 **	0.275
Mother's education level (vs: primary school or drop out)				
Secondary school 1	-0.034	0.034	-0.153	0.172
Secondary school 2	0.002	0.051	0.077	0.225
University degree	0.018	0.056	-0.099	0.275
Other or non response	0.005	0.043	-0.166	0.220
Mother's activity (vs: active): Inactive	0.028	0.032	-0.035	0.157
Family financial situation (vs: very difficult)				
Very comfortable	-0.051	0.071	-0.198	0.374
Comfortable	0.016	0.058	-0.247	0.287
Difficult	0.059	0.058	-0.118	0.288
Non response	0.051	0.141	0.171	0.679
Parental health status (vs: very good, good, fair)				
Father poor or very poor health	-0.069	0.050	-0.626 **	0.247
Mother poor or very poor health	-0.060	0.049	-0.593 **	0.263
Childhood physician density				
Density of GP's	-0.006 ***	0.002	-0.019 *	0.010
Density of specialists	0.004 **	0.002	0.013 *	0.008
Birth region (vs: Parisian region)				
Bassin parisien	0.061	0.096	0.400	0.466
North	0.136	0.115	0.455	0.535
East	-0.001	0.093	-0.011	0.479
West	0.143	0.095	0.694	0.441
South west	0.105	0.099	0.547	0.450
East Centre	0.112	0.088	0.915 **	0.454
Mediterranean	0.203 **	0.092	0.740 *	0.437
Non Metropolitan France	-0.241 *	0.145	-0.596	0.740
Parental habit during childhood (vs: See a doctor right away)				
Wait before visiting	-0.025	0.042	-0.280	0.221
Self-care behavior	-0.069 *	0.040	0.059	0.230
Use of alternative medicine	-0.036	0.049	-0.420 *	0.249
Obs.	1944		1944	
Pseudo R^2	0.0920			

Notes: Parental habits correspond to the share of experiences during childhood. Probability of any visit estimated using a logit model; Number of visits estimated using a negative binomial model ; Clustered on household membership (1099 households). Legend: * p<0.1; ** p<0.05; *** p<0.01.

Chapitre 4

Inequality of opportunity in health and the principle of natural reward: evidence from European countries

This chapter corresponds to a forthcoming publication in *Research on Economic Inequality*, Volume 21 : Health and Inequality, Pedro Rosa Dias and Owen O'Donnell (eds), Emerald Group Publishing. This study has been co-written with Florence Jusot, Sandy Tubeuf and Alain Trannoy.

RÉSUMÉ

Ce chapitre a pour objectif de mesurer et de comparer les inégalités des chances en santé entre les pays européens. Deux positions normatives concurrentes quant au traitement de la corrélation entre effort, mesuré par les comportements à risque, et circonstances, mesurées par les conditions de vie dans l'enfance, défendues par Brian Barry et John Roemer sont étudiées. Cette étude propose des analyses de régression et plusieurs mesures d'inégalités des chances. Les analyses sont conduites à partir des données de l'enquête rétrospective SHARELIFE qui s'intéresse au parcours de vie des européens de 50 ans et plus.

Les inégalités des chances en Europe considérée dans son ensemble représentent presque 50% des inégalités de santé dues aux circonstances et aux efforts dans le scenario de Barry et 57,5% dans celui de Roemer. La comparaison de l'importance des inégalités des chances en santé entre les pays européens montre d'importantes inégalités en Autriche, France, Espagne et Allemagne alors que la Suède, la Pologne, la Belgique, les Pays-Bas, et la Suisse présentent des inégalités des chances plus faibles. La position normative concernant le traitement de la corrélation entre efforts et circonstances apparaît peu importante en Espagne, Autriche, Grèce, France et République Tchèque, Suède et Suisse alors qu'elle est plus importante en Belgique, aux Pays-Bas, en Italie, en Allemagne, en Pologne et au Danemark.

Dans la plupart des pays, les inégalités des chances en santé sont principalement dues au milieu social d'origine qui affecte la santé à l'âge adulte directement, ce qui nécessiterait des politiques publiques compensant directement les faibles conditions initiales. D'autre part, nos résultats suggèrent un important déterminisme social et familial des comportements de santé en Belgique, aux Pays-Bas, en Italie, en Allemagne, en Pologne et au Danemark, ce qui accentue les inégalités des chances dans ces pays et appelle à des politiques plus ciblées.

ABSTRACT

This paper aims to quantify and compare inequalities of opportunity in health across European countries considering two alternative normative ways of treating the correlation between effort, as measured by lifestyles, and circumstances, as measured by parental and childhood characteristics, championed by Brian Barry and John Roemer. This study relies on regression analysis and proposes several measures of inequality of opportunity. Data from the Retrospective Survey of SHARELIFE, which focuses on life histories of European people aged 50 and over, are used.

In Europe at the whole, inequalities of opportunity stand for almost 50% of the health inequality due to circumstances and efforts in Barry scenario and 57.5% in Roemer scenario. The comparison of the magnitude of inequalities of opportunity in health across European countries shows considerable inequalities in Austria, France, Spain, and Germany, whereas Sweden, Poland, Belgium, the Netherlands, and Switzerland present the lowest inequalities of opportunity. The normative principle on the way to treat the correlation between circumstances and efforts makes little difference in Spain, Austria, Greece, France, Czech Republic, Sweden, and Switzerland, whereas it would matter the most in Belgium, the Netherlands, Italy, Germany, Poland, and Denmark.

In most countries, inequalities of opportunity in health are mainly driven by social background affecting adult health directly, and so would require policies compensating for poorer initial conditions. On the other hand, our results suggest a strong social and family determinism of lifestyles in Belgium, the Netherlands, Italy, Germany, Poland, and Denmark, which emphasises the importance of inequalities of opportunity in health within those countries and calls for targeted prevention policies.

4.1. Introduction

Inspired by the philosophical concept of equality of opportunity developed by Dworkin (1981), Arneson (1989), Cohen (1989), Roemer (1998), and Fleurbaey (2008), a number of recent publications in health economics have focused on drawing the line between legitimate and illegitimate causes of health inequalities (Sen, 2002; Fleurbaey, 2006; Rosa-Dias and Jones, 2007; Rosa-Dias, 2009; Fleurbaey and Schokkaert, 2009; Rosa-Dias, 2010; Trannoy et al., 2010; Tubeuf et al., 2012; Fleurbaey and Schokkaert, 2012; Garcia Gomez et al., 2012 ; Jusot et al., 2013). The main argument is that differences in observed health outcomes are explained by factors for which the individual can be held responsible, called effort, such as healthy lifestyles, and by factors for which the individual should not be held responsible, called circumstances, such as social and family background. The distinction between efforts and circumstances is at the core of the implementation of equality of opportunity policies and is based on the concept of individual responsibility. Equality of opportunity principles recommend first to respect the impact of individual responsibility, namely effort, on the outcome; this is the principle of natural reward, and second to compensate the impact of characteristics independent of individual responsibility, namely circumstances; this is the principle of compensation (Fleurbaey, 1995). One requires therefore distinguishing the respective contributions of efforts and circumstances to overall health inequalities, so that policy-makers are able to identify the effort which should be rewarded and the circumstances that should be compensated. The challenge when doing so is that the two components cannot be assumed to be independent and one needs to decide how the correlation between efforts and circumstances should be treated. Two main alternative views have been debated in the literature within this context (for a more extensive presentation of debates on the distinction between legitimate and illegitimate inequalities in health, see Fleurbaey and Schokkaert, 2012). According to Roemer (1998) effort should be respected inasmuch as effort is disembodied from the impact of circumstances; in other words the correlation between efforts and circumstances is considered as circumstances and is independent from individual responsibility. On the other hand, according to Barry (transcription of Barry position according to Roemer, 1998 page 21; Barry, 2005) effort should be entirely rewarded and the correlation of effort and circumstances does not require to be acknowledged. To illustrate the debate, let us consider

the case of smokers; would we hold sons of smokers less responsible to smoke than sons of non-smokers? From Roemer viewpoint, sons of smokers are less responsible than sons of non-smokers; from Barry viewpoint, parental circumstances are not relevant and sons of smokers are as responsible as sons of non-smokers for smoking. According to the viewpoint adopted, the magnitude of inequalities of opportunity in smoking will differ and this will have important implications on the implementation of the principle of natural reward and the principle of compensation. Empirical applications of this debate remain scarce (Jusot et al., 2013) and this issue has never been considered at the European-level. In the case of France, Jusot et al. (2013) have shown that inequalities of opportunity represent about 46% of observed health inequalities regardless of the normative viewpoint adopted. They concluded that the philosophical view on the correlation between efforts and circumstances does not matter empirically and the share of inequality related to circumstances is very large in comparison with the share of inequalities related to efforts in France.

This paper quantifies and compares inequality of opportunity in health in different European countries and assess whether it empirically matters to adopt Barry or Roemer view on the magnitude of inequalities of opportunity in each of these countries. In particular, the paper investigates whether the correlation between effort and circumstances differ from one country to another. We use data from the Retrospective Survey of SHARELIFE, which focuses on life histories of European people aged 50 and over in 2008/2009.

A large strand of recent European studies have shown persistent socioeconomic health inequalities on general population data (van Doorslaer and Koolman, 2004; Hernandez-Quevedo et al., 2007; Mackenbach et al., 2008), as well as on sample of older adults (Crimmins and Cambois, 2003; Masseria et al., 2006). Most of them have highlighted the importance of social aspects in the explanation of systematic differences in health status using various contemporary socioeconomic indicators, such as education, income, occupation, wealth, etc. and only one study have investigated the contribution of family and social background to socioeconomic inequalities in health in Europe (Tubeuf and Jusot, 2011). Based on the first wave of the Survey of Health Ageing and Retirement Survey, Jusot

et al. (2009, 2010) have compared inequalities of opportunity in health due to a small set of circumstances across European countries. As effort variables were not considered, this study only provided a partial picture of inequalities of opportunity in health and did not allow disentangling illegitimate and legitimate sources of inequalities.

Our results show differences in inequalities of opportunity across European countries with larger inequalities in Austria, France, Spain, and Germany, and lower inequalities in Sweden, Poland, Belgium, the Netherlands, and Switzerland. The share of inequalities of opportunity in health inequalities due to circumstances and efforts varies from 30% in the less unequal countries to 80% in the most unequal countries, whereas it represents 50% at the aggregate level. The way the correlation between efforts and circumstances is changing the measure of inequalities of opportunity also varies between countries where the difference between the alternative scenarios is not significant such as Switzerland and Sweden and countries where adopting a Roemerian approach matters more and induces a maximum of about 20% increase of the measurement of inequalities of opportunity. At the aggregate level, the difference between the alternative scenarios represents an increase of 16.8% in the Roemer measure of inequalities of opportunity comparing to the Barry measure.

The remainder of the paper is as follows. Section 4.2 presents the methods and in particular the econometric model, section 4.3 describes the data, section 4.4 presents results on the explanatory factors of overall health inequalities in Europe and focuses on the findings on inequalities of opportunity in health between European countries. A discussion and concluding remarks form the final section.

4.2. Methods

We empirically assess how Roemer and Barry respective viewpoints matter for the measurement of inequalities of opportunity in health in Europe using a regression-based methodology as suggested in Jusot et al. (2013). In the first step, reduced-form models are estimated in each country to measure the association between health status and respectively

circumstances and efforts[16]. In the second step, predicted variables are used to measure the magnitude of health inequalities and to compare inequality of opportunity in health between European countries.

4.2.1. Estimation strategy

Let us assume that individual health status H is a function of circumstances C, efforts E, demographic variables D and an error term u:

$$H = f(C, E, D, u) \qquad \text{(Eq. 4.1)}$$

The vector of circumstances C consists of a set of variables beyond individual control related to health status in adulthood such as childhood conditions and family background. The vector of efforts E captures individual responsibility for health, such as lifestyles. Circumstances are considered as a source of illegitimate inequalities and efforts are considered as a source of legitimate inequalities.

The vector of demographic variables D captures biological determinants such as age and sex. Controlling for demographics is essential for international comparisons in order to control for differences in population composition. These biological determinants are circumstances in the very sense of the word. It could also be argued that health differences by age classes reflect the human destiny and everyone will experiment them soon or later over the life cycle. The error term u represents unobserved variables such as unobserved efforts or circumstances as well as luck. If we assume that we have a complete description of all factors, the residual term appeals to pure luck and others random factors (accident for example) which cannot be captured by the other determinants. In a regression, the residual term will be uncorrelated to other factors and its distribution will be even-handed with respect to circumstances as required for equality of opportunity (see Lefranc et al., 2009)[17].

[16]We rely on a reduced form model because we are primarily interested in capturing correlations between health and effort; health and circumstances, and finally effort and circumstances. In particular, we do not include contemporary socioeconomic characteristics among the regressors because they are endogenous and may be correlated with past health, parental characteristics as well as individual effort (See Jusot et al., 2013 for more details).

[17] See Fleurbaey and Schokkaert (2011) for a more precise consideration on the role of luck.

Whether this makes health differences due to biological factors as well as any unobserved variables a legitimate source of health inequality is not straightforward, and we therefore consider that demographics and the error term are two other sources of health inequality.

According to Barry, individual effort has to be fully respected whatever the influence of past circumstances on effort decisions. This position allows directly regressing circumstances and effort variables on health status to measure the correlation between health status and individual effort in health capital investment on the one hand, and the correlation between health status and circumstances on the other. The health status H_{ij} of individual *i* in country *j* within Barry context can then be written as follows:

$$H_{ij} = \lambda_j^B + \alpha_j^B C_{ij} + \beta_j^B E_{ij} + \gamma_j^B D_{ij} + u_{ij} \qquad \text{(Eq. 4.2)}$$

Equation (Eq. 4.2) allows us to test the condition of equality of opportunity in Barry view by testing the equality of $\hat{\alpha}_j^B$ to zero. Independence between C_{ij} and E_{ij} is not required.

According to Roemer (1998), equality of opportunity requires that effort is purged from any contamination coming from circumstances so that it represents pure individual effort. This concept leads us to estimate an auxiliary equation regressing the effort E_{ij} of individual *i* in country *j* against their circumstances C_{ij}. It allows isolating a residual term e_{ij}, the relative efforts, which represent individual efforts purged from any circumstances:

$$E_{ij} = \lambda_j + \delta_j . C_{ij} + e_{ij} \qquad \text{(Eq. 4.3)}$$

We then substitute the vector of actual efforts E_{ij} for the estimated relative efforts $\hat{e}_{ij}$ in the equation of health status (Eq. 4.2) and the health status H_{ij}^R of individual *i* in country *j* within Roemer context can be written in as follows:

$$H_{ij} = \lambda_j^R + \alpha_j^R C_{ij} + \beta_j^R \hat{e}_{ij} + \gamma_j^R D_{ij} + u_{ij} \qquad \text{(Eq. 4.4)}$$

Equation (Eq. 4.4) allows us to test the condition of equality of opportunity in Roemer view by testing the equality of $\hat{\alpha}_j^R$ to zero since C_{ij} and e_{ij} are independent.

We estimate both health equations (Eq. 4.2 and Eq. 4.4) and the auxiliary equation (Eq. 4.3) using linear probability models. These models allow us to have a perfect orthogonalisation of the auxiliary equations and to obtain comparable models in (Eq. 4.2) and (Eq. 4.4) according to the Frisch-Waugh-Lowell theorem. It provides us with $\hat{\beta}_j^B$ in the first health equation (Eq. 4.2) being the same as $\hat{\beta}_j^R$ in the second health equation (Eq. 4.4). However $\hat{\alpha}_j^R$ and $\hat{\alpha}_j^B$ remain different because in Roemer approach the coefficient of circumstances additionally incorporates the indirect effect of circumstances on efforts, which corresponds to the product of the coefficient of efforts in Barry approach and the coefficient of circumstances in the auxiliary equation ($\alpha_j^R = \alpha_j^B + \beta_j^B \delta_j$). We can note that predicted health is the same in the alternative specifications according to Barry or to Roemer as the set of regressors of both models contains the same information.

4.2.2. Inequality measurement

We are interested in quantifying and decomposing the magnitude of health inequality into its components and for this purpose we use the variance. The variance presents a natural decomposition and has properties of consistency, symmetry and independence of the level of disaggregation (Shorrocks, 1982).

Using the previous estimation strategy, we can isolate the four main components of health namely circumstances $\hat{H}_C^k$, efforts $\hat{H}_E^k$, demographics $\hat{H}_D^k$, and residual $\hat{H}_{res}^k$ in each context k = {B (Barry); R (Roemer)}.

The decomposition of the variance of health status $\sigma^2(H)$ is therefore given by:

$$\sigma^2(H) = \text{cov}(\hat{H}_C^k, H) + \text{cov}(\hat{H}_E^k, H) + \text{cov}(\hat{H}_D^k, H) + \text{cov}(\hat{H}_{res}^k, H) \qquad \text{(Eq. 4.5)}$$

We use this decomposition to measure inequalities of opportunities IOP^k and inequalities related to efforts IEF^k. We also propose another measure of inequalities of opportunities as a share of inequalities related to circumstances and efforts SOP^k.

The measure of inequality of opportunities in health IOP^k is simply equal to the component of health inequality related to illegitimate factors, namely circumstances and is written as follows:

$$IOP^k = \text{cov}(\hat{H}_C^k, H) \text{ with } k=B, R \quad \text{(Eq. 4.6)}$$

Similarly, the measure of health inequality related to efforts IEF^k is equal to the component of health inequality related to legitimate factors, namely efforts and is written as follows:

$$IEF^k = \text{cov}(\hat{H}_E^k, H) \text{ with } k=B,R \quad \text{(Eq. 4.7)}$$

The second measure of inequality of opportunities in health SOP^k assesses the magnitude of inequalities of opportunity in health as a share of health inequality explained by the two main sources of interest from a normative point of view, namely efforts and circumstances.

$$SOP^k = \frac{IOP^k}{IOP^k + IEF^k} = \frac{\text{cov}(\hat{H}_C^k, H)}{\text{cov}(\hat{H}_C^k, H) + \text{cov}(\hat{H}_E^k, H)} \text{ with } k=B,R \quad \text{(Eq. 4.8)}$$

In order to compare the extent to which the inequality of opportunity in health varies between Barry and Roemer approaches, we rely on a measure of the difference between the alternative scenarios as follows:

$$Diff^{R-B} = \frac{IOP^R - IOP^B}{IOP^B} \quad \text{(Eq. 4.9)}$$

We note that $Diff^{R-B}$ will be the same regardless of the measure of inequality of opportunities (IOP^k or SOP^k) being considered.

4.2.3. Statistical inference and empirical strategy for the international comparison

A bootstrap procedure is implemented to calculate standard errors for the estimated coefficients within the two health equation of each scenario and standard errors for the various inequality measures taking into account the whole process of estimation using 1,000

replications. This is particularly relevant for the two-step estimation needed for the Roemer scenario as estimated residuals from the auxiliary equations introduced in the main health equation are likely to introduce uncertainty.

Before we undertake the health regression models for each country and each viewpoint, we carry out a pooled health regression at the European-level including country dummies. Comparisons of inequality of opportunity in health across countries are made using IOP^k, IEF^k, and SOP^k as computed separately in each country. The calculation of standard errors allows us to test all inequality measures within each country being equal to zero and to make pairwise comparisons across countries. In particular, unilateral t-tests are undertaken to test the ranking across countries and allow distinguishing three groups of countries: countries having high inequality measure which are never dominated by another country; countries with low inequality measure which never dominate another country, and countries with an intermediate level of inequality measure.

4.3. Data

For the purpose of this study, we mainly use the third wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) which was collected in 2008/09. This wave is called SHARELIFE- the Retrospective Survey- as it focuses on people's life histories and thus provides a unique set of information on circumstances and health status for several European countries. We also use additional information on lifestyles and circumstances collected at Wave 1 in 2004 and Wave 2 in 2006/07. SHARE is a multidisciplinary database representative of the European population aged 50 and over in Scandinavia (Denmark and Sweden), Western Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands), and the Mediterranean countries (Spain, Italy, and Greece), as well as two transition countries (the Czech Republic and Poland). Additional information about the dataset is available in Börsch-Supan et al. (2005).

We consider a sample of 20,946 individuals (9,447 men and 11,499 women) aged between 50 and 80 years old. The variable of interest is health in adulthood as measured by self-assessed health (SAH) in wave 3. Respondents were asked to rate their own health on a five-point categorical scale ranging from poor to excellent health status. We used SAH as a

binary variable taking the value one if the individuals rate their health as "good" or better, and zero if they rate their health less than "good". On the one hand, self-assessed health has been shown to be a good predictor of mortality, morbidity and subsequent use of health care (Idler and Benyamini, 1997) and has largely been used in cross-country comparisons (van Doorslaer and Koolman, 2004; Masseria et al., 2006; Mackenbach et al., 2008; Jusot et al., 2009, 2010; Tubeuf and Jusot, 2011). On the other hand, Jürges (2007) found large cross-country variation in SAH using the 2004 wave of SHARE, with the healthiest respondents living in the Scandinavian countries and the least healthy in Southern Europe. He concluded that differences are partly explained by differences in health status and the remaining part come from reporting styles. Danish and Swedish respondents are found to overrate their health whereas Germans are found to underrate. These results suggest a bias on comparing average health across countries. If we assume that this bias on national average health is not linked to circumstances and efforts, then we can assume that there is no bias on the estimation of the covariances between health and circumstances and efforts, respectively.

Table 4.1 - Distribution of "good" health status across European countries (20,946 observations)

	Percentage
Europe	62.5
Austria (AT)	58.0
Germany (DE)	56.7
Sweden (SW)	70.2
Netherlands (NL)	68.9
Spain (SP)	46.7
Italy (IT)	56.1
France (FR)	62.1
Denmark (DK)	72.3
Greece (GR)	73.3
Switzerland (CH)	79.7
Belgium (BE)	69.4
Czech Republic (CZ)	56.4
Poland (PL)	34.0

Table 4.1 provides the distribution of the sample according to self-assessed health. 62.5% of the European sample reports a good, very good or excellent self-assessed health status. The proportion of individuals reporting a good health status varies from 34% in Poland to 79.7% in Switzerland. Health status also varies within countries; the variance of

self-assessed health is significantly different from zero in each country and ranges from 0.162 in Switzerland to 0.249 in Spain (1st row in Table 4.4)[18].

Three sets of variables are considered in the study: circumstances, efforts and demographics. The set of circumstances includes variables related to parents' characteristics that have been shown to matter for health (Rosa-Dias, 2009, 2010; Trannoy et al., 2010; Tubeuf et al., 2012; Jusot et al., 2013). Effort is proxied by health-related behaviours that are available at wave 1 and wave 2 in SHARE. Table 4.2 presents the descriptive statistics of the sample at European-level.

The vector of circumstances includes a number of social conditions in childhood, parents' longevity and parents' health-related behaviours. Social conditions include the occupation of the main breadwinner during childhood, which is described with the ISCO classification (International Standard Classification of Occupations) into six groups (i) "senior managers and professionals", (ii) "technicians and associate professionals and armed forces", (iii) "office clerks, service and sales workers", (iv) "skilled agricultural and fishery workers", (v) "craftsmen and skilled workers", (vi) "elementary occupations and unskilled workers", and an additional category is added if individuals reported no breadwinner at home during their childhood. Most of the respondents in Europe have a parent who was a skilled agricultural or fishery worker (26.8%), or craftsman or skilled worker (26.2%) whereas only 8.1% of the sample is born from a father who was manager or professional. Social conditions also include the number of books at home when the respondent was a child; this could be used as a proxy of parents' educational level. The number of books at home is a four categories variable starting from a first category with individuals declaring to have none or very few books (0-10 books) to a last category with individuals describing to have enough to fill two or more bookcases (more than 100 books). We also use information on living conditions at home; this included the number of rooms per household member at home when the respondent was 10, the number of facilities available in the accommodation when the respondent was 10 such as having cold running

[18] In the case of a binary indicator, the variance is directly derived from the proportion of individuals who report good health status and is bounded from 0 to 0.25.

water supply or central heating for example. Finally, social conditions include two indicators of financial difficulties during childhood: individual report of economic hardships and report of hunger episodes before the respondent was aged 16. Parental health is also considered and a variable of the longevity of each parent is created using their vital status at the time of the survey in 2008/09 or their age at death when applicable. For deceased parents, we use the national median age at death on the basis of SHARELIFE data and the age at death to divide those parents into two groups: those who died earlier and those who died at the median age or later. As expected on a cohort of respondents aged 50 and over, only 10.4% of the fathers and 26.3% of the mothers are still alive. In addition, we used three parental health-related lifestyles when the respondent was 10: smoking, alcohol problem and particular aspects of health care use. The smoking indicator takes the value one if at least one of the two parents was reported to be a smoker; the alcohol variable takes the value one if at least one of the two parents was reported to have a problem with alcohol; the health care behaviour variable indicates the lack of regular visits to the dentist for their children.

The vector of efforts includes three past lifestyles variables reported in waves 1 or 2: smoking status, obesity status[19] and sedentary lifestyles (defined as binary variables). Smoking status variable takes the value one if the respondent reported to be a current smoker in at least one of the past waves and zero otherwise. Obesity status is constructed using reported height and weight and calculating the body mass index (BMI); it takes the value one if the respondent is obese (BMI higher than 30) in at least one of the past waves and zero otherwise. Sedentary lifestyles are measured using respondent's reported involvement in activities requiring a moderate level of physical energy; it equals one if the respondent reports engaging hardly ever or not at all in activities in one of the past waves and zero otherwise.

[19] There might be a debate on whether obesity can be considered as an individual effort or as an outcome because of its link with nature and nurture. We consider that obesity status captures aggregated effects of lifestyles in our context. This view is supported by public health decision makers such as the NICE. In the NICE guideline (2006) with respect regard to the treatment of obesity, it is stated that "*People choose whether or not to change their lifestyle or agree to treatment. Assessing their readiness to make changes affects decisions on when or how to offer any intervention.*"(page 6).

Table 4.2 - Descriptive statistics at European-level (20,946 observations)

	Percentage
Sex	
Men	45.1
Women	54.9
Age	
50-54	11.5
55-59	21.1
60-64	21.0
65-69	17.9
70-74	15.0
75-80	13.5
Main breadwinner occupation	
Senior managers and professionals	8.1
Technicians, associate professionals and armed forces	6.1
Office clerks, service workers and sales workers	13.5
Skilled agricultural and fishery workers	26.8
Craftsmen and skilled workers	26.2
Elementary occupations and unskilled workers	17.7
No main breadwinner	1.6
Number of books at home :	
None or very few (0-10 books)	43.2
Enough to fill one shelf (11-25 books)	22.6
Enough to fill one bookcase (26-100 books)	21.5
Enough to fill two or more bookcases (more than 100 books)	12.7
Number of rooms per household member (mean)	0.72
Number of facilities at home:	
None	26.7
One	19.7
Two or three	29.0
Four or five	24.6
Period of difficulties during childhood	
Economic hardships	2.3
Hunger	5.9
Parent's longevity	
Mother prematurely deceased	38.6
Mother deceased in later ages	35.2
Mother alive	26.3
Father prematurely deceased	47.6
Father deceased in later ages	42.0
Father alive	10.4
Parent's health-related behaviours	
No regular dentist visits for their children	47.9
Parents' smoking	63.6
Parents' alcohol consumption	8.4
Lifestyle/Effort variables	
Reported smoking status at least once in the past waves	21.3
Obesity at least once in the past waves	18.9
Reported sedentary lifestyles at least once in the past waves	8.7

4.4. Results

The main results of interest of the paper are the cross-country comparisons of the magnitude of inequality of opportunity and of the differences observed by alternative normative viewpoints. We primarily give an overview of the determinants of health inequalities in Europe and in each country commenting the regression analysis results for the health equations in the two alternative viewpoints. We then focus on the results of cross-country differences in inequality of opportunity in health.

4.4.1. Regression Analysis

The results of both linear probability models are presented in Table 4.3 and are provided as coefficients[20] associated to circumstances and efforts on the probability of reporting excellent, very good or good health at the European-level within each scenario (columns 2 and 3). Results of auxiliary equations at the European level are available in Table F.1 in Appendix F. Findings of health equations separately carried out for each country are presented in Table G.1 in Appendix and auxiliary equations for each country are presented in Table F.2 in Appendix F.

There are clear differences in the magnitude of the coefficients of circumstance variables in both scenarios in Europe; the coefficients of circumstances being in average 31% larger in Roemer scenario than in Barry scenario (Table 4.3). However results remain similar in terms of signs and relatively close in terms of significance levels in both specifications. It appears that any circumstances included in the model are significantly associated with the probability of reporting good health in Europe.

Higher social background is strongly and significantly associated with the probability of reporting a good health status. Individuals born in a family where the main breadwinner was a senior manager or professional worker have a probability 5.4 percentage points higher to report a better health status than individuals born of an elementary occupation or an unskilled worker in Barry model. The coefficient reaches 6.1 percentage points in Roemer scenario because of the strong correlation between self-assessed health and obesity indicated in the related auxiliary equation (Appendix F Table F.1). The number of books at home during childhood is also found to be strongly related to a better health status in adulthood as individuals reporting to have had enough books to fill at least one shelf significantly reported a better health status than those reporting none or very few books at

[20] It is important to remind that effort variables are different from a mathematical point of view in each scenario. Actual efforts are measured as dummy variables in Barry model whereas relative efforts are measured as continuous variables in Roemer model. However, according to Frisch-Waugh-Lowell theorem and because we use linear probability models in the auxiliary equation, the coefficients of effort variables are identical in both scenarios. Conversely, circumstances variables are introduced in the same mathematical form in both models but their coefficients differ in Roemer scenario according to the extent to which circumstances are correlated to efforts.

home. Moreover, we note a significant and positive effect of housing characteristics during childhood; the probability of reporting a good health status is increasingly associated with the number of rooms per household members and the number of facilities at home. The coefficients associated with parental education proxy and housing conditions are noticeably higher in Roemer context than in Barry context, which suggest their strong correlation with lifestyles in auxiliary equations (Appendix F Table F.1). Periods of difficulties during childhood also significantly contribute to the probability of reporting a good health status with an 11.7 percentage points decrease in the case of economic hardships and a 5.6 percentage points decrease in the case of hunger episodes. However, despite their strong association with health status, we note a weaker difference in the magnitude of the coefficient across scenarios, due to contradictory correlations with the various lifestyles. Parents' health also drives health disparities: having a father or a mother who died in older ages or who is still alive at the time of the survey is associated with a higher probability of good health status in adulthood. Those associations are particularly large in Roemer scenario due to their strong negative correlation with all lifestyles. For instance, the coefficient associated to having a father died in older age increases from 3.5 percentage points in Barry scenario to 4.1 percentage points in Roemer scenario. Finally, we find a negative and significant effect of parents' poor health-related behaviours such as the lack of regular visits to the dentist for their children, parents' smoking and parents' alcoholic consumption during childhood. As expected, we note an increase in their coefficients in Roemer scenario, parents' poor health-related behaviours being positively correlated to individual poor health-related behaviours.

If we now turn our attention to the coefficients of the three past efforts variables, smoking, being obese and lack of activity are found significantly and negatively associated with good health. The coefficient of sedentary lifestyles is particularly striking as compared to other effort variables. Individuals with weak involvement in physically demanding activities are 20.6 percentage points less likely to report good health. Similarly, obesity is significantly associated with a decrease of 13 percentage points in the probability of being in good health. Finally, smoking is an important determinant of health but the marginal effect is considerably smaller than the previous ones, with a magnitude of 5.6 percentage points.

Table 4.3 - Regressions coefficients of the probability of reporting good health status from Barry and Roemer specifications at the European level (with bootstrapped standard errors)

	Barry specification		Roemer specification	
Sex (ref : Female): Male	0.042***	(0.006)	0.042***	(0.006)
Age (ref : 50-54)				
55-59	-0.025**	(0.011)	-0.025**	(0.010)
60-64	-0.061***	(0.012)	-0.061***	(0.011)
65-69	-0.094***	(0.013)	-0.094***	(0.012)
70-74	-0.140***	(0.014)	-0.140***	(0.013)
75-80	-0.215***	(0.015)	-0.215***	(0.014)
Main breadwinner (ref : Elementary occupations and unskilled workers)				
Senior managers and professionals	0.054***	(0.014)	0.061***	(0.014)
Technicians, associate professionals and armed forces	0.019	(0.015)	0.025	(0.016)
Office clerks, service workers and sales workers	0.029**	(0.012)	0.033***	(0.012)
Skilled agricultural and fishery workers	0.006	(0.010)	0.013	(0.010)
Craftsmen and skilled workers	0.010	(0.010)	0.012	(0.010)
No main breadwinner	0.028	(0.026)	0.027	(0.027)
Number of books at home (ref: None or very few (0-10 books))				
Enough to fill one shelf (11-25 books)	0.049***	(0.009)	0.056***	(0.009)
Enough to fill one bookcase (26-100 books)	0.060***	(0.010)	0.071***	(0.010)
Enough to fill two or more bookcases (more than 100 books)	0.050***	(0.013)	0.058***	(0.013)
Number of room/household member	0.026***	(0.009)	0.037***	(0.009)
Number of facilities (ref: None)				
One	0.005	(0.010)	0.015	(0.010)
Two or three	0.025**	(0.010)	0.032***	(0.010)
Four or five	0.037***	(0.012)	0.046***	(0.012)
Period of difficulties during childhood				
Economic hardships	-0.117***	(0.022)	-0.119***	(0.022)
Hunger	-0.056***	(0.015)	-0.057***	(0.015)
Mother's longevity (ref: mother prematurely deceased)				
Mother deceased in later ages	0.018**	(0.007)	0.024***	(0.008)
Mother alive	0.029***	(0.008)	0.036***	(0.008)
Father's longevity (ref: father prematurely deceased)				
Father deceased in later ages	0.035***	(0.007)	0.041***	(0.007)
Father alive	0.038***	(0.012)	0.047***	(0.011)
Parents' health-related behaviours				
No regular dentist visits for their children	-0.029***	(0.008)	-0.035***	(0.008)
Parents' smoking	-0.017***	(0.007)	-0.019***	(0.007)
Parents' alcohol consumption	-0.066***	(0.012)	-0.072***	(0.012)
Lifestyle variables/residuals				
Smoking	-0.056***	(0.008)	-0.056***	(0.008)
Obesity	-0.130***	(0.008)	-0.130***	(0.008)
Sedentarity	-0.206***	(0.012)	-0.206***	(0.011)
Country (ref: Austria (AT))				
Germany (DE)	-0.064***	(0.022)	-0.064***	(0.022)
Sweden (SW)	0.025	(0.023)	0.025	(0.022)
Netherlands (NL)	0.038*	(0.022)	0.038*	(0.021)
Spain (SP)	-0.076***	(0.023)	-0.076***	(0.022)
Italy (IT)	0.013	(0.022)	0.013	(0.021)
France (FR)	-0.002	(0.022)	-0.002	(0.020)
Denmark (DK)	0.054**	(0.022)	0.054**	(0.021)
Greece (GR)	0.154***	(0.021)	0.154***	(0.020)
Switzerland (CH)	0.129***	(0.023)	0.129***	(0.022)
Belgium (BE)	0.076***	(0.021)	0.076***	(0.020)
Czech Republic (CZ)	-0.069***	(0.022)	-0.069***	(0.023)
Poland (PL)	-0.202***	(0.023)	-0.202***	(0.022)
Constant	0.655***	(0.025)	0.576***	(0.025)
Obs	20946		20946	
R^2	0.143		0.143	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

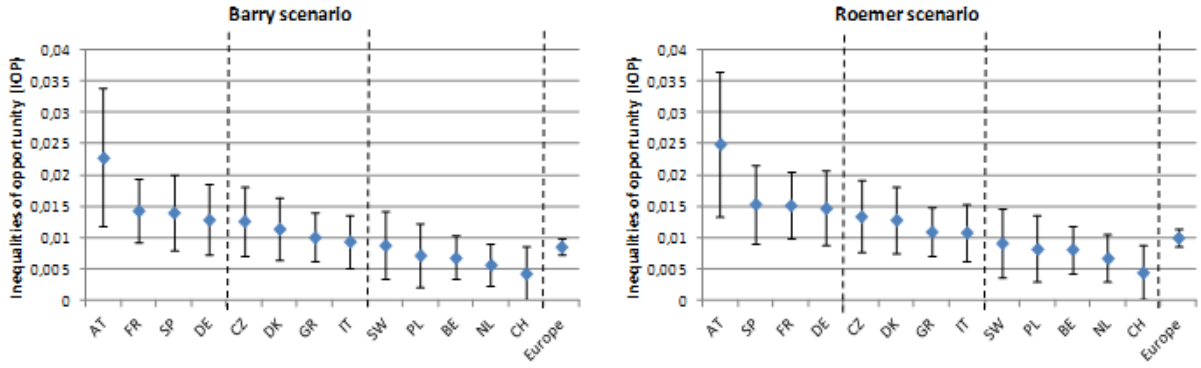
Table G.1 in Appendix G shows the findings of health equations separately conducted in each country in both contexts. Lifestyles are significantly associated with health in most countries. Obesity is significant in all countries except Denmark; adopting sedentary behaviour is significantly associated with poorer health in all countries except Austria and smoking is significant for health in most of the European countries. Conversely, significant circumstances differ from one country to the other and there are also countries where circumstances are not significantly related to health. It is particularly noticeable in Poland and in Switzerland where most of the coefficients of the circumstances are not significantly different from zero. In Barry context, social background matters in most of the countries except in Poland and Switzerland. The association between SAH and parental longevity is found weaker than the association between SAH and social background in most of the countries except in the Netherlands, Denmark and France where parental longevity is strongly related to SAH. We found a weak association between SAH and parental behaviours, excepted in Belgium, Denmark, Greece, Spain, and Poland. It is important to be cautious with those results as the lack of significance in the regression models might also come from a limited statistical power. Consistently with the results found at the European level, coefficients associated with circumstances are higher in Roemer model than in Barry model and this coefficients' increase varies across countries. The increase is particularly large in Germany where the coefficient associated with parental longevity is not significant in Barry context but reaches 5% level significance in Roemer context. We also find a large increase in Belgium and the Netherlands where coefficients associated with the number of books at home are particularly higher in Roemer context than in Barry context.

4.4.2. Inequalities measurement

Using the estimated coefficients of the health equations, we can assess how the magnitude of legitimate health inequalities and illegitimate health inequalities, namely inequalities of opportunity in health, differs between the alternative views. Roemer's view is expected to amplify the magnitude of inequalities of opportunities in health if circumstances associated with poor health status are also associated to unhealthy lifestyles.

Table 4.4 gives the magnitude of health inequalities using the variance of health status and provides then various insights on the differences in magnitude of inequalities of opportunities in health and inequalities related to lifestyles within each scenario for all countries separately as well as for Europe as a whole. We find inequalities of opportunity in health in all countries. When we consider IOP^k regardless of the scenario, inequalities of opportunity are significantly different from zero in all countries. Moreover, the inequality of opportunity in inequalities due to circumstances and efforts (SOP^k) is significantly different from zero in all countries in both scenarios as are the inequalities related to efforts (IEF^k). However there are some differences between countries in the magnitude of these inequalities according to the scenario and the measure being used.

Figure 4.1: Inequalities of opportunity according to Barry and Roemer scenario across European countries (IOP), with 95% confidence intervals



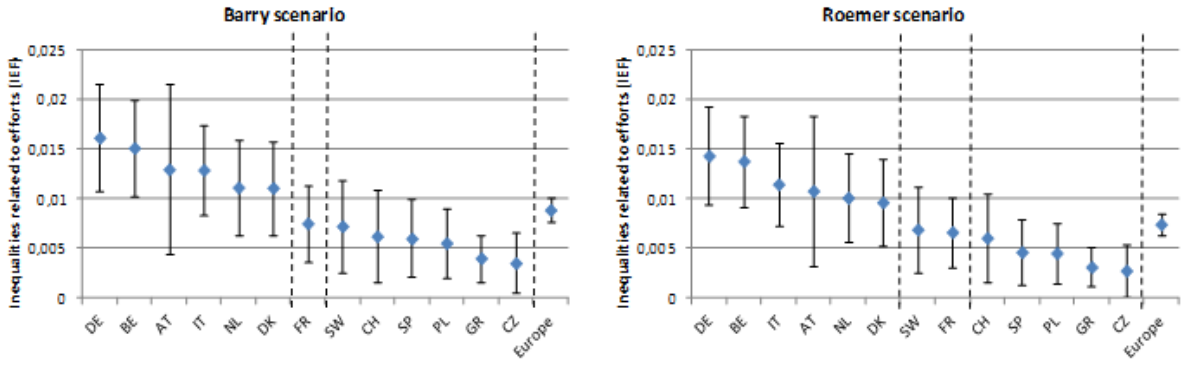
Note: The dashed lines are based on the t-tests values; they divide countries into countries with a high inequality measure which are never dominated by another country, countries with a low inequality measure which never dominate another country, countries with an intermediate inequality measure, and finally inequality at European level.

Figures 4.1 and 4.2 respectively show the magnitude of the inequalities of opportunity IOP^k and of the inequalities related to efforts IEF^k according to Barry and Roemer scenarios in the European countries with confidence intervals obtained from bootstrapped standard errors; the countries are ranked from the most to the least unequal. Figure 3 shows the ranking of countries according to the magnitude of the inequalities of opportunity in health inequalities due to circumstances and efforts SOP^k in both scenarios. Differences between countries are calculated using unilateral t-tests (Tables of results are presented in Appendix H). For each inequality measure, t-tests allow distinguishing three groups of countries separated by the dashed lines in the figures: countries with a high inequality

measure which are never dominated by another country; countries with a low inequality measure which never dominate another country, and countries with an intermediate inequality measure.

According to the Barry scenario, we find that inequalities of opportunity in health when measured with IOP^B are significantly the largest in Austria, France, Spain, and Germany whereas they are the lowest in Sweden, Poland, Belgium, the Netherlands, and Switzerland. Czech Republic, Denmark, Greece, and Italy show an intermediate position. Inequalities of opportunity represent a quite small proportion of the total health inequality; IOP^B as a share of total variance varying from 2.7% in Switzerland and the Netherlands to 9.3% in Austria. Considering inequalities related to efforts (IEF^B), they also vary across countries and are the highest in Germany, Belgium, Austria, Italy, the Netherlands, and Denmark whereas they are the lowest in Sweden, Switzerland, Spain, Poland, Greece, and Czech Republic. France has an intermediate position in this ranking.

Figure 4.2 : Inequalities related to efforts according to Barry and Roemer scenario across European countries (IEF), with 95% confidence intervals



Note: The dashed lines are based on the t-tests values; they divide countries into countries with a high inequality measure which are never dominated by another country, countries with a low inequality measure which never dominate another country, countries with an intermediate inequality measure, and finally inequality at European level.

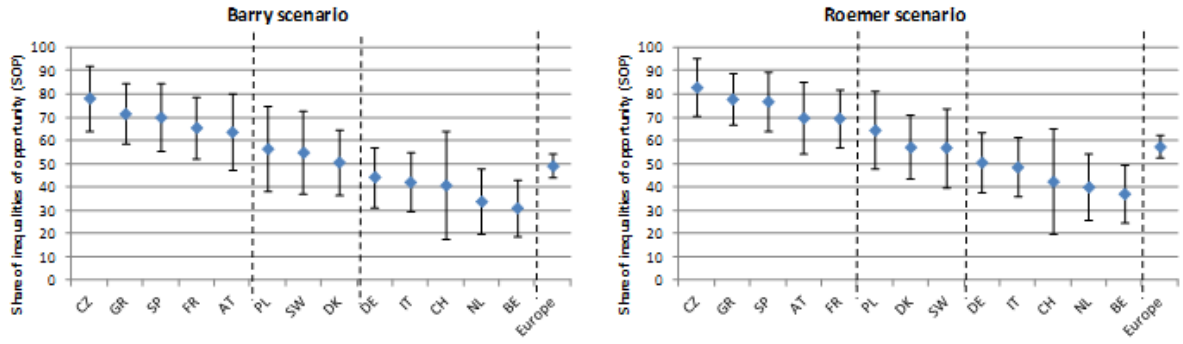
Table 4.4 - Inequalities of opportunity in health and inequalities related to efforts according to Barry and Roemer scenario across European countries

	Europe	AT	DE	SW	NL	ES	IT	FR	DK	GR	CH	BE	CZ	PL
Variance	0.234***	0.244***	0.246***	0.209***	0.214***	0.249***	0.246***	0.236***	0.200***	0.196***	0.162***	0.212***	0.246***	0.225***
	(0.001)	(0.003)	(0.002)	(0.005)	(0.004)	(0.001)	(0.001)	(0.003)	(0.005)	(0.004)	(0.007)	(0.004)	(0.002)	(0.004)
Barry scenario														
IOP^B	0.009***	0.023***	0.013***	0.009***	0.006***	0.014***	0.009***	0.014***	0.011***	0.010***	0.004**	0.007***	0.013***	0.007***
	(0.001)	(0.006)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
IEF^B	0.009***	0.013***	0.016***	0.007***	0.011***	0.006***	0.013***	0.008***	0.011***	0.004***	0.006***	0.015***	0.004**	0.006***
	(0.001)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
SOP^B	49.172***	63.733***	44.395***	54.944***	33.902***	70.044***	42.219***	65.597***	50.727***	71.542***	40.908***	31.111***	78.252***	56.579***
	(2.730)	(8.461)	(6.598)	(9.147)	(7.166)	(7.349)	(6.543)	(6.735)	(7.134)	(6.669)	(11.829)	(6.192)	(7.104)	(9.246)
Roemer scenario														
IOP^R	0.010***	0.025***	0.015***	0.009***	0.007***	0.015***	0.011***	0.015***	0.013***	0.011***	0.004**	0.008***	0.013***	0.008***
	(0.001)	(0.006)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
IEF^R	0.007***	0.011***	0.014***	0.007***	0.010***	0.005***	0.011***	0.007***	0.010***	0.003***	0.006***	0.014***	0.003**	0.005***
	(0.001)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
SOP^R	57.424***	69.804***	50.691***	57.029***	40.093***	76.824***	48.650***	69.584***	57.192***	77.849***	42.480***	37.179***	82.921***	64.520***
	(2.579)	(7.785)	(6.535)	(8.645)	(7.212)	(6.456)	(6.446)	(6.278)	(6.976)	(5.725)	(11.592)	(6.423)	(6.219)	(8.456)
Difference between Roemer and Barry														
$Diff^{R-B}$	16.782***	9.526**	14.181***	3.796	18.261***	9.680***	15.233***	6.078**	12.744***	8.816***	3.843	19.505***	5.967***	14.035***
	(1.570)	(4.314)	(4.118)	(4.167)	(4.828)	(2.926)	(4.127)	(2.405)	(3.532)	(2.617)	(5.407)	(4.617)	(2.172)	(4.610)
N	20946	648	1550	1193	1794	1439	2094	1800	1746	2466	1032	2250	1514	1420

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

If we now turn our attention to the magnitude of inequalities of opportunity in health relative to the sole inequalities which can be classified from a normative point of view, namely circumstances and effort, as measured by SOP^B, the ranking of countries is considerably changing. Inequalities of opportunity in health measured as SOP^B are now significantly larger in Czech Republic, Greece, Spain, France, and Austria, intermediate in Poland, Sweden, and Denmark, and lower in Germany, Italy, Switzerland, the Netherlands, and Belgium. SOP^B equals 30% in Belgium and the Netherlands whereas it equals more than 70% in Spain, Greece and Czech Republic. We can remark that there are two potential explanations for the high level of SOP^B: either having a high value for IOP^B such as in Austria and in France and Spain, or having a small share of inequalities related to efforts IEF^B as observed in Czech Republic and Greece. On the contrary, SOP^B is particularly low in Switzerland, Belgium, the Netherlands because of the small value of IOP^B, and also in Germany because of a large share of inequalities related to efforts (IEF^B).

Figure 4.3: Share of inequalities of opportunity in health inequalities due to circumstances and efforts across European countries according to Barry and Roemer scenario (SOP), with 95% confidence intervals

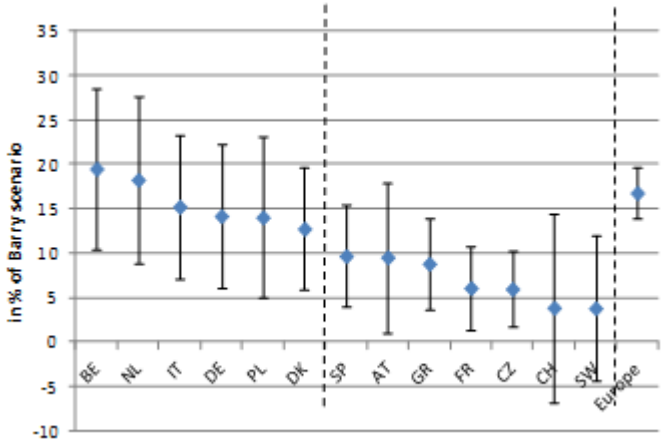


Note: The dashed lines are based on the t-tests values; they divide countries into countries with a high inequality measure which are never dominated by another country, countries with a low inequality measure which never dominate another country, countries with an intermediate inequality measure, and finally inequality at European level.

If we turn to the Roemer scenario, results are very similar in terms of the ranking of countries for the two measures of inequalities of opportunity and for the measure of inequalities related to efforts. The magnitude of inequalities of opportunity is higher in Roemer scenario in most countries, which can be illustrated when computing the difference between the measures between Roemer and Barry scenarios ($Diff^{R-B}$). Figure 4 shows the ranking of the countries according to $Diff^{R-B}$ providing confidence intervals constructed

using bootstrapped standard errors. The difference between the Roemer and Barry scenarios is found significant within most the countries, except in Sweden and in Switzerland where the difference is not significantly different from zero and in France and Austria, the difference is only significant at the 10% level. Using unilateral t-tests of the magnitude of the differences, we can distinguish two groups of countries: countries which are never dominated by another country and countries which never dominate another country. The first group is composed of countries where the difference between normative scenarios is particularly important, e.g. Belgium, the Netherlands, Italy, Germany, Poland and Denmark; in those countries, adopting the Roemer viewpoint leads to an increase of the extent of inequalities of opportunity of more than 10% with comparison to the Barry approach. On the other hand, the second group gathers countries where the difference between scenarios is small or non-significant as it is the case in Spain, Austria, Greece, France, Czech Republic, Switzerland, and Sweden.

Figure 4.4: Relative difference between Barry and Roemer measure of inequalities of opportunity in health across European countries ($Diff^{R-B}$), with 95% confidence intervals



Note: The dashed lines are based on the t-tests values; they divide countries into countries with a high inequality measure which are never dominated by another country, countries with a low inequality measure which never dominate another country, and finally inequality at European level.

Those findings illustrate the strong link between efforts and circumstances within the countries where the difference across scenarios is large, i.e. individuals' efforts (lifestyles) are likely to be strongly determined by circumstances (family and social background). Conversely, the small difference within other countries is either due to a weak correlation between efforts and circumstances or a weak influence of efforts on health status.

If we now turn to the results in Europe as a whole, we find significant inequalities of opportunity in both Barry and Roemer scenarios and for both IOP^k and SOP^k inequality of opportunities indicators. Concerning their magnitude, inequalities of opportunity represent a small proportion of total health inequality; $IOP^B = 3.7\%$ of the total variance in Barry and $IOP^R = 4.3\%$ in Roemer scenario. However, when we compare illegitimate inequalities to the sole inequalities which can be classified from a normative point of view as measured by SOP^k, inequalities in opportunity stand for almost 50% of the health inequality due to circumstances and efforts in the Barry scenario and 57.5% in the Roemer scenario. The difference between Roemer and Barry $Diff^{R-B}$ is significant and represents 16.8% of the health inequality measured in Barry scenario.

4.5. Discussion

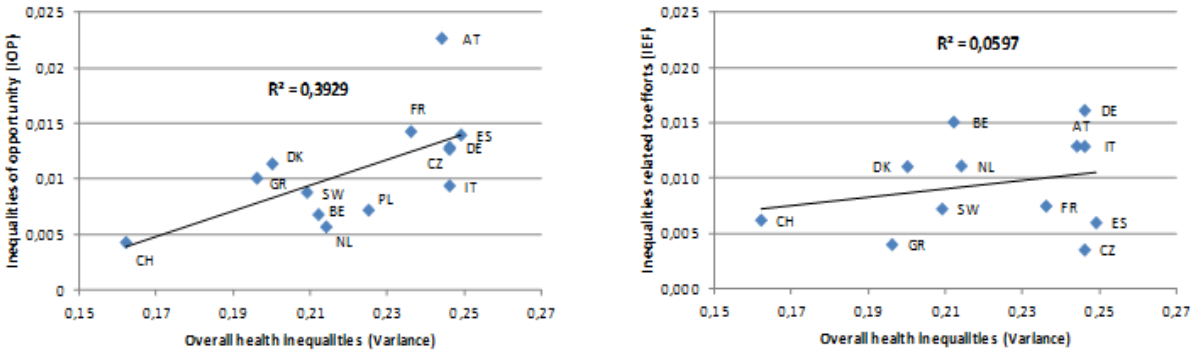
The aim of this paper is to quantify and compare inequalities of opportunity in health in Europe and to assess whether it matters empirically to adopt Barry or Roemer viewpoint on the treatment of the correlation between efforts and circumstances. Our results firstly attest the existence of inequalities of opportunity in health in Europe. Moreover, the comparison of the magnitude of inequalities of opportunity in health across European countries and across scenarios provides interesting results. Inequalities of opportunities are the largest in Austria, France, Spain, and Germany and the lowest in Sweden, Poland, Belgium, the Netherlands and Switzerland. The share of inequalities of opportunity in health inequalities due to circumstances and efforts varies from 30% in the less unequal countries to 70% in the most unequal countries, whereas it represents 50% at the aggregate level. The way the correlation between efforts and circumstances matters for the assessment of inequalities of opportunity also varies across countries. The difference between scenarios is negligible in Switzerland and Sweden but is particularly important in Belgium and the Netherland where taking into account the indirect effect of circumstances through lifestyles induces a 20% increase in inequalities of opportunity.

We have to bear in mind that our study is based on a subjective indicator of health status. As mentioned before, reporting styles will not be problematic for the assessment and the comparison of inequalities of opportunity across countries if reporting biases are

orthogonal to circumstances and to efforts. However, we cannot exclude the existence of such reporting bias. Moreover, our empirical model specification suffers from potential unobserved circumstances and effort variables. It is therefore important to underline that our study is likely to assess only the lower bound of inequality of opportunity in health.

Inequalities of opportunity in Europe represent on average half of the health inequalities due to circumstances and efforts and there are large variations across countries. Moreover, inequalities of opportunity are found to be more correlated to the magnitude of health inequalities than legitimate inequalities. Figure 4.5 explores the relationship between overall health inequality and respectively inequalities of opportunity in health and inequalities related to efforts. It shows a positive correlation between inequalities of opportunity in health and health inequality with a coefficient of correlation of about 0.39. The correlation between inequalities related to efforts and health inequalities is relatively small and is about 0.06. This result is in line with a recent paper that has provided evidence of a positive link between inequalities of opportunity and inequalities of outcomes in the case of income inequalities (Lefranc et al., 2008).

Figure 4.5: Relationship between inequalities of opportunity (IOP) and inequalities related to efforts (IEF) with overall health inequalities (Variance)



The difference induced by the adopted normative viewpoint is more important in countries with high inequalities due to efforts. Conversely, we do not find a general pattern on the relationship between the extent of inequalities of opportunities and the way the correlation between efforts and circumstances matters for the assessment of inequalities of opportunity. Sweden and Switzerland combine low inequalities of opportunities in health and weak differences between Roemer and Barry's viewpoints whereas Germany, Italy,

Spain and Denmark combine high inequalities of opportunity in health and strong differences between Roemer and Barry's viewpoints. However, some countries do not fit with these patterns; Austria, France and Czech Republic show high inequalities of opportunity in health but the two alternative normative viewpoints do not appear to matter much. Finally, Belgium, the Netherlands and Poland do not show very important inequalities of opportunity in health but differences between the two scenarios are considerable.

These results contribute to the debate on whether it is individual health-related behaviours (efforts) or poor past conditions (circumstances) that should be tackled to reduce effectively inequalities of opportunity in health and health inequalities in general. Social background, parents' health and parent's health-related behaviours represent factors beyond the realm of individual responsibility (Roemer, 1998; Fleurbaey, 2008; Fleurbaey and Schokkaert, 2009; Trannoy et al., 2010), they are socially or morally unacceptable sources of inequality and they legitimate public interventions. The recent report of the World Health Organization's Commission on the Social Determinants of Health (Marmot et al., 2008) highlights the role of childhood conditions as primary sources of unfair inequality in health. Causal estimates of the effect of circumstances and efforts on health are required to define precisely the policy interventions that matter to tackle inequality of opportunity and our paper does not explore causality inference. However, given the magnitude of the inequalities of opportunity in health and the strong correlation between social background and health that are observed in each country, our research work recommends improving childhood conditions and equality of opportunity in education and in income acquisition to reduce inequality of opportunity in health.

According to Roemer's viewpoint, targeting determinants of health-related behaviours which are beyond individual responsibility would be also normatively justified. Empirically, the choice between the alternative normative viewpoints about the legitimacy of the correlation between efforts and circumstances seems to matter more in some European countries than in others. This suggests differences in the underlying public health policies that could be put in place to fight against inequalities of opportunity in health. Even if this analysis does not provide causal findings, it suggests a strong social and family determinism

of lifestyles in Belgium, the Netherlands, Italy, Germany, Poland, and Denmark which emphasised the importance of inequalities of opportunity in health within those countries according to the Roemerian approach. In terms of public health and social policies, reducing social reproduction and the intergenerational transmission of unhealthy lifestyles would be appropriate in those countries if they endorse the Roemerian ethical viewpoint on equality of opportunity. On the other hand, Austria, France, Spain, and Czech Republic show high inequalities of opportunities in health mainly driven by social and family background affecting adult health directly, and so those countries would require policies compensating for poorer initial conditions mainly, regardless of the normative point of view adopted.

4.6. Appendices

Appendix F: Auxiliary equations at the European level and across countries

Table F.1 - Regressions coefficients of auxiliary equations at the European level (with bootstrapped standard errors)

	Smoking		Obesity		Sedentarity	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	0.008	(0.013)	-0.055***	(0.013)	-0.001	(0.009)
Technicians, associate professionals and armed forces	-0.002	(0.014)	-0.034**	(0.013)	-0.007	(0.009)
Office clerks, service workers and sales workers	0.015	(0.011)	-0.027***	(0.010)	-0.003	(0.007)
Skilled agricultural and fishery workers	-0.019**	(0.009)	-0.029***	(0.008)	-0.009	(0.006)
Craftsmen and skilled workers	0.009	(0.009)	-0.020**	(0.009)	0.001	(0.006)
No main breadwinner	-0.009	(0.023)	0.003	(0.022)	0.005	(0.016)
Number of books at home (ref: None or very few (0-10 books))						
Enough to fill one shelf (11-25 books)	-0.012	(0.008)	-0.013*	(0.007)	-0.023***	(0.005)
Enough to fill one bookcase (26-100 books)	-0.015*	(0.009)	-0.020**	(0.008)	-0.037***	(0.006)
Enough to fill two or more bookcases (more than 100 books)	0.005	(0.011)	-0.018*	(0.011)	-0.030***	(0.008)
Number of room/household member	-0.020***	(0.007)	-0.035***	(0.007)	-0.027***	(0.005)
Number of facilities (ref: None)						
One	0.002	(0.009)	-0.018**	(0.008)	-0.040***	(0.006)
Two or three	0.036***	(0.008)	-0.034***	(0.008)	-0.022***	(0.006)
Four or five	0.056***	(0.010)	-0.052***	(0.010)	-0.026***	(0.007)
Period of difficulties during childhood						
Economic hardships	-0.025	(0.019)	-0.020	(0.018)	0.029**	(0.013)
Hunger	-0.071***	(0.012)	-0.003	(0.012)	0.024***	(0.008)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.028***	(0.007)	-0.018***	(0.006)	-0.007	(0.005)
Mother alive	0.040***	(0.007)	-0.031***	(0.007)	-0.021***	(0.005)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.036***	(0.006)	-0.016***	(0.006)	-0.011**	(0.004)
Father alive	-0.013	(0.010)	-0.021**	(0.010)	-0.023***	(0.007)
Parents' health-related behaviours						
No regular dentist visits for their children	0.027***	(0.006)	0.006	(0.006)	0.019***	(0.004)
Parents' smoking	0.075***	(0.006)	-0.006	(0.006)	-0.007*	(0.004)
Parents' alcohol consumption	0.043***	(0.010)	0.029***	(0.010)	0.000	(0.007)
Constant	0.164***	(0.012)	0.296***	(0.012)	0.154***	(0.008)
Obs	20946		20946		20946	
R^2	0.024		0.015		0.019	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table F.2 - Regressions coefficients of auxiliary equations across European countries

	Austria (AT)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	0.096	(0.071)	-0.046	(0.081)	-0.065	(0.060)
Technicians, associate professionals and armed forces	-0.046	(0.076)	-0.063	(0.087)	-0.054	(0.065)
Office clerks, service workers and sales workers	-0.077	(0.056)	0.021	(0.064)	-0.061	(0.048)
Skilled agricultural and fishery workers	-0.131***	(0.048)	-0.003	(0.055)	0.010	(0.041)
Craftsmen and skilled workers	-0.074	(0.046)	-0.047	(0.052)	-0.052	(0.039)
No main breadwinner	-0.031	(0.075)	-0.012	(0.086)	-0.081	(0.064)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.067*	(0.037)	0.047	(0.042)	-0.029	(0.031)
Enough to fill one bookcase (26-100 books)	-0.067	(0.045)	0.058	(0.052)	0.011	(0.038)
Enough to fill two or more bookcases (more than 100 books)	-0.009	(0.066)	0.036	(0.076)	0.047	(0.057)
Number of room/household member	0.017	(0.033)	0.012	(0.038)	0.027	(0.028)
Number of facilities (ref: None)						
One	0.062	(0.041)	-0.094**	(0.047)	-0.076**	(0.035)
Two or three	0.029	(0.041)	-0.122**	(0.048)	-0.050	(0.035)
Four or five	0.024	(0.049)	-0.029	(0.057)	-0.054	(0.042)
Period of difficulties during childhood						
Economic hardships	0.064	(0.077)	0.043	(0.089)	-0.035	(0.066)
Hunger	-0.122**	(0.057)	0.004	(0.065)	0.036	(0.048)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.037	(0.033)	0.003	(0.038)	0.030	(0.028)
Mother alive	0.019	(0.045)	-0.035	(0.051)	-0.025	(0.038)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.035	(0.031)	-0.009	(0.036)	-0.063**	(0.026)
Father alive	0.124*	(0.065)	0.032	(0.075)	-0.002	(0.055)
Parents' health-related behaviours						
No regular dentist visits for their children	0.020	(0.031)	-0.014	(0.036)	0.015	(0.027)
Parents' smoking	0.112***	(0.030)	0.064*	(0.034)	0.060**	(0.025)
Parents' alcohol consumption	0.080*	(0.048)	0.158***	(0.056)	0.074*	(0.041)
Constant	0.174***	(0.057)	0.234***	(0.066)	0.141***	(0.049)
Obs	648		648		648	
R^2	0.085		0.043		0.058	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued)- Regressions coefficients of auxiliary equations across European countries

	Germany (DE)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.085*	(0.050)	-0.075	(0.052)	-0.049*	(0.028)
Technicians, associate professionals and armed forces	-0.078	(0.048)	-0.057	(0.050)	0.003	(0.027)
Office clerks, service workers and sales workers	-0.016	(0.040)	-0.083**	(0.041)	-0.027	(0.023)
Skilled agricultural and fishery workers	-0.030	(0.041)	-0.049	(0.043)	-0.020	(0.024)
Craftsmen and skilled workers	-0.027	(0.036)	-0.041	(0.037)	-0.035*	(0.021)
No main breadwinner	-0.014	(0.060)	-0.023	(0.062)	-0.017	(0.034)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.011	(0.026)	0.007	(0.027)	-0.048***	(0.015)
Enough to fill one bookcase (26-100 books)	-0.012	(0.027)	-0.021	(0.028)	-0.041***	(0.016)
Enough to fill two or more bookcases (more than 100 books)	0.020	(0.035)	-0.009	(0.036)	-0.041**	(0.020)
Number of room/household member	-0.037	(0.025)	-0.003	(0.026)	0.010	(0.014)
Number of facilities (ref: None)						
One	0.029	(0.031)	0.005	(0.032)	-0.025	(0.018)
Two or three	0.032	(0.032)	-0.046	(0.033)	-0.011	(0.018)
Four or five	0.100***	(0.036)	-0.048	(0.037)	-0.015	(0.021)
Period of difficulties during childhood						
Economic hardships	0.015	(0.060)	0.028	(0.062)	-0.035	(0.034)
Hunger	-0.057**	(0.028)	0.004	(0.029)	0.001	(0.016)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	0.001	(0.022)	-0.042*	(0.023)	-0.019	(0.013)
Mother alive	0.059**	(0.026)	-0.069***	(0.027)	-0.025*	(0.015)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.014	(0.020)	-0.050**	(0.021)	-0.032***	(0.012)
Father alive	-0.065*	(0.035)	-0.030	(0.036)	-0.024	(0.020)
Parents' health-related behaviours						
No regular dentist visits for their children	0.024	(0.019)	-0.026	(0.020)	-0.006	(0.011)
Parents' smoking	0.097***	(0.020)	-0.049**	(0.020)	0.001	(0.011)
Parents' alcohol consumption	0.083**	(0.035)	0.119***	(0.037)	0.008	(0.020)
Constant	0.118**	(0.047)	0.353***	(0.049)	0.141***	(0.027)
Obs	1550		1550		1550	
R^2	0.046		0.035		0.027	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Sweden (SW)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.009	(0.047)	-0.095**	(0.045)	-0.020	(0.020)
Technicians, associate professionals and armed forces	-0.013	(0.054)	-0.133***	(0.051)	-0.021	(0.023)
Office clerks, service workers and sales workers	0.006	(0.046)	-0.102**	(0.043)	-0.050***	(0.019)
Skilled agricultural and fishery workers	-0.032	(0.041)	-0.098**	(0.039)	-0.032*	(0.017)
Craftsmen and skilled workers	0.021	(0.040)	-0.068*	(0.038)	-0.033*	(0.017)
No main breadwinner	-0.079	(0.101)	0.105	(0.095)	-0.068	(0.043)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.024	(0.035)	0.019	(0.033)	0.002	(0.015)
Enough to fill one bookcase (26-100 books)	-0.045	(0.035)	-0.023	(0.033)	-0.031**	(0.015)
Enough to fill two or more bookcases (more than 100 books)	-0.005	(0.040)	-0.018	(0.038)	-0.021	(0.017)
Number of room/household member	0.093***	(0.025)	-0.053**	(0.024)	-0.003	(0.011)
Number of facilities (ref: None)						
One	0.051	(0.043)	0.048	(0.041)	-0.004	(0.018)
Two or three	-0.015	(0.045)	-0.001	(0.043)	-0.006	(0.019)
Four or five	0.035	(0.040)	-0.004	(0.038)	-0.006	(0.017)
Period of difficulties during childhood						
Economic hardships	0.161*	(0.097)	0.005	(0.092)	-0.000	(0.041)
Hunger	-0.130	(0.100)	-0.212**	(0.094)	0.027	(0.042)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.004	(0.025)	-0.041*	(0.024)	-0.013	(0.011)
Mother alive	0.037	(0.027)	0.011	(0.026)	-0.003	(0.012)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.021	(0.023)	-0.003	(0.021)	-0.004	(0.010)
Father alive	0.098***	(0.037)	-0.007	(0.035)	-0.010	(0.016)
Parents' health-related behaviours						
No regular dentist visits for their children	0.052	(0.035)	0.005	(0.033)	0.013	(0.015)
Parents' smoking	0.021	(0.022)	-0.018	(0.021)	0.000	(0.009)
Parents' alcohol consumption	-0.030	(0.039)	0.042	(0.037)	-0.021	(0.017)
Constant	0.059	(0.054)	0.287***	(0.051)	0.085***	(0.023)
Obs	1193		1193		1193	
R^2	0.051		0.036		0.022	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Netherlands (NL)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	0.010	(0.043)	-0.021	(0.037)	-0.050**	(0.025)
Technicians, associate professionals and armed forces	-0.029	(0.047)	0.044	(0.040)	-0.049*	(0.028)
Office clerks, service workers and sales workers	-0.074*	(0.041)	0.011	(0.036)	-0.044*	(0.025)
Skilled agricultural and fishery workers	-0.028	(0.039)	-0.041	(0.034)	-0.038*	(0.023)
Craftsmen and skilled workers	0.026	(0.035)	0.003	(0.030)	-0.026	(0.021)
No main breadwinner	-0.179**	(0.075)	0.014	(0.065)	0.024	(0.044)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.078***	(0.027)	-0.026	(0.023)	-0.007	(0.016)
Enough to fill one bookcase (26-100 books)	-0.052*	(0.028)	-0.044*	(0.024)	-0.038**	(0.016)
Enough to fill two or more bookcases (more than 100 books)	-0.068**	(0.034)	-0.028	(0.030)	-0.004	(0.020)
Number of room/household member	-0.016	(0.029)	0.031	(0.025)	-0.011	(0.017)
Number of facilities (ref: None)						
One	0.066	(0.052)	-0.029	(0.045)	-0.037	(0.031)
Two or three	0.076	(0.050)	-0.048	(0.043)	-0.025	(0.030)
Four or five	0.088	(0.058)	-0.083*	(0.050)	-0.021	(0.034)
Period of difficulties during childhood						
Economic hardships	0.068	(0.146)	-0.041	(0.127)	0.178**	(0.087)
Hunger	-0.129***	(0.043)	-0.031	(0.037)	0.005	(0.025)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.059***	(0.022)	-0.040**	(0.019)	0.002	(0.013)
Mother alive	-0.009	(0.026)	-0.034	(0.023)	-0.006	(0.016)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.028	(0.021)	-0.011	(0.018)	-0.009	(0.012)
Father alive	-0.048	(0.036)	-0.035	(0.031)	-0.007	(0.021)
Parents' health-related behaviours						
No regular dentist visits for their children	-0.008	(0.024)	0.031	(0.021)	0.002	(0.014)
Parents' smoking	0.067**	(0.028)	0.030	(0.024)	-0.005	(0.016)
Parents' alcohol consumption	0.152***	(0.046)	0.013	(0.040)	0.037	(0.027)
Constant	0.205***	(0.064)	0.198***	(0.055)	0.150***	(0.038)
Obs	1794		1794		1794	
R^2	0.043		0.016		0.017	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Spain (SP)					
	Smoking		Obesity		Sedentarity	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	0.097	(0.063)	-0.084	(0.074)	0.047	(0.056)
Technicians, associate professionals and armed forces	0.030	(0.052)	-0.084	(0.061)	-0.042	(0.046)
Office clerks, service workers and sales workers	0.014	(0.037)	-0.001	(0.044)	-0.012	(0.033)
Skilled agricultural and fishery workers	-0.031	(0.025)	-0.048	(0.030)	-0.009	(0.023)
Craftsmen and skilled workers	0.012	(0.029)	-0.015	(0.035)	-0.001	(0.026)
No main breadwinner	-0.051	(0.099)	-0.043	(0.117)	-0.053	(0.089)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	0.022	(0.027)	-0.008	(0.032)	0.032	(0.024)
Enough to fill one bookcase (26-100 books)	-0.002	(0.037)	-0.033	(0.044)	-0.039	(0.033)
Enough to fill two or more bookcases (more than 100 books)	-0.041	(0.048)	-0.069	(0.057)	-0.006	(0.043)
Number of room/household member	0.002	(0.025)	-0.063**	(0.030)	-0.025	(0.023)
Number of facilities (ref: None)						
One	0.021	(0.027)	-0.008	(0.032)	-0.060**	(0.024)
Two or three	0.084***	(0.027)	-0.045	(0.032)	-0.020	(0.025)
Four or five	0.153***	(0.040)	-0.052	(0.047)	0.003	(0.036)
Period of difficulties during childhood						
Economic hardships	-0.043	(0.050)	0.010	(0.060)	0.023	(0.046)
Hunger	-0.024	(0.032)	-0.013	(0.038)	0.035	(0.029)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.039*	(0.022)	-0.033	(0.027)	-0.026	(0.020)
Mother alive	0.066**	(0.028)	-0.067**	(0.033)	-0.001	(0.025)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.055***	(0.021)	0.008	(0.025)	-0.010	(0.019)
Father alive	-0.075*	(0.039)	0.012	(0.046)	-0.067*	(0.035)
Parents' health-related behaviours						
No regular dentist visits for their children	-0.008	(0.032)	0.062	(0.038)	0.051*	(0.029)
Parents' smoking	0.037*	(0.021)	0.022	(0.025)	-0.005	(0.019)
Parents' alcohol consumption	0.078**	(0.037)	0.015	(0.044)	0.014	(0.034)
Constant	0.138***	(0.043)	0.309***	(0.051)	0.135***	(0.039)
Obs	1439		1439		1439	
R^2	0.060		0.030		0.020	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Italy (IT)					
	Smoking		Obesity		Sedentarity	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	0.088	(0.056)	0.005	(0.057)	0.031	(0.054)
Technicians, associate professionals and armed forces	0.064	(0.044)	-0.012	(0.045)	-0.004	(0.042)
Office clerks, service workers and sales workers	0.073**	(0.030)	0.001	(0.030)	0.079***	(0.028)
Skilled agricultural and fishery workers	0.000	(0.021)	-0.026	(0.022)	0.007	(0.020)
Craftsmen and skilled workers	0.055**	(0.027)	-0.032	(0.027)	0.013	(0.026)
No main breadwinner	-0.026	(0.079)	-0.089	(0.080)	0.040	(0.075)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.015	(0.026)	-0.063**	(0.026)	-0.061**	(0.025)
Enough to fill one bookcase (26-100 books)	0.003	(0.034)	-0.102***	(0.035)	-0.048	(0.033)
Enough to fill two or more bookcases (more than 100 books)	-0.062	(0.054)	-0.106*	(0.055)	-0.054	(0.052)
Number of room/household member	-0.003	(0.026)	-0.033	(0.026)	-0.060**	(0.025)
Number of facilities (ref: None)						
One	0.002	(0.025)	-0.028	(0.025)	-0.011	(0.024)
Two or three	0.063***	(0.023)	0.005	(0.023)	0.021	(0.022)
Four or five	0.093***	(0.031)	0.001	(0.031)	0.013	(0.030)
Period of difficulties during childhood						
Economic hardships	-0.028	(0.046)	-0.061	(0.046)	0.096**	(0.044)
Hunger	0.004	(0.032)	0.012	(0.032)	-0.018	(0.030)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.033*	(0.019)	-0.029	(0.019)	-0.010	(0.018)
Mother alive	0.036	(0.023)	-0.010	(0.023)	-0.060***	(0.022)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.015	(0.018)	-0.023	(0.018)	-0.024	(0.017)
Father alive	-0.028	(0.034)	-0.062*	(0.034)	-0.013	(0.032)
Parents' health-related behaviours						
No regular dentist visits for their children	0.038	(0.023)	0.017	(0.023)	0.038*	(0.022)
Parents' smoking	0.048***	(0.018)	0.009	(0.018)	0.003	(0.017)
Parents' alcohol consumption	0.018	(0.028)	-0.021	(0.029)	-0.002	(0.027)
Constant	0.082**	(0.036)	0.251***	(0.036)	0.180***	(0.034)
Obs	2094		2094		2094	
R^2	0.032		0.017		0.022	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	France (FR)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.047	(0.037)	-0.045	(0.039)	0.030	(0.031)
Technicians, associate professionals and armed forces	-0.034	(0.036)	-0.070*	(0.037)	0.011	(0.030)
Office clerks, service workers and sales workers	-0.007	(0.032)	-0.015	(0.034)	0.028	(0.027)
Skilled agricultural and fishery workers	-0.044	(0.027)	-0.081***	(0.028)	-0.000	(0.022)
Craftsmen and skilled workers	-0.014	(0.026)	-0.025	(0.027)	0.009	(0.022)
No main breadwinner	-0.019	(0.095)	-0.065	(0.099)	0.213***	(0.079)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.008	(0.023)	-0.021	(0.024)	-0.033*	(0.019)
Enough to fill one bookcase (26-100 books)	-0.005	(0.026)	-0.026	(0.027)	-0.060***	(0.022)
Enough to fill two or more bookcases (more than 100 books)	0.026	(0.032)	-0.010	(0.034)	-0.054**	(0.027)
Number of room/household member	-0.002	(0.022)	-0.010	(0.023)	-0.010	(0.019)
Number of facilities (ref: None)						
One	0.031	(0.026)	0.025	(0.028)	-0.012	(0.022)
Two or three	0.055**	(0.027)	-0.006	(0.028)	-0.017	(0.023)
Four or five	0.128***	(0.030)	-0.039	(0.031)	-0.002	(0.025)
Period of difficulties during childhood						
Economic hardships	-0.078	(0.061)	-0.103	(0.064)	0.004	(0.051)
Hunger	-0.032	(0.036)	0.008	(0.038)	0.055*	(0.030)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.036*	(0.021)	0.015	(0.022)	-0.023	(0.018)
Mother alive	-0.004	(0.021)	0.013	(0.022)	-0.007	(0.018)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.043**	(0.019)	-0.029	(0.020)	-0.016	(0.016)
Father alive	-0.031	(0.027)	-0.028	(0.028)	-0.038*	(0.022)
Parents' health-related behaviours						
No regular dentist visits for their children	0.023	(0.018)	0.028	(0.019)	-0.005	(0.015)
Parents' smoking	0.041**	(0.017)	-0.053***	(0.018)	-0.013	(0.014)
Parents' alcohol consumption	-0.026	(0.028)	0.035	(0.029)	-0.018	(0.023)
Constant	0.122***	(0.037)	0.249***	(0.038)	0.158***	(0.031)
Obs	1800		1800		1800	
R^2	0.034		0.026		0.018	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued)- Regressions coefficients of auxiliary equations across European countries

	Danemark (DK)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.103**	(0.042)	-0.075**	(0.032)	0.029	(0.019)
Technicians, associate professionals and armed forces	-0.027	(0.057)	-0.061	(0.043)	0.012	(0.026)
Office clerks, service workers and sales workers	-0.063*	(0.038)	-0.031	(0.029)	-0.003	(0.018)
Skilled agricultural and fishery workers	-0.143***	(0.033)	-0.030	(0.025)	-0.029*	(0.015)
Craftsmen and skilled workers	-0.101***	(0.034)	-0.040	(0.026)	0.006	(0.016)
No main breadwinner	-0.145	(0.157)	-0.038	(0.121)	0.085	(0.073)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.066**	(0.033)	-0.048*	(0.026)	0.016	(0.016)
Enough to fill one bookcase (26-100 books)	-0.037	(0.032)	-0.071***	(0.025)	0.011	(0.015)
Enough to fill two or more bookcases (more than 100 books)	-0.034	(0.036)	-0.059**	(0.028)	0.008	(0.017)
Number of room/household member	0.028	(0.028)	-0.014	(0.021)	-0.027**	(0.013)
Number of facilities (ref: None)						
One	-0.009	(0.041)	0.033	(0.032)	-0.048**	(0.019)
Two or three	-0.015	(0.042)	0.037	(0.032)	-0.042**	(0.019)
Four or five	0.004	(0.041)	0.013	(0.031)	-0.042**	(0.019)
Period of difficulties during childhood						
Economic hardships	-0.126	(0.115)	0.215**	(0.088)	-0.000	(0.054)
Hunger	0.003	(0.141)	0.179*	(0.108)	0.141**	(0.065)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.051**	(0.025)	-0.005	(0.019)	0.010	(0.012)
Mother alive	-0.031	(0.028)	-0.020	(0.021)	-0.013	(0.013)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.078***	(0.023)	-0.011	(0.018)	0.005	(0.011)
Father alive	-0.035	(0.036)	0.047*	(0.027)	0.016	(0.017)
Parents' health-related behaviours						
No regular dentist visits for their children	0.046*	(0.027)	-0.004	(0.021)	0.020	(0.013)
Parents' smoking	0.059**	(0.028)	0.004	(0.022)	0.011	(0.013)
Parents' alcohol consumption	0.054	(0.036)	0.102***	(0.028)	0.006	(0.017)
Constant	0.361***	(0.053)	0.198***	(0.041)	0.081***	(0.025)
Obs	1746		1746		1746	
R^2	0.038		0.036		0.023	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Greece (GR)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.003	(0.052)	-0.011	(0.046)	-0.012	(0.026)
Technicians, associate professionals and armed forces	0.067	(0.062)	-0.031	(0.055)	-0.035	(0.031)
Office clerks, service workers and sales workers	0.021	(0.036)	-0.050	(0.032)	-0.017	(0.018)
Skilled agricultural and fishery workers	-0.086***	(0.029)	0.016	(0.026)	-0.014	(0.015)
Craftsmen and skilled workers	0.010	(0.036)	-0.023	(0.032)	-0.034*	(0.018)
No main breadwinner	0.038	(0.079)	0.083	(0.069)	0.011	(0.039)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.003	(0.024)	-0.006	(0.021)	-0.009	(0.012)
Enough to fill one bookcase (26-100 books)	-0.019	(0.036)	0.018	(0.031)	-0.028	(0.018)
Enough to fill two or more bookcases (more than 100 books)	0.043	(0.070)	0.055	(0.061)	0.009	(0.035)
Number of room/household member	0.052	(0.043)	-0.021	(0.038)	-0.012	(0.021)
Number of facilities (ref: None)						
One	-0.073***	(0.024)	-0.014	(0.021)	-0.004	(0.012)
Two or three	-0.002	(0.027)	0.010	(0.024)	-0.007	(0.013)
Four or five	0.013	(0.040)	0.035	(0.035)	0.006	(0.020)
Period of difficulties during childhood						
Economic hardships	-0.065	(0.044)	-0.052	(0.039)	0.046**	(0.022)
Hunger	-0.047	(0.042)	0.009	(0.037)	0.027	(0.021)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.044*	(0.023)	0.023	(0.020)	0.008	(0.011)
Mother alive	0.077***	(0.024)	-0.036*	(0.021)	0.024**	(0.012)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	0.006	(0.020)	-0.013	(0.018)	0.004	(0.010)
Father alive	0.008	(0.032)	-0.029	(0.028)	-0.021	(0.016)
Parents' health-related behaviours						
No regular dentist visits for their children	-0.014	(0.025)	0.009	(0.022)	-0.004	(0.012)
Parents' smoking	0.098***	(0.019)	0.029*	(0.017)	0.010	(0.010)
Parents' alcohol consumption	0.070*	(0.038)	0.061*	(0.033)	0.009	(0.019)
Constant	0.293***	(0.046)	0.199***	(0.041)	0.066***	(0.023)
Obs	2466		2466		2466	
R^2	0.048		0.014		0.012	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Switzerland (CH)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	0.005	(0.063)	-0.007	(0.051)	-0.016	(0.029)
Technicians, associate professionals and armed forces	-0.068	(0.067)	0.034	(0.054)	-0.025	(0.031)
Office clerks, service workers and sales workers	0.052	(0.053)	0.017	(0.043)	-0.027	(0.024)
Skilled agricultural and fishery workers	0.038	(0.053)	0.039	(0.043)	-0.026	(0.025)
Craftsmen and skilled workers	-0.002	(0.049)	0.043	(0.039)	-0.021	(0.022)
No main breadwinner	0.160	(0.130)	-0.013	(0.105)	0.027	(0.060)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.010	(0.037)	0.008	(0.030)	-0.003	(0.017)
Enough to fill one bookcase (26-100 books)	-0.001	(0.036)	-0.029	(0.029)	0.009	(0.017)
Enough to fill two or more bookcases (more than 100 books)	-0.017	(0.043)	-0.010	(0.035)	-0.033*	(0.020)
Number of room/household member	0.037	(0.035)	0.044	(0.028)	0.031*	(0.016)
Number of facilities (ref: None)						
One	-0.038	(0.065)	-0.014	(0.053)	-0.008	(0.030)
Two or three	-0.048	(0.063)	0.025	(0.051)	-0.049*	(0.029)
Four or five	0.006	(0.065)	-0.008	(0.053)	-0.033	(0.030)
Period of difficulties during childhood						
Economic hardships	-0.111	(0.094)	-0.008	(0.076)	-0.022	(0.043)
Hunger	0.022	(0.080)	-0.058	(0.065)	0.121***	(0.037)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.033	(0.030)	0.006	(0.024)	0.013	(0.014)
Mother alive	0.021	(0.033)	-0.044	(0.027)	-0.008	(0.015)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.061**	(0.028)	0.029	(0.022)	-0.009	(0.013)
Father alive	-0.042	(0.042)	0.027	(0.034)	-0.024	(0.019)
Parents' health-related behaviours						
No regular dentist visits for their children	-0.001	(0.031)	0.000	(0.025)	-0.039***	(0.014)
Parents' smoking	0.103***	(0.026)	-0.030	(0.021)	-0.008	(0.012)
Parents' alcohol consumption	-0.053	(0.043)	0.072**	(0.035)	0.036*	(0.020)
Constant	0.166**	(0.078)	0.067	(0.063)	0.081**	(0.036)
Obs	1032		1032		1032	
R^2	0.038		0.022		0.039	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Belgium (BE)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.026	(0.034)	-0.079**	(0.035)	-0.005	(0.023)
Technicians, associate professionals and armed forces	-0.010	(0.034)	-0.008	(0.035)	0.002	(0.023)
Office clerks, service workers and sales workers	-0.052*	(0.029)	0.000	(0.029)	0.027	(0.019)
Skilled agricultural and fishery workers	-0.029	(0.026)	-0.048*	(0.027)	-0.005	(0.018)
Craftsmen and skilled workers	0.017	(0.022)	-0.045**	(0.022)	0.034**	(0.015)
No main breadwinner	-0.026	(0.058)	0.008	(0.059)	0.017	(0.039)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.008	(0.022)	-0.065***	(0.022)	-0.013	(0.015)
Enough to fill one bookcase (26-100 books)	-0.006	(0.023)	-0.042*	(0.024)	-0.048***	(0.016)
Enough to fill two or more bookcases (more than 100 books)	0.020	(0.030)	-0.029	(0.031)	-0.035*	(0.021)
Number of room/household member	-0.007	(0.018)	0.007	(0.018)	-0.008	(0.012)
Number of facilities (ref: None)						
One	0.025	(0.022)	-0.005	(0.023)	0.013	(0.015)
Two or three	0.089***	(0.024)	-0.043*	(0.025)	0.004	(0.017)
Four or five	0.114***	(0.028)	-0.028	(0.028)	0.003	(0.019)
Period of difficulties during childhood						
Economic hardships	0.099	(0.085)	0.018	(0.087)	0.132**	(0.058)
Hunger	-0.058	(0.042)	-0.028	(0.042)	0.037	(0.028)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	0.024	(0.019)	-0.034*	(0.019)	-0.005	(0.013)
Mother alive	0.086***	(0.021)	-0.056***	(0.022)	-0.023	(0.015)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.050***	(0.017)	-0.028	(0.017)	-0.003	(0.012)
Father alive	-0.055*	(0.029)	-0.006	(0.030)	-0.006	(0.020)
Parents' health-related behaviours						
No regular dentist visits for their children	0.028	(0.018)	0.016	(0.018)	0.010	(0.012)
Parents' smoking	0.061***	(0.018)	-0.014	(0.019)	-0.010	(0.012)
Parents' alcohol consumption	0.110***	(0.028)	-0.003	(0.028)	-0.009	(0.019)
Constant	0.070**	(0.035)	0.285***	(0.036)	0.090***	(0.024)
Obs	2250		2250		2250	
R^2	0.046		0.022		0.018	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Czech Republic (CZ)					
	Smoking		**Obesity**		**Sedentarity**	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.032	(0.065)	-0.128*	(0.070)	-0.026	(0.050)
Technicians, associate professionals and armed forces	-0.000	(0.052)	-0.074	(0.056)	-0.013	(0.040)
Office clerks, service workers and sales workers	-0.009	(0.048)	-0.071	(0.051)	0.012	(0.037)
Skilled agricultural and fishery workers	-0.007	(0.045)	-0.027	(0.049)	-0.012	(0.035)
Craftsmen and skilled workers	0.012	(0.041)	-0.068	(0.044)	0.026	(0.031)
No main breadwinner	0.044	(0.081)	-0.038	(0.087)	0.003	(0.063)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	-0.018	(0.033)	-0.028	(0.036)	-0.023	(0.026)
Enough to fill one bookcase (26-100 books)	-0.013	(0.035)	0.010	(0.038)	-0.026	(0.027)
Enough to fill two or more bookcases (more than 100 books)	0.048	(0.042)	0.009	(0.045)	-0.033	(0.032)
Number of room/household member	0.078*	(0.043)	-0.074	(0.046)	-0.048	(0.033)
Number of facilities (ref: None)						
One	0.010	(0.037)	0.071*	(0.040)	0.007	(0.029)
Two or three	0.067**	(0.032)	0.032	(0.034)	0.061**	(0.024)
Four or five	0.084**	(0.038)	-0.012	(0.041)	0.045	(0.029)
Period of difficulties during childhood						
Economic hardships	-0.102	(0.116)	-0.038	(0.125)	-0.086	(0.089)
Hunger	-0.045	(0.105)	-0.104	(0.113)	-0.127	(0.081)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.006	(0.024)	-0.024	(0.026)	-0.010	(0.018)
Mother alive	0.008	(0.029)	-0.048	(0.031)	-0.070***	(0.022)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.020	(0.022)	-0.006	(0.024)	-0.026	(0.017)
Father alive	0.068	(0.043)	-0.046	(0.046)	-0.042	(0.033)
Parents' health-related behaviours						
No regular dentist visits for their children	-0.033	(0.031)	0.011	(0.034)	0.060**	(0.024)
Parents' smoking	0.103***	(0.021)	0.029	(0.023)	-0.007	(0.016)
Parents' alcohol consumption	0.169***	(0.045)	-0.087*	(0.049)	-0.016	(0.035)
Constant	0.068	(0.054)	0.351***	(0.058)	0.143***	(0.042)
Obs	1514		1514		1514	
R^2	0.048		0.020		0.030	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Table F.2 (continued) - Regressions coefficients of auxiliary equations across European countries

	Poland (PL)					
	Smoking		Obesity		Sedentarity	
Main breadwinner (ref : Elementary occupations and unskilled workers)						
Senior managers and professionals	-0.037	(0.081)	-0.131	(0.083)	0.003	(0.070)
Technicians, associate professionals and armed forces	-0.007	(0.077)	-0.130*	(0.079)	-0.074	(0.067)
Office clerks, service workers and sales workers	0.010	(0.066)	-0.081	(0.067)	-0.121**	(0.057)
Skilled agricultural and fishery workers	-0.110**	(0.043)	-0.006	(0.045)	-0.006	(0.038)
Craftsmen and skilled workers	-0.059	(0.045)	-0.024	(0.047)	-0.030	(0.039)
No main breadwinner	0.031	(0.184)	-0.299	(0.188)	-0.268*	(0.159)
Number of books at home (ref: None or very few (0-10 books))						
Enough of fill one shelf (11-25 books)	0.015	(0.031)	-0.004	(0.032)	-0.040	(0.027)
Enough to fill one bookcase (26-100 books)	-0.007	(0.039)	0.011	(0.040)	-0.031	(0.034)
Enough to fill two or more bookcases (more than 100 books)	0.181***	(0.060)	-0.036	(0.061)	-0.052	(0.052)
Number of room/household member	-0.010	(0.051)	0.002	(0.053)	-0.020	(0.045)
Number of facilities (ref: None)						
One	0.053	(0.045)	-0.023	(0.046)	-0.086**	(0.039)
Two or three	0.066	(0.043)	-0.052	(0.044)	-0.040	(0.037)
Four or five	0.096*	(0.054)	0.027	(0.056)	-0.008	(0.047)
Period of difficulties during childhood						
Economic hardships	-0.015	(0.112)	-0.092	(0.115)	0.151	(0.097)
Hunger	-0.116**	(0.049)	-0.029	(0.051)	0.061	(0.043)
Mother's longevity (ref: mother prematurely deceased)						
Mother deceased in later ages	-0.010	(0.026)	-0.027	(0.027)	-0.017	(0.023)
Mother alive	0.074**	(0.032)	-0.003	(0.033)	-0.077***	(0.028)
Father's longevity (ref: father prematurely deceased)						
Father deceased in later ages	-0.025	(0.025)	-0.008	(0.025)	0.006	(0.021)
Father alive	-0.001	(0.050)	-0.077	(0.052)	-0.099**	(0.044)
Parents' health-related behaviours						
No regular dentist visits for their children	0.053**	(0.027)	-0.011	(0.027)	0.048**	(0.023)
Parents' smoking	0.136***	(0.025)	-0.003	(0.025)	-0.074***	(0.021)
Parents' alcohol consumption	-0.020	(0.044)	-0.026	(0.045)	-0.019	(0.038)
Constant	0.214***	(0.055)	0.341***	(0.056)	0.278***	(0.048)
Obs	1420		1420		1420	
R^2	0.073		0.014		0.061	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient: *** 1%, **5%, *10%.

Appendix G: Health equations across European countries

Table G.1 - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	Austria (AT)				Germany (DE)			
	Barry specification		Roemer specification		Barry specification		Roemer specification	
Sex (ref : Female)								
Male	-0.014	(0.038)	-0.014	(0.038)	0.001	(0.024)	0.001	(0.024)
Age (ref : 50-54 yo)								
55-59 yo	-0.049	(0.089)	-0.049	(0.089)	0.050	(0.047)	0.050	(0.047)
60-64 yo	-0.131	(0.088)	-0.131	(0.088)	-0.002	(0.051)	-0.002	(0.051)
65-69 yo	-0.112	(0.089)	-0.112	(0.089)	-0.008	(0.053)	-0.008	(0.053)
70-74 yo	-0.145	(0.092)	-0.145	(0.092)	-0.028	(0.057)	-0.028	(0.057)
75-79 yo	-0.266***	(0.098)	-0.266***	(0.098)	-0.110*	(0.060)	-0.110*	(0.060)
Main breadwinner (ref : Elementary occupations and unskilled workers)								
Senior managers and professionals	0.200**	(0.085)	0.218**	(0.085)	0.081	(0.064)	0.123*	(0.064)
Technicians, associate professionals and armed forces	0.178*	(0.097)	0.198**	(0.097)	-0.040	(0.062)	-0.015	(0.062)
Office clerks, service workers and sales workers	0.139*	(0.073)	0.139*	(0.073)	0.095*	(0.052)	0.125**	(0.052)
Skilled agricultural and fishery workers	0.013	(0.065)	0.011	(0.065)	-0.004	(0.052)	0.017	(0.052)
Craftsmen and skilled workers	0.030	(0.062)	0.046	(0.062)	0.015	(0.047)	0.037	(0.046)
No main breadwinner	0.034	(0.103)	0.044	(0.103)	0.127	(0.078)	0.138*	(0.078)
Number of books at home (ref: None or very few (0-10 books))								
Enough of fill one shelf (11-25 books)	0.135***	(0.048)	0.126***	(0.048)	-0.037	(0.034)	-0.027	(0.034)
Enough to fill one bookcase (26-100 books)	0.157***	(0.054)	0.142***	(0.054)	-0.017	(0.036)	-0.000	(0.036)
Enough to fill two or more bookcases (more than 100 books)	0.052	(0.087)	0.039	(0.087)	0.037	(0.044)	0.046	(0.044)
Number of room/household member	-0.016	(0.044)	-0.022	(0.044)	0.020	(0.035)	0.024	(0.035)
Number of facilities (ref: None)								
One	-0.002	(0.055)	0.029	(0.054)	0.110***	(0.041)	0.111***	(0.041)
Two or three	0.060	(0.055)	0.095*	(0.054)	0.116***	(0.041)	0.126***	(0.041)
Four or five	0.024	(0.063)	0.036	(0.063)	0.182***	(0.046)	0.185***	(0.046)
Period of difficulties during childhood								
Economic hardships	0.118	(0.090)	0.111	(0.090)	-0.132*	(0.077)	-0.134*	(0.077)
Hunger	0.077	(0.079)	0.072	(0.078)	-0.073*	(0.038)	-0.067*	(0.038)
Mother's longevity (ref: mother prematurely deceased)								
Mother deceased in later ages	0.047	(0.043)	0.043	(0.043)	0.044	(0.028)	0.059**	(0.028)
Mother alive	0.048	(0.058)	0.059	(0.058)	0.028	(0.034)	0.043	(0.034)
Father's longevity (ref: father prematurely deceased)								
Father deceased in later ages	0.054	(0.042)	0.062	(0.041)	0.035	(0.026)	0.057**	(0.026)
Father alive	0.134*	(0.074)	0.128*	(0.074)	0.066	(0.045)	0.088**	(0.045)
Parents' health-related behaviours								
No regular dentist visits for their children	-0.019	(0.041)	-0.016	(0.041)	-0.002	(0.026)	0.003	(0.026)
Parents' smoking	-0.008	(0.039)	-0.028	(0.038)	0.020	(0.025)	0.019	(0.025)
Parents' alcohol consumption	-0.117*	(0.067)	-0.162**	(0.065)	-0.029	(0.046)	-0.072	(0.046)
Lifestyle variables/residuals								
Smoking	0.010	(0.049)	0.010	(0.049)	-0.137***	(0.033)	-0.137***	(0.033)
Obesity	-0.242***	(0.045)	-0.242***	(0.045)	-0.256***	(0.031)	-0.256***	(0.031)
Sedentarity	-0.097	(0.059)	-0.097	(0.059)	-0.234***	(0.051)	-0.234***	(0.051)
Constant	0.601***	(0.108)	0.532***	(0.107)	0.465***	(0.075)	0.325***	(0.073)
Obs	648		648		1550		1550	
R^2	0.169		0.169		0.130		0.130	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table G.1 (continued) - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	Sweden (SE)				Netherlands (NL)			
Sex (ref : Female)	**Barry specification**		**Roemer specification**		**Barry specification**		**Roemer specification**	
Male	0.060**	(0.027)	0.060**	(0.027)	-0.018	(0.022)	-0.018	(0.022)
Age (ref : 50-54 yo)								
55-59 yo	-0.127**	(0.057)	-0.127**	(0.057)	0.105**	(0.041)	0.105**	(0.041)
60-64 yo	-0.145**	(0.058)	-0.145**	(0.058)	0.094**	(0.042)	0.094**	(0.042)
65-69 yo	-0.109*	(0.061)	-0.109*	(0.061)	0.016	(0.048)	0.016	(0.048)
70-74 yo	-0.151**	(0.066)	-0.151**	(0.066)	0.052	(0.053)	0.052	(0.053)
75-79 yo	-0.215***	(0.070)	-0.215***	(0.070)	0.025	(0.055)	0.025	(0.055)
Main breadwinner (ref : Elementary occupations and unskilled workers)								
Senior managers and professionals	-0.018	(0.060)	0.004	(0.060)	0.064	(0.046)	0.077*	(0.046)
Technicians, associate professionals and armed forces	0.037	(0.065)	0.067	(0.064)	0.045	(0.049)	0.049	(0.049)
Office clerks, service workers and sales workers	-0.073	(0.057)	-0.045	(0.057)	0.021	(0.047)	0.035	(0.047)
Skilled agricultural and fishery workers	-0.025	(0.052)	0.003	(0.052)	0.082*	(0.044)	0.101**	(0.043)
Craftsmen and skilled workers	0.020	(0.049)	0.037	(0.048)	0.020	(0.039)	0.023	(0.039)
No main breadwinner	0.076	(0.120)	0.081	(0.120)	-0.038	(0.087)	-0.027	(0.087)
Number of books at home (ref: None or very few (0-10 books))								
Enough of fill one shelf (11-25 books)	0.084*	(0.046)	0.083*	(0.046)	0.067**	(0.029)	0.082***	(0.029)
Enough to fill one bookcase (26-100 books)	0.106**	(0.045)	0.123***	(0.045)	0.061**	(0.030)	0.083***	(0.030)
Enough to fill two or more bookcases (more than 100 books)	0.102**	(0.050)	0.110**	(0.050)	-0.039	(0.038)	-0.026	(0.038)
Number of room/household member	0.029	(0.030)	0.028	(0.030)	0.030	(0.033)	0.027	(0.033)
Number of facilities (ref: None)								
One	0.109*	(0.056)	0.095*	(0.056)	0.023	(0.056)	0.030	(0.056)
Two or three	0.127**	(0.060)	0.130**	(0.060)	0.041	(0.055)	0.048	(0.055)
Four or five	0.122**	(0.053)	0.119**	(0.053)	0.048	(0.065)	0.061	(0.065)
Period of difficulties during childhood								
Economic hardships	0.044	(0.140)	0.023	(0.140)	0.007	(0.133)	-0.029	(0.134)
Hunger	-0.017	(0.133)	0.033	(0.132)	-0.049	(0.051)	-0.030	(0.051)
Mother's longevity (ref: mother prematurely deceased)								
Mother deceased in later ages	0.032	(0.033)	0.043	(0.033)	0.050*	(0.026)	0.064**	(0.026)
Mother alive	0.015	(0.035)	0.009	(0.035)	0.055*	(0.029)	0.064**	(0.029)
Father's longevity (ref: father prematurely deceased)								
Father deceased in later ages	0.033	(0.028)	0.036	(0.028)	0.044*	(0.024)	0.051**	(0.024)
Father alive	0.059	(0.045)	0.050	(0.044)	0.084**	(0.038)	0.098**	(0.038)
Parents' health-related behaviours								
No regular dentist visits for their children	-0.048	(0.046)	-0.058	(0.046)	0.022	(0.027)	0.016	(0.027)
Parents' smoking	0.011	(0.027)	0.012	(0.027)	-0.032	(0.030)	-0.044	(0.030)
Parents' alcohol consumption	-0.054	(0.048)	-0.054	(0.047)	0.046	(0.050)	0.020	(0.050)
Lifestyle variables/residuals								
Smoking	-0.127***	(0.039)	-0.127***	(0.039)	-0.101***	(0.028)	-0.101***	(0.028)
Obesity	-0.182***	(0.041)	-0.182***	(0.041)	-0.207***	(0.033)	-0.207***	(0.033)
Sedentarity	-0.206**	(0.086)	-0.206**	(0.086)	-0.211***	(0.046)	-0.211***	(0.046)
Constant	0.624***	(0.092)	0.547***	(0.090)	0.544***	(0.084)	0.451***	(0.083)
Obs	1193		1193		1794		1794	
R^2	0.096		0.096		0.087		0.087	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table G.1 (continued) - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	Spain (SP)				Italy (IT)			
	Barry specification		Roemer specification		Barry specification		Roemer specification	
Sex (ref : Female)								
Male	0.103***	(0.027)	0.103***	(0.027)	0.100***	(0.021)	0.100***	(0.021)
Age (ref : 50-54 yo)								
55-59 yo	-0.019	(0.049)	-0.019	(0.049)	-0.026	(0.041)	-0.026	(0.041)
60-64 yo	-0.125**	(0.051)	-0.125**	(0.051)	-0.103**	(0.043)	-0.103**	(0.043)
65-69 yo	-0.056	(0.055)	-0.056	(0.055)	-0.154***	(0.046)	-0.154***	(0.046)
70-74 yo	-0.103*	(0.055)	-0.103*	(0.055)	-0.230***	(0.049)	-0.230***	(0.049)
75-79 yo	-0.197***	(0.058)	-0.197***	(0.058)	-0.305***	(0.051)	-0.305***	(0.051)
Main breadwinner (ref : Elementary occupations and unskilled workers)								
Senior managers and professionals	-0.006	(0.084)	-0.001	(0.084)	0.093	(0.058)	0.082	(0.058)
Technicians, associate professionals and armed forces	-0.012	(0.069)	0.003	(0.069)	-0.001	(0.056)	-0.001	(0.056)
Office clerks, service workers and sales workers	-0.033	(0.046)	-0.031	(0.046)	0.048	(0.036)	0.025	(0.036)
Skilled agricultural and fishery workers	0.006	(0.033)	0.012	(0.033)	0.015	(0.026)	0.016	(0.026)
Craftsmen and skilled workers	-0.010	(0.038)	-0.008	(0.038)	0.063**	(0.032)	0.061*	(0.032)
No main breadwinner	0.001	(0.134)	0.011	(0.134)	0.053	(0.112)	0.051	(0.112)
Number of books at home (ref: None or very few (0-10 books))								
Enough of fill one shelf (11-25 books)	0.087**	(0.035)	0.085**	(0.035)	0.082**	(0.033)	0.103***	(0.033)
Enough to fill one bookcase (26-100 books)	0.079	(0.049)	0.087*	(0.049)	0.027	(0.043)	0.048	(0.043)
Enough to fill two or more bookcases (more than 100 books)	0.143**	(0.061)	0.151**	(0.061)	0.106*	(0.056)	0.131**	(0.056)
Number of room/household member	0.047	(0.030)	0.057*	(0.030)	0.051	(0.040)	0.070*	(0.040)
Number of facilities (ref: None)								
One	0.016	(0.035)	0.024	(0.035)	-0.001	(0.031)	0.004	(0.031)
Two or three	0.065*	(0.035)	0.073**	(0.035)	0.013	(0.028)	0.005	(0.028)
Four or five	0.083	(0.054)	0.089*	(0.054)	0.043	(0.040)	0.038	(0.040)
Period of difficulties during childhood								
Economic hardships	-0.014	(0.061)	-0.019	(0.061)	-0.127***	(0.049)	-0.146***	(0.049)
Hunger	0.002	(0.042)	-0.001	(0.042)	-0.076*	(0.042)	-0.072*	(0.042)
Mother's longevity (ref: mother prematurely deceased)								
Mother deceased in later ages	0.008	(0.029)	0.014	(0.029)	0.027	(0.024)	0.034	(0.024)
Mother alive	0.083**	(0.039)	0.091**	(0.039)	0.005	(0.030)	0.021	(0.030)
Father's longevity (ref: father prematurely deceased)								
Father deceased in later ages	0.035	(0.027)	0.035	(0.027)	0.030	(0.021)	0.038*	(0.021)
Father alive	-0.011	(0.052)	-0.006	(0.052)	0.002	(0.040)	0.011	(0.040)
Parents' health-related behaviours								
No regular dentist visits for their children	-0.021	(0.043)	-0.034	(0.043)	-0.037	(0.029)	-0.049*	(0.029)
Parents' smoking	-0.039	(0.027)	-0.040	(0.027)	-0.027	(0.021)	-0.029	(0.021)
Parents' alcohol consumption	-0.148***	(0.044)	-0.151***	(0.044)	0.011	(0.033)	0.013	(0.033)
Lifestyle variables/residuals								
Smoking	0.009	(0.036)	0.009	(0.036)	-0.025	(0.026)	-0.025	(0.026)
Obesity	-0.114***	(0.028)	-0.114***	(0.028)	-0.090***	(0.027)	-0.090***	(0.027)
Sedentarity	-0.116***	(0.039)	-0.116***	(0.039)	-0.256***	(0.027)	-0.256***	(0.027)
Constant	0.484***	(0.072)	0.435***	(0.071)	0.673***	(0.060)	0.602***	(0.059)
Obs	1439		1439		2094		2094	
R^2	0.116		0.116		0.147		0.147	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table G.1 (continued) - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	France (FR)				Danemark (DK)			
	Barry specification		Roemer specification		Barry specification		Roemer specification	
Sex (ref : Female)								
Male	0.034	(0.022)	0.034	(0.022)	0.039*	(0.020)	0.039*	(0.020)
Age (ref : 50-54 yo)								
55-59 yo	-0.041	(0.039)	-0.041	(0.039)	-0.022	(0.031)	-0.022	(0.031)
60-64 yo	0.002	(0.041)	0.002	(0.041)	0.010	(0.035)	0.010	(0.035)
65-69 yo	-0.115**	(0.046)	-0.115**	(0.046)	-0.031	(0.039)	-0.031	(0.039)
70-74 yo	-0.173***	(0.047)	-0.173***	(0.047)	-0.046	(0.047)	-0.046	(0.047)
75-79 yo	-0.253***	(0.048)	-0.253***	(0.048)	-0.137***	(0.049)	-0.137***	(0.049)
Main breadwinner (ref : Elementary occupations and unskilled workers)								
Senior managers and professionals	0.031	(0.045)	0.036	(0.045)	0.054	(0.040)	0.059	(0.040)
Technicians, associate professionals and armed forces	-0.015	(0.048)	-0.005	(0.048)	0.057	(0.054)	0.058	(0.054)
Office clerks, service workers and sales workers	-0.050	(0.042)	-0.053	(0.042)	0.008	(0.038)	0.018	(0.038)
Skilled agricultural and fishery workers	-0.011	(0.034)	0.004	(0.034)	0.047	(0.032)	0.077**	(0.032)
Craftsmen and skilled workers	-0.062*	(0.034)	-0.060*	(0.034)	0.002	(0.034)	0.014	(0.033)
No main breadwinner	0.011	(0.130)	-0.018	(0.130)	0.016	(0.190)	0.003	(0.190)
Number of books at home (ref: None or very few (0-10 books))								
Enough of fill one shelf (11-25 books)	0.045	(0.030)	0.054*	(0.030)	0.107***	(0.036)	0.111***	(0.036)
Enough to fill one bookcase (26-100 books)	0.093***	(0.032)	0.108***	(0.032)	0.112***	(0.034)	0.115***	(0.034)
Enough to fill two or more bookcases (more than 100 books)	0.094**	(0.041)	0.102**	(0.041)	0.069*	(0.037)	0.072*	(0.037)
Number of room/household member	0.036	(0.030)	0.039	(0.030)	0.040	(0.026)	0.048*	(0.026)
Number of facilities (ref: None)								
One	0.026	(0.036)	0.022	(0.036)	0.003	(0.045)	0.021	(0.045)
Two or three	0.077**	(0.037)	0.076**	(0.037)	-0.014	(0.045)	0.003	(0.045)
Four or five	0.065	(0.041)	0.059	(0.041)	0.029	(0.045)	0.044	(0.045)
Period of difficulties during childhood								
Economic hardships	-0.194**	(0.084)	-0.175**	(0.084)	-0.274**	(0.133)	-0.267**	(0.133)
Hunger	-0.020	(0.048)	-0.028	(0.048)	-0.129	(0.173)	-0.190	(0.173)
Mother's longevity (ref: mother prematurely deceased)								
Mother deceased in later ages	0.056**	(0.028)	0.062**	(0.028)	0.028	(0.025)	0.030	(0.025)
Mother alive	0.052*	(0.029)	0.052*	(0.029)	0.032	(0.027)	0.041	(0.026)
Father's longevity (ref: father prematurely deceased)								
Father deceased in later ages	0.049*	(0.026)	0.059**	(0.025)	0.055**	(0.023)	0.063***	(0.023)
Father alive	0.058*	(0.034)	0.071**	(0.034)	0.093***	(0.032)	0.089***	(0.032)
Parents' health-related behaviours								
No regular dentist visits for their children	-0.042*	(0.024)	-0.047**	(0.024)	-0.081***	(0.028)	-0.094***	(0.028)
Parents' smoking	-0.007	(0.023)	-0.001	(0.023)	-0.011	(0.028)	-0.023	(0.028)
Parents' alcohol consumption	-0.065*	(0.038)	-0.063*	(0.038)	-0.028	(0.038)	-0.041	(0.038)
Lifestyle variables/residuals								
Smoking	-0.091***	(0.031)	-0.091***	(0.031)	-0.122***	(0.025)	-0.122***	(0.025)
Obesity	-0.124***	(0.031)	-0.124***	(0.031)	-0.036	(0.033)	-0.036	(0.033)
Sedentarity	-0.184***	(0.038)	-0.184***	(0.038)	-0.380***	(0.056)	-0.380***	(0.056)
Constant	0.627***	(0.061)	0.556***	(0.060)	0.620***	(0.065)	0.538***	(0.063)
Obs	1800		1800		1746		1746	
R^2	0.139		0.139		0.129		0.129	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table G.1 (continued) - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	Greece (GR)				Switzerland (CH)			
	Barry specification		Roemer specification		Barry specification		Roemer specification	
Sex (ref : Female)								
Male	0.074***	(0.017)	0.074***	(0.017)	0.031	(0.025)	0.031	(0.025)
Age (ref : 50-54 yo)								
55-59 yo	-0.053**	(0.024)	-0.053**	(0.024)	-0.033	(0.038)	-0.033	(0.038)
60-64 yo	-0.121***	(0.029)	-0.121***	(0.029)	-0.045	(0.042)	-0.045	(0.042)
65-69 yo	-0.174***	(0.032)	-0.174***	(0.032)	-0.026	(0.045)	-0.026	(0.045)
70-74 yo	-0.293***	(0.035)	-0.293***	(0.035)	-0.086*	(0.050)	-0.086*	(0.050)
75-79 yo	-0.409***	(0.036)	-0.409***	(0.036)	-0.212***	(0.054)	-0.212***	(0.054)
Main breadwinner (ref : Elementary occupations and unskilled workers)								
Senior managers and professionals	-0.017	(0.041)	-0.015	(0.041)	0.022	(0.060)	0.027	(0.060)
Technicians, associate professionals and armed forces	-0.057	(0.051)	-0.048	(0.051)	-0.067	(0.069)	-0.057	(0.069)
Office clerks, service workers and sales workers	-0.050*	(0.029)	-0.043	(0.029)	0.022	(0.052)	0.022	(0.053)
Skilled agricultural and fishery workers	-0.117***	(0.026)	-0.121***	(0.026)	0.013	(0.054)	0.011	(0.054)
Craftsmen and skilled workers	-0.054*	(0.030)	-0.048	(0.030)	-0.023	(0.049)	-0.022	(0.049)
No main breadwinner	-0.051	(0.070)	-0.058	(0.070)	0.151	(0.113)	0.128	(0.113)
Number of books at home (ref: None or very few (0-10 books))								
Enough of fill one shelf (11-25 books)	0.001	(0.022)	0.002	(0.022)	-0.003	(0.037)	-0.002	(0.037)
Enough to fill one bookcase (26-100 books)	0.001	(0.030)	0.002	(0.030)	0.012	(0.035)	0.014	(0.035)
Enough to fill two or more bookcases (more than 100 books)	-0.015	(0.055)	-0.019	(0.055)	-0.010	(0.041)	0.002	(0.041)
Number of room/household member	0.094***	(0.036)	0.099***	(0.036)	-0.016	(0.037)	-0.034	(0.037)
Number of facilities (ref: None)								
One	-0.014	(0.021)	-0.015	(0.021)	0.042	(0.075)	0.050	(0.075)
Two or three	-0.040*	(0.024)	-0.040*	(0.024)	0.099	(0.073)	0.115	(0.072)
Four or five	-0.045	(0.034)	-0.048	(0.034)	0.150**	(0.074)	0.159**	(0.074)
Period of difficulties during childhood								
Economic hardships	-0.101**	(0.045)	-0.105**	(0.045)	0.081	(0.092)	0.100	(0.091)
Hunger	-0.123***	(0.044)	-0.129***	(0.044)	-0.089	(0.086)	-0.118	(0.085)
Mother's longevity (ref: mother prematurely deceased)								
Mother deceased in later ages	-0.002	(0.022)	-0.007	(0.022)	-0.023	(0.030)	-0.024	(0.030)
Mother alive	0.012	(0.021)	0.016	(0.021)	-0.050	(0.031)	-0.045	(0.031)
Father's longevity (ref: father prematurely deceased)								
Father deceased in later ages	0.031*	(0.018)	0.032*	(0.018)	0.012	(0.028)	0.018	(0.028)
Father alive	0.051**	(0.024)	0.056**	(0.024)	0.005	(0.040)	0.013	(0.040)
Parents' health-related behaviours								
No regular dentist visits for their children	-0.040**	(0.019)	-0.041**	(0.019)	-0.038	(0.031)	-0.027	(0.031)
Parents' smoking	-0.037**	(0.018)	-0.036**	(0.017)	0.010	(0.027)	0.005	(0.026)
Parents' alcohol consumption	-0.090**	(0.038)	-0.093**	(0.038)	-0.009	(0.043)	-0.021	(0.043)
Lifestyle variables/residuals								
Smoking	0.042**	(0.017)	0.042**	(0.017)	-0.109***	(0.035)	-0.109***	(0.035)
Obesity	-0.085***	(0.022)	-0.085***	(0.022)	-0.120***	(0.043)	-0.120***	(0.043)
Sedentarity	-0.115***	(0.039)	-0.115***	(0.039)	-0.278***	(0.082)	-0.278***	(0.082)
Constant	0.968***	(0.043)	0.956***	(0.043)	0.819***	(0.089)	0.770***	(0.088)
Obs	2466		2466		1032		1032	
R^2	0.186		0.186		0.095		0.095	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table G.1 (continued) - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	Belgium (BE)				Czech Republic (CZ)			
	Barry specification		Roemer specification		Barry specification		Roemer specification	
Sex (ref : Female)								
Male	0.055***	(0.019)	0.055***	(0.019)	0.007	(0.026)	0.007	(0.026)
Age (ref : 50-54 yo)								
55-59 yo	-0.043	(0.032)	-0.043	(0.032)	-0.086**	(0.041)	-0.086**	(0.041)
60-64 yo	-0.079**	(0.033)	-0.079**	(0.033)	-0.086*	(0.044)	-0.086*	(0.044)
65-69 yo	-0.138***	(0.038)	-0.138***	(0.038)	-0.106**	(0.048)	-0.106**	(0.048)
70-74 yo	-0.134***	(0.039)	-0.134***	(0.039)	-0.158***	(0.054)	-0.158***	(0.054)
75-79 yo	-0.170***	(0.042)	-0.170***	(0.042)	-0.276***	(0.057)	-0.276***	(0.057)
Main breadwinner (ref : Elementary occupations and unskilled workers)								
Senior managers and professionals	0.007	(0.038)	0.024	(0.038)	0.257***	(0.072)	0.269***	(0.072)
Technicians, associate professionals and armed forces	0.012	(0.038)	0.014	(0.038)	0.147**	(0.063)	0.154**	(0.063)
Office clerks, service workers and sales workers	-0.012	(0.033)	-0.014	(0.033)	0.183***	(0.059)	0.186***	(0.059)
Skilled agricultural and fishery workers	0.059**	(0.029)	0.071**	(0.029)	0.055	(0.053)	0.058	(0.053)
Craftsmen and skilled workers	0.036	(0.026)	0.029	(0.026)	0.076	(0.048)	0.077	(0.048)
No main breadwinner	-0.072	(0.071)	-0.075	(0.071)	0.157	(0.103)	0.159	(0.103)
Number of books at home (ref: None or very few (0-10 books))								
Enough of fill one shelf (11-25 books)	0.044*	(0.026)	0.059**	(0.026)	0.029	(0.042)	0.034	(0.042)
Enough to fill one bookcase (26-100 books)	0.067***	(0.026)	0.090***	(0.026)	0.083*	(0.042)	0.085**	(0.042)
Enough to fill two or more bookcases (more than 100 books)	0.095***	(0.034)	0.109***	(0.034)	0.021	(0.053)	0.024	(0.053)
Number of room/household member	-0.009	(0.020)	-0.006	(0.020)	0.070	(0.049)	0.080	(0.049)
Number of facilities (ref: None)								
One	-0.063**	(0.027)	-0.069***	(0.027)	-0.058	(0.045)	-0.063	(0.045)
Two or three	-0.010	(0.029)	-0.017	(0.029)	-0.043	(0.039)	-0.054	(0.038)
Four or five	-0.044	(0.034)	-0.056*	(0.034)	-0.035	(0.043)	-0.041	(0.043)
Period of difficulties during childhood								
Economic hardships	-0.298***	(0.110)	-0.358***	(0.110)	0.162	(0.156)	0.177	(0.156)
Hunger	-0.088	(0.055)	-0.088	(0.055)	-0.172	(0.128)	-0.148	(0.128)
Mother's longevity (ref: mother prematurely deceased)								
Mother deceased in later ages	-0.001	(0.022)	0.003	(0.022)	0.012	(0.030)	0.015	(0.030)
Mother alive	-0.007	(0.025)	-0.003	(0.025)	0.044	(0.035)	0.056	(0.034)
Father's longevity (ref: father prematurely deceased)								
Father deceased in later ages	0.038**	(0.019)	0.050***	(0.019)	0.023	(0.027)	0.027	(0.027)
Father alive	-0.025	(0.034)	-0.015	(0.034)	0.031	(0.048)	0.039	(0.048)
Parents' health-related behaviours								
No regular dentist visits for their children	-0.024	(0.020)	-0.033*	(0.020)	-0.062	(0.043)	-0.070	(0.043)
Parents' smoking	-0.002	(0.021)	-0.005	(0.021)	-0.060**	(0.026)	-0.063**	(0.026)
Parents' alcohol consumption	-0.111***	(0.034)	-0.123***	(0.034)	-0.047	(0.057)	-0.042	(0.057)
Lifestyle variables/residuals								
Smoking	-0.135***	(0.027)	-0.135***	(0.027)	-0.016	(0.032)	-0.016	(0.032)
Obesity	-0.151***	(0.026)	-0.151***	(0.026)	-0.066**	(0.029)	-0.066**	(0.029)
Sedentarity	-0.334***	(0.040)	-0.334***	(0.040)	-0.131***	(0.040)	-0.131***	(0.040)
Constant	0.845***	(0.050)	0.763***	(0.050)	0.576***	(0.079)	0.533***	(0.078)
Obs	2250		2250		1514		1514	
R^2	0.120		0.120		0.096		0.096	

Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Table G.1 (continued) - Regressions coefficients of the probability of reporting good health status from Barry and Roemer scenario across European countries (with bootstrapped standard errors)

	Poland (PL)			
Sex (ref : Female)	**Barry specification**		**Roemer specification**	
Male	0.004	(0.025)	0.004	(0.025)
Age (ref : 50-54 yo)				
55-59 yo	-0.066	(0.044)	-0.066	(0.044)
60-64 yo	-0.167***	(0.047)	-0.167***	(0.047)
65-69 yo	-0.213***	(0.052)	-0.213***	(0.052)
70-74 yo	-0.259***	(0.055)	-0.259***	(0.055)
75-79 yo	-0.254***	(0.058)	-0.254***	(0.058)
Main breadwinner (ref : Elementary occupations and unskilled workers)				
Senior managers and professionals	0.155*	(0.081)	0.165**	(0.080)
Technicians, associate professionals and armed forces	0.049	(0.083)	0.069	(0.083)
Office clerks, service workers and sales workers	0.078	(0.072)	0.100	(0.072)
Skilled agricultural and fishery workers	0.049	(0.043)	0.053	(0.043)
Craftsmen and skilled workers	0.075	(0.047)	0.083*	(0.047)
No main breadwinner	0.011	(0.205)	0.069	(0.204)
Number of books at home (ref: None or very few (0-10 books))				
Enough of fill one shelf (11-25 books)	0.037	(0.034)	0.042	(0.034)
Enough to fill one bookcase (26-100 books)	-0.043	(0.042)	-0.039	(0.042)
Enough to fill two or more bookcases (more than 100 books)	0.031	(0.063)	0.036	(0.063)
Number of room/household member	-0.028	(0.054)	-0.025	(0.054)
Number of facilities (ref: None)				
One	0.005	(0.051)	0.017	(0.051)
Two or three	0.008	(0.046)	0.016	(0.046)
Four or five	0.088	(0.062)	0.085	(0.062)
Period of difficulties during childhood				
Economic hardships	-0.063	(0.082)	-0.077	(0.082)
Hunger	-0.040	(0.047)	-0.043	(0.047)
Mother's longevity (ref: mother prematurely deceased)				
Mother deceased in later ages	-0.026	(0.027)	-0.022	(0.027)
Mother alive	0.010	(0.037)	0.019	(0.037)
Father's longevity (ref: father prematurely deceased)				
Father deceased in later ages	-0.024	(0.025)	-0.023	(0.025)
Father alive	0.041	(0.059)	0.061	(0.058)
Parents' health-related behaviours				
No regular dentist visits for their children	-0.041	(0.028)	-0.048*	(0.028)
Parents' smoking	-0.052**	(0.026)	-0.045*	(0.026)
Parents' alcohol consumption	-0.086**	(0.041)	-0.081**	(0.041)
Lifestyle variables/residuals				
Smoking	-0.027	(0.030)	-0.027	(0.030)
Obesity	-0.073***	(0.027)	-0.073***	(0.027)
Sedentarity	-0.140***	(0.030)	-0.140***	(0.030)
Constant	0.568***	(0.068)	0.498***	(0.067)
Obs	1420		1420	
R^2	0.108		0.108	

Note: Standard errors in parenthesis and significance levels of test of rejecting the hypothesis of the nullity of the coefficient from 1,000 bootstrapped replications: *** 1%, **5%, *10%.

Appendix H: Unilateral tests

Table H.1 – Unilateral tests of superiority of countries in column on countries in row, according to IOP index in Barry scenario (p-value)

	AT	FR	ES	DE	CZ	DK	GR	IT	SW	PL	BE	NL	CH
AT	0.50	0.91	0.92	0.94	0.95	0.97	0.98	0.99	0.99	0.99	1.00	1.00	1.00
FR	0.09	0.50	0.53	0.64	0.66	0.78	0.89	0.91	0.91	0.97	0.99	0.99	1.00
ES	0.08	0.47	0.50	0.60	0.62	0.74	0.85	0.88	0.89	0.95	0.98	0.99	1.00
DE	0.06	0.36	0.40	0.50	0.52	0.65	0.79	0.83	0.84	0.93	0.96	0.98	0.99
CZ	**0.05**	0.34	0.38	0.48	0.50	0.63	0.76	0.81	0.82	0.92	0.96	0.98	0.99
DK	**0.03**	0.22	0.26	0.35	0.37	0.50	0.66	0.73	0.75	0.88	0.93	0.97	0.99
GR	**0.02**	0.11	0.15	0.21	0.24	0.34	0.50	0.59	0.64	0.81	0.89	0.95	0.98
IT	**0.01**	0.09	0.12	0.17	0.19	0.27	0.41	0.50	0.56	0.74	0.82	0.90	0.96
SW	**0.01**	0.09	0.11	0.16	0.18	0.25	0.36	0.44	0.50	0.66	0.72	0.82	0.90
PL	**0.01**	**0.03**	**0.05**	0.07	0.08	0.12	0.19	0.26	0.34	0.50	0.55	0.69	0.81
BE	**0.00**	**0.01**	**0.02**	**0.04**	**0.04**	0.07	0.11	0.18	0.28	0.45	0.50	0.67	0.82
NL	**0.00**	**0.01**	**0.01**	**0.02**	**0.02**	**0.03**	**0.05**	0.10	0.18	0.31	0.33	0.50	0.70
CH	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	**0.04**	0.10	0.19	0.18	0.30	0.50

Table H.2 – Unilateral tests of superiority of countries in column on countries in row, according to IOP index in Roemer scenario (p-value)

	AT	ES	FR	DE	CZ	DK	GR	IT	SW	PL	BE	NL	CH
AT	0.50	0.93	0.93	0.94	0.96	0.97	0.99	0.99	0.99	1.00	1.00	1.00	1.00
ES	0.07	0.50	0.52	0.56	0.67	0.72	0.87	0.87	0.92	0.96	0.97	0.99	1.00
FR	0.07	0.48	0.50	0.54	0.67	0.72	0.88	0.88	0.93	0.96	0.98	0.99	1.00
DE	0.06	0.44	0.46	0.50	0.62	0.68	0.85	0.84	0.90	0.95	0.97	0.99	1.00
CZ	**0.04**	0.33	0.33	0.38	0.50	0.55	0.75	0.75	0.84	0.90	0.93	0.97	0.99
DK	**0.03**	0.28	0.28	0.32	0.45	0.50	0.72	0.72	0.83	0.89	0.93	0.97	0.99
GR	**0.01**	0.13	0.12	0.15	0.25	0.28	0.50	0.52	0.69	0.79	0.84	0.93	0.99
IT	**0.01**	0.13	0.12	0.16	0.25	0.28	0.48	0.50	0.67	0.77	0.81	0.91	0.98
SW	**0.01**	0.08	0.07	0.10	0.16	0.17	0.31	0.33	0.50	0.59	0.61	0.75	0.90
PL	**0.00**	**0.04**	**0.04**	**0.05**	0.10	0.11	0.21	0.23	0.41	0.50	0.51	0.67	0.87
BE	**0.00**	**0.03**	**0.02**	**0.03**	0.07	0.07	0.16	0.19	0.39	0.49	0.50	0.70	0.90
NL	**0.00**	**0.01**	**0.01**	**0.01**	**0.03**	**0.03**	0.07	0.09	0.25	0.33	0.30	0.50	0.79
CH	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.02**	0.10	0.13	0.10	0.21	0.50

Table H.3 – Unilateral tests of superiority of countries in column on countries in row, according to IEF index in Barry scenario (p-value)

	DE	BE	AT	IT	NL	DK	FR	SW	CH	ES	PL	GR	CZ
DE	0.50	0.61	0.73	0.82	0.91	0.92	0.99	0.99	1.00	1.00	1.00	1.00	1.00
BE	0.39	0.50	0.67	0.74	0.87	0.88	0.99	0.99	1.00	1.00	1.00	1.00	1.00
AT	0.27	0.33	0.50	0.50	0.64	0.64	0.87	0.87	0.91	0.93	0.94	0.98	0.98
IT	0.18	0.26	0.50	0.50	0.70	0.71	0.96	0.96	0.98	0.99	0.99	1.00	1.00
NL	0.09	0.13	0.36	0.30	0.50	0.51	0.88	0.87	0.93	0.95	0.97	1.00	1.00
DK	0.08	0.12	0.36	0.29	0.49	0.50	0.88	0.87	0.92	0.95	0.97	1.00	1.00
FR	**0.01**	**0.01**	0.13	**0.04**	0.12	0.12	0.50	0.54	0.66	0.71	0.77	0.94	0.95
SW	**0.01**	**0.01**	0.13	**0.04**	0.13	0.13	0.46	0.50	0.62	0.66	0.72	0.89	0.91
CH	**0.00**	**0.00**	0.09	**0.02**	0.07	0.08	0.34	0.38	0.50	0.53	0.59	0.80	0.83
ES	**0.00**	**0.00**	0.07	**0.01**	**0.05**	**0.05**	0.29	0.34	0.47	0.50	0.57	0.80	0.84
PL	**0.00**	**0.00**	0.06	**0.01**	**0.03**	**0.03**	0.23	0.28	0.41	0.43	0.50	0.76	0.81
GR	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	0.06	0.11	0.20	0.20	0.24	0.50	0.60
CZ	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.05**	0.09	0.17	0.16	0.19	0.40	0.50

Table H.4 – Unilateral tests of superiority of countries in column on countries in row, according to IEF index in Roemer scenario (p-value)

	DE	BE	IT	AT	NL	DK	SW	FR	CH	ES	PL	GR	CZ
DE	0.50	0.56	0.81	0.78	0.89	0.92	0.99	0.99	0.99	1.00	1.00	1.00	1.00
BE	0.44	0.50	0.77	0.75	0.87	0.90	0.98	0.99	0.99	1.00	1.00	1.00	1.00
IT	0.19	0.23	0.50	0.56	0.67	0.72	0.93	0.96	0.96	0.99	1.00	1.00	1.00
AT	0.22	0.25	0.44	0.50	0.56	0.60	0.81	0.84	0.85	0.93	0.93	0.97	0.98
NL	0.11	0.13	0.33	0.44	0.50	0.56	0.84	0.89	0.90	0.97	0.98	1.00	1.00
DK	0.08	0.10	0.28	0.40	0.44	0.50	0.81	0.85	0.87	0.96	0.97	1.00	1.00
SW	**0.01**	**0.02**	0.07	0.19	0.16	0.19	0.50	0.54	0.60	0.79	0.81	0.94	0.95
FR	**0.01**	**0.01**	**0.04**	0.16	0.11	0.15	0.46	0.50	0.58	0.79	0.81	0.96	0.96
CH	**0.01**	**0.01**	**0.04**	0.15	0.10	0.13	0.40	0.42	0.50	0.69	0.71	0.88	0.89
ES	**0.00**	**0.00**	**0.01**	0.07	**0.03**	**0.04**	0.21	0.21	0.31	0.50	0.52	0.78	0.81
PL	**0.00**	**0.00**	**0.00**	0.07	**0.02**	**0.03**	0.19	0.19	0.29	0.48	0.50	0.78	0.81
GR	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	0.06	**0.04**	0.12	0.22	0.22	0.50	0.59
CZ	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.05**	**0.04**	0.11	0.19	0.19	0.41	0.50

Table H.5 – Unilateral tests of superiority of countries in column on countries in row, according to SOP index in Barry scenario (p-value)

	CZ	GR	ES	FR	AT	PL	SW	DK	DE	IT	CH	NL	BE
CZ	0.50	0.75	0.78	0.90	0.90	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
GR	0.25	0.50	0.56	0.73	0.76	0.90	0.92	0.98	1.00	1.00	0.99	1.00	1.00
ES	0.22	0.44	0.50	0.67	0.71	0.87	0.89	0.97	0.99	1.00	0.98	1.00	1.00
FR	0.10	0.27	0.33	0.50	0.57	0.78	0.82	0.93	0.99	0.99	0.97	1.00	1.00
AT	0.10	0.24	0.29	0.43	0.50	0.72	0.75	0.88	0.96	0.98	0.94	1.00	1.00
PL	**0.03**	0.10	0.13	0.22	0.28	0.50	0.55	0.69	0.86	0.90	0.85	0.97	0.99
SW	**0.03**	0.08	0.11	0.18	0.25	0.45	0.50	0.64	0.82	0.87	0.82	0.96	0.98
DK	**0.00**	**0.02**	**0.03**	0.07	0.12	0.31	0.36	0.50	0.74	0.81	0.76	0.95	0.98
DE	**0.00**	**0.00**	**0.01**	**0.01**	**0.04**	0.14	0.18	0.26	0.50	0.59	0.60	0.85	0.93
IT	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	0.10	0.13	0.19	0.41	0.50	0.54	0.80	0.89
CH	**0.00**	**0.01**	**0.02**	**0.03**	0.06	0.15	0.18	0.24	0.40	0.46	0.50	0.69	0.77
NL	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.04**	**0.05**	0.15	0.20	0.31	0.50	0.61
BE	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.02**	0.07	0.11	0.23	0.39	0.50

Table H.6 – Unilateral tests of superiority of countries in column on countries in row, according to SOP index in Roemer scenario (p-value)

	CZ	GR	ES	AT	FR	PL	DK	SW	DE	IT	CH	NL	BE
CZ	0.50	0.72	0.75	0.91	0.93	0.96	1.00	0.99	1.00	1.00	1.00	1.00	1.00
GR	0.28	0.50	0.55	0.80	0.83	0.90	0.99	0.97	1.00	1.00	1.00	1.00	1.00
ES	0.25	0.45	0.50	0.75	0.78	0.87	0.98	0.96	1.00	1.00	1.00	1.00	1.00
AT	0.09	0.20	0.25	0.50	0.51	0.68	0.89	0.86	0.97	0.98	0.98	1.00	1.00
FR	0.07	0.17	0.22	0.49	0.50	0.68	0.91	0.87	0.98	0.99	0.98	1.00	1.00
PL	**0.04**	0.10	0.13	0.32	0.32	0.50	0.75	0.72	0.90	0.93	0.94	0.98	0.99
DK	**0.00**	**0.01**	**0.02**	0.11	0.09	0.25	0.50	0.51	0.75	0.82	0.86	0.95	0.98
SW	**0.01**	**0.03**	**0.04**	0.14	0.13	0.28	0.49	0.50	0.71	0.77	0.84	0.92	0.96
DE	**0.00**	**0.00**	**0.00**	**0.03**	**0.02**	0.10	0.25	0.29	0.50	0.59	0.73	0.86	0.93
IT	**0.00**	**0.00**	**0.00**	**0.02**	**0.01**	0.07	0.18	0.23	0.41	0.50	0.68	0.81	0.90
CH	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	0.06	0.14	0.16	0.27	0.32	0.50	0.57	0.66
NL	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.05**	0.08	0.14	0.19	0.43	0.50	0.62
BE	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.04**	0.07	0.10	0.34	0.38	0.50

Table H.7 – Unilateral tests of superiority of countries in column on countries in row, according to $Diff^{R-B}$ (p-value)

	BE	NL	IT	DE	PL	DK	SP	AT	GR	FR	CZ	CH	SW
BE	0.50	0.57	0.75	0.81	0.80	0.88	0.96	0.94	0.98	1.00	1.00	0.99	0.99
NL	0.43	0.50	0.68	0.74	0.74	0.82	0.94	0.91	0.96	0.99	0.99	0.98	0.99
IT	0.25	0.32	0.50	0.57	0.58	0.68	0.86	0.83	0.91	0.97	0.98	0.95	0.97
DE	0.19	0.26	0.43	0.50	0.51	0.60	0.81	0.78	0.86	0.96	0.96	0.94	0.96
PL	0.20	0.26	0.42	0.49	0.50	0.59	0.79	0.76	0.84	0.94	0.94	0.92	0.95
DK	0.12	0.18	0.32	0.40	0.41	0.50	0.75	0.72	0.81	0.94	0.95	0.92	0.95
SP	**0.04**	0.06	0.14	0.19	0.21	0.25	0.50	0.51	0.59	0.83	0.85	0.83	0.88
AT	0.06	0.09	0.17	0.22	0.24	0.28	0.49	0.50	0.56	0.76	0.77	0.79	0.83
GR	**0.02**	**0.04**	0.09	0.14	0.16	0.19	0.41	0.44	0.50	0.78	0.80	0.80	0.85
FR	**0.00**	**0.01**	**0.03**	**0.04**	0.06	0.06	0.17	0.24	0.22	0.50	0.51	0.65	0.68
CZ	**0.00**	**0.01**	**0.02**	**0.04**	0.06	**0.05**	0.15	0.23	0.20	0.49	0.50	0.64	0.68
CH	**0.01**	**0.02**	**0.05**	0.06	0.08	0.08	0.17	0.21	0.20	0.35	0.36	0.50	0.50
SW	**0.01**	**0.01**	**0.03**	**0.04**	**0.05**	**0.05**	0.12	0.17	0.15	0.32	0.32	0.50	0.50

Conclusion générale

Cette thèse, de nature empirique, a pour objet la mesure et la compréhension des inégalités des chances en santé, avec un intérêt spécifique pour la contribution des comportements liés à la santé. La thèse comporte quatre chapitres et s'articule autour de trois axes : (i) la mesure de l'importance respective des conditions de vie dans l'enfance, du niveau d'éducation et des comportements de santé dans l'explication des inégalités de santé, tout en prenant en compte l'interdépendance entre ces trois facteurs ; (ii) l'analyse des mécanismes en jeu dans la transmission intergénérationnelle des comportements de santé en prenant l'exemple du tabagisme et des habitudes de soins ; (iii) les différences entre pays au niveau européen dans la mesure des inégalités des chances en santé en considérant les deux points de vue normatifs concernant le statut de la corrélation entre efforts et circonstances.

Le premier chapitre explore les effets à long terme des conditions de vie dans l'enfance, de l'éducation et des comportements à risque. Pour cela, une méthodologie utilisant des données de panel a été proposée afin de prendre en compte l'hétérogénéité individuelle inobservée. Des équations auxiliaires ont aussi permis de dissocier les effets directs de l'éducation et du milieu d'origine des effets indirects passant par les comportements à risque. Ensuite, des méthodes de décomposition ont été mises en œuvre pour faire part de l'importance des différents facteurs en jeu que ce soit de façon directe ou indirecte. Cette étude utilise les données de la cohorte britannique National Child Development Study fournissant un suivi longitudinal depuis la naissance jusqu'à l'âge de 46 ans. Ce chapitre a permis de confirmer que les conditions de vie dans l'enfance contribuent de façon directe aux inégalités de santé et aussi de façon indirecte par la détermination du niveau d'éducation et par la transmission des comportements à risque. Elles représentent ainsi 20% de l'inégalité de santé observée quand les effets indirects sont identifiés. Il faut souligner que l'absence de père à la naissance et l'expérience de difficultés financières pendant l'enfance sont les facteurs les plus importants des effets directs sur la santé. Le niveau d'éducation et l'obésité à l'âge de 16 ans influencent la santé directement et indirectement à travers les comportements à risque. Les comportements à risque expliquent une part importante des inégalités de santé à l'âge adulte notamment par un effet à long terme sur la santé plutôt que par un effet transitoire. Leur contribution réduit de 32% à 25% quand les effets indirects des conditions dans l'enfance sont mesurés. On constate

aussi une importante contribution de la santé passée aux inégalités ce qui confirme la forte inertie de l'état de santé et suggère l'importance de l'utilisation de données de panel pour répondre à la question posée. Cette importance est aussi soulevée par la grande part d'hétérogénéité individuelle inobservée que permet de contrôler le modèle.

Le second chapitre étudie l'influence du milieu d'origine et du statut social sur le parcours tabagique. Les résultats confirment tout d'abord une association entre le tabagisme des parents et l'initiation tabagique déjà mise en évidence par d'autres études. Mais ils mettent également en évidence que le tabagisme des parents réduit les chances de cessation du tabagisme. Ce résultat va à l'appui de l'hypothèse d'une transmission des comportements entre générations même s'il peut aussi refléter l'existence d'une cause génétique commune favorisant les risques de dépendance. Les résultats révèlent ensuite une inversion du gradient social entre l'initiation et la cessation : alors que les enquêtés les plus éduqués et issus d'un milieu favorisé présentent un risque d'initiation plus élevé, ils ont plus de chances de connaitre une cessation précoce, tout comme les enquêtés ayant une situation sociale actuelle favorable. Les enfants d'agriculteurs ont enfin moins de risque de commencer à fumer et plus de chances de s'arrêter.

Le troisième chapitre prolonge l'analyse de la transmission entre générations des comportements de santé en s'intéressant aux habitudes de soins. Plus précisément, nous étudions l'influence des habitudes de soins des parents dans l'enfance des individus sur leurs habitudes de soins à l'âge adulte, ainsi que les différences induites en termes de consultation de médecin pour leurs propres enfants. L'étude est basée sur les répondants principaux de l'enquête Santé et Protection Sociale 2010 dans laquelle il a été introduit un module spécial concernant les conditions de vie et les habitudes de soins dans l'enfance. Les résultats montrent une transmission intergénérationnelle des habitudes de soins. D'une part, nous montrons une influence des habitudes de soins des parents dans l'enfance des individus sur les habitudes de soins des individus à l'âge adulte. D'autre part, nous mettons en évidence une influence des habitudes de soins dans l'enfance sur le recours au médecin à l'âge adulte pour ses propres enfants. Ces résultats sont robustes à différentes spécifications mais nous montrons néanmoins une réduction de la corrélation intergénérationnelle lorsque les

individus ont changé de région entre l'enfance et l'âge adulte ce qui suggère le caractère modérateur de l'environnement social.

Le quatrième chapitre s'intéresse aux différences entre pays au niveau européen dans la mesure des inégalités des chances en santé. Deux positions normatives concurrentes quant au traitement de la corrélation entre effort et circonstances défendues par Brian Barry et John Roemer sont proposées. L'analyse combine des analyses de régression aux mesures d'inégalités pour comparer les inégalités des chances en santé en Europe. Les analyses sont conduites à partir des données de l'enquête rétrospective SHARELIFE qui s'intéresse au parcours de vie des européens de 50 ans et plus. Les résultats montrent d'importants niveaux d'inégalités des chances en santé en Autriche, France, Espagne et Allemagne alors que la Suède, la Pologne, la Belgique, les Pays-Bas et la Suisse présentent des inégalités des chances plus faibles. La part des inégalités des chances en santé dans les inégalités de santé dues aux efforts et aux circonstances varie de 30% à 70% selon les pays et représente 50% au niveau européen. Le choix de la position normative concernant le traitement de la corrélation entre efforts et circonstances pour la mesure des inégalités des chances en santé n'a pas la même importance selon les pays. Elle est négligeable en Suisse et en Suède mais est plus particulièrement importante en Belgique et aux Pays-Bas où la prise en compte des effets indirects des circonstances sur les efforts augmente de 20% les inégalités des chances en santé. Ces résultats permettent de conclure que dans la plupart des pays, les inégalités des chances en santé sont principalement dues au milieu social d'origine qui affecte la santé à l'âge adulte directement, ce qui nécessiterait des politiques publiques compensant directement les faibles conditions initiales. D'autre part, nos résultats suggèrent un important déterminisme social et familial des comportements de santé en Belgique, aux Pays-Bas, en Italie, en Allemagne, en Pologne et au Danemark, ce qui accentue les inégalités des chances dans ces pays et appelle à des politiques plus ciblées.

Cette thèse montre l'existence d'importantes inégalités des chances en santé en France et dans la plupart des pays européens. Les résultats soulignent la contribution aux inégalités de santé des conditions de vie dans l'enfance et du niveau d'éducation de façon directe et de façon indirecte par les comportements de santé. Ils montrent l'importance de mettre en œuvre des politiques pour limiter la reproduction des inégalités face à la santé et suggèrent

la mise en place de politiques d'éducation à la santé en milieu scolaire. A ce titre, il faut souligner les récentes propositions de la stratégie nationale de santé qui donnent priorité à la promotion de la santé et à la prévention, notamment par des politiques d'éducation à la santé à l'école. Compte tenu de l'importance des effets directs de l'éducation et des conditions de vie dans l'enfance, ces politiques doivent néanmoins s'accompagner de mesures visant l'accès à l'éducation afin de limiter les phénomènes de reproduction sociale et plus globalement l'amélioration des conditions de vie.

Cette thèse sur la contribution des comportements à risque dans la formation des inégalités des chances en santé a ouvert des pistes de recherche que nous souhaitons approfondir.

Tout d'abord, pour mieux comprendre les mécanismes en jeu dans la formation des inégalités de santé, il apparaît important de fournir une analyse des inégalités de santé dans une approche au cours du cycle de vie. Une telle approche requiert de s'intéresser à la notion même d'inégalité en cycle de vie. En effet, deux perspectives possibles sont mises en évidence lorsque l'on veut réaliser cette mesure. La première consisterait à agréger les états de santé aux différents âges pour chaque individu avant de mesurer les inégalités entre individus (vision ex ante). La seconde consisterait à mesurer les inégalités de santé entre individus à chaque âge puis à agréger les inégalités aux différents âges (vision ex post). Le but de cette recherche est d'expliquer les différences conceptuelles entre les deux approches et de tester empiriquement les différences que l'on peut observer en termes de mesures des inégalités de cycle de vie. Il existe une différence éthique entre les deux approches. L'approche ex ante respecte la trajectoire de santé des individus ainsi que l'inter temporalité des choix individuels en matière de santé alors que l'approche ex post révèle des problèmes spécifiques aux différents âges.

D'autre part, l'analyse des parcours tabagiques rétrospectifs nécessite un approfondissement afin de mieux comprendre la diffusion du tabagisme entre groupes sociaux. A l'aide de données sur les histoires tabagiques recueillies dans les enquêtes Baromètres santé, nous proposons une analyse de la dynamique des inégalités dans la consommation de tabac au cours de la vie, c'est-à-dire de l'évolution de ces inégalités avec l'âge. La taille de l'échantillon nous permettra d'analyser l'évolution de cette dynamique avec

les générations ainsi que de mener des analyses séparément pour les hommes et les femmes, afin de rendre compte des disparités et des dynamiques différenciées selon le genre.

Enfin, nous souhaitons poursuivre les travaux sur la mesure des inégalités des chances en santé en France par une analyse des différences de mortalité suivant la catégorie socioprofessionnelle des parents en utilisant l'Echantillon Démographique Permanent. Les extraits de naissance (qui contiennent l'information sur les parents) ayant été collectés sur les individus nés à partir de 1968, nous pourrons tester l'hypothèse d'égalité des chances sur la mortalité prématurée en France. L'utilisation de l'information collectée lors des différents recensements permettra aussi de contrôler les analyses par le niveau d'éducation et la catégorie socioprofessionnelle de l'enquêté afin de tester l'hypothèse d'égalité des chances en mortalité en neutralisant l'effet de la reproduction sociale.

Références bibliographiques

Ahlburg, D. (1998). "Intergenerational Transmission of Health". *American Economic Review*, vol. 88, no. 2, pp. 265-270.

Akerlof, G.A. (1997). "Social Distance and Social Decisions", *Econometrica*, Econometric Society, vol. 65(5), pp. 1005-1028.

Albouy, V., Lequien, L. (2009). "Does compulsory education lower mortality?". *Journal of health economics*, *28*(1), 155-168.

Allonier, C., Dourgnon, P., Rochereau, T. (2008). "L'Enquête Santé Protection Sociale 2006, un panel pour l'analyse des politiques de santé, la santé publique et la recherche en économie de la santé", *Questions d'Économie de la Santé*, 131.

Anda, R. F., Whitfield, C. L., Felitti, V. J., Chapman, D., Edwards, V. j., Dube, S. R., & Williamson, D. F. (2002), "Adverse childhood experiences, alcoholic parents, and later risk of alcoholism and depression", *Psychiatric Services*, vol. 53, no. 8, pp. 1001-1009.

Arneson, R. J. (1989). "Equality and equal opportunity of welfare". *Philosophical Studies*, 56, 77-93.

Arulampalam, W., Stewart, M. B. (2009), "Simplified implementation of the Heckman estimator or the dynamic Probit model and a comparison with alternative estimators", *Oxford Bulletin of Economics and Statistics*, vol. 71, no. 5, pp. 659-681.

Bago d'Uva, T, Jones, A. (2009). "Health care utilisation in Europe: New evidence from the ECHP". *Journal of Health Economics* 28: 265–279.

Balia, S., Jones, A. (2008). "Mortality, lifestyles and socio-economic status", *Journal of Health Economics*, vol. 27, pp. 1-26.

Balia, S., Jones A. (2011). "Catching the Habit: A Study of Inequality of Opportunity in Smoking-Related Mortality", *Journal of the Royal Statistical Society Series A*, 174 (1) : 175-194.

Barker, D.J.P. (1995). "Fetal origins of coronary heart disease", *British Medical Journal*, 311, 6998 : 171-174.

Barry, B. (2005). *Why Social Justice Matters*. Cambridge: Polity Press.

Baška, T., Warren, C.W., Hudečková, H., Ochaba, R., Sťastný, P., Lea, V., Lee, J. (2010). "The Role of Family Background on Cigarette Smoking Among Adolescent School

Children in Slovakia: Findings from the 2007 Slovakia Global Youth Tobacco Survey", *International Journal of Public Health*, 55 (6) : 591-7.

Becker, G., Mulligan, C. (1997). "The endogenous determination of time preference". *Quarterly Journal of Economics*, 112, 729-758.

Bernt Karlson, K., Holm, A. (2011). "Decomposing primary and secondary effects: a new decomposition method", *Research in Social Stratification and Mobility*, vol. 29, pp. 221-237.

Bernt Karlson, K., Holm, A., Breen, R. (2012). "Comparing Regression Coefficients Between Same-Sample Nested Models using Logit and Probit: A New Method", *Sociological Methodology*, vol. 42.

Bisin, A., Verdier, T., (2001). "The Economics of Cultural Transmission and the Evolution of Preferences", *Journal of Economic Theory*, 97(1), pp.298-319.

Black Report (1980). *Inequalities in Health: Report of a Research Working Group*, London Department of Health and Social Security.

Blanpain, N., Chardon, O. (2011). Les inégalités sociales face à la mort. *Tables de mortalité par catégorie sociale et indices standardisés de mortalité pour quatre périodes (1976–1984, 1983–1991, 1991–1999, 2000–2008). INSEE, Direction des statistiques démographiques et sociales*.

Börsch-Supan, A., Brugiavini, A., Jürges, H., Mackenbach, J.P., Siegrist, J., Weber, G. (2005). *Health, ageing and retirement in Europe - First results from the Survey of Health, Ageing and Retirement in Europe*. Mannheim: Mannheim Research Institute for the Economics of Aging (MEA).

Braakmann, N. (2011). "The Causal Relationship Between Education, Health and Health Related Behaviour: Evidence from a Natural Experiment in England", *Journal of Health Economics*, 30 (4) : 753-763.

Breslow, N. (1974). "Covariance Analysis of Censored Survival Data", *Biometrics*, 30 : 89-99.

Bricard, D., Jusot, F., Tubeuf, S. (2010). "Lifestyles: a channel of intergenerational transmission of health inequalities ? ", *Issues in Health Economics*, 154.

Bricard, D., Jusot, F., Tubeuf, S. (2011). "L'influence à long terme du milieu social d'origine et du tabagisme des parents sur le tabagisme en France : les résultats de l'enquête Santé et protection sociale 2006", *Bulletin Epidémiologique Hebdomadaire*, Numéro thématique – Inégalités sociales de santé, 8-9 : 96-98.

Bricard, D., Jusot, F. (2012). "Milieu d'origine, situation sociale et parcours tabagique en France", *Économie publique/Public economics*, 28-29 - 2012/1-2 : 169-195.

Bricard, D., Jusot, F., Trannoy, A., Tubeuf, S. (2013). "Inequality of opportunity in health and the principle of natural reward: evidence from european countries", *Research on Economic Inequality*, à paraître.

Bricker, J.B., Leroux, B.G., Peterson, A.V. Jr, Kealey K.A., Sarason, I.G., Andersen, M.R., Marek, P.M. (2003). "Nine-Year Prospective Relationship Between Parental Smoking Cessation and Children's Daily Smoking", *Addiction*, 98 (5) : 585-93.

Cambois, E., Jusot, F. (2011). "Contribution of Lifelong Adverse Experiences to Social Health Inequalities: Findings from a Population Survey in France", *European Journal of Public Health*, , 21, 5 : 667-673.

Case, A., Katz, L. (1991), "The company you keep: the effects of family and neighborhood on disadvantaged youths", *NBER Working Paper*.

Case, A., Deaton, A. S. (2005). Broken down by work and sex: How our health declines. In *Analyses in the Economics of Aging* (pp. 185-212). University of Chicago Press.

Case, A., Fertig, A., & Paxson, C. (2005), "The lasting impact of childhood health and circumstance", *Journal of Health Economics*, vol. 24, pp. 365-389.

Clark, AE., Etile, F. (2006), "Don't give up on me baby: Spousal correlation in smoking behaviour", *Journal of Health Economics*, Elsevier, vol. 25(5), pages 958-978, September.

Clark, AE., Loheac, Y. (2007). ""It wasn't me, it was them!" Social influence in risky behavior by adolescents", *Journal of Health Economics*, Elsevier, vol. 26(4), pages 763-784, July.

Clark, D., Royer, H. (2010). "The effect of education on adult health and mortality: Evidence from Britain" (No. w16013). National Bureau of Economic Research.

Cohen, G.A. (1989). On the Currency of Egalitarian Justice. *Ethics*, 99, 906-944.

Conti, G., Heckman, J., Urzua, S. (2010). "The education-health gradient". *The American Economic Review*, *100*(2), 234-238.

Contoyannis, P., Jones, A. (2004), "Socio-economic status, health and lifestyle", *Journal of Health Economics*, vol. 23, pp. 965-995.

Costa-Font, J., Miladovsky, P. (2008), "Social capital and the social formation of health-related preferences and behaviours", *Health Economics, Policy and Law*, 3, 04: 413 - 427.

Cox, D.R. (1972). "Regression Models and Life Tables" (with discussions), *Journal of the Royal Statistical Society*, B, 34: 187-220.

Crimmins, E., Cambois, E. (2003). Social inequalities in health expectancy. In J.-M. Robine, C. Jagger, C., Mathers, E., Crimmins, & R., Suzman (Eds.), *Determining Health Expectancies*, pp. 111-126. Chichester.

Currie, J., Stabile, M. (2003). "Socioeconomic status and child health: why is the relationship stronger for older children", *American Economic Review*, vol. 93, no. 1813, p. 1823.

Cutler, D. M., Deaton, A., Lleras-Muney, A. (2006). "The determinants of mortality", *Journal of Economic Perspectives*, vol. 20, no. 3, pp. 97-120.

Cutler, D., Lleras-Muney, A. (2008). "Education and Health: Evaluating Theories and Evidence", in Schroeni R.F., House J.S., Kaplan G.A., Pollack H. (Eds.), *Making Americans healthier: Social and Economic Policy as Health Policy*, New York : Russell Sage Foundation : 29-60.

Cutler, D., Lleras-Muney, A. (2010). "Understanding Differences in Health Behaviors by Education", *Journal of Health Economics*, 29 (1) : 1-28.

Deaton, A. S., Paxson, C. H. (1998). Aging and inequality in income and health. *The American Economic Review*, *88*(2), 248-253.

Devaux, M., M. de Looper (2012), "Income-Related Inequalities in Health Service Utilisation in 19 OECD Countries, 2008-2009", *OECD Health Working Papers*, No. 58.

De Walque, D. (2007), "Does education affect smoking behaviors? Evidence using the Vietnam draft as an instrument for college education", *Journal of Health Economics*, vol. 26, no. 5, pp. 877-895.

Dohmen, T., Falk, A., Huffman, D., & Sunde, U. (2012). "The intergenerational transmission of risk and trust attitudes". *The Review of Economic Studies*, *79*(2), 645-677.

Dworkin, R. (1981), "What is equality ? Part I: Equality of Welfare", *Philosophy and Public Affairs*, vol. 10, pp. 185-246.

Etilé, F. (2007), "Social norms, ideal body weight and food attitudes", *Health Economics*, 16, 945-966.

Etilé, F. (2007). « Modes de vie et santé des jeunes ». In Cohen D. (Eds.), *Une jeunesse difficile. Portrait économique et social de la jeunesse française*, Editions Rue d'Ulm/Presses de l'Ecole Normale Supérieure. Paris.

Etilé, F., Jones, A. (2011). "Schooling and Smoking Among the Baby-Boomers: An Evaluation of the Impact of Educational Expansion in France", *Journal of Health Economics*, 30 (4) :811-31.

Fisher, P., Ward, A. (1994). "Complementary medicine in Europe". *BMJ: British Medical Journal*, *309*(6947), 107.

Fleurbaey, M. (1995). Equality and responsability. *European Economic Review*, 39, 683-689.

Fleurbaey, M. (2006). Health, Equity, and Social Welfare. *Annales d'Économie et de Statistique*, 83/84, 21-59.

Fleurbaey, M. (2008). *Fairness, Responsibility, and Welfare*. Oxford University Press. Oxford.

Fleurbaey, M., Schokkaert, E. (2009). "Unfair inequalities in health and health care". *Journal of Health Economics*, 28, 1, 73-90.

Fleurbaey, M, Schokkaert, E. (2011). "Equity in health and health care", in M.Pauly, T. McGuire and P. Pita-Barros (eds) *Handbook of Health Economics*, vol. 2, North-Holland.

Folland, S. (2008). "An economic model of social capital and health", *Health Economics, Policy and Law*, 3, 04 : 333 – 348.

Forster, M., Jones, A.M. (2001). "The Role of Tobacco Taxes in Starting and Quitting Smoking: Duration Analysis of British Data". *Journal of the Royal Statistical Society Series A*, 164 (3) : 1–31.

Francesconi, M., Jenkins, S. P., Siedler, T. (2010). "The effect of lone motherhood on the smoking behavior of young adults", *Health Economics*, vol. 19, no. 11, pp. 1377-1384.

Frisvold, D., Golberstein, E. (2011). "School Quality and the Education–Health Relationship: Evidence from Blacks in Segregated Schools", *Journal of Health Economics*, 30 (6) : 1232-45.

Galama, T., Van Kippersluis, H. (2010). "A theory of socioeconomic disparities in health over the life cycle". *RAND Working Paper No.* WR-773.

Galama, T. J., Van Kippersluis, H. (2013). *Health Inequalities through the Lens of Health Capital Theory: Issues, Solutions, and Future Directions* (No. 13-076/V). Tinbergen Institute.

Garcia Gomez, P., Schokkaert, E., Van Ourti, T., Bago d'Uva, T. (2012). "Inequity in the face of death", *CORE Discussion Paper*, 2012/24.

Gohlmann, S., Schmidt, C. m., & Tauchmann, H. (2010). "Smoking initiation in Germany: the role of intergenerational transmission", *Health Economics*, vol. 19, no. 2, pp. 227-242.

Grignon, M. (2009). "An Empirical Investigation of Heterogeneity in Time Preferences and Smoking Behaviours", *Journal of Socio-Economics*, 38 (5) : 739-751.

Grimard, F., Parent, D. (2007). "Education and smoking: were Vietnam war draft avoiders also more likely to avoid smoking?", *Journal of Health Economics*, vol. 26, no. 5, pp. 896-926.

Grossman, M. (1972). "On the concept of health capital and the demand for health". *The Journal of Political Economy*, *80*(2), 223-255.

Grossman, M. (2000). "The Human Capital Model", in Culyer A.J., Newhouse J.P. (eds), *Handbooks of Health Economics*, Elsevier: 348-408.

Grossman, M. (2006). "Education and nonmarket outcomes," in *Handbook of the Economics of Education - vol 2*, Elsevier edn, E. A. Hanushek & F. Welch, eds., pp. 577-633.

Hakkinen, U., Jarvelin, M.-R., Rosenqvist, G., Laitinen, J. (2006). "Health, schooling and lifestyle among young adults in Finland", *Health Economics*, vol. 15, no. 11, pp. 1201-1216.

Heckman, J. J. (1981). "The incidental parameter problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process," in *Structural Analysis of Discrete Data with Econometric Applications*, Cambridge: the MIT Press edn, C. F. Manski & D. L. McFadden, eds., pp. 179-195.

Hernandez-Quevedo, C., Jones, A., Lopez, A. N., Rice, N. (2007). "Socio-economic inequalities in health: a comparative longitudinal analysis using the European Community Household Panel". *Social Science and Medicine*, 63, 1246-1262.

d'Hombres, B., Rocco, L., Suhrcke, M., & McKee, M. (2010). "Does social capital determine health? Evidence from eight transition countries". *Health Economics*, 19(1), 56-74.

Hyde M., Jakub H., Melchior M., van Oort F., Weyers S. (2006). "Comparison of the effects of low childhood socioeconomic position and low adulthood socioeconomic position on self-rated health in four European countries", *Journal of Epidemiology and Community Health*, 60 : 882-886.

Idler, E. L. & Benyamini, Y. (1997). "Self-rated health and mortality: a review of twenty-seven community studies", *Journal of Health and Social Behaviour*, vol. 38, no. March, pp. 21-37.

Insee. (2011). *Tableaux de l'économie française*, Edition 2011, Paris : Insee.

Islam, M.K. (2007). "Essays on Social Capital, Health and Socio-economic Inequalities in Health", Lund University Eds.

Iversen, T. (2008). "An exploratory study of associations between social capital and self-assessed health in Norway?", *Health Economics, Policy and Law*, 3, 04 : 349 - 364.

Jacobson, L., (2000). "The family as producer of health—an extended Grossman model". *Journal of Health Economics* 19, 611–637.

Jefferis, B.J.M.H., Power, C., Graham, H., Manor, O. (2004). "Effects of Childhood Socioeconomic Circumstances on Persistent Smoking", *American Journal of Public Health*, 94 (2) : 279-285.

Jenkins, S. P. (1995). "Easy estimation methods for discrete-time duration models". *Oxford bulletin of economics and statistics*, *57*(1), 129-136.

Jürges, H. (2007). "True health vs response styles: exploring cross-country differences in self-reported health". *Health Economics*, 16, 2, 163-178.

Jusot F., Grignon M., Dourgnon P. (2008). "Access to psycho-social resources and health: exploratory findings from a survey of the French population", *Health Economics, Policy and Law*, 3: 365-391.

Jusot F., Khlat M., Rochereau T., Sermet C. (2008). "Job Loss from Ill-Health, Smoking and Obesity: Concurrent Evidence for Direct and Indirect Selection", *Journal of Epidemiology and Community Health*, 62 (4) : 332-337.

Jusot, F., Tubeuf, S., Trannoy, A. (2009). "Tel père, tel fils : l'influence de l'origine sociale et familiale sur la santé des descendants en Europe". *Retraite et Société*, 58, 2, 63-85.

Jusot, F., Tubeuf, S., & Trannoy, A. (2010). "Effort or circumstances: does the correlation matter for inequality of opportunity in health", *Working Paper IRDES*, vol. DT33.

Jusot, F., Tubeuf, S., Trannoy, A. (2010). "Inequality of Opportunities in Health in Europe: Why So Much Difference Across Countries?" *HEDG Working Paper*, 10/26.

Jusot F., Or Z., Sirven N. (2012). "Variations in Preventive care utilisation in Europe", *European Journal of Ageing*, 9, 1 : 15-25.

Jusot, F., & Khlat, M. (2013). The role of time and risk preferences in smoking inequalities: A population-based study. *Addictive behaviors*.

Jusot, F., Tubeuf, S., Trannoy, A. (2013). "Circumstances and Efforts: How important is their correlation for the measurement of inequality of opportunity in health?", *Health Economics*, DOI: 10.1002/hec.2896.

Kim, D., Subramanian, S. V., & Kawachi, I. (2008). Social capital and physical health. *Social capital and health*, 139-190.

Kemptner, D., Jürges, H., & Reinhold, S. (2011). "Changes in compulsory schooling and the causal effect of education on health: Evidence from Germany", *Journal of Health Economics*, vol. 30, no. 2, pp. 340-354.

Kenkel, D. S. (1991). "Health behavior, health knowledge, and schooling", *The Journal of Political Economy*, vol. 99, no. 2, pp. 287-305.

Kenkel, D.S., Lillard, D.R., Mathios, A.D. (2004). "Accounting for Misclassification Error in Retrospective Smoking Data", *Health Economics* 13 (10) : 1031–1044.

Khang, Y.-H., Lynch, J., Yang, S., Harper, S., Yun, S.-C., Jung-Choi, K., Kim, H. R. (2009). "The contribution of material, psychosocial, and behavioral factors in explaining educational and occupational mortality inequalities in a nationally representative sample of South Koreans: relative and absolute perspectives", *Social Science and Medicine*, vol. 68, no. 5, pp. 858-866.

Khaw, K. T., Wareham, N., Bingham, S., Welch, A., Luben, R., Day, N. (2008). Combined impact of health behaviours and mortality in men and women: the EPIC-Norfolk prospective population study. *PLoS medicine*, *5*(1), e12.

Kjellsson, G., Gerdtham, U. G., Lyttkens, C. H. (2011). "Breaking bad habits by education - smoking dynamics among Swedish women", *Health Economics*, vol. 20, no. 7, pp. 876-881.

Kohler, U., Bernt Karlson, K., Holm, A. (2011). "Comparing coefficients of nested nonlinear probability models", *The Stata Journal*, vol. 11, no. 3, pp. 420-438.

Koivusilta, L. K., Rimpelä, A., Rimpelä, M. K. (1999), "Health-related lifestyle in adolescence-origin of social class differences in health?", *Health Education Research*, vol. 14, no. 3, pp. 339-355.

Kuh, D., Ben-Shlomo, Y., Lynch, J., Hallqvist, J., Power, C. (2003). "Life course epidemiology", *Journal of Epidemiology and Community Health*, vol. 57, no. 10, pp. 778-783.

Laaksonen, M., Talala, K., Martelin, T., Rahkonen, O., Roos, E., Helakorpi, S., Laatikainen, T., Prattala, R. (2008). "Health behaviours as explanations for education level

differences in cardiovascular and all-cause mortality: a follow-up of 60,000 men and women over 23 years", *European Journal of Public Health*, vol. 18, no. 1, pp. 38-43.

Lahti-Koski, M., Gill, T. (2004). "Defining Childhood Obesity," in *Obesity in Childhood and Adolescence*, W. Kiess, C. Marcus, & M. Wabitsch, eds., pp. 1-19.

Laitinen, J., Power, C., Järvelin, M.-R. (2001). "Family social class, maternal body mass index, childhood body mass index, and age at menarche as predictors of adult obesity", *American Journal of Clinical Nutrition*, vol. 74, no. 3, pp. 287-294.

Lantz, P., Golberstein, E., House, J. S., Morenoff, J. (2010). "Socioeconomic and behavioral risk factors for mortality in a national 19-year prospective study of US adults", *Social Science and Medicine*, vol. 70, no. 10, pp. 1558-1566.

Laporte, A., Nauenberg, E., Shen, L. (2008). "Aging, social capital, and health care utilization in Canada", *Health Economics, Policy and Law*, 3 ,04: 393 – 411.

Lefranc, A., Pistolesi, N., Trannoy, A. (2008). "Inequality of opportunities vs inequality of outcomes: Are Western Societies all alike?" *Review of Income and Wealth*, 54, 4, 513-46.

Lefranc, A., Pistolesi, N., Trannoy, A. (2009). "Equality of opportunity and luck: Definitions and testable conditions, with an application to income in France". *Journal of Public Economics*, 93, 11-12 , 1189-1208.

Legleye, S., Khlat, M., Beck, F., Peretti-Watel, P. (2011), "Widening Inequalities in Smoking Initiation and Cessation Patterns: A Cohort and Gender Analysis in France", *Drug and Alcohol Dependence*, 117 (2-3) : 233-241.

Lindeboom, M., Llena-Nozal, A., van der Klauuw, B. (2009), "Parental education and child health: evidence from a schooling reform", *Journal of Health Economics*, vol. 28, no. 1, pp. 109-131.

Lleras-Muney, A. (2005). "The relationship between education and adult mortality in the United States". *The Review of Economic Studies*, *72*(1), 189-221.

Mackenbach, J.P., Stirbu, I., Roskam, A.J.R., Schaap, M.M., Menvielle, G., Leinsalu, M., Kunst, A.E., The European Union Working Group on Socioeconomic Inequalities in

Health. (2008). "Socioeconomic Inequalities in Health in 22 European Countries", *The New England Journal of Medicine*, 358 (23) : 2468-2481.

Mackenbach, J. P., Meerding, W. J., & Kunst, A. E. (2011). Economic costs of health inequalities in the European Union. *Journal of Epidemiology and Community Health*, *65*(5), 412-419.

Mackenbach, J. (2011). "What Would Happen to Health Inequalities if Smoking were Eliminated", *British Medical Journal*; 342:d3460.

Manski, CF. (2000). "Economic analysis of social interactions". *Journal of Economic Perspectives* 14, 3 : 115–136.

Marmot, M., Shipley, M. J., Brunner, E. G., & Hemingway, H. (2001). "Relative contributions of early-life and adult socioeconomic factors to adult morbidity in the Whitehall II study", *Journal of Epidemiology and Community Health*, vol. 55, no. 5, pp. 301-307.

Marmot, M., Wilkinson, R. (Eds.). (2009). *Social determinants of health*. Oxford University Press.

Marmot, M., Friel, S., Bell, R., Houweling, T., Taylor, S., & the Commission on Social Determinants of Health (2008). Closing the gap in a generation: health equity through action on the social determinants of health. *The Lancet*, 372, 1661-1669.

Masseria, C., Mossalios, E., Allin, S. (2006). "Measurement of socioeconomic inequality of health in 10 European countries: an exploratory analysis of SHARE using three approaches". *European Commission - Research Note*, LSE.

McKelvey, R. D. & Zavoina, W. (1975). "A statistical model for the analysis of ordinal level dependent variable", *Journal of Mathematical Sociology*, vol. 4, pp. 103-120.

Melchior, M., Berkman, L.F., Kawachi, I., Krieger, N., Zins, M., Bonenfant, S. (2006a). "Lifelong socioeconomic trajectory and premature mortality (35-65 years) in France: findings from the GAZEL Cohort Study", *Journal of Epidemiology and Community Health*, 60 : 937-944.

Melchior, M., Lert, F., Martin, M., Ville, I. (2006b). "Socioeconomic position in childhood and in adulthood and functional limitations in midlife: data from a nationally-

representative survey of French men and women", *Social Science and Medicine*, 63, 11 : 2813-2824.

Menvielle, G., Boshuizen, H., Kunst, A. E., Dalton, S., Vineis, P., Bergmann, M., Silke, H., Ferrari, P., Raaschou-Nielsen, O., Tjonneland, A., Kaaks, r., & et al. 2009, "The role of smoking and diet in explaining educational inequalities in lung cancer incidence", *Journal of the National Cancer Institute*, vol. 101, no. 5, pp. 321-330.

Miranda, A. (2007). "Dynamic probit models for panel data: A comparison of three methods of estimation". United Kingdom Stata Users' Group Meetings 2007 11.

Mokdad, A. H., Marks, J. S., Stroup, D. F., Gerberding, J. L. (2004). "Actual causes of death in the United States, 2000". *JAMA: the journal of the American Medical Association*, *291*(10), 1238-1245.

Moser, K., Li, L., & Power, C. (2003). "Social inequalities in low birth weight in England and Wales: trends and implications for future population health", *Journal of Epidemiology and Community Health*, vol. 57, pp. 687-691.

Mundlak, Y. (1978). "On the pooling of time series and cross-section data", *Econometrica*, vol. 46, no. 1, pp. 69-85.

Murray, C. J. L., Gakidou, E. E., & Frenk, J. (1999). Critical Reflection-Health inequalities and social group differences: What should we measure?. *Bulletin of the World Health Organization*, *77*(7), 537-544.

NICE (2006). "Obesity guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children". *NICE clinical guideline 43*.

Or, Z., Jusot, F., Yilmaz, E., The European Union Working Group on Socioeconomic Inequalities in Health (2009). "Inégalités sociales de recours aux soins en Europe: Quel rôle pour le système de soins ?", *Revue Economique*, 60, 2 : 521-543.

Oreopoulos, P. (2006). "Estimating average and local average treatment effects of education when compulsory schooling laws really matter", *American Economic Review*, vol. 96, no. 1, pp. 152-175.

Orme, C. (2001). "Two-step inference in dynamic non-linear panel data models", *Mimeo* no. Revision of Economics Discussion Paper 9633: "The initial conditions problem and two-step estimation in discrete panel data models".

Pampel, F.C. (2009). "Persistence of Educational Differences in Smoking", *Social Problems*, 56 (3) : 526-542.

Papke, L. E., Wooldridge, J. M. (1996). "Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates". *Journal of Applied Econometrics* 11(6):619-632.

Park, C., Kang, C. (2008). "Does education influence healthy lifestyles?", *Journal of Health Economics*, vol. 27, no. 6, pp. 1516-1531.

Peltzman, S. (2009). Mortality inequality. *The Journal of Economic Perspectives*, *23*(4), 175-190.

Peretti-Watel P., Constance J., Seror V., Beck F. (2009). "Cigarettes and Social Differentiation in France: Is Tobacco Use Increasingly Concentrated Among the Poor?", *Addiction*, 104 (10) : 1718-1728.

Power, C., Matthews, S., Manor, O. (1998). "Inequalities in self-rated health: explanations from different stages of life", *The Lancet*, 351, 9108 : 1009-1014.

Raynaud, D. (2002). "Les déterminants individuels des dépenses de santé: Les dépenses de santé". *Dossiers solidarité et santé*, (1), 29-58.

Reinhold, S. & Jürges, H. (2010). "Secondary school fees and the causal effect of schooling on health behavior", *Health Economics*, vol. 19, no. 8, pp. 994-1001.

Ribet C., Zins M., Gueguen A. *et al.* (2003). "Occupational Mobility and Risk Factors in Working Men: Selection, Causality or Both? Results from the Gazel Study", *Journal of Epidemiology and Community Health*, 57 (11) : 901-906.

Roemer, J. 1998, *Equality of opportunity*, Harvard University Press edn, Cambridge.

Rosa-Dias, P., Jones, A. (2007). "Giving equality of opportunity a fair innings". *Health Economics*, 16, 109-112.

Rosa-Dias, P. (2009). "Inequality of Opportunities in Health: Evidence from a UK cohort study", *Health Economics*, vol. 18, no. 9, pp. 1057-1074.

Rosa-Dias, P. (2010). "Modelling opportunity in health under partial observability of circumstances". *Health Economics*; 19(3); 252-264.

Scheffler, R., Brown, T. (2008), "Social capital, economics, and health: new evidence", *Health Economics, Policy and Law*, 3, 04 : pp 321 – 331

Sen, A. K. (2002). "Why health equity?", *Health Economics*, 11, 659-666.

Senik, C. (2005), "What Can we Learn from Subjective Data ? The Case of Income and Well-Being*", Journal of Economic Surveys*, 2005, 19 (1), 43-63.

Shaw, M., Dorling, D., Davey Smith, G. (1999). "Poverty, Social Exclusion, and Minorities", in Marmot M., Wilkinson R.G. (Eds), *Social determinants of health*, Oxford: Oxford University Press : 211–39.

Shorrocks, A. (1982). "Inequality Decomposition by Factor Components", *Econometrica*, vol. 50, no. 1, pp. 193-211.

Silles, M. A. (2009). "The causal effect of education on health: Evidence from the United Kingdom", *Economics of Education Review*, vol. 28, no. 1, pp. 122-128.

Singh-Manoux, A., & Marmot, M. (2005). "Role of socialization in explaining social inequalities in health". *Social Science and Medicine*, 60, 2129–2133.

Sirven, N., Debrand, T. (2008), "Social Participation and Healthy Ageing: An international Comparison Using SHARE data", *Social Science & Medicine*, 67: 2017–2026.

Skalicka, V., van Lenthe, F., Bambra, C., Krokstad, S., & Mackenbach, J. P. (2009). "Material, psychological, behavioural and biomedical factors in the explanation of relative socio-economic inequalities in mortality: evidence from the HUNT study", *International Journal of Epidemiology*, vol. 38, no. 5, pp. 1272-1284.

Smith, J.P. (1999). "Healthy bodies and thick wallets", *Journal of Economic Perspectives*, 13(2): m145-166.

Smith, J.P. (2007). "The impact of socioeconomic status on health over the life course", *Journal of Human Resources*, 42(4): 739–764.

Staff, J., Patrick, M., Loken, E., & Maggs, J. (2008). "Teenage alcohol use and educational attainment", *Journal of Studies on Alcohol and Drugs* no. November, pp. 848-858.

Strand, B. H. & Tverdal, A. (2004). "Can cardiovascular risk factors and lifestyle explain the educational inequalities in mortality from ischaemic heart disease and from other heart diseases? 26 year follow up of 50 000 Norwegian men and women", *Journal of Epidemiology and Community Health*, vol. 58, no. 8, pp. 705-709.

Stringhini, S., Sabia, S., Shipley, M. J., Brunner, E. G., Nabi, H., Kivimaki, M., & Singh-Manoux, A. (2010). "Association of socioeconomic position with health behaviors and mortality", *The Journal of the American Medical Association*, vol. 303, no. 12, pp. 1159-1166.

Tenn, S., Herman, D.A., Wendling, B. (2011). "The Role of Education in the Production of Health: An Empirical Analysis of Smoking Behavior", *Journal of Health Economics*, 29(3) : 404-417.

Therneau, T.M., Grambsch, P.M. (2000). *Modeling Survival Data: Extending the Cox model*, New York: Springer.

Trannoy, A., Tubeuf, S., Jusot, F., Devaux, M. (2010), "Inequality of Opportunities in Health in France: A first pass", *Health Economics*, vol. 19, no. 8, pp. 921-938.

Tubeuf, S., Jusot, F. (2011). "Social health inequalities among older Europeans: the contribution of social and family background". *European Journal of Health Economics*, 12, 1, 61-77.

Tubeuf S., Jusot F., Bricard D. (2012). "Mediating Role of Education and Lifestyles in the Relationship between Early-Life Conditions and Health: Evidence from the 1958 British Cohort", *Health Economics*, 21, S1 : 129-150.

Van der Meer, J. B. W., Mackenbach, J. P. (1998). "Low education, high GP consultation rates: the effect of psychosocial factors". *Journal of psychosomatic research*, *44*(5), 587-597.

Van der Pol, M. (2011). "Health, Education and Time Preference", *Health Economics*, 20 (8) : 917–929.

Van Doorslaer, E., Koolman, X. (2004), "Explaining the differences in income-related health inequalities across European countries", *Health Economics*, vol. 13, no. 7, pp. 609-628.

Van Oort, F., van Lenthe, F., Mackenbach, J. P. (2005). "Material, psychosocial, and behavioural factors in the explanation of educational inequalities in mortality in the Netherlands", *Journal of Epidemiology and Community Health*, vol. 59, no. 3, pp. 214-220.

Van Ours, J. C. & Williams, J. (2009). "Why parents worry: initiation into cannabis use by youth and their educational attainment", *Journal of Health Economics*, vol. 28, no. 1, pp. 132-142.

Waldkirch, A., Ng, S., Cox, D. (2004). "Intergenerational Linkages in Consumption Behavior", *Journal of Human Resources*, University of Wisconsin Press, vol. 39(2).

Woodward, M., Oliphant, J., Lowe, G. Tunstall-Pedoe H. (2003). "Contribution of Contemporaneous Risk Factors to Social Inequality in Coronary Heart Disease and All Causes Mortality", *Preventive Medicine*, 36 (5) : 561-568.

Wooldridge, J. (2002) *Econometric Analysis of Cross Section and Panel Data*, MIT Press edn, Cambridge.

Working Party of the Royal College of Physicians UK 2001, *Alcohol - Can the NHS afford it? Recommendations for a coherent alcohol strategy for hospitals*, NHS edn, London.

Titre : Construction des inégalités des chances en santé à travers les modes de vie

Résumé:

Cette thèse porte sur la mesure et la compréhension des inégalités des chances en santé c'est-à-dire aux inégalités attribuables à des facteurs ne relevant pas de la responsabilité individuelle, tel que le milieu d'origine. Nous portons un intérêt spécifique à la contribution des comportements de santé dans la construction de ces inégalités. Nous développons notre analyse à travers trois axes : (i) la mesure de l'importance respective des conditions de vie dans l'enfance, du niveau d'éducation et des comportements de santé dans l'explication des inégalités de santé ; (ii) l'analyse des mécanismes en jeu dans la transmission intergénérationnelle des comportements de santé avec l'exemple du tabagisme et des habitudes de soins ; (iii) la mesure des différences entre pays européens dans les inégalités des chances en santé. Les analyses empiriques combinent des données prospectives d'une cohorte britannique ainsi que des données rétrospectives issues d'une enquête française et d'une enquête européenne. Les résultats soulignent la contribution aux inégalités de santé des conditions de vie dans l'enfance et du niveau d'éducation de façon directe et de façon indirecte par les comportements de santé.

Mots-clefs:

inégalités des chances ; inégalites de santé ; comportements de santé ; décomposition d'inégalité

Title : On the construct of inequality of opportunity in health through lifestyles

Abstract :

This thesis focuses on the measurement and the understanding of inequality of opportunity in health which are inequalities related to factors beyond the individual responsability, such as the individual's social background. We focus on the contribution of health-related behaviors in the construction of these inequalities. Our analysis is based on three topics: (i) the measure of the respective contribution of early-life conditions, education and lifestyles to health inequality ; (ii) the analysis of the intergenerational transmission of health-related behaviors with the example of smoking and health care habits ; (iii) the measure of cross-country differences in inequality of opportunity in health with a European perspective. Empirical analysis are conducted with both prospective data using a British cohort and retrospective data using a French study and a European study. The results emphasize the contribution of early-life conditions and education to health inequality both directly and indirectly through lifestyles.

Keywords:

inequality of opportunity ; health inequalities ; lifestyles ; inequality decomposition